BEYOND MATTER, WITHIN SPACE

Curatorial and Art Mediation Techniques on the Verge of Virtual Reality

Edited by Lívia Nolasco-Rózsás
with Marianne Schädler

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For Peter Weibel (1944–2023)

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A MESSAGE FROM THE GERMAN MINISTER OF STATE FOR CULTURE AND THE MEDIA

Peter Weibel, the longtime chairman of ZKM | Center for Art and Media Karlsruhe who passed away in March 2023 at the age of seventy-eight, was a fascinating pioneer of media art and a powerhouse of creativity. He once neatly summed up the task of art as "opening doors that no one sees are there." The international project "Beyond Matter. Cultural Heritage on the Verge of Virtual Reality" throws open the doors for the museum of the future, for art and for its mediation: How does digital technology influence our conception of space, and how does that affect the work of museums and the way art is shared with the public? How does digital transformation change our aesthetic experiences? Artists, researchers, and museum experts in Europe worked together for four years to answer these questions: from the Centre Pompidou in Paris to ZKM in Karlsruhe and the Ludwig Museum of Contemporary Art in Budapest; from Aalto University in Helsinki to Tallinn Art Hall in Estonia and tech companies in Germany.

Digital transformation is one of the major challenges of our time for culture and the media as well. This challenge demands creative minds and innovative approaches. It is in our common interest to make sure that museums can continue to accomplish their mission under rapidly changing conditions, both as institutions of art and culture, and as sites of social and democratic discourse.

This publication and the related project website are a valuable resource for everyone who has the task of expanding their digital offerings and providing museum services that meet current and future needs.

I am glad that the office of the Federal Government Commissioner for Culture and the Media was able to support the digital transformation of museums by contributing funding to the Beyond Matter project. I am grateful to Peter Weibel's dedicated team at the ZKM and to all those who participated in this project for their commitment, and I hope the readers of this volume will find it interesting and inspiring.

Claudia Roth
Member of the German Bundestag
Minister of State for Culture and the Media

Berlin, April 4, 2023

FOREWORD FROM ZKM|KARLSRUHE

Peter Weibel (1944–2023) spent more than twenty-four years shaping ZKM|Center for Art and Media Karlsruhe into an unparalleled institution of artistic and scientific research and exhibition practice. Through a never-ending stream of questions pertaining to the connections between art, philosophy, science, and technology, ZKM|Karlsruhe has cultivated an expertise in realizing projects for which there are no blueprints or safety nets. Beyond Matter has been exemplary of this tradition, setting out in an open field of questions, possibilities, and novel solutions for the accessible digital documentation and networked presentation of art and exhibitions.

Exhibitions have been the established medium for the presentation of art since the mid-nineteenth century. We are equally familiar with the exhibition catalog, which documents artistic production and translates it into the two-dimensionality of printed paper. What had been lacking was a transposition of the exhibition as a curated narrative into three-dimensional virtual space. Beyond Matter has bridged that gap. Galleries and other cultural institutions can benefit from its digital exhibition platforms developed as templates for making exhibitions freely available in the digital realm.

Beyond Matter is rooted in a long-standing cooperation between ZKM|Karlsruhe and the Centre Pompidou in Paris, and this was reflected not least in the traveling exhibition *Matter. Non-Matter. Anti-Matter. Past Exhibitions as Digital Experiences* (2021–23). The digital exhibition models were developed based on the two iconic exhibitions *Les Immatériaux* (Centre Pompidou, 1985) and *Iconoclash. Beyond the Image Wars in Science, Religion and Art* (ZKM|Karlsruhe, 2002).

This publication, *Beyond Matter, Within Space. Curatorial and Art Mediation Techniques on the Verge of Virtual Reality*, offers a wide variety of contributions that allow for comprehensive insight into the complexities, research processes, and solutions arising from endeavors to "transfer the essence and the curatorial concept of an exhibition into the digital space," as described by Lívia Nolasco-Rózsás, initiator and head of the project.

We would like to thank all staff members, partners, artists, scientists, and authors who have contributed to Beyond Matter as a collaborative European project. Special thanks are owed to the ZKM project team with Lívia Nolasco-Rózsás, Felix Koberstein, and Marianne Schädler.

We are grateful for the financial support provided by the Creative Europe Program of the European Union (EU) and the Federal Government Commissioner for Culture and the Media (BKM). We truly appreciate your trust in ZKM|Karlsruhe and its research.

Alistair Hudson
Scientific-artistic chairman of ZKM|Center for Art and Media Karlsruhe

Dr. Helga Huskamp
Managing director of ZKM|Center for Art and Media Karlsruhe

INTRODUCTION.
Beyond Matter. An Inquiry into the Modes of Exhibition Practices in the Virtual Condition

Lívia Nolasco-Rózsás

This publication documents the broad spectrum of initiatives that took place within the framework of the international, collaborative, practice-based research project "Beyond Matter. Cultural Heritage on the Verge of Virtual Reality." The book also gathers voices that contribute to the theoretical groundwork the project stands on, and thus unites various disciplines of the sciences and the arts—theories and practices with a keen interest in curation and art mediation in computer-generated and hybrid spaces and their impact on the spaces of the exhibition.

Beyond Matter engaged with a contemporary shift in the production and mediation of visual art within institutional frameworks that is largely attributable to the rapid development and ubiquitous presence and use of computation and information technology, specifically augmented and virtual reality but also artificial intelligence.

The shift is seismic and it is leading to a condition that may be summarized as "the virtual." If the postmodern condition was a "crisis of narratives," as Jean-François Lyotard put it,[1] then the virtual condition reveals a crisis of dichotomies. Its analysis suggests that dichotomies are losing their validity: presence and absence, physical and computer-generated, real and simulated. The algorithmically-generated increasingly dominates our reality, intertwines the physical with the virtual, and skews the linearity of time. This has extensive implications for the spatial aspects of the curation and mediation of visual arts, as well as their reception by a public whose affinity for technology is ever-increasing. The museum transmogrifies into a hybrid entity whose geographical location is extended by various digital platforms; instead of one there is an affluence of exhibition spaces, an extended but also porous system of multiple dimensions.

The creation of generative networked spaces to display art and produce knowledge is not a novelty: it has unfolded hand in hand with the development of computation's ability to visualize simulated or generated spaces that may or may not resemble our observable surroundings and the ways in which we perceive them.

This publication summarizes the various activities that have resulted from the practice-based research on the virtual condition undertaken by the Beyond Matter partner institutions. Through our common endeavor, the partners aimed to produce a "pool of tools"[2] and related knowledge to help arts practitioners, curators, and museum professionals understand the shift described above and then plan and use best practices. Putting an emphasis on the spatial aspects of art

1   See Jean-François Lyotard, *La condition postmoderne: rapport sur le savoir* (Paris: Éditions de Minuit, 1979).
2   The expression "pool of tools" was used by Peter Weibel in the context of the exhibition *Renaissance 3.0* (2023–24, ZKM|Karlsruhe).

production, curation, and mediation, the project included the digital revival of selected past landmark exhibitions, the curation of new art and archival exhibitions, conferences, artist residency programs, an online platform, and publications. These multiple actions were based on the virtual condition but also reflected on it.

Beyond Matter was led by ZKM|Center for Art and Media Karlsruhe, and the collaborators comprised of researchers and curators at: Aalto University, Espoo; Centre Georges Pompidou, Paris; Ludwig Múzeum – Kortárs Művészeti Múzeum (Ludwig Museum – Museum of Contemporary Art), Budapest; Tallinna Kunstihoone (Tallinn Art Hall); Tirana Art Lab – Center for Contemporary Art; and the associated partners EPFL Pavilions, Lausanne; HAWK – University of Applied Sciences and Arts, Hildesheim, GIM Gesellschaft für Innovative Marktforschung mbH, Heidelberg and Bio Design Lab at the HfG Karlsruhe. These are institutions of varied scales and profiles with a shared interest in the innovative use of digital technologies to reach non-local audiences, to expand their exhibition spaces digitally, and to create hybrid access to the content they wish to mediate. With this project they each tread upon new territory.

At the heart of Beyond Matter was an exploration of the potential harbored in computer-generated exhibition spaces. The key focus areas, examined through an array of approaches, were formed by notions of space and their meaning in the context of artistic and exhibition practice, as well as by perceptions of the reciprocal relationship between computer-generated virtual and physical spaces—and the immersive features in them—from the points of view of all actors of the constellation of an exhibition.[3] This exploration manifested variously throughout the projects, for example in the modeling of two historical exhibitions or through inviting artists to elaborate their take on the virtual from diverse angles.

In the context of art production and mediation, the word "virtual" often appears together with "reality." Virtual reality is predominantly understood as a term for computer-aided interactive and immersive environments accessed via screened images and in many cases additional devices (such as head-mounted displays). Dissecting the term "virtual reality," including its etymology, aids in understanding the condition brought about by the technological opportunity to create relatively sophisticated representations of anything we can perceive and calculate digitally. Indeed, deconstruction serves as a basis for constructing new terms, which in turn serves to contextualize art production and mediation. Donna Haraway came up with a seemingly deconstructive yet genuinely constructive method to evolve the abbreviation SF into versatile pairings of words.[4] Generally standing for science fiction, SF was subjected to a word game as Haraway formulated other terms that it could stand for, all of which relate in meaning to science fiction or offer an alternative to it, such as "speculative fabulation" and "string figures." Inspired by how all these new SF terms joined Haraway's arsenal of methodologies, we applied her formula to VR and found that it could stand for a variety of terms beyond virtual reality: viral radiation, valid readings, vaporous restoration, variable relations, visible revision, visionary ramblings, and many more. This publication takes these enfoldments of VR as an initial set of points to frame the Beyond Matter endeavor. Each chapter takes one enfoldment as its initial point and elaborates on the newly coined term through commissioned essays and descriptions of the outputs of the practice-based research conducted throughout the project, or, in the case of the last chapter, through interviews with the artists and scholars who participated in the Beyond Matter residency program.

While some of the essays discuss the subjects of inspiration and themes grounding the ambitions of the arts practitioners who contributed to the project, others analyze or directly relate to the project's results. Reflections on different facets of the work at ZKM|Karlsruhe

3   The term "constellation" is used here in the sense Beatrice von Bismarck used in *The Curatorial Condition* (Berlin: Sternberg Press, 2022).

4   See Donna Haraway, *SF: Speculative Fabulation and String Figures/SF: spekulative Fabulation und String-Figuren, So Far, 100 Notes – 100 Thoughts/100 Notizen – 100 Gedanken*, documenta (13) (Ostfildern: Hatje Cantz, 2011).

are also included in order to embed Beyond Matter within a historical trajectory and within the prospective future of the institution that most shaped it. These contributions are provided by authors of various disciplinary backgrounds: philosophy, sociology, art theory and history, curatorial studies, media theory, technoscience, and information technology. Most of the commissioned essayists represent a European tradition and walk along the continental path in philosophy, with a few refreshing exceptions which have different references. What unites these positions is a deliberate distantiation from Modernism on various levels, and shimmering through the essays are thus a prospective cosmotechnical future and a genuinely posthumanist approach.[5] The texts resonate with the outcomes of the project, which are documented here in the forms of illustrated descriptions of the research processes and the software and hardware developments, curatorial texts, interviews, summaries of evaluation measures, and reflections on the sociopolitical environments around the project. These texts incorporate the various concepts linked to the archival, curatorial, design, and research processes, as well as interviews with the Beyond Matter residency artists and other involved practitioners.

In addition to the thematic clustering, the structure of the publication follows a loosely chronological order and starts with the documentation of the first large-scale exhibition organized in the framework of Beyond Matter: *Spatial Affairs* took place in 2021, in the midst of the Covid-19 pandemic. The various waves of lockdowns made planning of public events, travel, and workflows challenging. Throughout this time art institutions largely relied on online formats. Spatial online art mediation formats had constituted the main focus of Beyond Matter before the pandemic-related lockdowns accelerated this process of digital expansion. *Spatial Affairs* had been conceived as a hybrid exhibition, while the *Tirana Floating Archive*, also presented in the book's first chapter, had been conceived as an online exhibition and curated archive, accessible via an app and a website.

Entitled "Viral Radiation" and including *Spatial Affairs* and the *Tirana Floating Archive*, the first chapter describes generated virtual spaces that "radiate" and mediate curated artistic knowledge and aesthetic components that are unbound from where their physical carrier is actually situated, or where their exhibition takes place. These spaces offer answers to queries about the significance of the space of the exhibition after the post-digital turn, and how art institutions can react to this paradigmatic shift. In an interview, Beatrice von Bismarck discusses these questions, and the relationship between the virtual and curatorial conditions. The chapter also presents Bogna Konior's ruminations on the already announced but not yet actualized *metaverse*, which may well belong to the future virtual condition of art institutions, as their exhibition halls expand to spaces on the "world wide virtual web." Spatial thinking was central to the exhibition *Spatial Affairs*, and Irmgard Emmelhainz discusses this aspect of the show, extending the discussion to two further exhibitions with which Beyond Matter engaged deeply: *Iconoclash. Beyond the Image Wars in Science, Religion and Art* (2002, ZKM|Karlsruhe, curated by Bruno Latour and Peter Weibel) and *Les Immatériaux* (1985, Centre Pompidou, curated by Jean-François Lyotard and Thierry Chaput). Emmelhainz elaborates on the notion of digital materiality to prospect and lay the groundwork for the chapters to come.

"Valid Readings" is the title of the second chapter, which documents the traveling exhibition *Matter. Non-Matter. Anti-Matter* with a specific focus on its extended iteration at

5   "I developed the concept of cosmotechnics to suggest that there is not one universal and homogenous technology, but rather that it is necessary to rediscover and articulate how there are multiple cosmotechnics historically and philosophically. I gave a preliminary definition to cosmotechnics as the unification of moral order and cosmic order through technical activities. However, this definition has to be further articulated, for example by specifying the moral and cosmic order to which we refer, and the process of unification." In: Yuk Hui, *Art and Cosmotechnics* (Minneapolis, MN: University of Minnesota Press, 2021), 41.

ZKM|Karlsruhe. Each presentation of this exhibition, varying in size and context, had the same element at its core: *The Immaterial Display*, a hardware installation developed to present digital exhibition spaces—also described in the chapter. The two digital exhibition models shown on the display engaged with *Iconoclash* and *Les Immatériaux*. Based on those two paradigmatic exhibitions, the exhibition and its accompanying program explored the possibilities of virtual exhibition histories, a topic taken up by two essays in the chapter: Sybille Krämer contemplates the simultaneity of the non-simultaneous enabled by digitality, and Siegfried Zielinski posits digital exhibition models as constituting an artificial memory practice. The exhibition title *Matter. Non-Matter. Anti-Matter* calls for reflections on the changing notion of materiality, and these are provided here by Christiane Paul, while Bernard Dionysius Geoghegan remembers seminars with Bruno Latour and Bernard Stiegler—and reflects on the pandemic—as he analyzes the digital affordances offered by installations such as *The Immaterial Display*.

After an outline of the framework and the hardware on which the digital exhibition models were presented in exhibition spaces, chapter three concentrates on the two models themselves. "Vaporous Restoration" denotes a non-physical and non-reconstructive approach aiming at the emulation, modeling, or proxy-creation of the two selected past spatial assemblies of artworks. These virtual exhibition models, created in the framework of Beyond Matter, are based on extensive archival research, interviews with experts and the curators, and an iterative design process among a large interdisciplinary group. The chosen exhibitions were well-known, complex, self-reflexive instantiations of the medium that outlined escape routes from modernity while elaborating on notions of representation and materiality. The digital models inevitably prompt the question of whether the aura of an artwork, or even of the entire exhibition, can be migrated into the digital realm. In their essays Elena Papadaki and Graham Harman reflect upon this, analyzing the notion of the virtual as well as the roots and current imaginations of virtual reality and the metaverse. Anna Longo and Kim West approach these subjects from different perspectives in their contributions. The authors concentrate on one or the other case study; Harman, for example, focuses on *Iconoclash*, while Amanda Beech looks at *Les Immatériaux*.

The tension between presence and absence and the digital dissolution of the dichotomy between the two form the focus of the fourth chapter, "Variable Relations," which connotes the multiplicity of connections between visitors, artworks, artifacts, scenographies, curatorial concepts, artists, scholars, museum professionals, objects, and subjects. These new relations across virtual and physical spaces give rise to an epistemological shift that manifests in the *Beyond Matter VIEW Platform*, in the virtual exhibition platform of Tallinn Art Hall, and in an online guided-tour tool realized for the online exhibition *Spatial Affairs. Worlding*. Corina L. Apostol relates the cinematic approach to exhibition documentation at Tallinn Art Hall, while a discussion between Annet Dekker, Marialaura Ghidini, and Gaia Tedone refers to the *Beyond Matter VIEW Platform*. The three curators also contextualize the latter within an unfinished history of online curatorial endeavors. Non-locality or the sense of presence while being absent is the topic of Elena Esposito's reflection. The technological possibilities that enable such variable relations between the actors that constitute exhibitions propel a revision of the boundaries of museum or exhibition space.

The fifth chapter, "Visible Revision," examines how the hybrid museum experience can be defined, and what can be expected in the exhibition space when intelligent "things" contribute to its constellation. It does this through a description of the "Hymex – Hybrid Museum Experience 2021" symposium, and through contributions by Yannick Hoffmann, Cecilia Preiß, and Daria Mille tracing perspectives that open up from within ZKM. The chapter also includes a manifesto-like text by Mauro Martino on the role of AI in the construction and negotiation of collective memory and cultural identity, as well as an insight into the inner procedures and the anatomy of the project through the analysis of the MA fellowship program and the preparations for the *Matter. Non-Matter. Anti-Matter* exhibition at ZKM. An examination of curatorial agency in digitally expanded exhibition spaces from an external perspective is provided by Kai-Uwe Hemken. The evaluation

methods applied within the project are also discussed here. Performance-oriented research and audience and community studies were conducted and followed *The Immaterial Display* on its journey through Europe, while an evaluation automaton was developed and used to evaluate the digital content and interfaces in a hybrid exhibition qualitatively and quantitatively.

Beside practice-based research, Beyond Matter enabled artistic research and creation. A residency program saw fourteen artists to join one of three participating institutions and ramble—in their minds at least. Due to pandemic travel restrictions, not all resident artists and researchers could be present at the host institution and some had to develop and/or exhibit their residency project online. The *Beyond Matter VIEW Platform* contains the entirely online environments and the online parts of larger projects by some of the artists. Despite these logistical challenges, all the results of the residencies could be exhibited or performed in one or another framework provided by the Beyond Matter project—in the *Matter. Non-Matter. Anti-Matter* exhibition in Tirana, at ZKM, or as part of the group show *Immerse!* at Tallinn Art Hall. The chapter "Visionary Ramblings" documents the projects of the residency artists in the form of interviews and written recordings of performance-lectures, and storytelling events.

Beyond Matter entangled and intertwined formats, actions, processes, and results; it had a complex project architecture. Each partner contributed a layer of research and was involved with different activities. A project map depicts this network of institutions and projects to document their collaboration. A comprehensive appendix aids the reader in navigating this publication and its themes. A glossary of terms gives detailed explanation of terminology that has shaped the project. These ⬂Glossary terms are highlighted throughout the publication.

Beyond Matter has engendered new content—through exhibitions, symposia, discussions, and publications—but it also facilitated professional exchange between art institutions, mainly within European countries, contributed to cultural professionals' skillsets around digital mediation formats, and fostered a transnational mobility of artworks and arts professionals. The project also contributed to the digital commons through digitized archival materials and the development of open-source software that is available online and usable by any other cultural organization wishing to provide online access to the cultural heritage in its guardianship.

The new approaches to digital conservation provided by Beyond Matter are much-needed because exhibitions are both tangible and intangible. Preservation of and access to them, as a part of our cultural heritage with a long-term identity-shaping character, can help us understand current and future streams of events. Parallel to cultural heritage, digital culture increasingly influences cultural identities in Europe and globally. Beyond Matter has revived cultural heritage and connected it to today's digitality.

The project laid down possible directions for practice-based research and creation in non-academic environments such as art centers, museums, art halls, or art labs in the hope that not only the outcomes but the methodologies elaborated over the last four years will prevail, that art institutions will carry on with digital world-making and create online platforms that function as assemblies, that hybrid experiences in art mediation will soon be widely accepted, and AI-based construction of digital platforms for sharing knowledge will become ubiquitous.

PROJECT PARTNERS

Associated partners

Physical exhibitions

Publications

Digital exhibitions and virtual environments

Software, hardware, and evalution tools

Symposia, capacity building,
fellowship- and residency programs

TALLINN
ART HALL

Immerse!
Virtual Exhibition

Immerse!
Publication

Immerse!
Exhibition

*Les Immatériaux: A Virtual Exhibition
Iconoclash as a Digital Experience*

ZKM|CENTER FOR
ART AND MEDIA
KARLSRUHE

*The Immaterial
Display*

CENTRE GEORGES
POMPIDOU, PARIS

Evaluation
Automaton

*Matter. Non-Matter.
Anti-Matter*
Traveling Exhibition

GIM Gesellschaft für
Innovative Marktforschung mbH,
Heidelberg

Capacity building workshops
Webinar Series: *What Matters for
Virtual Museums?*

Series of online talks: *A Revival
of Clashes between Materiality
and Representation*

*Beyond Matter, Within Space.
Curatorial and Art Mediation Techniques
on the Verge of Virtual Reality*
Publication

*Beyond Matter
VIEW Platform*

Beyond Matter
Residency Program

TIRANA
ART LAB

*Tirana Floating
Archive*

EPFL Pavilions,
Lausanne

*Spatial Affairs
A Digital Twin*

*Spatial Affairs. Worlding
A tér világlása*

Software solution for
online guided tours

Spatial Affairs
Exhibition

Spatial Affairs
Publication

LUDWIG MUSEUM —
MUSEUM OF CONTEMPORARY
ART, BUDAPEST

HyMEx Proceedings
Publication

Hybrid Museum Experience
(HyMEx) Symposium

Aalto MA
Fellowship Program

AALTO UNIVERSITY

Audience and
Community Studies

1.
VIRAL RADIATION.
Spaces of the
Exhibition in the
Virtual Condition

SPATIAL AFFAIRS. A Triple-Aspect Interrogation of Our Evolving Perception of Space

Computer-generated environments, ↘virtual realities, and networked digital platforms—from cyberspace to metaverse—are no longer fictitious locations found in science-fiction. Their roles are now as significant as those of real spaces. The immaterial spheres generated by information technology have become legitimate parallel dimensions of our perceptions, experiences, knowledge, communication, and ourselves. Real and virtual are no longer antithetical. We must therefore re-examine our three-dimensional conception of space.

In a presentation spanning a physical exhibition, a digital twin of that exhibition, and a specially designed multi-user online environment that displays born-digital artwork, *Spatial Affairs* probed the mutual dependence between physical and digital presence through conceptual and contemporary artworks and manifestos. It proffered multiple artistic positions, in various media and from both before and after the emergence of computer technology, on the development and social impact of science and technology through the notion of space (see figs. 1–5). The co-dependence of the tangible real and the intangible digital was thus thrown into sharp relief.

In the process, *Spatial Affairs* reassessed certain widely accepted but not necessarily valid ideas about space. Instead of exploring differences between transcendental and material conceptions of space, it asked whether and how our conventional knowledge of space is influenced by computer technology and computer-generated spaces.

As early as the 1960s, the pioneers of computer art demonstrated that the computer could create and represent artificial spaces—take the computer-generated designs of Japanese philosopher Hiroshi Kawano or of German academic Georg Nees, for instance. Supplanting

Fig. 1.
Visual identity of the exhibition *Spatial Affairs*, Ludwig Museum, Budapest, 2021.

**Figs. 2 and 3
Exhibition views
Spatial Affairs, Ludwig
Museum, Budapest,
2021**
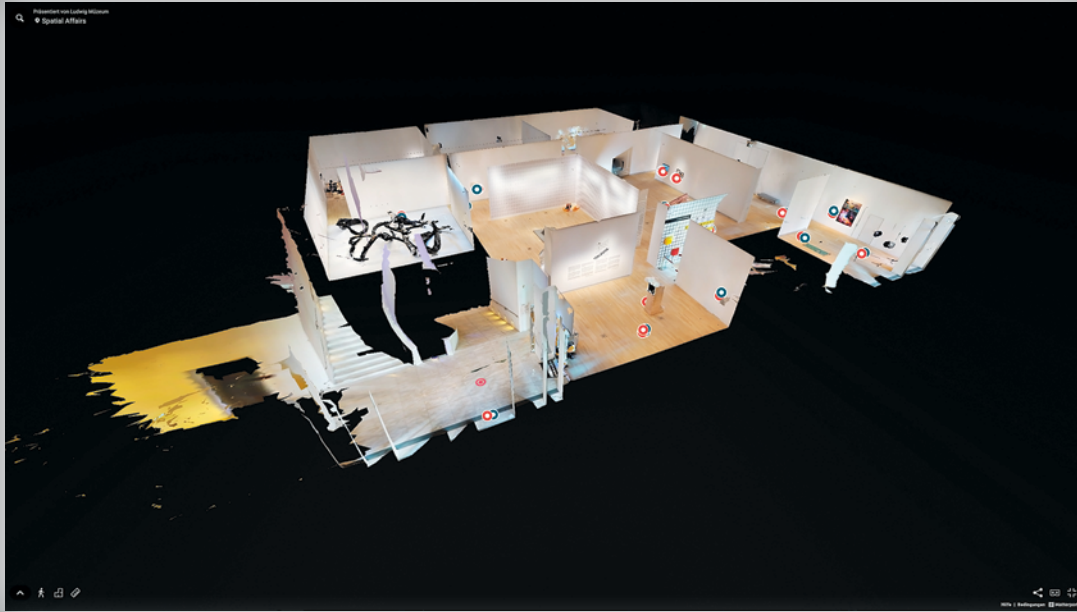
**Figs. 4 and 5
The digital twin of the
physical exhibition
Spatial Affairs.
Screenshots.**
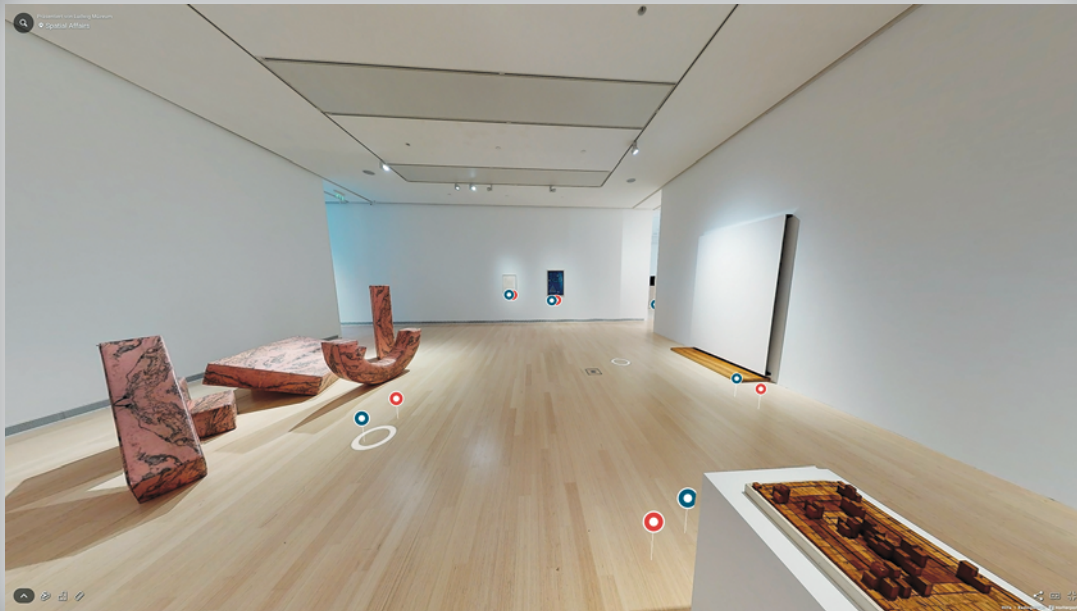
early descriptive and formalist practices, the focus of contemporary artists has shifted towards criticality: the 2016 digital video artwork *Information Skies* by the Metahaven design collective, for example, visualizes the ubiquity of networked social spaces and the epistemological complications they generate, including the virtual condition of fake news.

Long before the ubiquitous presence of computers, the impact of information technology and science became noticeable in the visual arts and the understanding of space. It inspired manifestos and new types of artworks. Key examples include the 1936 *Dimensionist Manifesto* by the Hungarian poet Károly Tamkó Sirató, or the Italian artists's, Lucio Fontana's environments from the 1940s and 1950s.

Depicting space that is an inherently invisible entity, is a complex task, whether approached as absolute, relative, real, or virtual. In exposing modernist conceptions of space and their non-modern reflections, *Spatial Affairs* necessarily explored the possibilities offered by information technology.

Spatial Affairs. Worlding – A tér világlása is the online extension of the physical *Spatial Affairs* exhibition, designed by the post-critical design studio The Rodina (see fig. 6). This multi-user virtual environment, in which born-digital artworks and visitors are represented by crawling avatars, was inspired by the theory Konrad Zuse expounded in *Calculating Space* (*Rechnender Raum*, 1969), which envisions the universe as a space inhabited by self-reproducing and self-reprogramming cellular automata. In such a virtual world, boundaries between digital objects and active subjects dissolve for good. The online environment designed for *Spatial Affairs. Worlding* is one possible answer proposed by The Rodina to the curators' questions: How can the content of an online exhibition be developed into a spatial and adaptive experience? What if artworks are represented by avatars? What if the exhibition becomes an ecosystem and, to use Zuse's phrase, generates a computing cosmos?

Spatial Affairs, in its physical and digital iterations, was documented by a catalog containing reproductions of exhibited artworks as well as essays by Adam Lovasz, Sven Lütticken, and Ceci Moss, and selected manifestos by Katarzyna Kobro and Władysław Strzemiński, Károly Tamkó

Sirató, Lucio Fontana, Gyula Pauer, Stanislav Filko, John Perry Barlow, Metahaven, Matteo Pasquinelli and Bogna Konior supplemented by additional content via an Augmented Reality App for smartphones by the studio Transbooking.

Exhibited artists:
Morehshin Allahyari, Andreas Angelidakis, Carola Bonfili, Adam Broomberg & Guy De Lancey & Brian O'Doherty, Petra Cortright, Agnes Denes, Aleksandra Domanović, Louise Drulhe, Wojciech Fangor, Stanislav Filko, Lucio Fontana, Dora García, Sam Ghantous, János Gulyás, Hans Hollein, Lauren Huret, JODI, Hiroshi Kawano, Katarzyna Kobro, Alicja Kwade, Oliver Laric, Sam Lavigne and Tega Brain, Jan Robert Leegte, Lou Cantor, Stano Masár, Cildo Meireles, Rosa Menkman, Metahaven, Imre Nagy, Georg Nees, Robert Olawuyi, Gyula Pauer, Goran Petercol, Sascha Pohflepp & Alessia Nigretti & Matthew Lutz, Àngels Ribé, The Rodina, Rafaël Rozendaal, Jeffrey Shaw, Andrej Škufca, Károly Tamkó Sirató, Viktor Timofeev, Unrated (Besorolás Alatt), Gyula Várnai
Curators:
Giulia Bini, Lívia Nolasco-Rózsás
Assistant curators:
Jan Elantkowski, Fruzsina Feigl

Spatial Affairs was a collaboration between ZKM | Center for Art and Media Karlsruhe and the Ludwig Museum – Museum of Contemporary Art, Budapest, with the contribution of the Aalto University. *Spatial Affairs. Worlding – A tér világlása* was co-produced by ZKM | Center for Art and Media Karlsruhe and EPFL Pavilions, Swiss Federal Institute of Technology Lausanne.

SPATIAL RELATIONS IN THE MUSEUM. *Spatial Affairs*

Jan Elantkowski and Fruzsina Feigl

The exhibition *Spatial Affairs* was held in spring 2021 at the Ludwig Museum – Museum of Contemporary Art in Budapest. It was unique in its format—not least because it was the first exhibition to be realized within the Beyond Matter project. Both authors of this text were involved in the creation of the exhibition as members of the Ludwig Museum team. We would like to reflect on the spatial relations in the museum and to describe our personal experiences of the making of *Spatial Affairs*. We will point to three main factors that, in our opinion, determined the project's final form: (1) the concept of the exhibition, (2) the coronavirus pandemic, and (3) the uncertain state of suspension that the pandemic caused.

The Exhibition Concept

The exhibition *Spatial Affairs* investigated the relationship and interdependence between physical presence and space on the one hand and digital presence and space on the other. The curatorial aim was to base this investigation on modern, conceptual, and contemporary works of art as well as artistic manifestos. The notion of ↘ space linked artistic approaches from before computerization to post-computational works. Regardless of the medium, the artworks attested to developments in science and technology and their social impact on humanity, raising questions about physical and digital spaces.

From the beginning, *Spatial Affairs* was understood as a project combining these two types of space—its hybridity in that sense was part of the concept. Designed as a physical exhibition, its so-called digital twin—a 3D scan of the physical exhibition—can be accessed online. *Spatial Affairs. Worlding – A tér világlása* is an interactive virtual extension of *Spatial Affairs* that virtually expands on the spatiality of the physical exhibition.

According to the concept, *Spatial Affairs* and *Spatial Affairs. Worlding* could be seen as one exhibition that interweaves complementary physical and virtual spheres. The physical white-cube exhibition space of the Ludwig Museum and the digital environment of *Spatial Affairs. Worlding* were closely linked. While *Spatial Affairs* in its physical form was dismantled in June 2021 (its digital twin is available online), *Spatial Affairs. Worlding* is an evolving online platform that will be available to the public until the end of the Beyond Matter project (July 2023).

The Pandemic

The global outbreak of Covid-19 meant a sudden crisis in every sphere for humanity: for governments, healthcare systems, economies, but also for arts and culture. Arts institutions all over the world faced the question of how to function in this strange new situation. The crisis seemed to undermine the role of museums and their modus operandi. A radical solution was needed to allow functioning under such extraordinary circumstances, including total lockdown in some places.

Arts professionals sought alternative modes of operating, and at museums this meant considering possible extensions to traditional physical presence that would still allow a museum experience.

The pandemic hit when the Ludwig Museum's curatorial team was in the midst of preparing the exhibition *Slow Life. Radical Practices of the Everyday*, planned to open on April 9, 2020.[1] In Hungary the first wave of Covid-19 and the first lockdown came in mid-March, just as the majority of the artworks had arrived at the museum and preparations for its installment were progressing. The museum closed overnight. Entering the building was prohibited, and all exhibitions were cancelled. The pandemic turned everybody's lives upside down and we had to decide on how to realize our annual program and maintain our mission at a time when all staff were required to work remotely. The sudden closure forced us to come up with a strategy for an online museum in the making: we decided to create a digital museum experience into which we could move the unfinished physical exhibition. We started by setting up a microsite which we filled with various contents over the next few months: a curatorial text, artwork descriptions, images, excerpts of videos, interviews with artists, other audio and video materials, key concepts for the exhibition, and online programs.[2] Our aim was to transpose as much of the museum experience into the digital as possible and to reduce the void caused by the closing of the physical exhibition space. During this time, the closest we came to a "real" museum experience was transforming the content generated for the physical exhibition into virtual space.

Fig. 1
Spatial Affairs, 2021, book cover. Ludwig Museum, Budapest, Hatje Cantz.

1   The exhibition was postponed and realized one year later: *Lassú élet. Radikális hétköznapok* (*Slow Life. Radical Practices of the Everyday*), July 14–September 5, 2021, curators: Petra Csizek, Jan Elantkowski, József Készman, Zsuzska Petró, Viktória Popovics, Krisztina Üveges. Since the exhibition couldn't be shown in 2020 at Ludwig Museum Budapest, due to the change of program, a smaller version was presented at Ludwig Museum in Koblenz (*Slow Life. Radikale Praktiken des Alltags*, November 1, 2020–March 15, 2021). The show in Germany, however, was also affected by the ever-looming lockdowns.

2   See: http://slowlife.ludwigmuseum.hu/en/.

These were the Ludwig Museum's first encounters with digital curatorial approaches. With the disappearance of the physical space where visitors would normally encounter artworks—a central element of the museum experience—immediate actions had to be taken to find new ways to engage our audience through online space. The quest was competitive, since cultural and creative sectors around the world had moved online.

Hungary's first lockdown ended in the second half of August 2020. By that time the preparations for *Spatial Affairs* were well underway. The second wave of the pandemic and the concurrent second lockdown in Hungary occurred between November 2020 and mid-May 2021. The opening of *Spatial Affairs* had been scheduled for April 2021.

Uncertainty

By the spring of 2021, we had a year's experience of facing the pandemic. Although the chaos of global panic had passed, a sense of uncertainty prevailed. This made the process of implementing *Spatial Affairs* complicated. By the same token, the pandemic also added a new dimension to its complex concept which had already been developed and broached the issue of how to extend the presence of a museum and an exhibition beyond the physical. Questions resulting from the pandemic that relate to the spatial relations in the museum became more topical than ever and lent the concept of *Spatial Affairs* a new layer.

The time during which we worked on the exhibition may be described as a state of suspension. Implementation was underway, but whether and when the exhibition would be realized was not certain. Due to the pandemic it was no longer an option to follow the original implementation plan; we had to face new challenges with continuous replanning, recreating scenarios, and emergency solutions. Our previous work process, revolving around on-site meetings, curators' physical presence, and cost-effective shipping, suddenly became impossible or could be realized only through complicated organization, tense waiting, and at times a grateful welcoming of artists who had transported and/or installed their own work. One of the curators was unable to travel to Hungary for an on-site meeting in September 2020 due to border closures, which remained closed during the final stages of the preparations in early 2021. This meant that affordable part-loading shipment options were unavailable and we were driven to take on the higher costs of exclusive, direct fine art transport and an extra workload to deal with this logistical change. Each international partner was affected by the closures differently, so synchronizing logistics and schedules was difficult. Uncertainty around the museum's general fate also hindered marketing and communication, for nobody knew when cultural institutions would reopen after the second lockdown. Another crucial part of the museum's activity, the work of its pedagogical department, was seriously obstructed because it was based on personal contact in real space. Adapting to the new situation, the whole team worked on parallel plans in order to complete the project. Optimizing tasks according to the changing situation was an important lesson, and we learned a lot.

Spatial Affairs "opened" after a slight delay on April 29, 2021. Hosting the opening behind closed doors led to the curious situation that visitors could see the physical exhibition for the first time through online guided tours given by the curators in both Hungarian and English. The curators walked through the physical space and their tour was broadcast live via *Zoom*. Our plan to invite the artists for the opening was unsuccessful. The physical exhibition was installed and was ready to welcome visitors, but there was no way of knowing whether any visitor would ever see it in real life.

It was extremely difficult to work in the reality of the pandemic, when all processes toward realizing an exhibition had to be either relearned or adjusted, and when it was almost impossible to plan ahead due to the constantly changing situation. But in mid-May 2021 lockdown ended in Hungary. We accomplished the goals of our makeshift pandemic museum and *Spatial Affairs* exhibition was finally on view and open to the public until June 27, 2021.

**Figs. 4 and 5
Andreas Angelidakis,
Domesticated Ruin,
2018. Book page (top)
and AR illustration of
artwork (bottom) by
Transbooking.**

Figs. 6 and 7
Stano Masár, works from
the series *Relocated
Spaces*, 2012. Book page
(top) and AR illustration
of artwork (bottom) by
Transbooking.
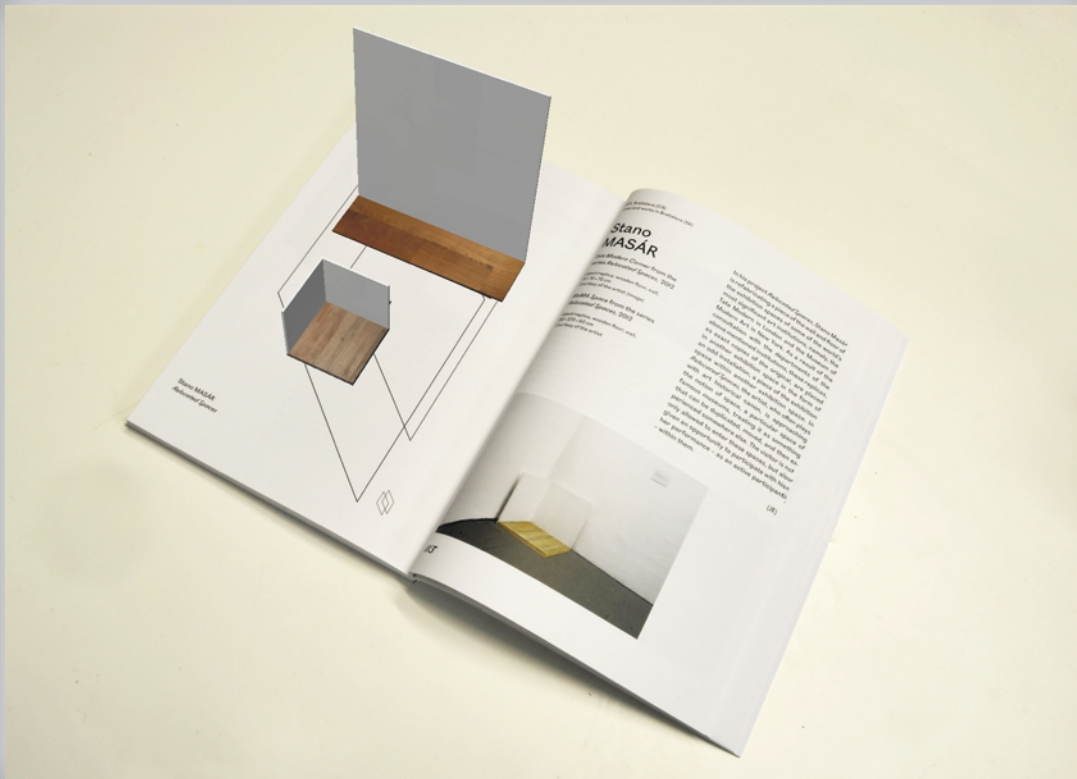
Spatial Relations in *Spatial Affairs*

In contrast to previous practice, the online guided tours—offered in Hungarian, English, and German—and the 3D scan of the exhibition were made available on the museum's platforms immediately after the opening. These couldn't replace the experience of a physical museum, but were part of the concept of *Spatial Affair*s. It was important to us that as many people as possible could get to know the exhibits despite the special circumstances and closures. The virtual tour through the digital twin of *Spatial Affairs* and its digital extension, *Spatial Affairs. Worlding*, drew in international audiences even after the closure of the physical exhibition.

While the physical exhibition didn't focus on the use of new technologies, it did feature some interactive works. *Physical Capacity* (2017) by Viktor Timofeev is a virtual reality game in which the player, wearing VR headset, is encouraged to fight cockroaches on all fours in an ever-changing basement-like virtual space. In the museum Carola Bonfili's *The Infinite End of Franz Kafka's Das Schloss* (2018) was presented as a video installation, but images of her work could also be experienced interactively with the help of VR headsets. Those two works lent another spatial dimension, that of virtual reality, to the complex spatial affairs of *Spatial Affairs*. Just as *Spatial Affairs. Worlding* was intended to be an interactive platform, several works in the museum's exhibition space were designed for interactive use by physical visitors, such as Andreas Angelidakis' *Domesticated Ruin* (2018), Stano Masár's works from the series *Relocated Spaces* (2012), and Jeffrey Shaw's *Virtual Sculpture* (1981).

An important element of *Spatial Affairs* is the catalog. In keeping with the exhibition concept, it treats its physical and virtual components as one. The catalog is available in an English edition (Hatje Cantz) and a Hungarian edition (Ludwig Museum) that are identical in content and form, with the concept developed by the curators and all texts edited by the museum's team. The catalog adds yet another layer to the project in the form of augmented reality contents created by Transbooking (see figs. 1–7). The reader downloads the *Spatial Affairs* app onto their device and locates the markers on the book's cover and on the pages bearing the *Spatial Affairs* symbol; while the cover page leads to the online platform *Spatial Affairs. Worlding*, the markers on the inside pages lead to AR illustrations of selected artworks in the exhibition. This rare feature for an art publication extend physical space (of the printed book) into virtual space (augmented reality) once more, probing the relationship between them.

The pandemic impacted continues to impact the spatial relations within the museum. For the Ludwig Museum, the exhibition *Spatial Affairs* was the first in a series of events organized within the context of Beyond Matter that faced difficulties resulting from the coronavirus. This extraordinary situation strengthened the spatial relations in *Spatial Affairs*, paradoxically placing even stronger emphasis on the project's hybridity, its multilayered character: being simultaneously physical, digital (online), virtual (VR), and augmented (AR). *Spatial Affairs* detached itself from the traditional frames of the museum, or rather from its physical spaces; by becoming an independent entity in different spaces it extended the museum's spatial boundaries.

WHEN DIGITAL TRANSFORMATION CASTS A SHADOW OVER SPACE.
In Conversation with Lívia Nolasco-Rózsás and Giulia Bini

Jan Elantkowski and Fruzsina Feigl

In May 2021, after months of lockdown, the Ludwig Museum – Museum of Contemporary Art, Budapest reopened with a new international show, *Spatial Affairs*. The exhibition and its digital extension, *Spatial Affairs. Worlding – A tér világlása*, were curated by Lívia Nolasco-Rózsás (ZKM | Center for Art and Media Karlsruhe), the head of the international project Beyond Matter, and Giulia Bini, currently curator and producer at EPFL Pavilions, and head of the program *Enter the Hyper-Scientific* in Lausanne. *Spatial Affairs* investigates questions of spatiality and spatial perception, the relation and interdependence of physical and digital presence, through a wide spectrum of international artworks spanning from the 1930s to today. This interview, led by Fruzsina Feigl and Jan Elantkowski—who were involved in the making of the exhibition as part of the Ludwig Museum team—focuses on the show but also puts *Spatial Affairs* into a wider context, presenting the promises of the bigger project, which addresses the complex relations in ↘ cultural heritage and culture versus virtual reality.

JAN ELANTKOWSKI   What are the spatial affairs in *Spatial Affairs*? What kind of spatiality is the exhibition dealing with and how would you briefly describe its message?

LÍVIA NOLASCO-RÓZSÁS   The spatial affairs are manifold and as fluid as the definition of space itself has been over the last approximately ninety years, which is the time scope of the exhibition. While engaging with the notion of space, it is hard not to notice that space is having an actual affair with ontology, and that on the other hand ontology is having an affair with visual arts, not to mention the fact that theoretical physics and information technology are "friends with benefits" with both space and ontology. The relationship status of space is thus utterly complicated. Apart from that, relations such as generative versus imaginary and cognitive space, simulated versus actual environments, coordinate and vector space, and the possibilities of dimension reduction, eventually extension, play an important role in the exhibition.

The main thesis behind the curatorial research was that information technology, especially from the time we can talk about ubiquitous computing, impacts the notion of space. Information technology presents a certain view of the world to us, and its applications do more than single calculations; they produce a way of thinking, a way of living, and a way of understanding things around us. Information technology produces an ontology. This means that we shouldn't draw an ontological line between ourselves and computers, but accept shared authorship and agency with them.

GIULIA BINI   *Spatial Affairs* deals with spatial approaches and perception pre- and post-computation. As well as acknowledging the change brought about by the impact of information technology in our conceptions and creation of space, it detects moments in twentieth-century art history when artists sensed a change of sensibility and thus foresaw future developments through reflections at the crossroads of art, science, and technology. The spatiality addressed by the works in *Spatial Affairs* highlights how these reflections inhabited artistic, architectural, and scientific fields well before the technologically enhanced perception we can experience nowadays and the advent of virtuality. Space is manifold itself and remains a conceptual field that is complicated to grasp; the variety of the works in the exhibition aims at pointing precisely to a multiplicity of approaches, from early avant-garde sculptural works to painting, conceptual art, and contemporary hybrid practices in digital and virtual space. The exhibition embarks on an ambitious quest around a philosophical and abstract locus, embracing ontological questions that acquire new value with the impact of information technology and ubiquitous computing. I find combining the titles of the curatorial texts introducing the exhibition in the catalog potentially enlightening in terms of the message: "Rendering the Digital Penumbra and its Translucence" … "In Spatial Terms."

The impact of the digital, of virtual realities, of the computer itself brings about a shift in art production, curation, and mediation.

FRUZSINA FEIGL   What drew you to this field of research and this experimental approach? How would you describe the significance of the project Beyond Matter and within it, *Spatial Affairs*?

LNR   The impact of the digital, of virtual realities, of the computer itself brings about a shift in art production, curation, and mediation. This is obvious, and various attempts have been made to gather knowledge about it. Yet it is still necessary to produce new terms that can help us define what we're actually dealing with under such fluid and rapidly changing conditions. I also find it necessary to dive deep into the topic and start from a very basic question: what is the main medium through which

we encounter art, the exhibition? Apparently, one answer is space: exhibition spaces are physical locations of knowledge production and exchange, where spatial qualities play an important role in the contextualization of information. As soon as art mediation takes place digitally, we have to deal with a different appearance of space

Beyond Matter engages with this challenge and aims at providing several alternative solutions, with one thing in common: the idea that variations of generated and real spaces, virtual productions, emulations, and revivals should maintain spatial qualities, but also be able to include digitized and born-digital content, whether artworks, exhibits, or informational materials. This is specifically relevant to the digital modeling of spaces that no longer exist.

GB The discussion around *Spatial Affairs* started at the time when the two of us were colleagues at ZKM│Karlsruhe. This was in 2014–15. We shared a common interest in questions related to spatiality, which I also addressed in the framework of my PhD research. The fact that these initial ideas and research could finally materialize in this exhibition, realized in the framework of Beyond Matter, points at the significance of the current restructuring of spatial reflections in the realm of virtuality. *Spatial Affairs* as an exhibition is experimental both in its multiple facets and its institutional platforms. At the same time it is an exhibition that we can consider aesthetically classical but conceptually adventurous, creating links and art-historical reflections that shed new light on artistic practices not yet analyzed from this specific "spatial" point of view or spectrum. As an exhibition that takes place at the Ludwig Museum, Budapest, it also re-examines Eastern European positions in this genealogy. *Spatial Affairs*. *Worlding* is a virtual environment hosted on various institutional platforms, such as those of Beyond Matter and EPFL Pavilions, an emerging experimental institution oriented toward experimental museology.

Spatial Affairs is a multifaceted endeavor, and as curators, we know that it can still potentially take on new forms. The curatorial narrative can be expanded in additional or different versions of the show. But *Spatial Affairs* at the Ludwig Museum gathers positions that we consider essential for the curatorial discourse of the show, especially in its art-historical approach.

JE The exhibition was accompanied by a two-day symposium, "HyMEx – Hybrid Museum Experience 2021" (Ludwig Museum, online, May 6–7, 2021) and a catalog. How do these complete each other?

LNR In terms of content they don't have much in common, but both the symposium and the catalog reflect a certain hybridity, the interconnectedness of the digitally virtual and the palpably real. "HyMEx 2021" traced the effect of digitality, which might be summarized as a dissolution of location, the disappearance of museum walls, which brings an emancipatory plurality to museums and art institutions (if handled well). The catalog presents reflections on various spaces—sculptural

spaces, mesh spaces, white spaces, cyberspaces, and computational spaces—and guides us through the artworks of the exhibition. In some cases it offers a digital interpretation of the artworks that goes beyond illustration and literally "augments" the catalog in a spatial way.

GB   The catalog of *Spatial Affairs* also reconsiders artistic manifestos and other artists' writings to draw a trajectory of the notion of space; it can function as a theoretical tool through its selection of manifestos (Katarzyna Kobro and Władysław Strzemiński, Károly Tamkó Sirató, Lucio Fontana, Gyula Pauer, Stanislav Filko, John Perry Barlow, Metahaven) and texts by theorists such as Matteo Pasquinelli and Bogna Konior and authors asked to reflect from different perspectives on the exhibition's topics (Ceci Moss, Ádám Lovász, Sven Lütticken). The AR visualizations of selected artworks allow a different experience of the book format, expanded into the digital dimension, which reflects the overall approach of Beyond Matter.

JE   The hybrid nature of *Spatial Affairs*, its combination of different dimensions or realities, is striking. What's more, the Covid-19 pandemic seems to have added yet another layer of meaning to the project, as it forced culture to seek alternative solutions.

Hybridity was always inherent to the project.

LNR   I assume you're referring to the attempt of cultural institutions to shift their operations online due to the lockdowns propelled by the pandemic. This solution had already been around before 2020: a complex infrastructure of various platforms was at hand when many museums had to close their doors. Beyond Matter attempted to offer solutions for art institutions sharing their practices and archives digitally—it was supposed to be a pilot project in this regard. While the pandemic skewed the linearity of time and accelerated engagement with digital technologies in the cultural scene, the objectives of Beyond Matter remain valid because its outputs are grounded in collaborative research processes. It is hard to say if *Spatial Affairs* would have looked different without the lockdowns and their ramifications, but possibly not significantly. The online extension and the digital twin of the exhibition were part of our plans back when we started elaborating the concept.

GB   I agree. Paradoxically, the pandemic didn't particularly affect the project except for schedule changes and the solitary opening. Hybridity was always inherent to the project. Since the beginning of our work on *Spatial Affairs*, we had in mind multiple spatialities transmitted not only through the artworks in the show but on various platforms. The dissipation of the exhibition space and the museum's dematerialization through online platforms and virtual ecosystems were ongoing processes anticipated by artists well before their adoption in the museum

context and the sudden exacerbation in 2020. It is certainly true that the project can have a particular resonance today in the aftermath of the lockdowns. I think *Spatial Affairs* also tries to consider challenges that will exponentially develop in the coming years, such as the proliferation of virtual platforms, their functioning, and questions of sustainability, accessibility, and digital divides—which came up during the online guided tour we gave of the show.

JE *Spatial Affairs* offers an extensive overview of artworks and theoretical texts addressing various approaches towards space. Starting with avant-garde artists' and theoreticians' conceptualizations of space, it moves towards a tremendous shift caused by computerization. This new paradigm and the virtual were strongly represented in the exhibition space of the Ludwig Museum. Virtual presence constitutes the essence of *Spatial Affairs. Worlding.* Are we moving away from traditional modes of exhibition, or do you think the physical and the virtual can coexist and complement each other?

LNR They will complement each other. Cinema hasn't disappeared because of Netflix, and probably won't. With *Spatial Affairs* a very clear narrative was created: if we go into the physical exhibition space, where the artworks and manifestos are not arranged chronologically but rather according to the dialogues that emerged between them, we'll arrive at the end of our visit in a "white space," where white is the dominant color. It is the "brain" of the exhibition, just as the apsis of the Fridericianum was the brain of dOCUMENTA(13); it summarizes the story of *Spatial Affairs*. It also features the video by Adam Broomberg and Guy de Lancey, which uses an excerpt of Brian O'Doherty's well-known essay *Inside the White Cube: The Ideology of the Gallery Space*[1] and guides us through an empty computer-generated "white cube" exhibition space, revealing a chance to turn away from it and start from a scratch in a computer-generated realm. *Spatial Affairs. Worlding* is thus a natural consequence and in a way a critique of the white cube.

GB Agreed—they will complement each other. The experience of real space is an essential component of the experience of art. The advantage of producing a digital twin of this show lay in the possibility of keeping track of the irreducible difference between *Spatial Affairs* and *Spatial Affairs. Worlding*, with *Worlding* being a component of *Spatial Affairs*.

Rather than reflecting on questions of substitutions among physical, real, and virtual, the exhibition explodes these spheres and makes manifest their intrinsic intertwinement. As the Ludwig Museum space opens up a specific experience, so does the virtual environment. They are complementary and, as highlighted by Lívia, the physical space points to the virtual and to the meta-narrative of the dissipation of the white

1   First published as a three-part essay in *Artforum* (March, April, November 1976); in 1986 published as the book Brian O'Doherty, *Inside the White Cube: The Ideology of the Gallery Space* (Culver City, CA: Lapis Press, 1986).

**Fig. 1
Chat function of *Spatial Affairs. Worlding – A tér világlása*. Ludwig Museum, Budapest, 2021. Screenshot.**
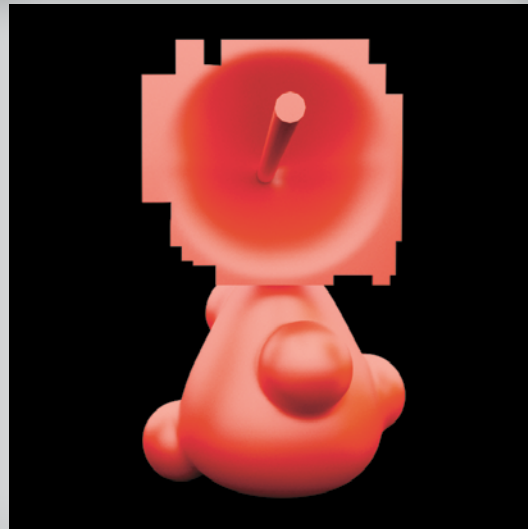
**Fig. 2
Avatar of the virtual exhibition guide in *Spatial Affairs. Worlding – A tér világlása*. Screenshot.**
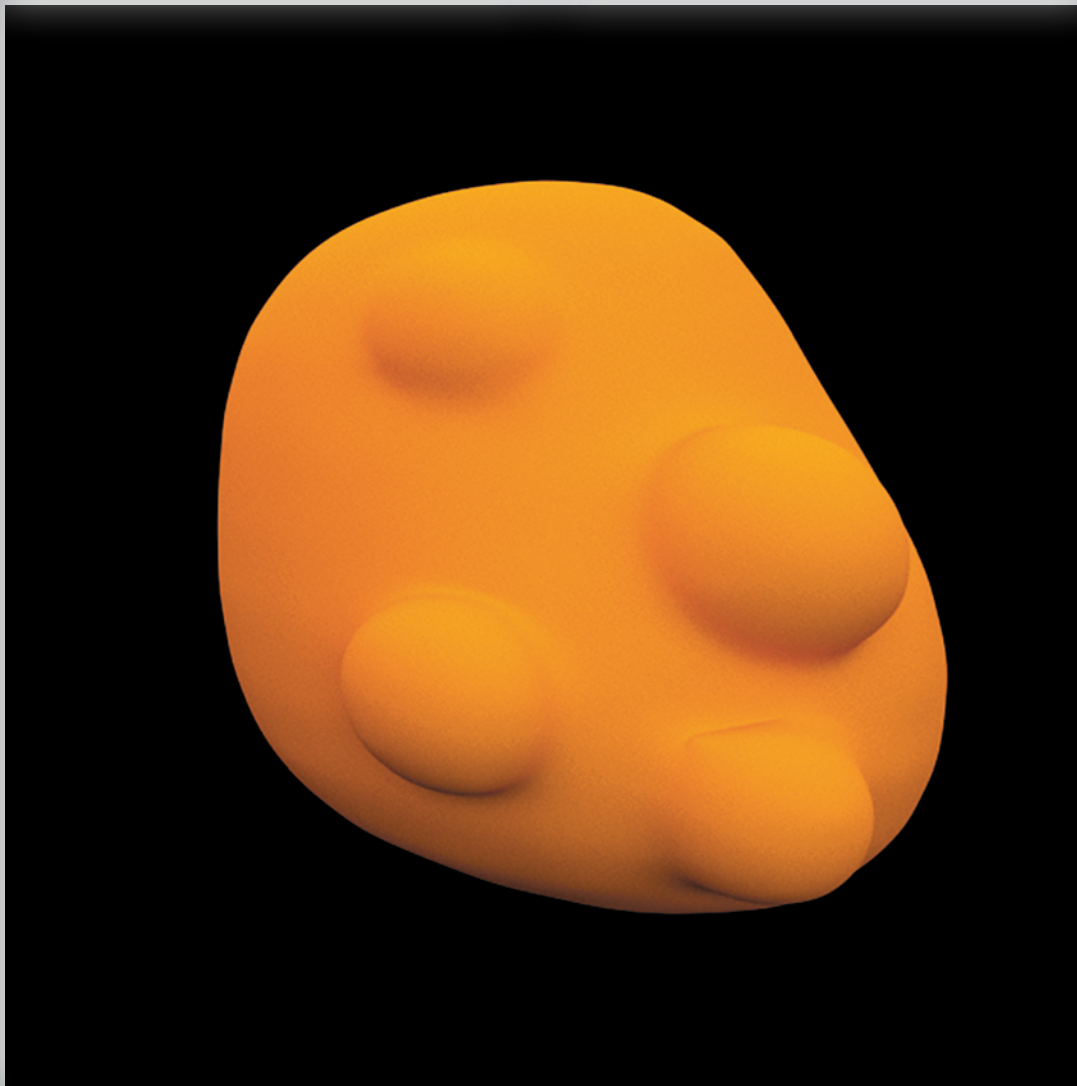
**Fig. 3
Draft of a body without organs for the virtual exhibition *Spatial Affairs. Worlding – A tér világlása*. Screenshot.**

cube into the digital realm. The entire curatorial narrative builds connections between the physical exhibition and its digital environment. But we didn't think in terms of substitution: our intention was to explode and augment the museum space and thus reflect on the transformative power of the digital and the virtual, which constitute a new challenge in curatorial and institutional practices. Rather than a radical turn, we are witnessing a transformative process.

A mediation program unfolded in *Spatial Affairs* throughout 2022 and 2023. In addition to being a virtual environment, we saw the potential in *Worlding* to become a platform for exchange on the themes covered in the exhibition. We considered ways to combine the navigation of virtual space with additional layers of interaction and exchange between the visitors, and developed a novel approach to hosting virtual guided tours. In doing so, we overcame technical challenges (see figs. 1–3).

FF What technologies are used in the *Spatial Affairs* exhibition and catalog, and is it important to develop novel solutions for the presentation and digital documentation of exhibitions?

LNR The exhibition focuses on the critique of information technology rather than its use, although two VR pieces are included. The catalog can be extended with an augmented reality app that includes three-dimensional interpretations of chosen artworks by Transbooking, adding a new digital layer to the exhibition.

A previous version of the text was published in August 2021 as "When Digital Transformation Casts a Shadow over Space. An Interview with Lívia Nolasco-Rózsás and Giulia Bini," https://34.sk/en/when-digital-transformation-casts-a-shadow-over-space-an-interview-livia-nolasco-rozsas-and-giulia-bini.

SPATIAL AFFAIRS. WORLDING. In Conversation with The Rodina (Tereza and Vit Ruller) and Enrico Boccioletti

Giulia Bini

Calculating Space, Body without Organs, Game of Life

GIULIA BINI When we started thinking about *Spatial Affairs'* digital environment, we considered two directions: Konrad Zuse's theory of *Calculating Space*[1] and Gilles Deleuze's theory of the body without organs.[2] Could you explain how these initial ideas informed your conception of the environment, and broadly how they relate to your practice?

THE RODINA In creating *Spatial Affairs. Worlding*, we were fascinated by Konrad Zuse's idea of the universe as a space inhabited by living and evolving automata, where all processes are computational. From the beginning, *Spatial Affairs. Worlding* was more than an online exhibition. It was developed as a computational universe—a space populated by cellular automata and informed by Zuse's digital philosophy, in which each element behaves like a cellular automaton that renews, regenerates, and reproduces itself in each new reiteration of a computational cycle. This computational space evolves into a kind of ⬉ simulation, a simulation in which all levels are governed by the same computational or self-calculated logic.

John Conway's *Game of Life* was a source of inspiration—here a cellular automaton played on a 2D grid.[3]

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1   Konrad Zuse, *Calculating Space – Translation of: Rechnender Raum,* trans. by Aztec School of Languages, Inc. (Cambridge, MA: Massachusetts Institute of Technology, 1970). First published as "Rechnender Raum," in *Schriften zur Datenverarbeitung*, vol. 1 (Braunschweig: Friedrich Vieweg+Teubner Verlag, 1969).

2   Gilles Deleuze, *The Logic of Sense*, trans. Mark Lester with Charles Stivale, ed. Constantin V. Boundas (New York, NY: Columbia University Press, 1990). First published as *Logique du Sense* (Paris: Les Editions de Minuit, 1969).

3   "The universe of the *Game of Life* (by John Conway, first published in 1970) is an infinite two-dimensional orthogonal grid of square cells, each of which (at any given time) is in one of two possible states, "live" (alternatively "on") or "dead" (alternatively "off"). Every cell interacts with its eight *neighbors*, which are the cells that are directly horizontally, vertically, or diagonally adjacent. [...] Births and deaths happen simultaneously, and the discrete moment at which this happens is sometimes called a *tick*." Quoted after "Conway's Game of Life," *LifeWiki*, April 30, 2023, https://conwaylife.com/wiki/Conway's_Game_of_Life#cite_note-2.
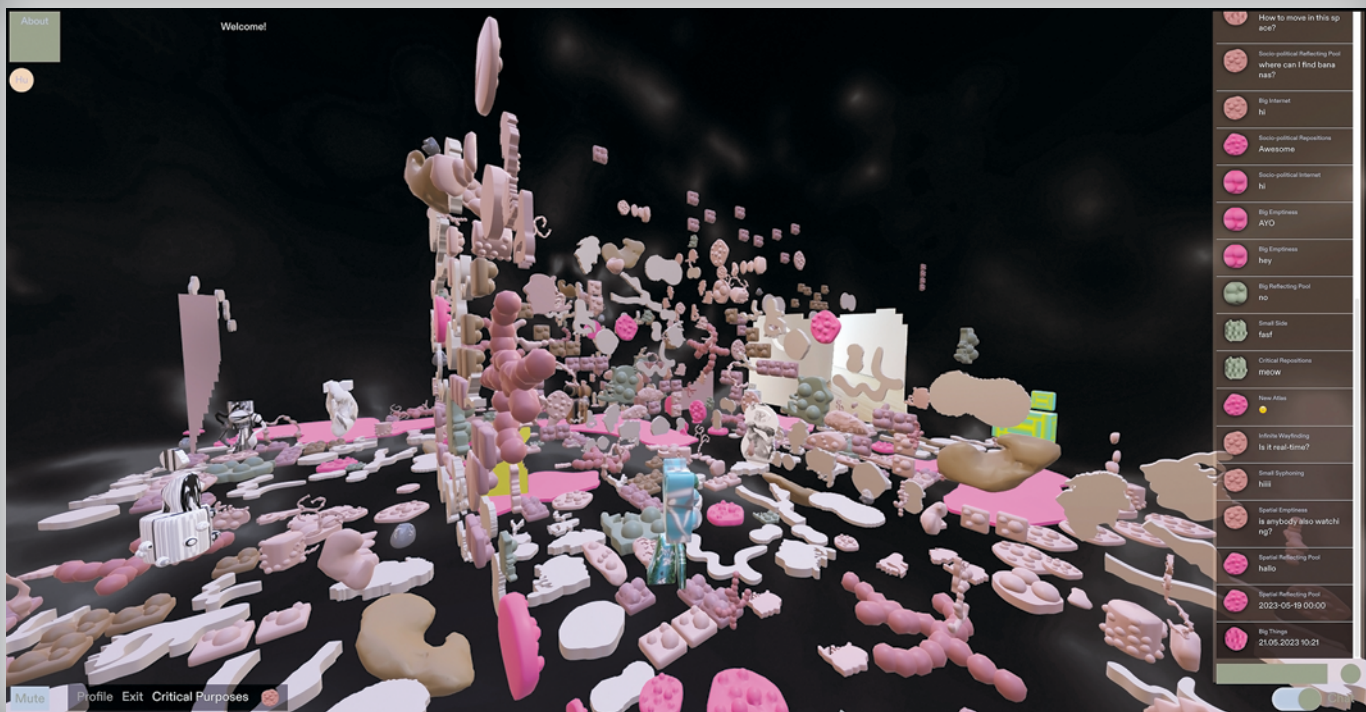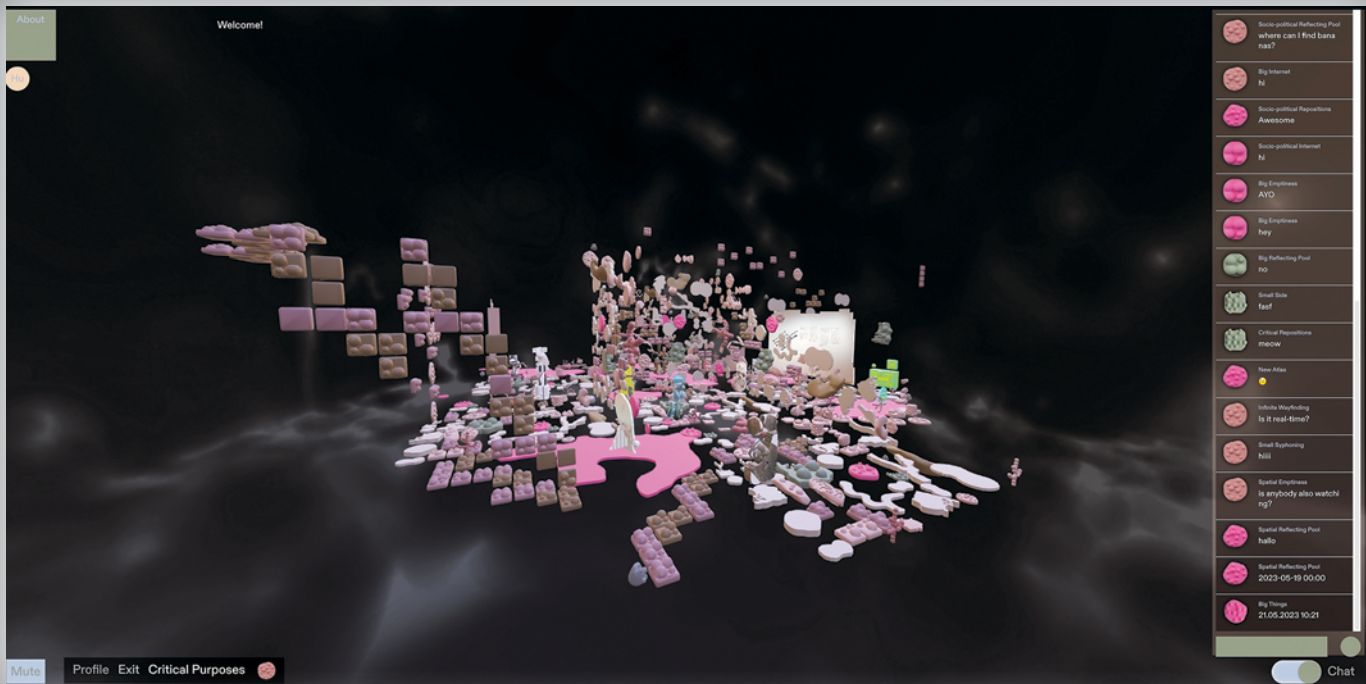
Figs. 1 and 2
*Spatial Affairs.
Worlding – A tér
világlása*, 2021–23.
Screenshots.

If you look at the *Game of Life*, it is interesting to observe these little digital objects and the logic they must follow. Because it is a self-calculated space and the simulation is both populated and unpopulated, we could say that there is an underlying philosophical question in the *Game of Life*.

From a design point of view, the "building material" of *Worlding* is the same for the environment, for the artworks, and for the users' avatars. And this is how we designed its building blocks. The intention was to visualize the tiles of which *Worlding* is composed, and that all the elements would be in motion, able to renew or produce themselves.

As graphic designers, we proceed with visual thinking and images. In this direction, next to Zuse and Conway, the dramatic and provocative Deleuzian vision of the "body without organs" allowed us to think about a kind of wild and layered quantum relational ontology. In *Worlding*, this image opens up the perspective to see beyond organs and beyond bodies to the interconnections between bodies and their environment. It is about guests' avatars interacting with artworks in virtual space— in our virtual ecosystem—and particularly about what they can do together. Let us stop thinking about separations between one organ or body and another, and rather think that there is a sum of bodies in front of us. Ultimately, then, the question is: how does their incorporation produce connections and relationships?

Fig. 3
Portal of the born-digital artwork of Sam Ghantous, *Reflecting Pool*, 2021 in *Spatial Affairs. Worlding*, 2021–23. Screenshot.
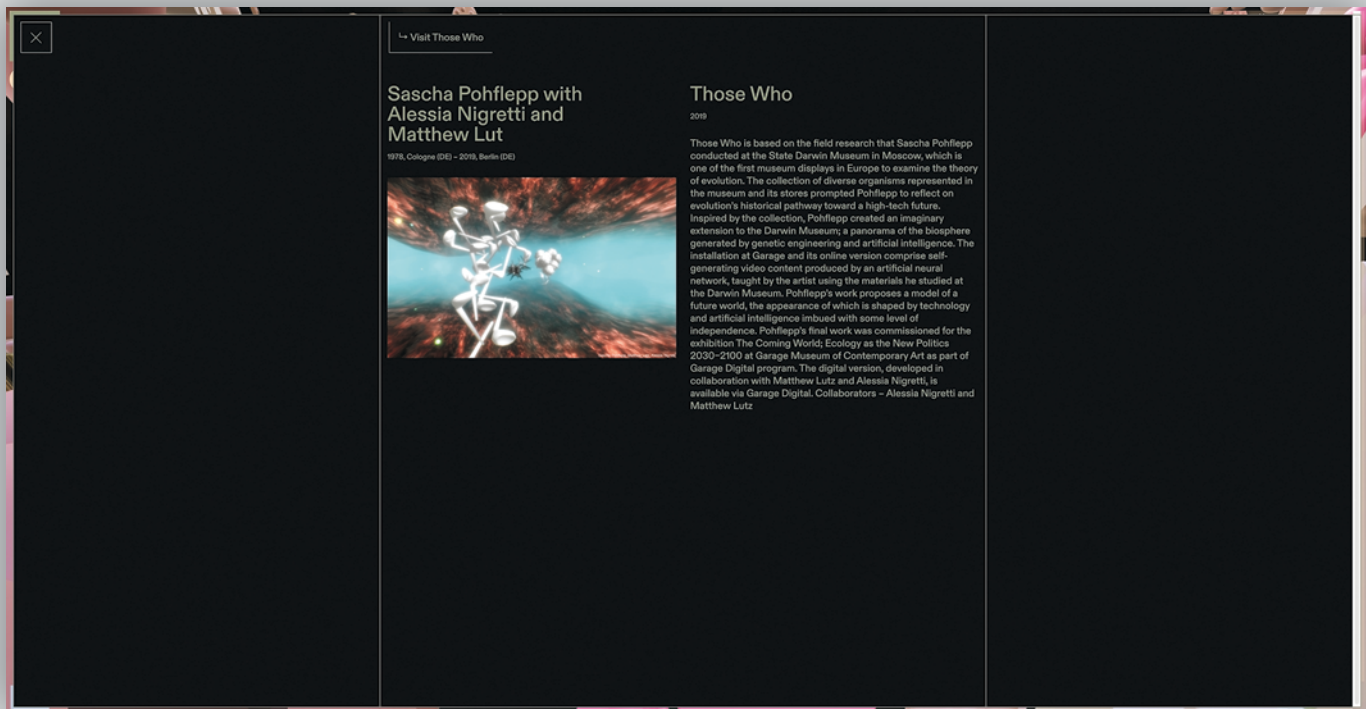
System—Eco-System

GB As we're discussing a system of interconnected parts, we could talk about an ecosystem and about an ecological approach in terms of the interconnections, impact, and mutual effect of all these elements on each other.

TR Yes, and how the interactions can create different potentials. The elements are contingent on each other or have encounters that are very productive, for this ecosystem is always being created anew and differently, it is never the same. It is a collective body produced by the interaction of bodies, how they move, how they behave, how they travel, how they think. It's very exciting! And the notion of "potential" is fundamental to *Worlding*. It is part of the space and its architecture.

To return to the metaphor of the body without organs, in moving from philosophy to design we asked ourselves how we could make the concept evident in the space. The easiest way to make it understandable was to imagine it as a museum without rooms, without visitors, and without works of art. The body's organs are something like the rooms, the artworks, and the visitors. So it is a museum characterized by their absence—this was our visual metaphor.

Technically, *Worlding* is also a practical space where one can click to find out more about each artwork. But in our thinking, in the way we composed the space, it is an ecosystem, an ecology without given structures, so that the presences inhabiting the space are freer and more interconnected. What we really like about worlding design is that we can work without categorization or analytical thinking. It is a

Fig. 4
Portal of the born-digital artwork of Sascha Pohflepp with Alessia Nigretti, and Matthew Lutz, *Those Who,* **2019 in** *Spatial Affairs. Worlding,* **2021–23. Screenshot.**

processual and operational methodology based on connections and reflecting on the potentials that emerge from the interactions between elements. If we think of Deleuze and Guattari and their notion of a "field of potential," the *Worlding* environment has a potential for action, for things happening. That's why we think such virtual spaces have a huge potential in the future, especially for artistic production. For purposes that are much more imaginative and go far beyond commercial gaming.

Adding special features for virtual guided tours and elements of discovery for online workshops in the space was a great challenge, yet a satisfying one. Some tours consisted of coordinated jumping into portals of artworks, to access the original browser-based works. In general, you can experience these portals as windows into the different worlds of specific projects featured in the exhibition. At the same time, *Worlding* is a living environment ready to be acted upon: when you fly through it you discover surprise elements, such as hidden wormholes. That's one way of collecting and accessing knowledge gathered in the space.

What's also nice is that the "computational soundscape"—a non-human humming—plays such a strong role in *Worlding*. As soon as you enter, the whole ambiance sets the mood. And the beginning of that atmosphere is defined by Enrico Boccioletti's synthetized soundscape.

Granular Synthesis—Scattered Polyrhythms

GB   Through Enrico's soundscape, users seem to enter a continuum, an atmosphere which gradually reveals many layers and apparently multiplies the presences animating the environment. It would be interesting to dive into the conceptual and creative process which led you to the creation of *Worlding* soundscape. How did you link analog sources to virtual space? How did you address the dimensions of temporality and space to build those atmospheres?

ENRICO BOCCIOLETTI   The soundscape produced for *Worlding* is meant to explore some possible points of intersection between the human voice and electromagnetic radiation, mostly using granular synthesis to manipulate and transform the sampled material.

The human voice and the inaudible buzzes emitted by light, electricity, and electronic devices are both sounds that exist in the world around us. They are both forms of energy that travel as waves and can be detected by our auditory systems and/or perceived bodily. We are familiar with both of them. The human voice can be used to convey emotion and meaning, creating a sense of familiarity and connection; electromagnetic radiation can be perceived as a manifestation of strangeness, resulting in a more eerie element depending on the listener's perception, sensibility, and emotional state.

Granular synthesis breaks up sounds into small particles, typically between a few milliseconds and a few hundred milliseconds in length. Once the grains have been extracted from the original recording, they can be manipulated in various ways, such as by changing their pitch, duration, amplitude, or spatial positioning. In the *Worlding* soundscape I used patterns of "cloud granulation," where a large number of grains are played simultaneously, creating a dense complex texture, together with a form of "stream granulation," where a sequence of grains is played in a specific order, creating a sense of movement or progression within the sound. This process was used to create scattered poly-rhythms, rendering an illusion of movement.

These sonic elements can be seen as reflections of, or counterpoints to, the "body without organs" as a state of desire and potential, evoking a sense of the natural and the artificial existing in parallel and influencing one another, a taste of familiarity that exists within alienation. Creating the soundscape involved shaping and molding sound to generate a sense of place, atmosphere, and meaning. This is similar to the idea of world-making, the process of creating and shaping our understanding and perception of the world(s) around us.

Sound and hearing can also reveal aspects of reality that are not perceivable or not perceived as such. Certain information is not easily accessible through other senses, such as the capacity to perceive vibrations and pressure waves that are beyond the range of human hearing, or the ability to detect extremely faint sounds. Sound is a means to explore other aspects of reality, such as the ultrasonic or infrasonic frequencies produced by electricity, light, and devices.

Knowledge Access—Online Agency

GB I would like to return more globally to the practice of "world-making" in design. As mentioned, digital world-making seems to be changing the way we access knowledge, and in this sense it is a tool full of possibili-ties still in the making.

TR One priority we have in developing environments is to get away from commercial and industrial companies and platforms that offer tools for designers to create virtual worlds. You have to sign up with your email, with algorithms that check you and understand what you are look-ing for. We are trying to escape these big tech companies, to access knowledge in a different way. You don't have to Google it; not a single piece of space comes from commercial platforms like Mozilla Hubs, for example. *Spatial Affairs. Worlding* is a completely alternative space, and we were looking for that when we conceived the environment. It has unlimited potential. Technically, it can host a huge audience. Many people can visit *Worlding* at the same time. And that's incredible!

The practical capacity of the code which actualizes the potential of the space we're talking about is really stimulating, as is thinking about

the relationship with the audience, the users or visitors who arrive at artworks through virtual environments, and questioning what actions and relationships can take place in these spaces. These may be very abstract questions, but in reality they can be materialized virtually and *Worlding* is our answer in some ways.

It's also important for us to reclaim the agency of the individual online, because there are so many companies and consultants, even for arts and culture and museum websites, who seem to have a definitive answer as to what the user experience is, who the user is, what they are looking for, what we need to give them. This closes things down, limiting creativity. The user should have their own agency. Which links to the ethics of digital spaces and the way platforms are taking over and dictating user experience and behavior. *Worlding* is an example of how we can respond to the problem and try to overcome it. How we can break through.

Worlding … and Performativity

GB   *Worlding* became the name for the environment quite organically. It resonates in techno-scientific thought and theory, with Donna Haraway's notion of science fiction writing,[4] and with contemporary artists' work with digital environments, as well as the notion of mirror-worlds in early gaming culture. What is the value of the concept of worlding in your practice?[5]

TR   For us it was also a very practical design answer, an imaginative visual answer. You asked us, "what if the exhibition becomes an ecosystem of this computing cosmos, of these automata?" and we considered how to answer that visually. So of course you can look at it from the perspective of performative design, which we always like to unwrap in our project, and which in our practice often becomes very physical communication or graphic design, with different forms of audience collaboration or participation. But in the case of *Worlding* we thought, what can visitors do online? And especially if performative design gets really focused on bodies or intertwined actions and doings and relations and becomings—transformative moments of performativity—then it's not linked only with the formation of things or what we call an "ontology of becoming," but also with the production of the matter of bodies in this virtual space, the question of how matter can produce these bodies.

4   "It matters what stories we tell to tell other stories with; it matters what knots knot knots, what thoughts think thoughts, what descriptions describe descriptions, what ties tie ties. It matters what stories make worlds, what worlds make stories. Strathern wrote about accepting the risk of relentless contingency; she thinks about anthropology as the knowledge practice that studies relations with relations, that puts relations at risk with other relations, from unexpected other worlds." Donna J. Haraway, "Playing String Figures with Companion Species," in *Staying with the Trouble* (Durham, NC: Duke University Press Books, 2016), 12 and 29. See also Catelijne Coopmans, Janet Vertesi, Michael Lynch, and Steve Woolgar, eds., *Representation in Scientific Practice Revisited* (Cambridge, MA: MIT Press, 2014).

5   See also Giulia Bini "Rendering the Digital Penumbra and its Translucence," in *Spatial Affairs*, ed. Giulia Bini et. al. (Berlin: Hatje Cantz, 2021).

As performativity was quite central for us for *Worlding*, next to Donna Haraway, we would mention Karen Barad and their concept of "post-human performativity."[6] Barad's interpretation of "how matter comes to matter," saying that we can look at different *doings* and *actions*. It is interesting to see what this virtual environment can do: how it can work, operate, what relations and meetings occur in it. What aspects matter and how that can define the agency of that matter in beings, connections, and relationships. It's not that all elements have an agency per se or that the artworks have their own agency, but that an agency is coded in the relationship of things.

And that, through Haraway and Barad, brings us back to Deleuze's metaphor and to Zuse's computational logic. *Worlding* is like a virtual ecosystem, but it's very abstract; we didn't intend to make a literal "green ecosystem" in virtual space. It's rather a techno-scientific continuum of never-ending or infinite ends. What's exciting is that it is full of portals: suddenly visitors realize that they are in the body of this avatar as a guest, as a visitor, as a user, and you can click on the moving bodies of artworks, self-producing looped portals to somewhere else.

It would be nice if one day this computational cosmos became more AI, if it really came alive, with self-producing new portals connected to new and different artworks. That would be fantastic. But the connections in *Spatial Affairs. Worlding* are already not static. They are in action, they are performative doings. In terms of performative thinking, this realm of potentiality brings back questions on the boundaries of these spaces: how can we think relationally about boundaries and possibilities and doings and actions? That's why we like to make these worlds. And it was a quite exciting time, the difficult time of Covid-19, with cultural events and gatherings canceled—suddenly coding became central, and making worlds and developing them was our main activity in the studio; that has been our daily work for quite a long time. For us that period allowed an exploration of what we can do in these spaces, what relations we could build and who would want to test and try them. When you came with the request for *Spatial Affairs. Worlding*, we thought it was exactly the right time to do it, when we could not go out, or meet anyone physically.

The Agency of the Code

GB Beyond the Covid-19 contingency which made *Spatial Affairs. Worlding* particularly timely, what do you see as the unmissable features which will exponentially appear as conditions and characteristics of digital worlds? Now that we are two years on from realization, how do you perceive the environment in its own presence and life on the web?

6 Karen Barad, "Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter," *Signs. Journal of Women in Culture and Society* 28, no. 3 (2003).

TR Looking back, we realized that it is not only artworks and users that have agency in this space. *Spatial Affairs. Worlding* invites other-than-human kinds of agency, such as that of the code itself and of different computational bodies. We consider the code stored on servers as a non-human entity that co-constitutes this space. This extra guest we hadn't thought of before is purely computational—all bits of code and algorithms.

GB With the rise and development of machine learning, we have started questioning the existence of a machine vision which exceeds human perception, which is partially inaccessible to humans. That is fascinating to me. Also, the scenario you mentioned of an intelligent environment, opening new portals and starting to reproduce itself, offers an exciting way to perhaps fully embrace this virtual dimension and the potential of such environments—to imagine their future developments, what you might expect or further experiment with.

TR It would be extremely exciting to work with the machine itself in collaboration, co-creation (although quote the word "creative" has downsides to it) in such a way that we are on an equal footing in making the thing.

Intelligent Debate

GB World-making—the beginning of intuition, beyond the concept of the generative.

TR An intuition which comes with an opinion, with agency, more than a generative approach, with a plan and a concept. We are not looking for total intelligence, of course, but rather for the possibility of an *intelligent debate* about things which could be creative for a designer working with machines; it would be nice to have a dialog that is visual, where the environment would build parts itself and it would grow and one day you would open it and it's a way bigger—and then there is even a new avatar connected and flying through the space. That would be amazing... also a bit scary, but amazing.

GB *An intelligent visual debate*—that is indeed an interesting thought.

TIRANA FLOATING ARCHIVE. Ethereal Narratives, Visual Essentialism, and Contemplative Navigation as a Proposal for a Slow Digital Archiving

Adela Demetja

The Local Context

When Lívia Nolasco-Rózsás from ZKM | Center for Art and Media Karlsruhe first approached Tirana Art Lab – Center for Contemporary Art (TAL) to invite us to become a partner in the collaboration project "Beyond Matter, Culture Heritage on the Verge of Virtual Reality", it took us a while to get to grips with our involvement in the project. Our main concern, related to the medium, was our institution's lack of previous experience with ⬛ virtual reality. Secondly, regarding the content, we were an independent institution with no collection or any major past exhibitions in need of being brought back through virtual reality, like some of the other partners. Nevertheless, there were two ways in which this project could be of relevance for Tirana Art Lab.

The first was that virtual reality could offer a layer of existence for Tirana Art Lab beyond its physical existence, which had been put into question at that time for two main reasons. TAL had operated from 2014 until the end of 2018 from a multifunctional space located in a central area in Tirana. We decided to leave the premises in which we had organized our public program due to difficulties in acquiring consistent funding to maintain the space and as a result of rent prices getting higher in the city center. Besides, new art spaces had emerged in the city that concentrated mostly on exhibiting; we at TAL were putting an emphasis on long-term projects involving research, production, and discourse. Witnessing how, in Albania as well as abroad, the exhibition as a format had increasingly been taken over by power structures and capital, becoming commodified and depoliticized, we started introducing the notion of performativity into TAL's curatorial practice. The author of this text initiated the Performative Exhibitions format in 2018 with the first project *Center for Integration*, which took place at TAL with the intention to disclose exhibiting, to not only make public through performativity the process of artistic creation and curating, but also to include in the exhibiting process the means of production behind and beyond the event itself. Performativity in this sense aims to find new ways of exhibiting and curating that break with the temporary/unique features of the contemporary exhibition and propose enduring ways of working together. The idea is to think of curating as a performative practice that can do/

act,[1] distinguishing itself from mere exhibiting by enhancing the exhibition's ability to produce or inform reality. We therefore saw that virtual/digital space would be a "territory" that could liberate us from physical restrictions and allow us to extend this performativity further, taking into consideration the time-based engagement and interaction of the public, beyond space.

The second way concerned the content of the project, which in our case could be more directed toward Tirana's public space, which had been the focus of many of our previous projects, including the collaborative project *Heroes We Love* (2015–16),[2] *100 Km Art Tirana – Shkodra* (2013),[3] and *Pipifax – Through the Looking Glass and what we found there* (2011).[4] The city of Tirana has been undergoing major transformations since the change of regimes in 1991. Until the mid-2000s, the contemporary art discourse in Albania developed mainly in state-run institutions. Independent initiatives started emerging by the latter part of the 2000s, to eventually become the primary actors in developing contemporary art discourse. Over the past fifteen years, Tirana has experienced the emergence and disappearance of several independent enterprises; a few of them have managed to survive and make progress, coming to serve as pillars of the scene, such as the Tirana Institute of Contemporary Art (T.I.C.A), the ZETA Center for Contemporary Art,

Fig. 1
Lumturi Blloshmi, *Piramida,* **2002. Plastic Coca-Cola bottles, metal structure, installation in front of National Gallery of Arts, Tirana. Work featured in the** *Tirana Floating Archive.*

1   I write more about curating as a performative practice in the essay "Curating as Performative Practice," in *Art Within Political Struggles. Solidary Artistic Practice at the Periphery: Tirana, Skopje,* ed. Adela Demetja and Rena Rädle with Ivana Vaseva and Valentina Bonizzi (Tirana: Tirana Art Lab, 2021), 91–105.

2   See http://www.tiranaartlab.org/en/project-collection/heroes-we-love, http://www.tiranaartlab.org/en/project-collection/nikolin-bujari-and-nada-prlja, http://www.tiranaartlab.org/en/project-collection/ceta-georgia-kotretsos-pleurad-xhafa, http://www.tiranaartlab.org/en/project-collection/the-art-of-the-socialist-period-between-contempt-fetishism-and-transition, accessed March 20, 2023.

3   See http://www.tiranaartlab.org/en/project-collection/100-km-art-tiranashkodra, accessed March 20, 2023.

4   See http://www.tiranaartlab.org/en/project-collection/workshop-and-exhibition, accessed March 20, 2023.

**Figs. 2 and 3
Enisa Cenaliaj, *Welcome dear workers*, 2005.
Performance in public space, Ex Textile Factory (Kombinat), Tirana.
Work featured in *Tirana Floating Archive*.
Cenaliaj's performance *Welcome dear workers* took place in March 2005, as part of the event "1:60 Insurgent Space," curated by Stefano Romano.**

and Tirana Art Lab. The first Tirana Biennale took place in 2001, bringing international artists to Tirana and confronting the local public with international contemporary art for the first time. One aspect of the second Tirana Biennale (2003) was to invite international artists to paint the facades of buildings in the city, an action initiated by Edi Rama, at the time major of Tirana, whose own colorful sketches were the first to be painted on prominent buildings in the city center. Few know that Tirana now has public buildings whose facades are painted according to the concepts of artists such as Rirkrit Tiravanija, Dominique Gonzalez-Foerster, Olafur Eliasson, Liam Gillick, and Tala Madani. Due to a lack of structures and spaces for the display of art and as a critique of the rapid, sometimes violent changes in Tirana's architecture and urban infrastructure, many Albanian and foreign artists of the independent art scene have been making artworks and interventions in public space, often to oppose and criticize initiatives like those from the "institutionalized" and "official" culture politics. The project *1.60insurgent space* (2005–07), for example, organized several interventions by Albanian and international artists in Tirana's public spaces. Many such interventions from the independent art scene have emerged as a critique of the disappearance or misuse of public space by those in power and as a way to claim back the public realm.

Unfortunately many of those interventions, both official like the facades produced by the Tirana Biennale and the often illegal ones made by the independent art scene, had remained undocumented, unpublished, and inaccessible to the public. We saw it would be convenient for us to use the opportunity of Beyond Matter to gather lost materials and documentation related to those projects, to make them available to the public, and to reconstruct some of them through various digital/virtual tools and create a digital archive.

The Floating Memory

During 2020 and 2021 we worked to create what has become the *Tirana Floating Archive* (www.tiranafloatingarchive.org), a digital platform documenting past and present art interventions made by the independent art scene in Tirana's public space. Interventions chosen for the archive stand for artistic quality and make meaningful contributions to past and present public debate around public space. The launch included 38 projects from 2002 until 2022. Each project or intervention is documented with text, photographs, and video material including the artists' biographies. At this stage, the artists included are Silva Agostini, Fabrizio Bellomo, Lumturi Blloshmi, Nikolin Bujari, Enisa Cenaliaj, ÇETA, Donika Çina, Adela Demetja, Haus am Gern, HAVEIT, Hanna Hildebrand, Sead Kazanxhiu, Ledia Kostandini, Georgia Kotretsos, Dren Maliqi, Alban Muja, Alketa Ramaj, Gabriele Rendina Cattani, Stefano Romano and Eri Çobo, Rena Rädle and VladanJeremić, Arjan Serjanaj, Syabhit Shkreli, Alexander Walmsley, and Ergin Zaloshnja.

Most of the archival materials were handed over to us by the artists, who tended to document their actions themselves. We then edited their text and visual materials to create parity regarding the amount of material and text from each artist. Together with the content manager and cocurator of the project, Eni Derhemi, we spent a lot of time thinking about how we would structure the archive. We wanted to find a creative way to organize, display, and make accessible its information for the user. Our initial decision was to name the undertaking *Tirana Floating Archive*: most of the interventions did not exist anymore and had left no physical traces, yet memories of this intangible cultural heritage was floating in the private and collective narratives of the art scene, playing an important role in shaping the independent artistic memory of the city. Metaphorically, the archive functions as a collection of information that has survived and can endure due to its capacity to lie on and beyond the surface of matter, change, and amnesia.

We aimed to create a conceptual framework for archiving the projects under specific categories, while still preserving the ethereal quality of the projects and the undertaking. We decided to use figurative expressions for categories to create an open system of meaning suggesting abstract, inclusive, and expansive narratives for the archive's future. The expressions are linked

with the notion of floating and are inspired by sea-related phenomena. By bringing together certain projects under one category, we created a system of interconnections between featured projects and events that had not yet been explored.

Ethereal Narratives

The categories of the archive are:

Waves
This category gathers projects linked with memory and remembrance. Projects that transmit a certain content like waves, transporting past elements into the present by creating moments of confrontation. The circular and repetitive motion of waves causes a disturbance or variation that interferes with and influences a given reality.

Fata Morgana
A Fata Morgana is an optical phenomenon caused by atmospheric conditions, creating a form of mirage appearing above the horizon at sea or on land. In this archive, Fata Morgana brings together projects oriented towards transformation and experimentation, intending to modify and reshape our perception and experience of things.

High Tide
Following the rising level of the sea with high tide, this category includes works that bring forward a proposal. Proposals are carried by all sorts of expression of feeling, from a desire to rage. Like the movement of rising water, these projects manifest their presence by interrupting and menacing the "norm."

Maelstrom

A maelstrom is a powerful whirlpool produced by opposing currents or a current running into an obstacle; it is often regarded as an oceanic black hole. Given the maelstrom's potent and unpredictable character, this category is dedicated to projects with a direct, confrontational impact. By protesting and refusing the order of things, these projects come as forms of critique and resistance.

Sea Breeze

This category includes projects which can maintain a light, almost funny approach even when dealing with serious issues. Just as the sea breeze pierces through the heat, characterized by a gentle and playful feeling, these projects penetrate the public space with ironic humor.

Low Tide

During low tide, the coast exposes what is usually covered by water, creating a powerful revelatory effect. Inspired by those moments, this category includes projects that disclose and denounce, telling the truth for the sake of the public good.

Visual Essentialism

Apart from the archive's content and structure, the website design was a crucial part of the project because the site is the only way to experience it. We worked closely with designer and artist Denislav Golemanov, who came up with proposals and solutions that would maximize user experience by allowing each user to navigate their own singular interactive path, guided by the narratives proposed while using a minimal visual language.

Golemanov and programmer Marin Nikolli tried to create a language and logic of navigation that goes beyond the general purpose of UI and UX and adapts to the specific needs of the project. After engaging with the design, Nikolli decided to build a backend data management system with *Laravel*. As for the frontend and the UX, a combination of solutions were used on a base of vanilla JavaScript with an additional *amCharts* force-directed library.

Design elements that are particularly important for the experience and meaning of navigating the archive include: the split screen; the diagram as an interconnected organism through which the site can be navigated differently every time; the time protocol recording all the steps of the user, creating an infinite unique page with the personalized navigation; the multifunctional button through which the map and the flat gallery can be accessed, allowing the user to enlarge each photo and video as desired. The site can also be navigated through the search area, which functions as a more simplified index making the material accessible in both Albanian and English. Major work has been done to adapt the site for both desktop and phone, with different solutions for each device type in order to ensure the transmission of content through an exploratory experience. The first stage of the archive was launched in March 2022. Since then we have been working on extending an additional feature, *Tirana Floating Tours* (www.tiranafloatingtours.org), a phone application that was launched in April 2023. This will provide users with four different tours stopping at more than sixty stations around the city of Tirana, enabling some projects in the archive to be revisited at the locations where they were once displayed. Additionally, the application will allow an exploration of the artworks developed by the Beyond Matter artists-in-residence in Tirana through augmented reality. New AR works will be developed and some past interventions will be reconstructed in 3D.

Fig. 5
Desktop view from
*Tirana Floating Archive***,**
designed by Denislav
Golemanov, code by
Marin Nikolli, featuring
an artwork by Rena
Rädle & Vladan Jeremić.
Screenshot.
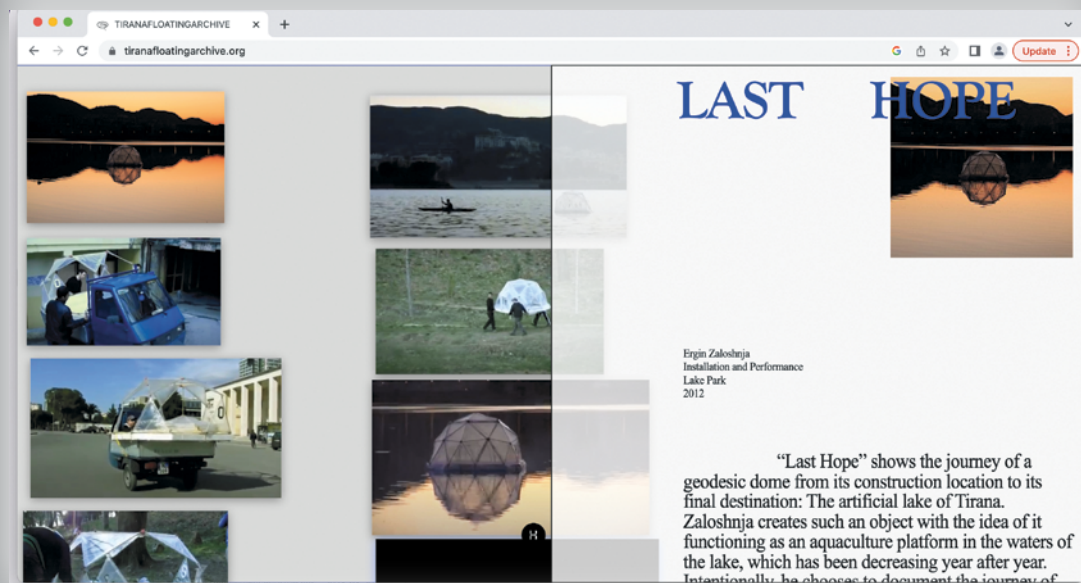
Fig. 6
Desktop view from
*Tirana Floating Archive***,**
designed by Denislav
Golemanov, code by
Marin Nikolli, featuring
an artwork by Ergin
Zaloshnja. Screenshot.

Fig. 7
Mobile view from
*Tirana Floating Archive***,**
designed by Denislav
Golemanov, code by
Marin Nikolli, featuring
an artwork by collective
HAVEIT. Screenshot.

Contemplative Navigation

For us the *Tirana Floating Archive* undertaking has been a process of preservation and a practice of meaning creation. We wanted the project to follow the approach of Tirana Art Lab, of curating as performative practice: the archive is an experience to be inhabited rather than consumed. The digital/virtual territory beyond physical space offered the perfect domain for this endeavor, allowing us to operate free from location and to engage with users through their attention and time.

The traditional role of the archive (*arkheion*[5]) as a site and institution that stores and controls content has been challenged by new media, the digital, the internet, and the database. That style of archive, made of layers to delve into, has been integrated into and influenced by the rapid production cycle of the neoliberal economy, corresponding to a flattening of cognitive space and merging with the horizontal flatness of the global present, as author Sven Spieker argues.[6] Positing certain artists' projects as examples, Spieker suggests several strategies for "slow archiving" that offer alternative archival methods, critical of neoliberal promises but avoiding nostalgic revival. For Spieker the slow archive's element is not space but speed, for it requires a change of pace in how we focus on archival material. The art projects he mentions make use of disorientation, unknowing, and the slowing of information flows, approaches that he considers as new archival politics.

With *Tirana Floating Archive* we hope to have created a hybrid between archive and art project, that can both preserve and suggest alternative ethereal narratives. We want it to offer an explorative experience, a contemplative navigation, built on visual essentialism—to act as a proposal for slow digital archiving.

5   See Jacques Derrida and Eric Prenowitz, "Archive Fever: A Freudian Impression," in *Diacritics*, 25, no. 2 (Summer, 1995), 9–63. http://artsites.ucsc.edu/sdaniel/230/derrida_archivefever.pdf.

6   See Sven Spieker, "Manifesto for a Slow Archive," *Artmargins Online*, January 2016, https://artmargins.com/manifesto-for-a-slow-archive/.

WORLD WIDE VIRTUAL WEB

Bogna Konior

"The picture, certainly, is in my eye. But I, I am in the picture."[1]

Jacques Lacan

In early January of 2022 in Shanghai, weeks before a general lockdown confined over 25 million people to the space of their apartments, colorful neon pink posters appeared in one of the city's hip bars. "Party Time!" they announced, followed by a description of the desired dress code: "metaverse metallic." Over the long months that followed, as drones delivering food to imprisoned citizens became a common sight, life felt confined to the spectral space of the mobile phone, where remnants of social interaction could take place and where the city's inhabitants frantically tried to figure out food delivery as physical infrastructure effectively shut down. In the summer, when the lockdown shifted to a milder form, with many public venues shut or only accessible if one presented a 48-hour virtual green code—evidence of a recently completed Covid-19 test—online English-language media overseen by China's Communist Party flaunted the term "↘ metaverse" with increased frequency. Beijing published a 50-billion-yuan "digital human industry" strategy, regulating digital assistants, virtual influencers, and gaming avatars. An expo at Shanghai's Zhangjiang Science Hall boasted of twenty-eight digital cameras that could synthesize virtual avatars capable of laughing, crying, and screaming—apparently the most useful reactions in the metaverse. Unlike in previous years, participation was by invitation only. Most Shanghainese remained in a more mundane version of the

metaverse, with QR codes, location trackers, and temperature sensors creating a virtual layer over the physical space of the city, dictating everyday movements and decisions. At any moment a text message could arrive informing you, for instance, that a few days prior you had passed by a venue where a close contact of a positive Covid-19 case had spent an hour; to mitigate the potential consequences of this hypothetical interaction calculated in virtual space, transportation to a centralized quarantine facility would be arranged for all involved.

The brave new world of the virtual has time and again arrived as the brave new world of governance. It was true for social media and virtual communities of Web 2.0., which promised anonymity, autonomy, and playfulness but enabled a tightening of surveillance by commercial platforms, and it will be true of any virtual world presented as an opportunity to connect to other people while simultaneously connecting to corporations, advertisers, and governments. And yet the virtual remains an escapist promise, a space of fantasy and potentiality. "Metaverse," a retro-futuristic and hopeful term, retains the sheen of high-spirited thrill that the stale and technical "internet" has now lost. This is so even though the promises of the metaverse—authentic or anonymous virtual expression, seamless integration between physical and virtual, sensory immersion—are one-to-one copies of the promises of the internet, to the point that it becomes impossible to distinguish Meta's

1 Jacques Lacan, *The Four Fundamental Concepts of Psychoanalysis*, trans. Alan Sheridan (New York: W.W. Norton, 1978), 96. First published as *Les quatre concepts fondamentaux de la psychanalyse* (Paris: Éditions du Seuil, 1973). Sheridan translates the last sentence as, "But I am not in the picture." In the original, however, it reads, "Mais moi, je suis dans le tableau."

recent *metaverse* launch video, either in tone or substance, from the adverts for the multiplayer online game *Second Life* of the early 2000s. Though we are tempted with new virtual- and augmented-reality gadgets, they join a long line of devices that failed to launch us into fantasy lands, from nineteenth-century Victorian stereoscopic goggles to the Sensorama in 1957. In the words of media scholar Yvette Granata, virtual reality is always emerging and just on the brink of full adoption, just as the cinema is always dying.[2] Look only at the series of exhibition catalogs which, from the 1980s onwards, entice us with a "new" world of virtual exhibitions presented as interactive websites. Arguably, for all those promises, no digital medium has even begun to substitute for the full immersion of reading a good novel. And yet we cannot shake off the feeling that there is something new and alluring in this specific form of the virtual we live in, or desire to live in, today. What computer immersion has provided us is a type of space and a form of agency that cannot easily be called human, and that complicates our ideas about agency and the self. The situation is ironic: we are promised that we'll be able to access a different space through a computer, while in truth it is computers that are constantly accessing and occupying the space around us. We are told we will be able to enter the metaverse, as if we were not already in an immersive computer-made world.

Computers watch us more closely than we watch them: occupying the air and the waters around us, bringing us the messages of our friends, and lurking in the darkness of our bedrooms. From our phones to CCTV networks and satellites, most computers today are cameras and sensors, in form or function. We look at them, they look back at us. We may sense their presence, but they sense us better. They record information we didn't know we were providing, they feed our senses with ongoing stimuli, and lay out the patterns of our thoughts, predicting and designing our movements. I imagine them as projectors. In each particle of space, these machines project a virtual net overlapping onto the reality humans can empirically perceive. The vastness of this space cannot be grasped by any one person alone—it is a black box of virtuality hanging over the city like a spider web. It is what Lev Manovich describes as "an augmented space [...] the physical space overlaid with dynamically changing information."[3] We used to call it the World Wide Web. In the late 1990s sociologist David Lyon wrote about the nascent potential of "intelligent agents," colloquially referred to as spiders, "that short-circuit the often tedious process of deploying internet search engines to find usable data."[4] Many spidery machines now crawl across the web. In 2006, Manovich described the modern city as "a physical space that is 'filled' with data, which can be retrieved by a user via a personal communication device."[5] In this imagination of the city, we would use our devices to enter the virtual, our phones acting like portals into the web. We would be spiders, spinning the web by exchanging information with others. But the virtual space currently emerging is the opposite—it is *we* who are the access points for the machines that spin the World Wide Web. Spun between them, it is not an escapist fantasy realm but a fully operational space of statistical calculation that overlays onto the "real" world and has concrete physical effects. In Shanghai, it is a vast expansive space of machinic simulations of risk which override one's decision about one's own body and movements. Calculations happening overhead through a vast machine of risk-averse reasoning are communicated to us through our personal devices, manifesting the virtual potentiality of risk as physical consequence in our daily lives: being locked inside an apartment, being moved to quarantine, having food deliveries and movements restricted, being separated

2   From a personal conversation with the author.

3   Lev Manovich, "The Poetics of Augmented Space," *Visual Communication* 5, no. 2 (2006): 219–240 (quotation on 220).

4   David Lyon, "The World Wide Web of Surveillance," *Information Communication and Society* 1, no. 1 (1998): 91–105 (quotation on 95).

5   Manovich, "The Poetics of Augmented Space." 221.

from family and friends. You do not *come to* an immersive space; immersion *comes for* you, escaping your phone and capturing your body.

Because the quest towards immersion, fantasy, and virtual worlds is as old as our first medium, language, the question of virtuality is always a question about the exact machines—and their owners—that project and sustain the virtual realm. We have long desired to make virtual worlds and simulations; it is only our machines that have changed and perhaps fallen into the wrong hands. Although we are now accustomed to thinking about computers in connection to virtuality, the term "virtual reality," coined by French dramatist Antonin Artaud in 1938, can also refer to the illusory spaces that audiences superimpose onto physical ones during a theater play.[6] Our mind's eye projects a virtual layer onto the stage, our brains acting like augmented-reality devices. During a play, objects, prompts, and spatial aesthetics in general are used as portals into virtual worlds, but theater is not unique in this respect. Margaret Wertheim and Laura Marks each describe the quest for aesthetic and experiential virtuality throughout the ages, ranging from the paintings of Giotto to Islamic philosophies of representation. Rather than through a computer, fourteenth-century Italians accessed virtual reality through a church and its sprawling frescoes. Giotto's masterwork in Padua is one of the most impactful attempts at creating the illusion of three-dimensionality on a flat surface, with his painted saints often turning their gaze as if into a reality beyond the walls. "Almost eight hundred years before today's purveyors of computer-based virtual reality,"

6   I am describing here a colloquial and simple understanding of the theater as a virtual reality. For a deeper reading of how virtualization is treated in Artaud's work, see the chapter "The Virtual Reality of the Theater: Antonin Artaud," in Samuel Weber, *Theatricality as Medium* (New York: Fordham University Press, 2004), 277–94.

Wertheim writes, "Giotto created in the Arena Chapel a hyper-linked virtual reality, complete with an interweaving cast of characters, multiple story lines, and branching options."[7] And earlier, as Marks describes, algorithmic fractalization was already present in the architectural techniques of Islamic mosques. Such interactive architecture, with elaborate visual illusions that change form depending on where in the mosque we watch them from, correspond to early Islamic philosophies of infinity and *takhayyul*, "the faculty of imaginative representation."[8] Quoting Oliver Leaman, in reference to twelfth-century Persian philosopher Suhrawardi and Arab Andalusian Muslim mystic Ibn Arabi, Marks writes:

> In the imaginal realm, our bodies "can wander freely around a range of ideas and experiences which would not be possible for our ordinary day-to-day bodies." The concept of the imaginal realm and the idea of a slightly abstracted body that is capable of drawing down higher truths, informs Persian painting, with its idealized and spiritualized bodies. They also describe what people try to do in (the currently clunky) "virtual reality" and in avatar online-based games and worlds.[9]

Virtuality, augmentation, and avatars have long been present in human thought. Chiefly spatial and ocular, current attempts at virtuality are distinguished from historical attempts not through the degree of immersion they offer, but rather by the fact that the machine producing them is a computer. A computer does not offer more or less immersion than a book, a church, or a play. But the presence of computers in our human spaces is quite different from that of churches or paintings. Where the latter

are like portals to other worlds, the computer as a device obscures the reality of the virtual web we are already in.

This concealment is perhaps the distinguishing feature of what our computers do as contemporary tools of virtuality. Although fully functional metaverses, in the pop-cultural understanding of the word, already exist in the spaces of online gaming today, be it *Fortnite* or *VRChat*, the idea of the metaverse as something that is always just about to arrive coincides with narratives of concealment and deferral. As Ian Bogost writes, the metaverse fantasy is a bilateral one: "it connects the rather prosaic reality of technologized consumer attention to a science-fictional dream of escape," but also "offers a path toward total consolidation, where one entity sells you entertainment, social connection, trousers, antifreeze, and everything in between [...] the ultimate company town."[10] By placing our fantasy in the futuristic idea of a fully inhabitable three-dimensional virtual image, we might forget that in our "urban data-space [...] the image is nothing but the moment of network access,"[11] and that we are the ones being accessed.

Images today—the health codes displayed on our phones in Shanghai, or, more prosaically, any of the social media interfaces netizens scroll through across the globe—are more than simple representations. As virtual access points for machines, "images are part of an operation, and this operation concerns me, you and the database."[12] "Machines" are meant here not only as devices in our homes, the computers and mobile phones which act like sensors providing information about us to whoever owns them, but also as functions of subjectivity production and facilitators of our experiences. In the two-volume

7   Margaret Wertheim, *The Pearly Gates of Cyberspace: A History of Space from Dante to the Internet* (New York: W.W. Norton, 1999), 81.

8   Laura U. Marks, *Enfoldment and Infinity: An Islamic Genealogy of New Media Art* (Cambridge, MA: MIT Press, 2010), 282.

9   Marks, *Enfoldment and Infinity*, 282.

10   Ian Bogost, "The Mataverse is Bad," *The Atlantic*, October 28, 2021, https://www.theatlantic.com/technology/archive/2021/10/facebook-metaverse-name-change/620449/.

11   Ingrid Hoelzl and Remi Marie, *Softimage: Towards a New Theory of the Digital Image* (Chicago, IL: The University of Chicago Press), 2015, 113.

12   Hoelzl and Marie, *Softimage*, 113.

Capitalism and Schizophrenia (1972/80), their notoriously difficult work, Gilles Deleuze and Felix Guattari told us about these machines: how one can be subject to them, a cog in a machine, and how one's actions are restricted to what the machines permit.[13] They proposed that we no longer simply use tools, but that tools use us. The two philosophers went as far as to speak of "machinic enslavement," which describes nothing less than remote control by machine and an inability to distinguish between ourselves and the machines that program our days, senses, movements, and thoughts.[14] We become components of the technologies that we use and that use us. We—our lives—are their input and output elements; it is through us that information and affect is transmitted. There is no big Queen Machine but a swarm of smaller machines, programming our body parts, thoughts, and senses, dictating our rhythms, everything within our days. What they weave together we call "capitalism" or "nature" or "reality" or "society"; among their webs "there is no subject, only collective arrangements of enunciation."[15] We are not spiders, we are the silk with which the web is made.

"New media technologies have always offered the fantastic while conforming to the needs of daily life when adopted," as Beth Coleman has pointed out.[16] Mundane metaverses are already here while their fantastic counterparts are advertised as only just arriving. There is the fantasy of entering a virtual reality through a computer, but there is also an emergent fantasy of not being an access point through which virtuality enters us. The metaverse is both a nostalgic term from old computer magazines and a future that has already begun.

13   See Gilles Deleuze and Félix Guattari, *Anti-Oedipus: Capitalism and Schizophrenia*, vol. 1, trans. Robert Hurlex, Mark Seem, and Helen R. Lane (London: Continuum, 2004); *A Thousand Plateaus: Capitalism and Schizophrenia*, vol. 2, trans. Brian Massumi (London: Continuum, 2004). First published as *L'Anti-Oedipe* and *Mille Plateaux* (Paris: Les Éditions de Minuit, 1972 and 1980).

14   See Deleuze and Guattari, *Anti-Oedipus* and *A Thousand Plateaux*.

15   Maurizio Lazzarato, "The Machine," *transversal*, October 2006, https://transversal.at/transversal/1106/lazzarato/en.

16   Beth Coleman, *Hello Avatar: The Rise of the Networked Generation* (Cambridge, MA: MIT Press, 2011), 8.

ON CONDITIONS.
The Curatorial and the Virtual

Beatrice von Bismarck and Lívia Nolasco-Rózsás

LÍVIA NOLASCO-RÓZSÁS

In your publication *The Curatorial Condition* (2022), you define the subject along four main terms: curatoriality, constellation, transposition, and hospitality. In the Beyond Matter project, from the beginning on we focused on the deconstruction and then the gradual reconstruction of the term "⬐ virtual reality" to escape a very technical approach to this phenomenon, and point out that VR can carry much more nuanced meanings, more than simple sensory illusion triggered by a certain set of hardware and software. The terms that were produced in the process appear as chapter titles in this publication (viral radiation, valid readings, vaporous restoration, variable relations, visible revision, and visionary ramblings) and collectively outline another condition that could be called virtual. Do you see any overlaps or resonances between the curatorial and the virtual condition, and if yes how would you describe them?

BEATRICE VON BISMARCK

I use "condition" not only in the sense of being in a specific—a fit or healthy—condition, but rather in terms of the pre-conditioning and sociopolitical circumstances in which the curatorial situation takes place. For me, the main characteristic is a coming-together in public differently: the change between the previous coming together and the new coming together within the curatorial situation implies a shift that traverses times, spaces, and media. In terms of tasks, positions, and roles, there is also a shift in the meaning, function, and status of all those participating. That is what I mean by coming together differently. It's taking place in public, because within any curatorial situation, human and non-human participants enter the public realm. Visibility or publicity, collectivity, and processuality are the essential conditions which contain the political aspects that the curatorial in its relationality brings with it. I think the "virtual condition" can be part of the curatorial condition and participate in a lot of those political aspects, but it shifts the attention from what I would call the specificities of the curatorial as a situation characterized by its relationality to a definition of this coming together through its medium.

I have described the curatorial situation as a "constellation." The term suggests a coming-together in public of humans and non-humans that alters according to how they relate to one another and how those relations are established. The historical use of the term constellation shows

that the ways in which relations are established play a role in further modes of coming-together because the relations themselves become agents. They become part of the non-human agents which are involved with the human agents. On a meta level, one might establish a connection between variable relations and curatorial relations. Your use of the phrase "variable relations" points to the fact that the virtual condition allows a flexible recombination mode that redefines "constellation." From the perspective of the curatorial condition, however, I would always look at the whole of the constellation and examine the participating elements and relations from there, such as its digital and non-digital parts.

I have described the curatorial situation as a "constellation." The term suggests a coming-together in public of humans and non-humans that alters according to how they relate to one another and how those relations are established.

LNR These are indeed relevant questions. Let me return to your description of a shift between previous ways and current ways of coming-together in the curatorial condition. What do you see as the cause of this shift?

BVB Whenever participants in a curatorial situation come together, they come together as strangers—regardless of whether they have previously related, they find themselves in new relations. Shifts occur because of these new relations, which affect the meaning, function, status, and role that these objects or people have within the new situation. To give a very straightforward example, a Paul Cézanne landscape painting can be exhibited in a constellation of other Cézanne landscapes, in a thematic exhibition on late nineteenth-century landscapes, or one on serial production in art. The characteristic foregrounded and the picture's resulting aesthetic function are related to its recombination. But reconstellations affect all the other human and non-human participants as well: the other exhibits, the display furniture, the walls, the curators, the museum director, the guards, and the critics, to name but a few of the players. They all show *themselves* and they show *something*. On a meta level, this is true for the constellation of the exhibition too: it shows itself and shows something. It is important to take this into account in writing exhibition history. In the 2013 remake of Harald Szeemann's *Live in Your Head: When Attitudes Become Form* (Kunsthalle Bern, 1969), this became particularly prominent.

The shift also has to do with transposition, which is how I describe the way in which meaning is produced through curatoriality. Transposition is a concept that Rosi Braidotti in particular has focused on, describing it as a change of relative situatedness in the widest sense. One aspect

she highlights is a zigzagging movement between different disciplinary, social, political, or artistic contexts, a zigzagging that is imminently connected to the generation of meaning and the production of knowledge. The potentiality of the shifts is always related to new forms of meaning production within the curatorial.

I understand an exhibition more like a performance than a permanent, fixed image or state.

LNR   Do you see a temporal aspect to curatorial relations, and if so is it congruent with exhibition histories?

BVB   I understand an exhibition more like a performance than a permanent, fixed image or state. It's a process-oriented, ephemeral form of cultural production. The curatorial situation continuously redefines its interior and exterior relations due to the dynamics among the various participants entering or leaving it. It changes in terms of materiality, but also in terms of the relations generated by that situation.

LNR   *When Attitudes Become Form* was restaged at the Fondazione Prada in Venice, in 2013 as you mentioned. This and other remakes, reenactments, or reconstructions of past shows tend to keep the prefix "re," which refers to an aspiration to create a copy of a past concept and its manifestation. What was at stake in the reenactment in Venice? What is your assessment ten years after—did it fulfill its aim?

BVB   When talking about exhibition history, we have to take the constellational quality of an exhibition with its processuality and historicity into account. In dealing with previous exhibitions, we encounter a variety of historical evaluations which in new combinations have changed and change over the course of time. In the Venetian installation of *When Attitudes Become Form*, the aim was to reconstruct a setting and the works which had been exhibited in 1969. When it was impossible to show the same exhibit that was shown in 1969, it was often reconstructed or replaced by a similar one. Conceptually, the re-installation focused on some of the original non-human participants and exhibits, as well as the exhibition institution, the Kunsthalle Bern. However, relations among the non-human but also human participants that were established through the 1969 exhibition and the subsequent periods of evaluation until 2013 were left out. Over the course of those 44 years, understandings of art in relation to the market, its publicity, and its documentation, of the curator in relation to artists and other agents in the field, and of the exhibition in relation to other artistic disciplines, to subjectivity, and—again—to the market (to name here just a few aspects) had all undergone fundamental changes. After 1969 the whole constellation of that historical show continuously grew in its historical, social, economic, and symbolic value. All participants—things and people—were part of the relational revaluating process. The participating

artists gained from it as much as Szeemann did, but in 2013 the exhi-
bition allowed for an economization of those previously established
relations. So looking back at the restaging in Venice in 2013, I see a
need to consider the historically formed and changing relations among
all participants as integral agents when practicing exhibition history or
rather the history of curatorial situations.

LNR   In the case of *Iconoclash* and *Les Immatériaux*, we opted to model rather
than reconstruct or reenact them. This was partly a necessity but also
a choice, since with the state-of-the-art equipment available to us
we can access computer-generated space differently than we can
physical space. There is always an interface between the viewer and
the exhibition model. The methodology established for these exhibition
models will be used for others, so we are still looking for the right term
to describe them. Model, emulation, or proxy are among the sugges-
tions. What do you think would be right word for such an endeavor?

BVB   I'm not sure I can propose adequate wording for your productive pro-
cess of making historical exhibitions accessible again. From my point
of view, you designed a constellation in which new participants have
entered: the virtual realm and the various technological tools that allow
for the modeling and emulation. These new participants play a role as
agents in relation to all the other participants, to such an extent that you
have to rethink their meaning, function, and status. "Modeling" seems
to grasp the dynamic characteristics of your approach with its capacity
for testing new forms of constellations, for variation and redoing.

LNR   Especially in the case of *Iconoclash*, we were indeed interested in trans-
posing constellations and possibly creating new ones, but very much
based on the original concept of the exhibition. We also briefly touched
upon the keyword "interface," which was very prominent in media the-
ory for a time, but which has been abandoned as an object of analysis
in the past fifteen or twenty years. In our discourse it gained a new
relevance as we realized that exhibitions cannot only be presented and
experienced in physical spaces. This leads to the question of whether
digital revivals of past exhibitions can be interpreted as transpositions,
like reenactments of past shows, or does a difference emerge with the
shift from physical to computer-generated virtual spaces?

BVB   That is a very interesting question that I would like to connect to the issue
of curatorial infrastructures. The relations established through and within
the curatorial could be called an infrastructure. Infrastructure allows
movement that shapes those that it moves and shapes their relations.
The digital interface could be associated with curatorial infrastructure
in as much as it takes on infrastructural functions within the curatorial
situations you created. The interface would have to be understood in its
political function, because it filters, organizes, includes, and excludes.
Thus the transfer from physical to digitally generated virtual space not
only implies additional agents, but also a widened realm of transposi-
tional movements and an extension of the means of the political (ambiva-
lent hospitable) functions within and through curatorial situations.

BEYOND MATTER.
Digital Materiality (Language, Image, Space)

Irmgard Emmelhainz

> Every surface conceals the textural relief of its raw material.[1]
>
> Jean-François Lyotard
>
> What has happened? Simply that our means of investigation and action have far outstripped our means of representation and understanding. This is the enormous new fact that results from all other new facts.
>
> So the whole question comes down to this: can the human mind master what the human mind has made?[2]
>
> Paul Valéry

The exhibition *Spatial Affairs*, as well as the two past landmark exhibitions *Iconoclash* (ZKM | Karlsruhe, 2002) and *Les Immatériaux* (Centre Pompidou, 1985), which served as case studies within the project Beyond Matter, trace discussions around the non-human and the immaterial. These discussions are punctuated by the anthropocentric being rendered obsolete, new epistemologies emerging in the face of ⭘ simulation, the destabilization of the modern, a celebration of disorientation taking over the will to mastery, a certain panic and anxiety brought about new networks of transmission, an association of immateriality with instability and unmasterability, a replacement of physical space by controlled digital space, a setting up of oppositional relations between vision and hearing (as image and language), between space and time, and an anticipation of new technologies of concretization. These three exhibitions are neither art shows nor philosophical arguments; they enact a process of thinking through by way of spatialization, rather than pedagogically illustrate a thesis. *Iconoclash* and *Les Immatériaux* can be understood as interfaces that invite reflection on the part of the viewer (see figs. 1 and 2). First, *Les Immatériaux*, conceived by French philosopher Jean-François Lyotard and design theorist Thierry Chaput experimented with the progressive assimilation of technological objects and how they have changed human lives, including anxieties around changes in communication

1   Jean-François Lyotard, "Surface introuvable," in *Les Immatériaux: Album et inventaire* (Paris: Centre Pompidou, 1985), n. p.

2   Paul Valéry, "Unpredictability" and "The Outlook for Intelligence," in *The Collected Works of Paul Valéry*, vol. 10, *History and Politics*, ed. Jackson Mathews, trans. Denise Folliot and Jackson Mathews (New York: Pantheon, 1962), 69, 138.

and scientific innovation. Second, *Iconoclash: Beyond the Image Wars in Science, Religion and Art*, curated by Bruno Latour, Peter Weibel, and others at ZKM | Center for Art and Media Karlsruhe in 2002—at the peak of the "visual turn" and the ubiquity of the World Wide Web— dealt with the fears and desires prompted by images throughout the history of mankind. Third, *Spatial Affairs* with its virtual extension *Spatial Affairs. Worlding – A Tér Világlása* at the Ludwig Museum – Museum of Contemporary Art in Budapest in 2021, through the increase of non-local exhibitions and in the context of the normalization of dislocated perception, probed the nature of computer-human interfaces and how media determine and constitute human's embodied responses and our sense of space. Through the Beyond Matter project, the two case study exhibitions have been virtually reproduced—as manifestations that emulate them experimentally, rather than as accurate digital copies of the original assemblages.

In a way, each exhibition pre-reflected on the conditions of its own virtualization. They also each interrogated the implications of the informational and digital milieux in terms of dematerialization, the non-human, and the epistemological and cognitive changes both brought about. Early on, the informational milieu raised two queries that are still pertinent about the digital milieu: is information the mere content of communication, and is information a mode (or form) of representation that has lost all reference to materiality (or substance)? The virtual condition of the reproduced exhibitions means that physical and digital space are now interdependent, however, and that a new materiality—beyond the dichotomy of material and immaterial—is at stake. We could also think of the digital twins of the exhibitions as explorations into how computers redefine spatial perception by amplifying the mind, expanding our capacities to produce alternative spheres.

Fig. 1
Exhibition view
Iconoclash,
ZKM | Karlsruhe, 2002.

Indeed, the computer-generated spaces that provide lodging for these exhibitions are spaces for contemplating and mediating art, carefully constructed upon research and conversations around the possibilities of representing artistic and museographic practices through their documentation.[3]

In our current sensorium, the ubiquity of informational dynamics has meant the triumph of form over matter and the priority of both over meaning formation. Postmodern theory anticipated this development, describing the late-capitalist culture of the early 1980s as one of "floating signifiers" in a realm of simulation, decoded and recoded by a dislocated, disembodied eye. The modern subject, as creator and knower of the world, was displaced by postmodern information communication technologies, which rendered the anthropocentric obsolete by radically reconfiguring subjectivity into abstract sequences of immaterial flows.

Meaning did not disappear but proliferated and dispersed—coded and decoded in text in an open informational milieu. Information technology perpetuates and is grounded in the modern desire for control and mastery. In order for humanism's two core tenets—the human quest to exercise agency over history and to pursue emancipation—to be fulfilled, humans' environment had to be rendered intelligible to them. They set out to investigate and harness the natural world through science and technology, developing huge power.[4] They mastered the world through networks, through digital computational systems (by way of information technologies), databases, algorithms, and simulations. Digital technology thus became the bases for governance, communication, and research methodologies, challenging the epistemologies of science and art.

In other words, harnessing the world for the human enjoyment of knowledge by way of the

3   Daniela Silva, "Lívia Nolasco-Rózsás, beyond matter & the museums of the future," *CLOT Magazine,* May 5, 2022, https://www.clotmag.com/interviews/livia-nolasco-rozsas-beyond-matter-and-the-museums-of-the-future.

4   Charlie Smith, "Confronting Modernity Means of Overcoming Humanism," *Palladium Magazine,* November 23, 2020, https://www.palladiummag.com//2020/11/23/confronting-modernity-means-overcoming-humanism/.

digital built an increasingly incomprehensible, complex world with which we are now struggling to cope. Machines and machine-readable communication changed the world to the point that the new normal, as Hito Steyerl puts it, is to not see anything intelligible because information is passed on as a set of signals that cannot be picked up by human senses.[5]

The early 1980s saw the passage from the society of the spectacle (Guy Debord) and information to digital communications or the computerized society. The 1990s represent an explosion of visibilities, a "visual turn" very much by way of the digital milieu and to a large extent, the processual mechanization of perception, whereby the image would become a politico-economic interface between the body and the social machinery deriving surplus value from human cognition. The status of human vision and language gradually changed, superseded by filtering, decrypting and pattern recognition. When a machine looks at images transmitted as data, coded as pulses of light or long lines of apparently random letters, they are incomprehensible to humans.[6] Along with this inhuman vision and language, the paradox of the Anthropocene prevails: as anthropocentrism was rendered obsolete by the "postmodern," human activity has a significant and negative impact on the Earth and its ecosystems. The question becomes—and this is what the three virtualized exhibitions tackle—how to make unease about the non-human into a matter of thought; how to ensure that the foundational disorientation and anxiety are not resolved or dismissed quickly, or that the new sensorium is taken as a given, but to open up spaces for thinking and creation. To understand and then restructure the sensorium toward a new constellation in sync with the transformations of contemporary digital/real space-time.

In 1979, Lyotard posited the "postmodern" as the end of a modern relationship to the world that had been based on the domination of matter and the idea that "everything speaks" to humans.[7] Changes generated by the informational milieu had come to impact how we understand space and matter and how they relate to each other. According to Lyotard, simulation had overturned modern epistemology, displacing humans and displacing human mastery with disorientation and its celebration (although human also experienced panic and anxiety, surveillance schemes, and the loss of their past). On a different register, the following paragraph from Annie Ernaux's *The Years* (2008) captures the spirit of the shift from the society of the spectacle to the incipient informational milieu that would give rise to the computational era:

We changed television sets so that we could acquire a SCART connector and a VCR. People were soothed by the arrival of the new. The certainty of continuous progress removed the desire to imagine it. New objects were no longer met with wonder or anxiety, but welcomed as additions to individual freedom and pleasure. CDs removed the need to get up every fifteen minutes to flip a record over, and thanks to the remote control one did not have to leave the couch all evening. Videotapes made the great home-cinema dream come true. On the Minitel, we checked phone listings and train schedules, horoscopes and porn sites. Now we were free at last to do everything at home—no need to ask anyone for anything. Genitals and sperm could be viewed in close-up without shame. The sense of surprise was fading. People forgot there'd been a time when they never thought they'd see the like. But there it was. One saw. And then, nothing. Only the satisfaction of having access, with complete impunity, to once-forbidden pleasures. With the Walkman, for the first time music entered the body. We could live inside music, walled off from the world.[8]

5   See Hito Steyerl, "A Sea of Data: Apophenia and Pattern (Mis-)Recognition," in *Duty Free Art: Art in the Age of Planetary Civil War* (London: Verso, 2017), 53.

6   See Steyerl, "A Sea of Data," 54.

7   See Jean-François Lyotard, *La condition postmoderne: rapport sur le savoir* (Paris: Éditions de Minuit, 1979).

8   Annie Ernaux, *The Years*, trans. Alison L. Streyer (New York: Seven Stories Press, 2017), 97. First published as *Les années* (Paris: Gallimard, 2008), 156.

In Erneaux's account, the new information technologies meant the normalization of technological innovations and changes and their incorporation to a cycle of consumption designed to fulfill the modern ideal of individuality, the capitalist libidinal drive toward pleasure and effortlessness: *jouissant* subjects isolated from the rest of the world.

In *Les Immatériaux*, Lyotard and Chaput sought to stage the anxiety brought about the postmodern condition, while *Iconoclash* was about the turbulence images can trigger and historical modes of representation in science, religion, and art. *Spatial Affairs*, in turn, investigated how virtual space was foreseen by modern artists and changed by computation. The virtual environments of their models, which amalgamate exhibition space, social space, and cyberspace, were envisioned as ontologically pluralistic and able to dismantle boundaries between subject and surroundings. Tracking changes in three key cognitive and epistemic sites destabilized by information and digitization—language and the linguistic turn (*Les Immatériaux*), the visual turn (*Iconoclash*), and the spatialization of virtual perception and its incorporation into everyday life through technologies such as video calls or Google Earth (*Spatial Affairs*)— the exhibitions asked what was at stake in terms of materiality.

Lyotard was the first thinker to systematically analyze digital materiality, which in his view went beyond technology and into the cultural form. *Les Immatériaux* tried to represent this postmodern condition associated with the revolution achieved by telecommunication technologies. For Lyotard, according to Yuk Hui, "the immaterial" is deeply material but transcends the modern concept of material as matter to be grasped and used by humans; the immaterial was rolling out a

new *digital materiality*. This meant nothing less than the reconfiguration of the modern metaphysical paradigm: "A metaphysics in which, precisely man is not a subject facing the world of objects, but only a sort of synapse, a sort of interactive clicking together of the complicated interface between fields wherein particle elements flow via channels of waves."[9] In the old metaphysics, language had been given too much power in the determination of matter. Modern thought presupposed that "everything speaks," according to Lyotard, so that insofar as we could connect to reality to capture, translate, and interpret it, there was no fundamental difference between data and a phrase, or a phenomenon of displacement in an electromagnetic spectrum and a logical proposition.[10] In other words, in modernity, everything was a message that can be decoded: "What does it speak of? How does it speak? What does it speak with? What speaks and what does it speak to?"[11]

Lyotard sought to do away with the concept of substance to conceptualize the new matter created by telecommunications technology and mapped onto the communicational model. In the informational milieu, interaction meant that the human is not the origin but sometimes the receiver, sometimes the referent, sometimes the code, and sometimes the support of the message, or the message itself. Lyotard was thinking of a kind of ontology of the endless transmission and translation of messages to each other, the implication being that identity is no longer fixed but rather grounded in interactions or material relationality.[12] To structure the exhibition and to rethink everything about the modern project, which implied a passive subject to be conquered, Lyotard presented five categories around the root *m*ât, which means "measurement" and "construction":

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9   Jean-François Lyotard, "After Six Months of Work…" (1984), in *30 Years After Les Immatériaux. Art Science and Theory*, ed. Yuk Hui and Andreas Broeckmann (Lüneburg, Meson Press, 2015), 29–66 (quotation on 42).

10   Lyotard, "After Six Months of Work…," 42.

11   Lyotard, "After Six Months of Work…," 43.

12   See Yuk Hui, "Towards a Relational Materialism: A Reflection on Language, Relations and the Digital," *Digital Culture and Society* 1, no. 1 (2015): 131–47.

Matérial or material/medium
Matériel or material/receiver
Maternité or maternity/emitter
Matière or matter/referent
Matrice or matrix/code[13]

Lyotard then took the structure of communication as a paradigm for the exhibition. The gallery space was divided into sites that staged a spatial disorientation, foreshadowing the navigating or surfing subject. Lyotard and Chaput laid out the limits and conditions of knowledge and reason before the materiality of machinic language, experimenting with the conditions of possibility, the a priori of empirical reality, and the immaterial/mental structures which made thinking possible before postmodern disorientation. Visitors were asked to wear headphones as they wandered the exhibition space, listening to a pre-recorded soundtrack of acoustic presences reading texts by authors such as Samuel Beckett, Antonin Artaud, Marcel Proust, Stéphane Mallarmé, Franz Kafka, and Paul Virilio, but also what sounded like advertising jingles and noise. They encountered industrial robots, holograms, computers, interactive sound installations, paintings, sculptures, and artworks by artists like Dan Graham, Joseph Kosuth, and Giovanni Anselmo.

Les Immatériaux performed the disappearance of the body both in the presentation of the objects and in the viewers' experience (just like the virtual experience of the exhibition, in which the new body and mind *materialize* in the form of code). The visitor here was a wandering eye with no overall view of the whole, immanently circulating in the space trying to find her way, mapping, through the maze of the exhibition. In one section, a videodisk played on a computer containing a bank of documentary images: in a proto-Google Images search, the spectator had access to three thousand images relating to art, history, science, technique, and tourism. A bracket opened for an exploration of the relationship between

bodies, images, and realities, acknowledging that images had overtaken the real to the point that it was difficult to distinguish the referent from the sign. Once transformed by information, is it possible to resacralize the image, to conceive it again as a presence?

The premise of *Iconoclash* was an understanding of images from the points of view of art history and criticism, religious studies, and science, bearing in mind that images elicit desires in humans to either destroy or multiply them. It was not about iconoclasm (the act of destroying images) or iconophilia, but about iconoclash: "the enigma, the hesitation, the visual puzzle" between the idea that images are dangerous (though we have so many of them) and the idea that they are innocent (though they trigger "such enduring passions").[14] The exhibition sought to move beyond the image wars and the cycle of destruction and fascination created by iconophilia and iconoclasm. Latour also brought up images as mediums for accessing the spiritual, prompting thought about whether images are "truths," "true," or can capture and carry a "truth." Of course images in science, art, and religion have different claims to truth. Human-made inscriptions of the sacred are mediators and thus not true, but fetishes. In science, their truth is objectivity: made by machines, not by a human hand, images describe the world in a way that can be proven true or false, verified and disputed. The realm of contemporary art, of the human-made, is a laboratory for experimenting with the cult of images. Staged at the beginning of the explosion of visibilities on the internet, *Iconoclash*'s interrogation of the epistemology and ontology of images made images oscillate between sacred and fetishistic, true and false, concrete and abstract, material and immaterial.

Iconoclash took place at a time which had seen the transformation of various disciplines into visual studies, visual culture, and image studies: the so-called visual turn, through which images became objects of knowledge

13   See Jean-François Lyotard, "Les Immatériaux, comment?," in *Les Immatériaux: Petit Journal*, exh. broch. (Paris: Centre Pompidou, 1985), 1.

14   Bruno Latour, "What is Iconoclash? Or is there a World Beyond the Image Wars?," in *Iconoclash: Beyond the Image Wars in Science Religion, and Art*, ed. Bruno Latour and Peter Weibel, exh. cat. ZKM | Karlsruhe (Cambridge, MA: MIT Press, 2002), 18.

in their own right—as augured in the computer's digital image bank in *Les Immatériaux*. An interdisciplinary field (visual culture) had consolidated, signaling that images, as opposed to text or language, were now central to representing the world, and teasing out tensions between visual and verbal representations.[15] Images came to be understood, as W.T.J. Mitchell put it in *Iconology: Image, Text, Ideology* (1986), as beyond signs, as "images as such," with the foil of textuality as the rival mode of representation. An image came to be considered a presence, while the word was the "other," the artificial, arbitrary production of human will that disrupts natural presence by introducing unnatural elements into the world: time, consciousness, history, and the alienating intervention of symbolic mediation.[16] Visual studies emerged as an interdisciplinary field to understand postmodernism in the context of digital computation, positing the problem of the visual and the gaze in the sense of who we see and who we do not, and who is privileged in the regime of visibilities, considering the newly gained ability to absorb and interpret visual information. This new visual literacy designated the visual as the place where meanings are created, as opposed to the visual world.

Spatial Affairs. Worlding the virtual extension of the physical exhibition *Spatial Affairs*—a hybrid exhibition project since its inception—aimed at breaking down the dichotomy between the virtual and the real. Its virtual iteration was inspired by Konrad Zuse's theory of *Calculating Space* (1969), which details a universe made up of living and evolving automata, and of computational systems composed of cells leading to a self-reproducing cellular automaton. Visitors interacted with other visitors and artworks through their avatars, confronted with a new form of understanding matter and space in the epoch of

the digital, that is, with the concretization of relations in terms of data and metadata. The exhibition at the Ludwig Museum explored how modern and conceptual artists foresaw the transition towards digitality even before computation, experimenting with matter, form, and space breaking with Euclidian geometry, and moving toward the gradual dematerialization of the sculptural object. Artists in the exhibition also explored new forms to conceptualize relations between space, time, and matter, playing with translucence, virtuality, dimensions, and surface in relation to meaning, overturning the logic of three dimensionality with a fixed orientation.

To conclude, the dislocation and disorientation caused by information technologies in the era of digitization have become the conditions under which cognitive workers live and work. It no longer matters in which part of the world I live; I can access the virtualized exhibitions of Beyond Matter and think about the many ways in which they reflect upon dematerialization in language, the visual, or space. I can now think of the anxieties coding has created around the correspondence of spoken, visual, or spatialized matter to real-world referents in relation to bird song, musical scores, and mathematical notation. Code is executed in language that refers not only to the manipulation of symbols, but to the real-world functions and effects of executed code. This is indeed a site for creative endeavor, especially as a new materiality, a digital materialism based on relations rather than substances, is a given. As Yuk Hui has pointed out,[17] Lyotard's informational metaphysics, now explicit under digital conditions, is conceptually new: the digital renders visible and makes explicit a relational materialism, in which relations and structure are constitutive of each other.

15   See Margaret Dikovitskaya, ed., *Visual Culture: The Study of the Visual After the Cultural Turn* (Cambridge, MA: MIT Press, 2005), 29.

16   W.T.J. Mitchell, *Iconology: Image, Text, Ideology* (Chicago, IL: University of Chicago Press, 1986), 43.

17   See Yuk Hui, "Towards a Relational Materialism."

2.
VALID READINGS.
Digitization of Materiality and Memory

MATTER. NON-MATTER. ANTI-MATTER. PAST EXHIBITIONS AS DIGITAL EXPERIENCES

Curatorial Concept of the Exhibition at ZKM | Karlsruhe

Philippe Bettinelli and Lívia Nolasco-Rózsás

> **The true method of making things present is to represent them in our space (not to represent ourselves in their space).[1]**
>
> **Walter Benjamin**

The ubiquity of computers is giving rise to a ⬩ virtual condition in which the digital is steadily becoming entrenched in the real and can no longer be separated from it. New onto-epistemological constructs, too, have become inevitable. The exhibition *Matter. Non-Matter. Anti-Matter. Past Exhibitions as Digital Experiences* at ZKM | Center for Art and Media Karlsruhe (December 2, 2022–April 23, 2023) probed the significance of digitality and computer-generated environments in the context of a material understanding of art production and its exhibition. Working on the assumption that the digital always involves a material dimension, through a digital modeling of two landmark exhibitions from the past and a deep investigation into those exhibitions' philosophical underpinnings, *Matter. Non-Matter. Anti-Matter* provided insight into the effects of new technologies on contemporary curatorial, artistic, and art-educational practices (see figs. 1–3).

Taking up the case studies of *Les Immatériaux* (Centre Pompidou, 1985) and *Iconoclash. Beyond the Image Wars in Science, Religion, and Art* (ZKM | Karlsruhe, 2002), Centre Pompidou and ZKM | Karlsruhe committed themselves to examining the possibilities of exhibition revival through experiential methods of digital and spatial modeling. Both past exhibitions constituted complex thought experiments deployed through and manifested in space. Both also experimented with innovative ways of juxtaposing scientific, technological, and artistic practices. In their respective ways, *Les Immatériaux* and *Iconoclash* proposed the exhibition as both a medium and an interface with a different level of reflection and creativity.

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1   Walter Benjamin, The Arcades Project, trans. Howard Eiland and Kevin Mc Laughlin (Cambridge, MA: The Bellknapp Press, 1999), 206. First published as Das Passagen-Werk, in Gesammelte Schriften, vol. 5.1, ed. Rolf Tiedemann and Hermann Schweppenhäuser (Frankfurt/Main: Suhrkamp, 1982).

Inspired by the work of Walter Benjamin, one of the main objectives of *Matter. Non-Matter.*
Anti-Matter was to revisit, restore, and re-present these past exhibitions in our spaces using
digital technology. The exhibition presented digital models of the two past exhibitions on *The*
Immaterial Display, a hardware apparatus newly developed for explorations of virtual exhibitions
(see fig. 4). The models' online launch took place in conjunction with the exhibition opening on
December 2, 2022. A selection of artworks and artifacts attested to art's conceptual demateri-
alization and digital rematerialization. Some artworks were specially commissioned for the exhi-
bition, while others largely came from the collections of Centre Pompidou and ZKM│Karlsruhe,
many of which were exhibited in *Les Immatériaux* or *Iconoclash* or both.

Digital Models: Instruments of Cultural Heritage

This exhibition featured digital exhibition models of the two past landmark exhibitions
that have served as case studies over the course of the Beyond Matter project (2019–23)
(see fig. 5). *Iconoclash* at ZKM│Karlsruhe (2002) and *Les Immatériaux* at Centre Pompidou (1985)
were pioneering primarily because of their experimental approaches to mediation and
exhibition scenography.

Les Immatériaux: A Virtual Exhibition (2021–22), the 3D model of *Les Immatériaux*, enables a virtual experience by focusing on the scenography of the historical exhibition (see figs. 6 and 7). It captures that exhibition's essence and infuses it with a new layer of immateriality. The translucency of each exhibit in the virtual emulation connects to the current state of its archival research. The exhibits' shapes and levels of translucency depend on whether their precise appearance and location are known or unknown: those which have been identified are rendered in transparent white, those whose whereabouts are unknown are semi-transparent black, and those of which only the title is known are represented by a black square. The 3D model harbors a further layer of information about the archival material, thereby bridging the gap between the physical and the virtual. A mimetic reconstruction of *Les Immatériaux* could not be achieved due to the multisensory and interactive dimension of its sixty-one sites or sections, some of which had an olfactory aspect, such as the site *Arôme simulé* (Simulated Aroma). The 3D model emulates the sixth floor of the Centre Pompidou in Paris, including all of its partitions, and conveys an understanding of the architecture and atmosphere of the space.

In the virtual exhibition model *Iconoclash as a Digital Experience* (2021–22), the mode of display creates a dynamic fluidity that counteracts any necessity to freeze-frame, resulting in an exhibition without spatial limitations (see figs. 8 and 9). Its digital scenography is strongly rooted in the curators' and the exhibition architect's original exhibition concept. The dynamic spatiality they conjured up has been transposed into the digital. Here too, the objective was not to create a "digital twin"—a virtual copy of a past exhibition—but to offer an experience in which exhibits are in constant motion. Archival material and interviews with the curators and organizers of the exhibition formed a basis for the development of the digital concept of *Iconoclash*.

**Fig. 5
Landing page for
entering the virtual
exhibitions *Iconoclash*
and *Les Immatériaux* on
The Immaterial Display,
2021–22. Screenshot.**
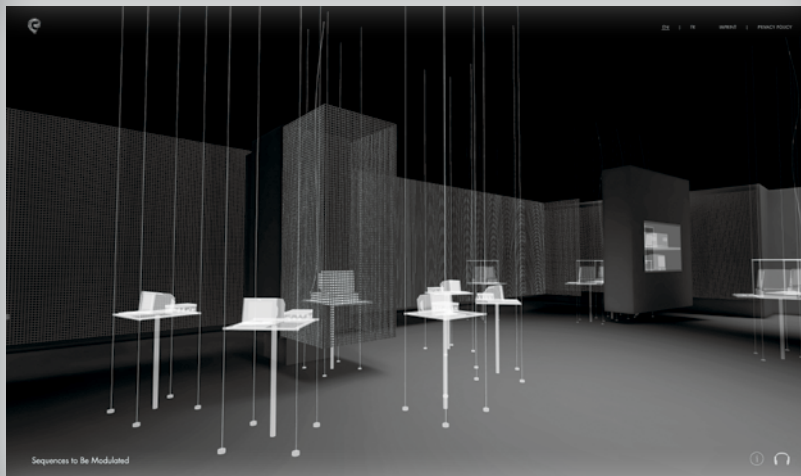
**Fig. 6
View of the site
Séquences à moduler
(Sequences to be
Modulated) in *Les
Immatériaux: A Virtual
Exhibition*, 2021–22.
Virtual exhibition model.
Screenshot.**
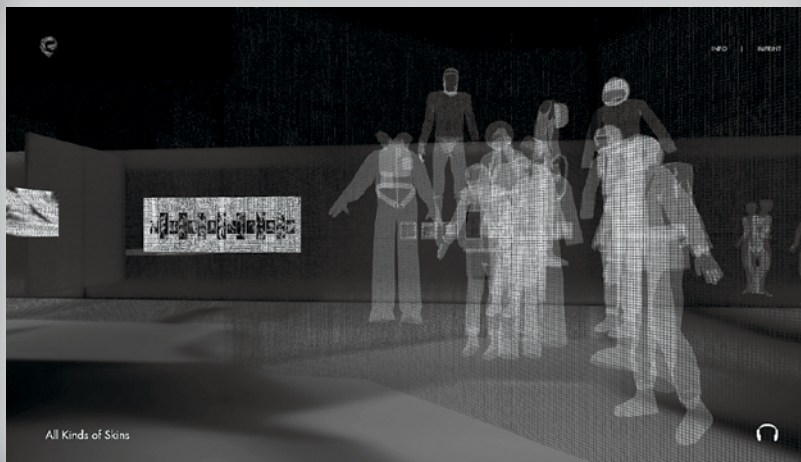
**Fig. 7
View of the site
Toutes les peaux (All
Kinds of Skins) in *Les
Immatériaux: A Virtual
Exhibition*, 2021–22.
Virtual exhibition model.
Screenshot.**
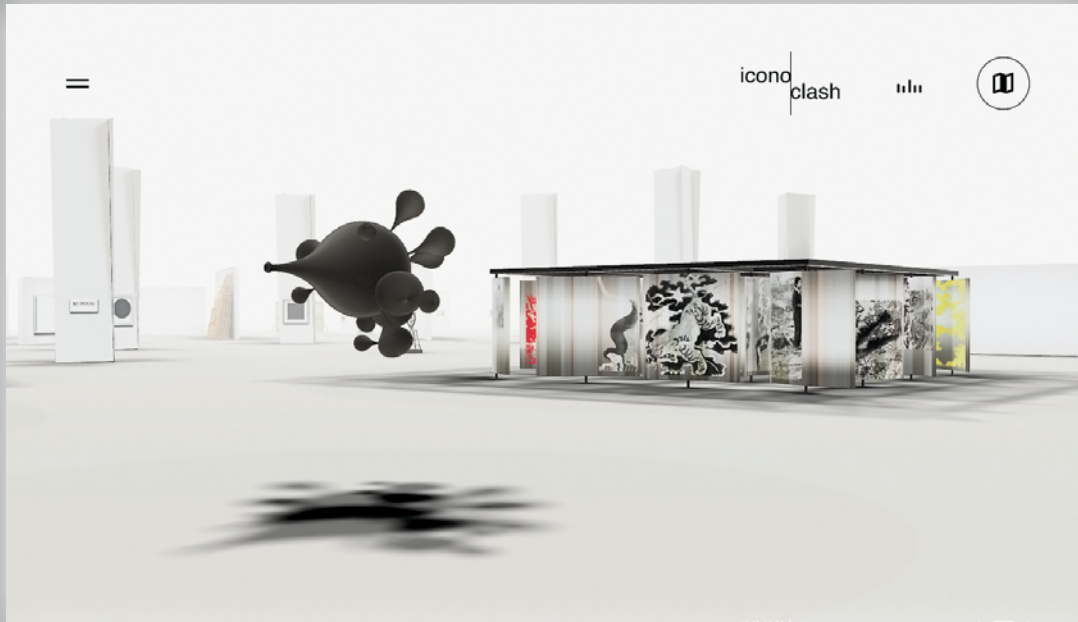
Figs. 8 and 9
Views into the 3D environment of *Iconoclash as a Digital Experience*, 2021–22. Virtual exhibition model. Screenshots.
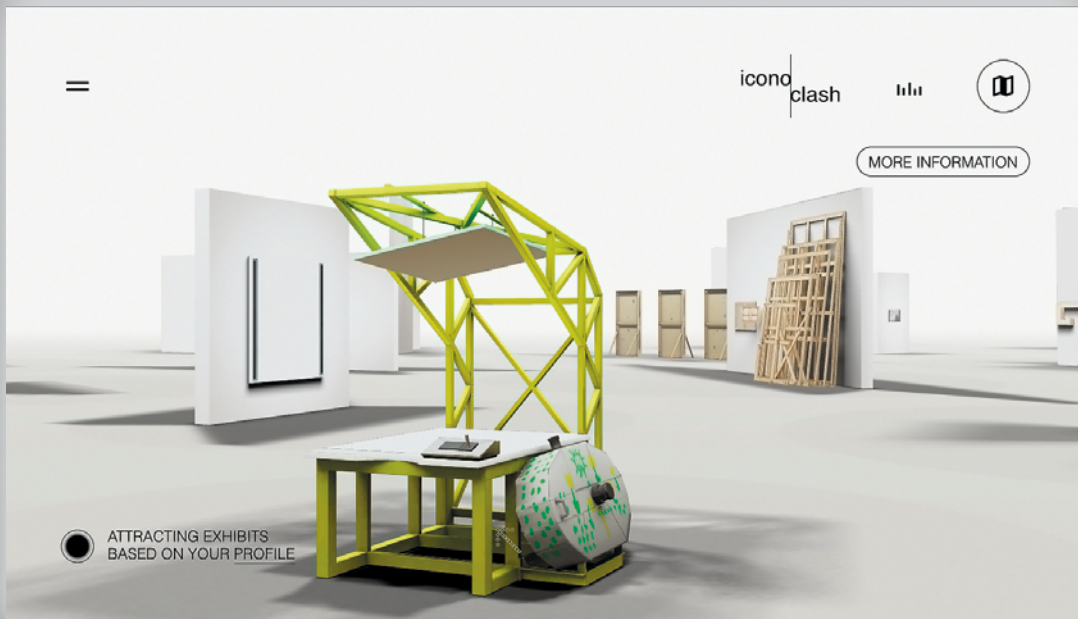
Digital Access to Cultural Heritage

Digital models that offer interactive presentations of exhibition concepts are constituted by collections of data. They offer insight into exhibition histories and, most importantly, they act as vehicles of access to cultural heritage. Data and digital objects collected in archival processes shape our digital commons. They are resources that are not owned privately but used and maintained by an interested community.

Data and digital objects are generally perceived as intangible, immaterial, and infinite. In fact, their collection, storage, and access require material resources and infrastructures. They are entities of information that form a global network. Devices that facilitate access to this data network function as instruments of cultural heritage.

A further outcome of the Beyond Matter project is the *Generic Exhibition Platform*. Primarily developed for the digital emulation of *Iconoclash*, it is an AI-based software tool that facilitates the generation of digital exhibition spaces. An exemplary online environment demonstrates the features of the software which seeks to encourage museums, art organizations, and cultural professionals to benefit from the open-source tool for the creation of digital exhibitions of their own (see fig. 10). In the interest of the participatory and democratic sharing of resources, the software is freely available on the GitHub account of ZKM | Karlsruhe.
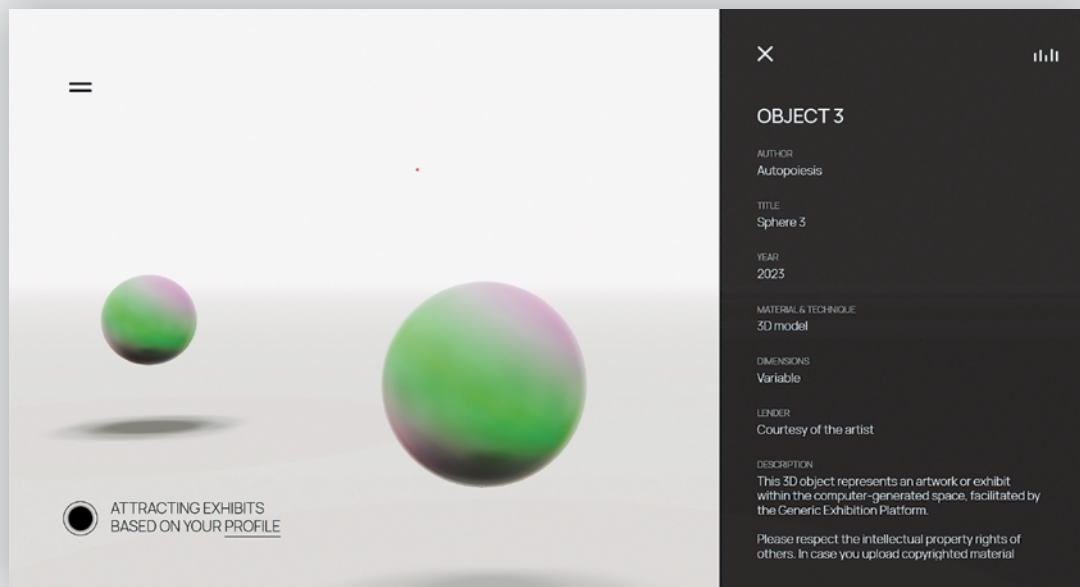
Fig. 10
Generic Exhibition Platform, 2023–. Screenshot. Development: Netzbewegung, Matthias Heckel.

Les Immatériaux, **Centre Pompidou, 1985**

Les Immatériaux was curated by French philosopher Jean-François Lyotard and design theorist Thierry Chaput, in consultation with a team of project managers and scientific advisors (see fig. 11). It was organized by the Center for Industrial Creation (CCI) at Centre Pompidou, and exhibited there in 1985. Engaging with the French neologism *immatériaux* (which translates as a noun form of "immaterial"), the exhibition questioned the impact of the dematerialization of information on everyday life, the arts, and science. Exploring the intersection of art, science, and technology, this *manifestation*, as the curators called it, put Lyotard's concepts into practice. It examined the transition from the modern to the postmodern era, when new technologies were profoundly changing humans' relationship to the world (see fig. 12). Eschewing a narrative-driven, sequential spatial arrangement, *Les Immatériaux* proposed an alternative approach to knowledge transfer that was diametrically opposed to that of the *Exposition universelle internationale* (World's Fair).

Fig. 11
Jean-François Lyotard
and Thierry Chaput at
the press conference
of *Les Immatériaux*,
Centre Pompidou, Paris,
January 8, 1985.

Fig. 12
View of the site
Labyrinthe du langage
(Labyrinth of Language)
in the exhibition *Les
Immatériaux*, Centre
Pompidou, Paris, 1985.

According to Lyotard, "Insecurity, loss of identity, and crisis are being experienced not only in the economic and social domains, but also in those of human sensibility, knowledge, powers (fertility, life, death) and ways of life (the relation to work, home, food, etc.)."[2] In investigating this statement, the exhibition challenged conventional curatorial methods. The idea of the exhibition as a space for experimentation and questioning, rather than mere demonstration, was fundamental to the curatorial process of *Les Immatériaux*.

The sixty-one sites of the exhibition spread were along five paths: *matériau* (material), *matrice* (matrix), *matériel* (hardware), *matière* (matter), and *maternité* (maternity). The theme of each path derived from the shared etymological root "mât," meaning making by hand, measuring, or constructing. Architects Philippe Délis and Katia Lafitte developed an experimental scenography around the notions of immateriality and indistinctness (see fig. 13). The labyrinthine exhibition structure imposed no specific path on visitors; suspended screens of multilayered metal mesh with varied gradients of transparency divided the space (see figs. 14 and 15). Through headphones, visitors could listen to soundtracks that included readings of literary, philosophical, and poetic texts accompanied by electronic music. Infrared technology was used to make

2   Jean-François Lyotard, "Avant-propos," in *Les Immatériaux: Petit Journal, exh. broch.* (Paris: Centre Pompidou, 1985), 1.
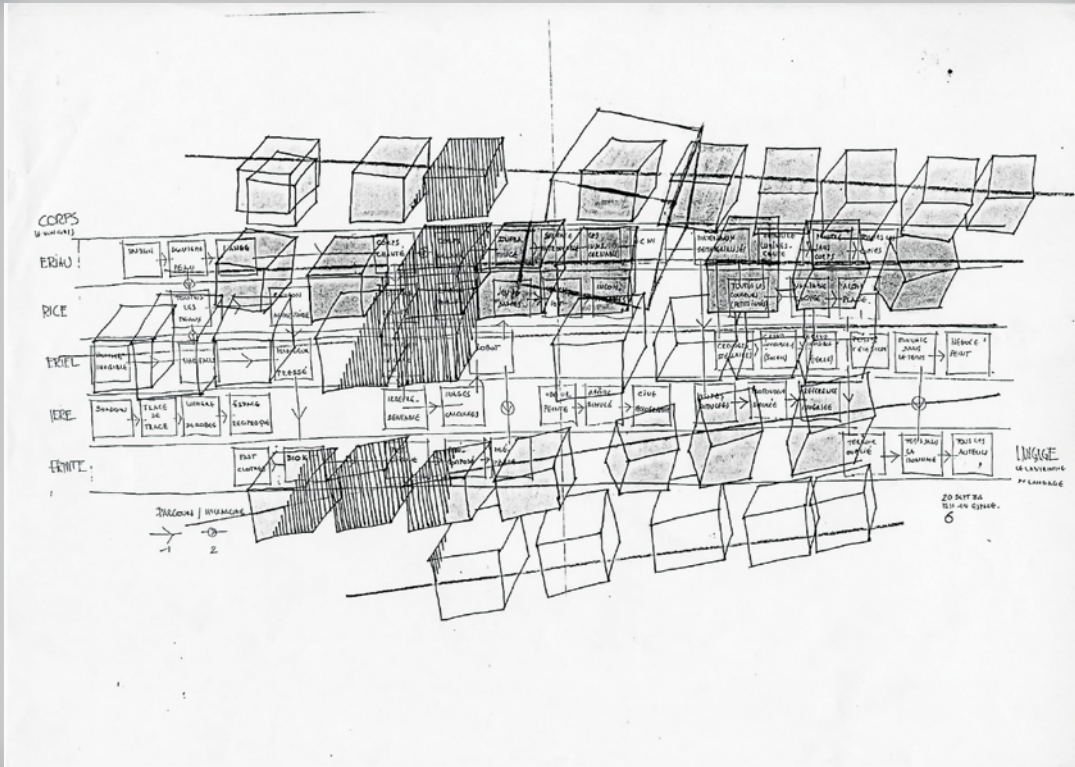
Fig. 13
Sketch of the spatial
layout of the sites of
the exhibition *Les
Immatériaux*, Centre
Pompidou, Paris, by the
scenographer Philippe
Délis, dated September
20, 1984.

Fig. 14
Corridor leading
past the site *Auto-
engendrement* (Auto-
generation) to *Images
calculées* (Calculated
Images) in the exhibition
Les Immatériaux, Centre
Pompidou, Paris, 1985.

Fig. 15
Suspended showcase
displaying *Merda*
d'artista (Artist's Shit)
by Piero Manzoni, 1961.
View of the site *Odeur*
***peinte* (Painted Scent)**
in the exhibition *Les*
***Immatériaux*, Centre**
Pompidou, Paris, 1985.

Fig. 16
View of the site
Labyrinthe du langage
(Labyrinth of Language)
in the exhibition *Les*
***Immatériaux*, Centre**
Pompidou, Paris,1985.

Fig. 17
Visitor in the site *Arôme*
***simulé* (Simulated**
Aroma) in the exhibition
***Les Immatériaux*, Centre**
Pompidou, Paris,1985.

visitors' movements through the exhibition space trigger the switching of sound channels. The soundtracks thus enriched the exhibition with additional auditive associations and disruptive elements (see figs. 16 and 17).

Iconoclash. Beyond the Image Wars in Science, Religion and Art, ZKM│Center for Art and Media Karlsruhe, 2002

Emerging from the collaboration of a group of established figures in the arts and sciences, *Iconoclash. Beyond the Image Wars in Science, Religion and Art* and was curated by Bruno Latour and Peter Weibel in 2002 at ZKM│Karlsruhe. The curatorial team included the physicist and historian of science Peter Galison, art historians Joseph Leo Koerner and Dario Gamboni, artist Adam Lowe, and curator Hans Ulrich Obrist. A scientific advisory board of experts from art history, oriental studies, philosophy, media theory, musicology, and anthropology was consulted: Hans Belting, Marie-José Mondzain, Heather Stoddard, Boris Groys, and Denis Laborde (see fig. 18).

Iconoclash was a large-scale exhibition and focused on a crucial issue: representation in its various forms across disciplines and cultures, along with the turbulence it can spark. The exhibition was not intended to itself be iconoclastic, but to present a synopsis of scientific exhibits, documents, and artworks about iconoclasms (see figs. 19–22). It was a thought experiment assuming the form of an exhibition—a so-called *Gedankenausstellung*.

Fig. 18
The curatorial team of *Iconoclash* at the press conference of the exhibition, 2002. From left to right: Peter Galison, Dario Gamboni, Boris Groys, Joseph Leo Koerner, Bruno Latour, Hans Ulrich Obrist, and Peter Weibel.

**Fig. 19
Exhibition view
Iconoclash,
ZKM │ Karlsruhe, 2002.**

**Fig. 20
Candice Breitz, *Babel
Series*, 1999. Installation
view *Iconoclash*,
ZKM │ Karlsruhe, 2002.**

**Fig. 21
Arata Isozaki, *The
Electric Labyrinth*,
1968/2002. Installation
view, ZKM │ Karlsruhe.**

Fig. 22
Exhibition view
Iconoclash,
ZKM | Karlsruhe, 2002.

Fig. 23
Isometric view of the
scenography of the
exhibition *Iconoclash*
with corrugated metal
sheets by the architect
and scenographer
Manfred Wolff-Plottegg,
dated March 14, 2002.
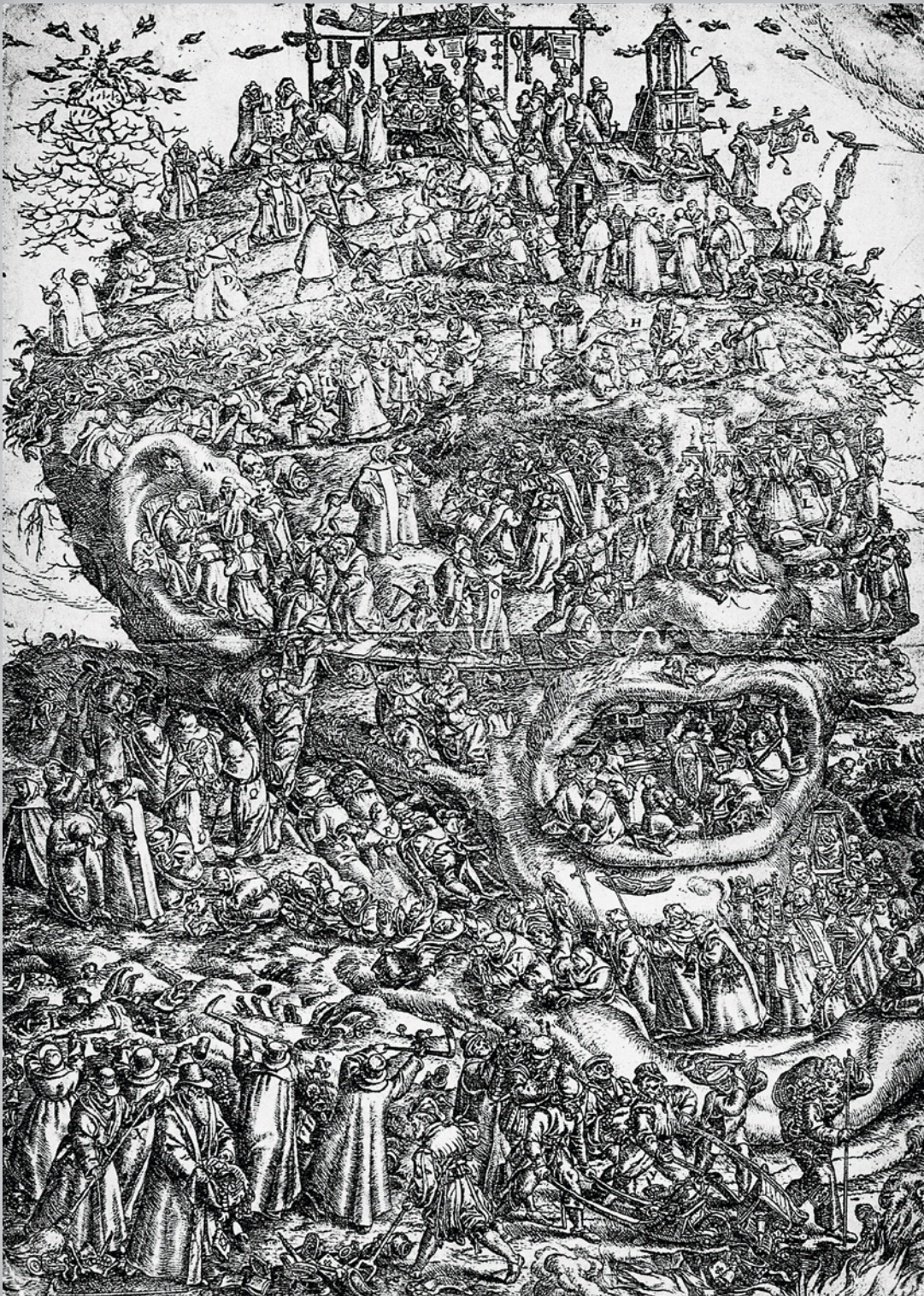
Fig. 24
Marcus Gheeraerts
the Elder, *Allegory
of Iconoclasm*, ca.
1566–68. Etching,
43.5 × 31.5 cm.

What emerged from this thematic approach was a unique scenography as designed by the architect and scenographer Manfred Wolff-Plottegg. Exhibited items coexisted in a nonhierarchical way. Owing to the spatial arrangement of the exhibi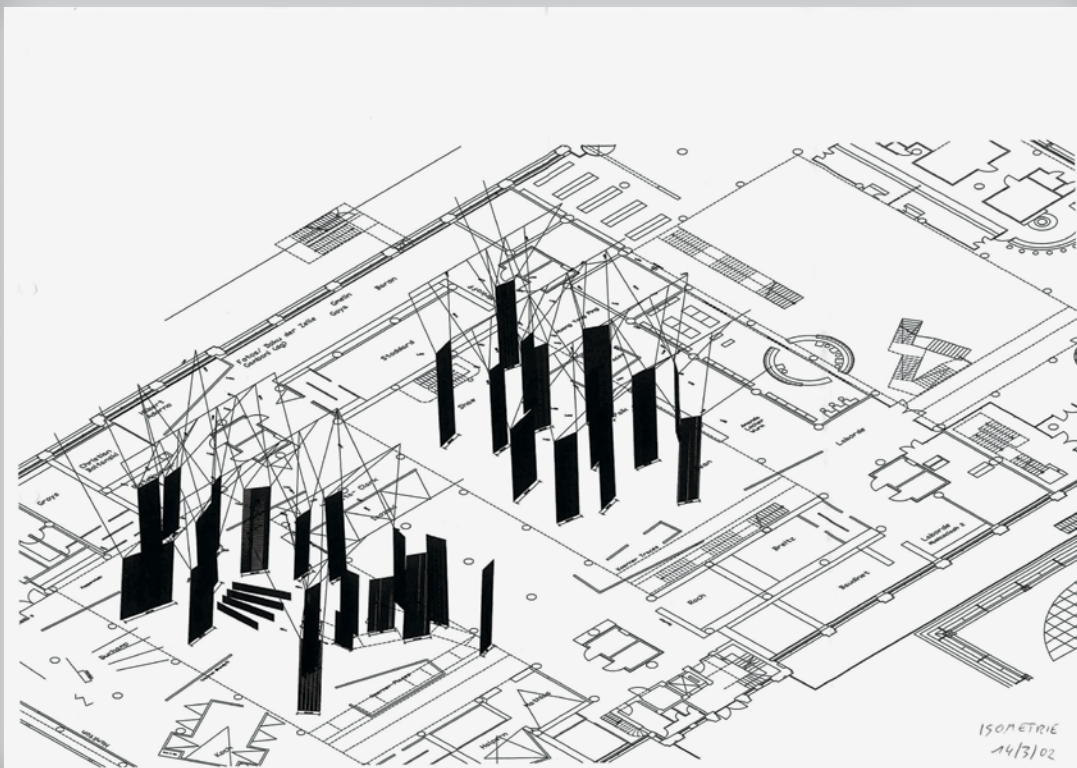tion, which was spread across the spacious former industrial halls in which ZKM | Karlsruhe is housed, visitors were presented with a curated view before being left to wander among a rhizomatic architecture (see fig. 23).

The etching *Allegory of Iconoclasm* by Marcus Gheeraerts the Elder served as a starting point for the exhibition scenography (see fig. 24). The composite image depicts instances of idolatry. Viewed from a distance, the overall chaos coalesces into a whole: the grotesque portrait of a monk. Similarly to the cells within the exhibition space, the pictorial scenes sprawl across the page without any hierarchy, thus epitomizing the phenomenon of iconoclasm, which can be defined as the intentional desecration or destruction of imagery.

The term "iconoclash" was a neologism combining "iconoclasm" and "clash." It reflects the tensions so frequently generated around representations due to their indispensability, inviolability, and power quite literally. According to Latour, the three major monotheistic religions, like scientific theory and contemporary art, all struggle with contradictory impulses to produce representations, images, and emblems but also to destroy them. The exhibition explored this dialectic, which has become intrinsic to the self-understanding of the Western world, through a large number of exhibits from diverse areas of life and research.

Parallels, Contrasts, Reverberations
Postmodern vs. Non-modern

In *The Postmodern Condition: A Report on Knowledge* (1978), Lyotard examines the epistemology of postmodern culture and declares it to be the end of metanarratives (*métarécits*), in the sense of totalizing narratives dependent on some form of transcendent universal truth. Lyotard praised information technology for encouraging critical experimentation and contributing to the creation of a new digital narrative that was a triumph of diversity and openness over uniformity and order. He proclaimed its impact as revitalizing knowledge production.

While Lyotard's notion of postmodernism is tied to modernism, Bruno Latour negates the modern completely. In his seminal 1991 publication *We Have Never Been Modern*, Latour rhetorically asks: "To make a place for the networks of sciences and technologies, do we really have to move heaven and earth? Yes, exactly, the Heavens and the Earth."[3] Yet Latour's approach cannot be declared as anti-modern. The essence of non-modernity lies in the negation of modern divisions between exact knowledge and the exercise of power, between nature and culture, and that separate the universe into human subjects and mechanical objects. This implies a need to reconsider representation.

Matter. Non-Matter. Anti-Matter engaged with reactions to the modernist understanding of exhibition-making. It questioned the concept of modernism in relation to digital curatorial methods. Digital models of past exhibitions, too, can be understood as a mode of representation through which modernism is either trespassed against or negated.

3   Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993), 10. First published as *Nous n'avons jamais été modernes* (Paris: La Découverte, 1991).

Fig. 25
View of the site *Toutes*
***les peaux* (All Kinds of**
Skins) in the exhibition
***Les Immatériaux*, Centre**
Pompidou, Paris, 1985.

Fig. 26
Exhibition view
***Iconoclash*,**
ZKM | Karlsruhe, 2002.

Materiality vs. Representation

How does information technology impact matter? In *Les Immatériaux*, Lyotard emphasized the new materiality of information technology generating a new metaphysics, a new fundamental characteristic of reality deriving from the "immaterial material": "A metaphysics in which, precisely, man is not a subject facing the world of objects, but only [...] a sort of synapse"[4] (see fig. 25).

Iconoclash set a thematic focus on the realms of representation in science, art, and religion. Besides the pictorial representation of the visible and measurable world, the exhibition offered an alternative history of what the curators called the "Western obsession with image worship and destruction." The exhibition's content and concept shifted between and thus synthesized two senses of the word representation: *Vertretung* (proxy) and *Darstellung* (depiction) (see fig. 26).

The exhibition *Matter. Non-Matter. Anti-Matter* at ZKM | Karlsruhe was an investigation into the virtual condition that is characterized by materiality of the digital. Having each been presented in one or both of the past landmark exhibitions, the artworks in this exhibition—ranging from a religious icon and an abstract painting that is now part of the Western art-historical canon to a digital artwork addressing the malleability of computer-generated representation—illuminated the manifold connections between the material artwork and its immaterial qualities.

Gedankenausstellung vs. *Manifestation*

Despite their diverging thematic approaches, both *Les Immatériaux* and *Iconoclash* were interdisciplinary and treated the exhibition format as a medium, as the spatial deployment of ontoepistemological systems. Both exhibitions' curators were opposed to calling them exhibitions: Jean-François Lyotard referred to *Les Immatériaux* as a *manifestation*, while Bruno Latour and Peter Weibel declared *Iconoclash* a *Gedankenausstellung*.

Coined by Weibel and Latour, the term *Gedankenausstellung* means a line of thought that proposes hypothetical "what if" scenarios, like the thought experiments of Galileo Galilei and Albert Einstein. Rather than mere visualizations of ideas, *Gedankenausstellungen* are parkours that involve visitors in an exploratory and participatory exhibition space. A *Gedankenausstellung* comes into being when science escapes its empirical boundaries and unfolds in the realm of ideas, and when art evades its functional and purpose-oriented roots in *techné* and allows itself to become scientific.

In contrast to the prevailing understanding of exhibition experiences that prioritized the visual, a *manifestation* is a "non-exhibition" that takes a multisensory approach. In *Les Immatériaux*, visitors were addressed not only as viewers but as listeners and readers who had to find their own way through the maze of the exhibition. Rather than explain a question, the aim was to bring it to the audience, to make them sensitive to it through the forms in which it appears in art and literature, technoscience, and ways of life. The immersive theatrical environment challenged the conventional presentation form of exhibitions.

Pivoting on these two pioneering exhibitions, *Matter. Non-Matter. Anti-Matter* examined exhibition-making and representation in virtual space. It was an exhibition about exhibiting with digital tools. If the virtual condition is an ambiguous space between heritage and that which is still to unfold, the exhibition *Matter. Non-Matter. Anti-Matter* functioned as a carrier of both. Through bridging the gap between virtual and physical, between time and space, it revived two past exhibitions and pointed toward a future in which curatorial and artistic practices are increasingly computer-based. It played with the idea of exhibitions' virtual enhancement and the

4   Jean-François Lyotard, "After Six Months of Work …" (1984), in *30 Years After Les Immatériaux: Art, Science and Theory*, ed. Yuk Hui and Andreas Broeckmann (Lüneburg: Meson Press, 2015), 29–66 (quotation on 36), doi.org/10.25969/mediarep/955.

algorithmic augmentation of exhibition-making, asking how exhibitions will be curated, archived, and mediated in an era when computer-generated spaces are on a par with physical ones. How is exhibition history influenced by the digital? In what ways can digital tools enhance and broaden access to cultural heritage?

Exhibited artists:
Josef Albers, Giovanni Anselmo, Arman, Art & Language, Jeremy Bailey, Fiona Banner, DiMoDA featuring Banz & Bowinkel, Christiane Paul, Tamiko Thiel, Ricardo Miranda Zúñiga, Samuel Bianchini, Bio Design Lab (HfG Karlsruhe), Jean-Louis Boissier & Liliane Terrier, John Cage, Jacques-Élie Chabert & Camille Philibert, damjanski, Annet Dekker & Marialaura Ghidini & Gaia Tedone, Marcel Duchamp, fabric | ch, Eric J. Heller, Prof. Dr. Kai-Uwe Hemken (Kunstwissenschaft Kunsthochschule Kassel / Universität Kassel), Joasia Krysa, Leonardo Impett, Eva Cetinić, MetaObjects, Sui, Michel Jaffrennou, Geraldine Juárez, Martin Kippenberger, Carolyn Kirschner, Maria Klonaris & Katerina Thomadaki, Joseph Kosuth, Denis Laborde, Mark Lewis & Laura Mulvey, Kasimir Malevich, Pietro Manzoni, Gordon Matta-Clark, Peo Olsson, Katarina Sjögren, Jonas Williamsson, Roman Opalka, Nam June Paik, Readymades belong to everyone®, Jeffrey Shaw, Annegret Soltau, Daniel Soutif & Paule Zajderman, Klaus Staeck, Anne Le Troter, Manfred Wolff-Plottegg, Erwin Wurm, Volker Möllenhoff
Curator:
Lívia Nolasco-Rózsás
Curatorial team:
Philippe Bettinelli, Julie Champion Lagadec, Felix Koberstein, Moritz Konrad, Marcella Lista

ARTWORKS IN THE EXHIBITION

ZONE I.
From Matter via Representation to Model

Across three zones, the iteration of *Matter. Non-Matter. Anti-Matter* at ZKM|Karlsruhe (December 2, 2022–April 23, 2023) expanded on the possibilities for contemporary exploration and revisitation harbored in the themes and curatorial methods of *Les Immatériaux* (Centre Pompidou, Paris, 1985) and *Iconoclash. Beyond the Image Wars in Sceince, Religion and Art* (ZKM|Karlsruhe, 2002). An introduction to both exhibitions, including to their parallels and contrasts, was accompanied by original prints, publications, photos, and drawings sourced from the archives of their respective institutions.

As sites of knowledge production in which concepts are deployed in space, exhibitions cannot be defined, modeled, or emulated without a spatial component. The past exhibitions' original scenographies, concepts, and contexts received equal consideration in the development of the experiential digital models *Les Immatériaux: A Virtual Exhibition* and *Iconoclash as a Digital Experience* (both 2021–22).

The various reinterpretations of the former exhibitions by the artists featured in this first zone—be it through the digital modeling their original scenographies, the multiplication and deconstruction of textural properties of artifacts from *Iconoclash* or references to the soundscape of *Les Immatériaux*—place particular emphasis on the scenographic elements that distinguished the respective historical exhibitions. Leading into the second zone, an elusive algorithmic fusion of past object assemblies forecasts a processual digital future for exhibition-making.

The following artwork texts emphasize the ties to the two past landmark exhibitions. Each exhibition had a different thematic approach, for which reason the artworks are described from the angles of materiality (*Les Immatériaux*) and representation (*Iconoclash*).

fabric | ch
Atomized (re-)Staging
2022

Mixed media installation, custom software and scripting, computer server,
network, computer screens, iPads, thermal printer, thermo paper rolls, poles
Courtesy of the artists

Materiality

On the main server of the project *Atomized (re-)Staging*, an
AI continuously reorganizes 3D models of artworks in the
computer-generated space. It explores the possible spatial
arrangements of the works according to their respective
parameters (light, noise, size, viewing distance), certain func-
tional elements of the exhibition (use of partitions, floors and
their albedos, light, etc.), and higher categories (postmodern
and nonmodern, *Gedankenexperiment* and *manifestation*).
The system learns from these training sets and gradually
formulates a result, giving the impression that the artworks
themselves gain an understanding of their optimal position-
ing, and thus create the exhibition landscapes autonomously.
Each new result can be understood as a guideline for a possi-
ble scenography. It is printed out on paper and stored on mo-
bile devices until a new exhibition configuration replaces it.

Representation

As an alternative approach to the digital models of the two
past landmark exhibitions *Iconoclash* and *Les Immatériaux*,
fabric | ch, an experimental art and architecture collective
from Switzerland, has created an architectural project
based on automated algorithmic principles. *Atomized (re-)
Staging* brings 3D models of the artworks from the two
historical exhibitions together in a new kind of museum
experience, where the intention is to build autonomously
evolving virtual scenographies. In keeping with the cura-
torial concept of *Iconoclash*, the installation explores how
freeze-framing can be counteracted through continually
renewing the movement of images.

Carolyn Kirschner
Iconoclash: Slow Squeeze
2022

Digital animation, soundscape, video loop 15:38 min
Soundscape: Kieran Brunt
Commissioned by ZKM│Karlsruhe, courtesy of the artist
The project was developed within the framework of the Beyond Matter Residency Program.

Materiality

Through taking well-known modernist artworks, such as by Joseph Beuys and Gordon Matta-Clark, recontextualizing them, and simultaneously transferring them into another material form, Kirschner questions the connections between art, fetish, pleasure, and experience. The deconstruction of the iconic forms of these artworks—and their illustrious metamorphosis—addresses other senses and habitual stimuli. Associated questions about relations between materiality, representation, and physical stimulation can create a new understanding of mediating both immaterial knowledge and material things. The project was developed within the framework of the Beyond Matter residency program.

Representation

With *Iconoclash: Slow Squeeze*, the artist engages with so-called autonomous sensory meridian responses (ASMR)—pleasurable tingling sensations triggered by acoustic and visual stimuli and inducing a bodily state of relaxation and calm. Kirschner draws on artworks that were part of the *Iconoclash* (ZKM│Karlsruhe, 2002,) such as Martin Kippenberger's *Modell Interconti (Peter Skulptur)* and *As Yet Untitled* by Canadian artist Max Dean. In reference to ASMR formats known through social media, Kirschner has these artworks chopped, inflated, and oscillating. The sound layer, composed by Kieran Brunt, is an exclusively analog production using sounds from unexpected everyday materials.

Anne Le Troter
La Pornoplante, Chapitre 1-2. Listening Bench for Soundtrack of Les Immatériaux
2021–22

Mixed media installation, turn tables, amplifier, speakers, metal frames, carpet
Commissioned by Centre Pompidou, Paris

Materiality

The sound sculptures presented in *La Pornoplante* chapters 1 and 2 offer echoes of the soundscapes featured in the exhibition *Les Immatériaux*. Visitors are invited to sit on benches made of audio cables and be surrounded by sound. The sounds in *La Pornoplante* draw inspiration from the compositional structures of audio porn and *autonomous sensory meridian responses* (ASMR) to tell a story about the metamorphosis of a person whose gender is unrevealed. Long after adolescence, their sex grows in the sun and then falls off in the autumn, much like a plant whose seed enters dormancy. Like the figure of Vendredi in Michel Tournier's novel *Vendredi ou Les Limbes du Pacifique* (*Friday, or, The Other Island*, 1967), the individual seeks to construct his or her own sexuality independently of others, outside of imposed norms, and quite literally outdoors, by pursuing a vegetal path.

Representation

La Pornoplante resonates with the artworks by Maria Klonaris and Katerina Thomadaki that were presented within the site *L'ange* (The Angel) in *Les Immatériaux*, and in which figures of dissident bodies—hermaphrodite and the intersexual angel—disrupted sexual and gender norms. *La Pornoplante* explores various forms of resistance. It substitutes visual pleasure with the possibility of an audio-sensory experience in the exhibition space; the intimate act of listening to audio porn finds its place in a public environment. In the story, the quest for a solitary sexuality that is both lively and painful and which changes with the seasons and vegetation evokes contemporary questions, opening up the possibility for an organic, open, and non-normative relationship with the world and with others.
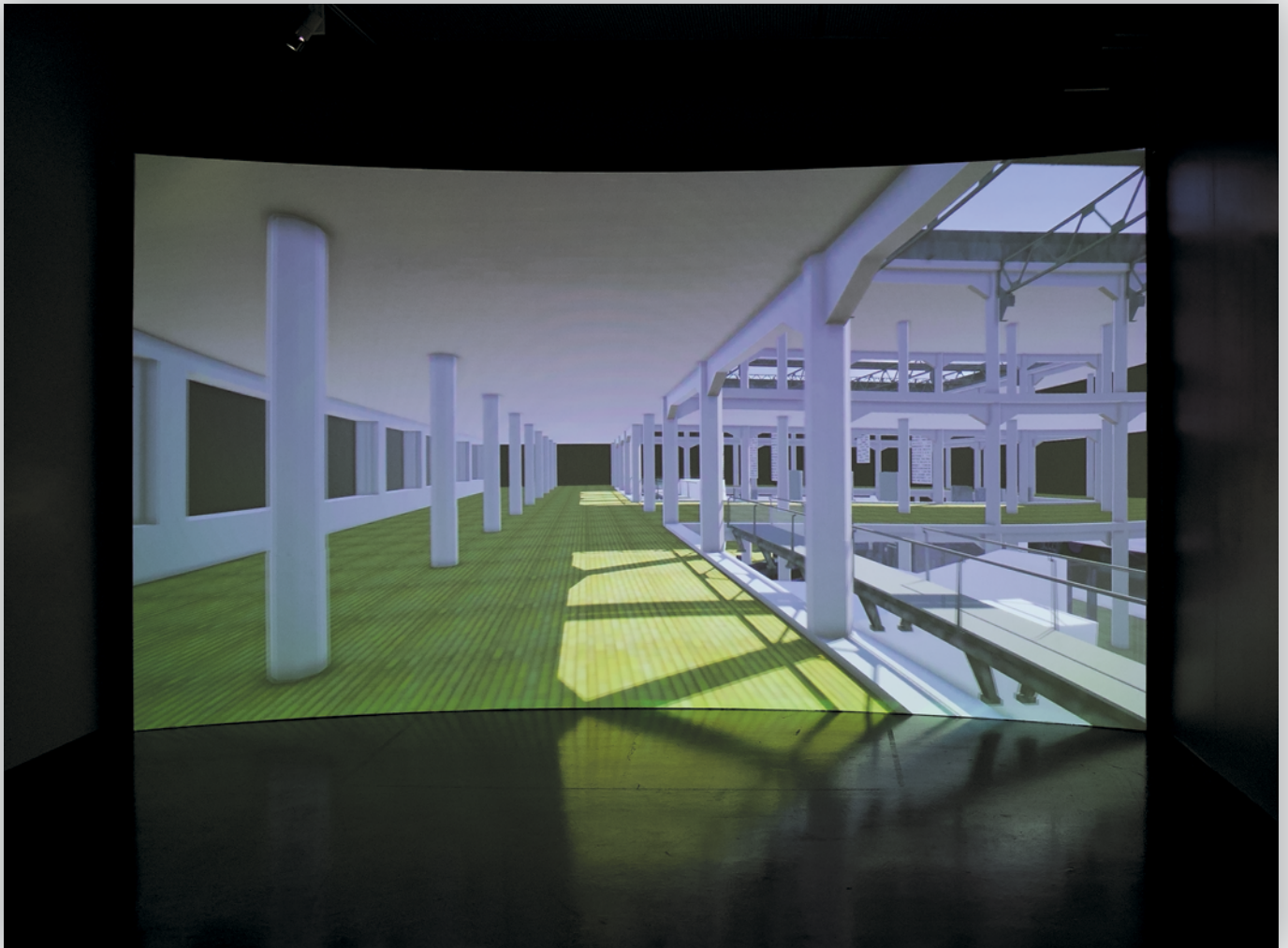
Manfred Wolff-Plottegg
Digital Model of the Scenography of Iconoclash
2002/22

VR Environment
Courtesy of the artist

The scenography of the *Iconoclash* exhibition was designed by Manfred Wolff-Plottegg, an Austrian architect and exhibition designer who has held various positions in teaching experimental architecture, computer conception, and computer-aided architectural design programs (CAAD) since the mid-1980s. His pioneering use of CAAD for the *Iconoclash* design enabled him to develop a 3D model of the complex exhibition. With a scenography distributed over several levels, Wolff-Plottegg was able to position its spectrum of elements in accurate relation to the space available. This installation presents a tour through those digital drafts of the spatial constellations as they were later realized in Atria 8 and 9 of ZKM | Karlsruhe.

The Immaterial Display
2021–2022

Interactive installation
Concept: Corina L. Apostol, Philippe Bettinelli, Julie Champion Lagadec, Adela Demetja,
Lily Díaz-Kommonen, Felix Koberstein, Marcella Lista, Cvijeta Miljak, Lívia Nolasco-Rózsás
Technical management: Thomas Schwab
Hardware design: Commonplace Studio
Project coordination: Matthias Heckel

Designed as an interactive installation, *The Immaterial Display* immerses its visitors in a multi-layered journey that expands on their actions and is therefore always unique. The spectator is also an actor who delves into a digital experience of which they have full control. It grants them the ability to roam through space, select, and approach the numerous exhibited objects in two fundamentally different digital models of the two past landmark exhibitions, *Les Immatériaux: A Virtual Exhibition* and *Iconoclash as a Digital Experience*.

Both models were developed by research teams at the institutions where the exhibitions were originally staged. The digital model, being an interactive presentation of exhibition concepts, is a novel approach to exploring exhibition histories, as well as the themes, the curatorial methods, and the types of engagement with representation and mediation that these exhibitions brought about. The models are not digital twins or virtual copies of past assemblages of artifacts and the architecture that surrounded them; the goal was rather an experiential digital transposition of the exhibitions in line with their curatorial concepts.

In 1991, Jeffrey Shaw generated an exhibition through an immaterial constellation on a digital display through his installation *The Virtual Museum*—a vital reference for the current project. *The Immaterial Display* is comprised of a curved screen as display and a "driver's seat," as Shaw termed a chair with a hand-held controller incorporating a self-regulating joystick that enables an inclusive accessibility. The system is intuitive and able to detect front/back, left/right, and up/down directions, offering a complete range of motion and visual perspective.

The Immaterial Display establishes a connection between virtual and real space by linking the featured exhibition models and their respective institutions, including their physical configurations and the areas where they are geographically located. It also connects the two exhibitions with one another, bridging gaps across time, space, and different spheres.

ZONE II.
De- and Rematerialization of the (Art) Object

Informed by information technology and in engagement with philosophy and art theory, the two past exhibitions explored materiality and representation in different ways. As well as selected artworks and exhibits from *Les Immatériaux* (Centre Pompidou, 2002) and *Iconoclash* (ZKM | Karlsruhe, 2002), the second and largest section of the exhibition *Matter. Non-Matter. Anti-Matter* at ZKM | Karlsruhe presented three commissioned artworks that respond to the two exhibitions. In their distinctive ways, the artworks presented here broach the issue of materiality.

Following Lucy R. Lippard's seminal publication *Six Years: The Dematerialization of the Art Object from 1966 to 1972* (1997), the dematerialization of art is associated with Conceptual art, which emerged in parallel to the computer's arrival in the visual arts. In the decades that followed, computers have enabled artists to determine their images numerically, to later generate spaces, and to ultimately augment realities. Computation has deeply influenced ideas of authorship, while reproducibility has challenged the artwork's originality.

In a tendency that harks back to the early twentieth century, images deliberately reject pictorial representation for abstraction and in some cases utter liminality. Depictions and understandings of our bodies have been influenced by information technology, more implicitly so in the 1980s and now more explicitly and ubiquitously.

Like digital production, in previous decades Conceptual art was perceived as immaterial. We have now arrived at the point at which a dematerialization of the art object is replaced by its rematerialization. Planetary-scale computation infrastructure alongside new materialist and virtual realist tendencies in philosophy insist on the materiality of computer-generated digital objects. The commissioned artworks presented here complement the exhibits displayed in *Les Immatériaux* and *Iconoclash* and lend them a contemporary layer.

The artworks in this zone add to the bodies of knowledge that once stood in the spaces of the two past landmark exhibitions and engage with increasingly digital contemporary exhibition-making methods. Among them, a sound installation accompanying selected artworks, an interactive installation subliminally exerting institutional critique, an AR app that reveals the tangibility of digital infrastructure, painting a dystopic picture of planetary-scale computation. Scientific objects and material samples of new biodegradable fabrics broadened the exhibition's thematic scope.

Josef Albers
Homage to the Square
1965

Oil on hardboard
Courtesy of Centre Pompidou, Paris; National Museum of Modern Art / Centre of Industrial Creation; Donation of Anni Albers and the Josef Albers Foundation, 1978
Similar artworks by the artist were part of the exhibition *Iconoclash*.

Materiality

It is not only through his illusory play with colors and forms that Josef Albers can be considered a pioneer of the Op Art movement. He knew that materials and substances themselves have haptic qualities that influence the effect of visual phenomena. He applied colors unmixed, straight from the tube, and then smoothed them with a knife. The support is hardboard, as it is for all the paintings in the series. Adjacent color fields touch each other so precisely that no white primer is visible. Only at the sides does the primer remain visible as a white border, which is another constant throughout the series.

Representation

In this series, on which the German artist worked until his death in 1976, Albers continued his many years of theoretical and practical investigations into the independent action of color. He examined the dependence of color on form, on its placement within the picture, and its constellation vis-à-vis other secondary colors. The gradual enlargement or reduction of the square, which reiterates the form of the picture's support, establishes the composition. Obviously inspired by Gestalt psychology, *Homage to the Square* can be understood as a study of the perceptual phenomena that emerge through combinations of color and form.

Giovanni Anselmo
Invisible
1971

Slide-projector, slide showing the word "visible"
Courtesy of Archivio Anselmo
The artwork was part of the exhibition *Iconoclash* and *Les Immatériaux*.

Materiality

Arte Povera emerged in Italy in the mid-1960s as artists integrated cheap everyday materials into their practices. As a proponent of that movement, Giovanni Anselmo developed a heightened awareness of relations between substance, time, and meaning. Throughout his life he has engaged with the spatial power of the subject, both as a body that is a plaything and an influential source of physical laws. In *Invisible*, visitors function as medium and support for immaterial visualizations as they walk through the space.

Representation

A slide projector is loaded with a single image which is projected into the emptiness of the room. The image is only revealed when a reflecting surface intersects the light beam. The crossover discloses the invisible in a kind of double entendre, since the image that is revealed spells out "invisible," in which the word "visible" is also contained. This is a linguistic conflict: signifier and signified can no longer be distinguished from each other; word becomes image while image becomes word. The reiteration of this mind game raises its complexity to a further level of intentional confusion when the visible is exposed as being invisible and likewise, the invisible as visible.

Arman
Poubelle (Wastepaper Basket)
1964

Acrylic box with waste on black lacquered wooden plate, 71 × 51 × 12 cm
ZKM│Karlsruhe
The artwork was part of the exhibition *Iconoclash*.

Materiality

Integrating valueless materials such the contents of a trash-can into the artistic process is not only an apt reflection of society but a form of direct realism—or more precisely Nouveau Réalisme, a movement founded by Yves Klein and art critic Pierre Restany, which insists on communicating through objects rather than via media. Released from the constraints of art's traditional materiality (paint, canvas, stone, paper, etc.), artists place concepts in the foreground, and the selection of actual materials is subordinated to those concepts.

Representation

The artistic practice of the French artist Arman can be considered iconoclastic for several reasons. In performances such as *Colères* (Fits of Anger) or *Conscious Vandalism*, he destroyed everyday objects, musical instruments, and furniture. His work with garbage and the contents of wastepaper bins peaked in 1960 with his exhibition *Le Plein* (Full Up), when he filled up the entire Iris Clert Gallery with rubbish.

Art & Language
Painting-Sculpture
1966–67/2005

Plywood, wood, acrylic
ZKM | Karlsruhe
The artwork was part of the exhibition *Iconoclash*.

Materiality

This work broaches the subject of self-inscription as self-description. Identical in form and color, each grey plywood board bears a different caption painted on its surface in capital letters. The captions authoritatively insist, or appear to insist, on the fact that they are different to each other. The viewer is called to read instead of look and consider the implications of such an artistic declaration. The artwork is a radical investigation into the definitions of two genres of visual arts. Through a degree of detachment from both the painterly and the sculptural aspects, the limits and the internal logic of these two categories are challenged. What defines a painting as opposed to a sculpture? Language is used to question art; words are substituted for images. Defining these almost unvarying forms merely by the inscriptions on their surfaces leaves little room for deeper interpretation. Likewise, the search for essence becomes redundant since the use of words is social. A dematerialization of art that is marked by rhetoric and an aesthetic of absence suggests that meaning may not lie within the material object itself but in the cultural and conceptual framework in which it is to be seen.

Representation

This critique of visual representation by the British conceptual artist group is abundantly obvious: even words do not suffice to represent the world adequately. The 1960s saw a rise in tautological form throughout artistic and critical discourse. Though one or even both self-referential statements may be a falsehood, the presentation of the artists' intention becomes an a priori truth based on social convention or artistic declaration. This change is characterized by a turning away from uncritical notions of perception in favor of critical analysis and a progressive challenge to art's representative function. *Painting-Sculpture* demonstrates the changing ontology of painting and sculpture. The artists intentionally used art forms that do not necessarily result in a finished object such as a painting or sculpture. Based on the assumption that works of art are self-contained things, the concept takes precedence over the object itself. Rejecting a historical self and pushing self-criticality to the point of dematerialization were iconoclastic in themselves, but paradoxically they also gave rise to new art forms.
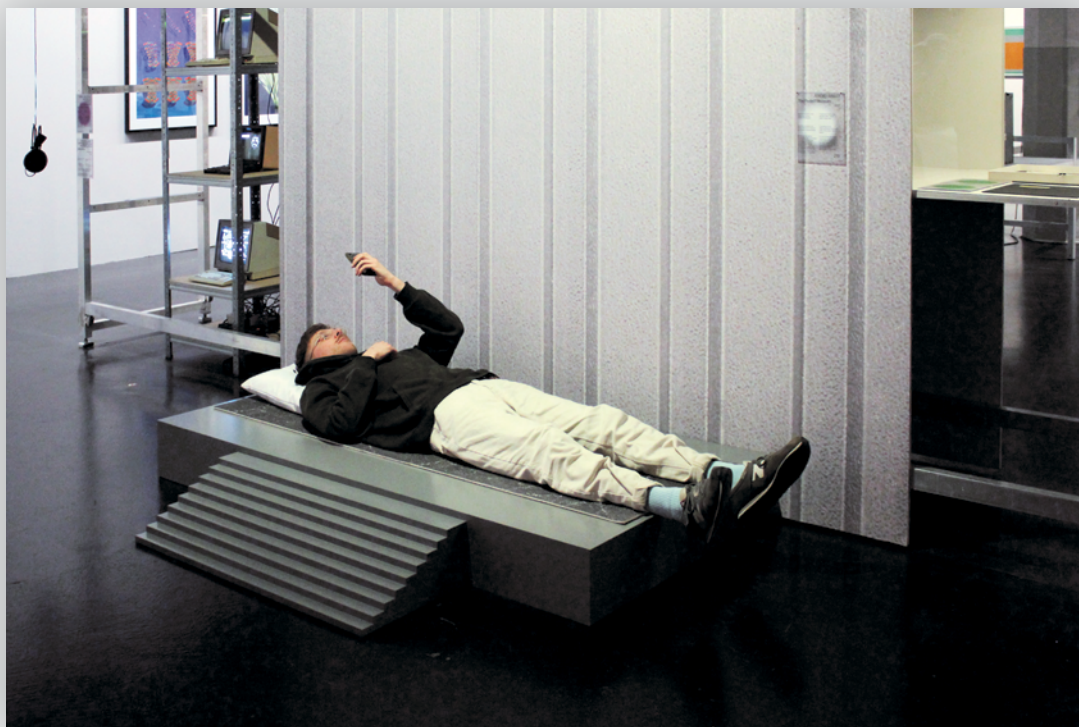
Jeremy Bailey
The Perfect Museum
2022

Augmented reality app, wooden plinth, pillow, tablet, metal frame
Commissioned by ZKM|Karlsruhe

Materiality

Jeremy Bailey takes up the discourse around agency within the context of the art museum and the AR filter selfie. Using the specially designed AR app transforms one's body into both exhibition space and curator. The visitor becomes capable of configuring and transfiguring randomly generated constellations of artworks from the exhibition across their bodies, which obey the laws of physics and respond to bodily movements. Bailey reverses the power relationship between institution and individual by displacing the formality of an exhibition context by chaotic play and a scramble to pick up the falling pieces. This effect turns viewers into playthings of the artworks' own arbitrariness.

Representation

This work continues the explorations of Bailey's previous augmented reality projects, such as *YOUar* (2020–), an online shop for digital museum-quality sculptures, and his software performance *Nail Art Museum* (2014), in which digital models of canonical artworks are presented on the tips of the user's fingers, which become virtual plinths. These works ironically critique the signifying power of the art museum's hallowed halls. The central point for Bailey is the role of the individual, who must struggle against the common belief that art is significant precisely because it is on display in the museum.
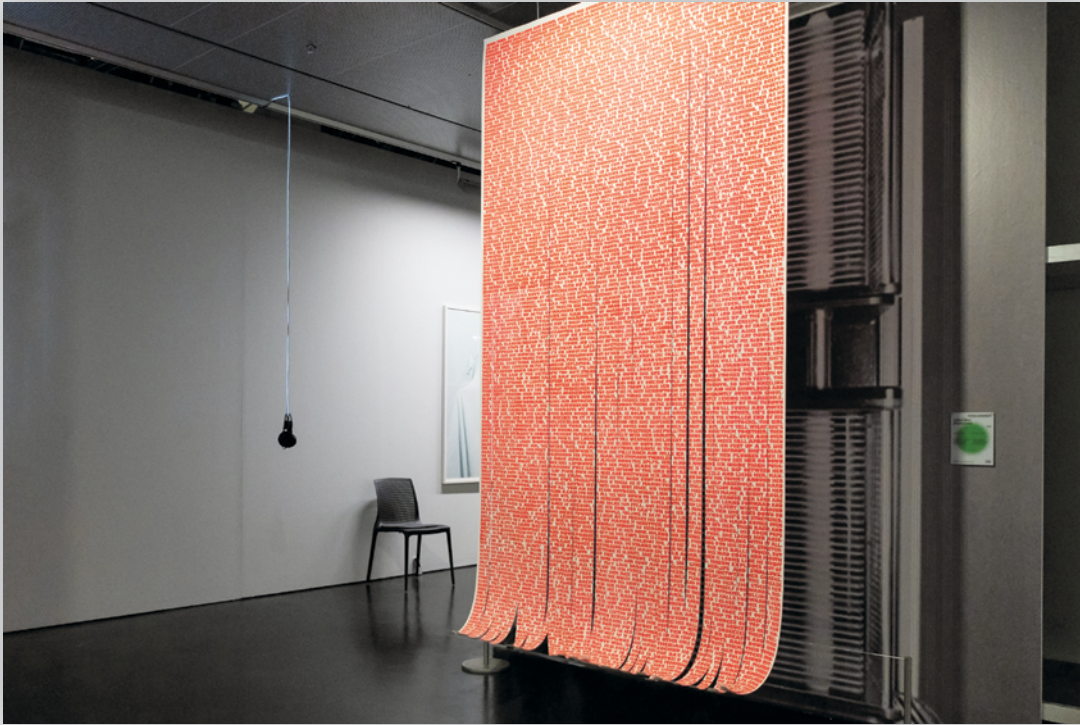
Fiona Banner
Colour Blind (Arsewoman)
2001

Unique screen-print on paper
Courtesy of Galerie Barbara Thumm
A similar artwork by the artist was part of *Iconoclash*.

Materiality

This work by British artist Fiona Banner is a transcription of a pornographic film—a personal retelling of the sequence of events as they unfold—that gives a detailed account of who does what to whom and what effect it has on them. Printed in pink ink on a large sheet of paper cut into strips, the words form a tattered yet uniform mass, lending a sculptural and architectural form to the whole. A playful investigation into the limits of written communication, it shows the impossibility of containing action and time in a prescribed structure. The work explores the ostensible immateriality of language, yet its monumental scale suggests otherwise: language is both semiotic and malleable.

Representation

Based on a porno film, the print illustrates the power struggle between form and meaning and hints at the excessive visual language of our culture. The sheer volume of words slows down perception, forcing viewers to apprehend sensation more deliberately. It calls for an enhanced attention and self-awareness that is rarely engendered by commercial productions, especially pornography. Through its processual retelling of a fictional drama designed to elicit sexual arousal, the wordscape engages with the historical nude. The observation of the feminine form, typically associated with the gaze of male painters, is cut to ribbons and reinvented. Publishing is understood in its broadest sense: that which was visual becomes verbal. The act of transcription is both subject and medium.

Samuel Bianchini
Sniper (Dispn series)
1999

Interactive image, on the web and as installation
Original programming: Emmanuel Méhois (web) and Oussama Mubarak (installation and
upgrade into 4K in 2021) with the support of ZKM | Karlsruhe
Permission to use scene from the film *Warshots*, courtesy of Heiner Stadler
Courtesy of Samuel Bianchini
The artwork was part of the exhibition *Iconoclash*.

Materiality

Composed of fragments from different frames shown on
one plane, the interactive image onscreen arranges the
chronological moments of a woman falling after having just
been shot. The simultaneity of time becomes the object
of manipulation by the viewer who controls the cursor;
because our actions cause harm to the woman regardless
of what we do with it, we assume the role of the sniper and
become responsible for the situation. Even though the
work is only a sequence of digital images, our sensitivity for
actions' consequences is enhanced empathically because
of our own actions at the screen.

Representation

Samuel Bianchini's *Sniper* presents a sequence that lasts
only a few seconds, in which a woman falls to the ground
after being shot by a sniper. The scene is extracted from
the film *Warshots* by Heiner Stadler. For the interactive
digital artwork, the image is fragmented into twenty-five
equal parts, with each element representing a snippet of a
random frame corresponding to that position in the select-
ed scene. Each time viewers hover over the image with the
cursor, the corresponding part of the subsequent frame
becomes visible.
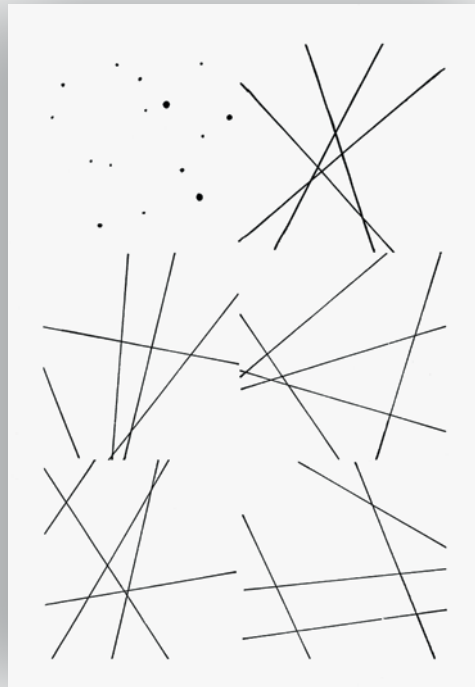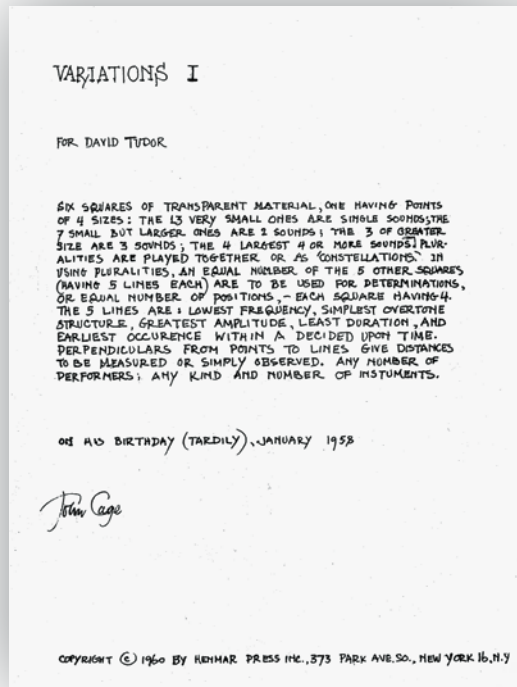
John Cage
Variations I
1958

Score
ZKM | Karlsruhe
The artwork was part of the exhibition *Iconoclash*.

Materiality

As its title promises, John Cage's *Variations* offers its interpreting musicians a relatively high degree of freedom in dealing with the individual components of its musical system. They are free to arrange the various transparent foils as they wish as long as they follow the instructions. The instruments, or rather the materials to be sounded, are mostly prescribed by the scores. The possibilities are thus limited to the musicians' perceptual, thought, and action repertoire, which means that habitual practices and skills with the given parameters come to the fore.

Representation

As a pioneer of chance and indeterminacy, John Cage is considered a trailblazer of the Happening and Fluxus movements of the 1960s in visual art, but also a key figure in contemporary music. With the *Variations* series, Cage created a musical system consisting of sheet music and instructions that give musicians the freedom to interpret "notes" which do not follow European note classification. These can take on free forms individually and within the framework of the instructions, and may be performed flexibly and again and again. With this approach, Cage designed a different relationship between the roles of composer and musician, in which the performer is no longer merely a representative of the composer's genius but has a large degree of autonomy. The *Variations* represent a space of possibility rather than a rigid system.
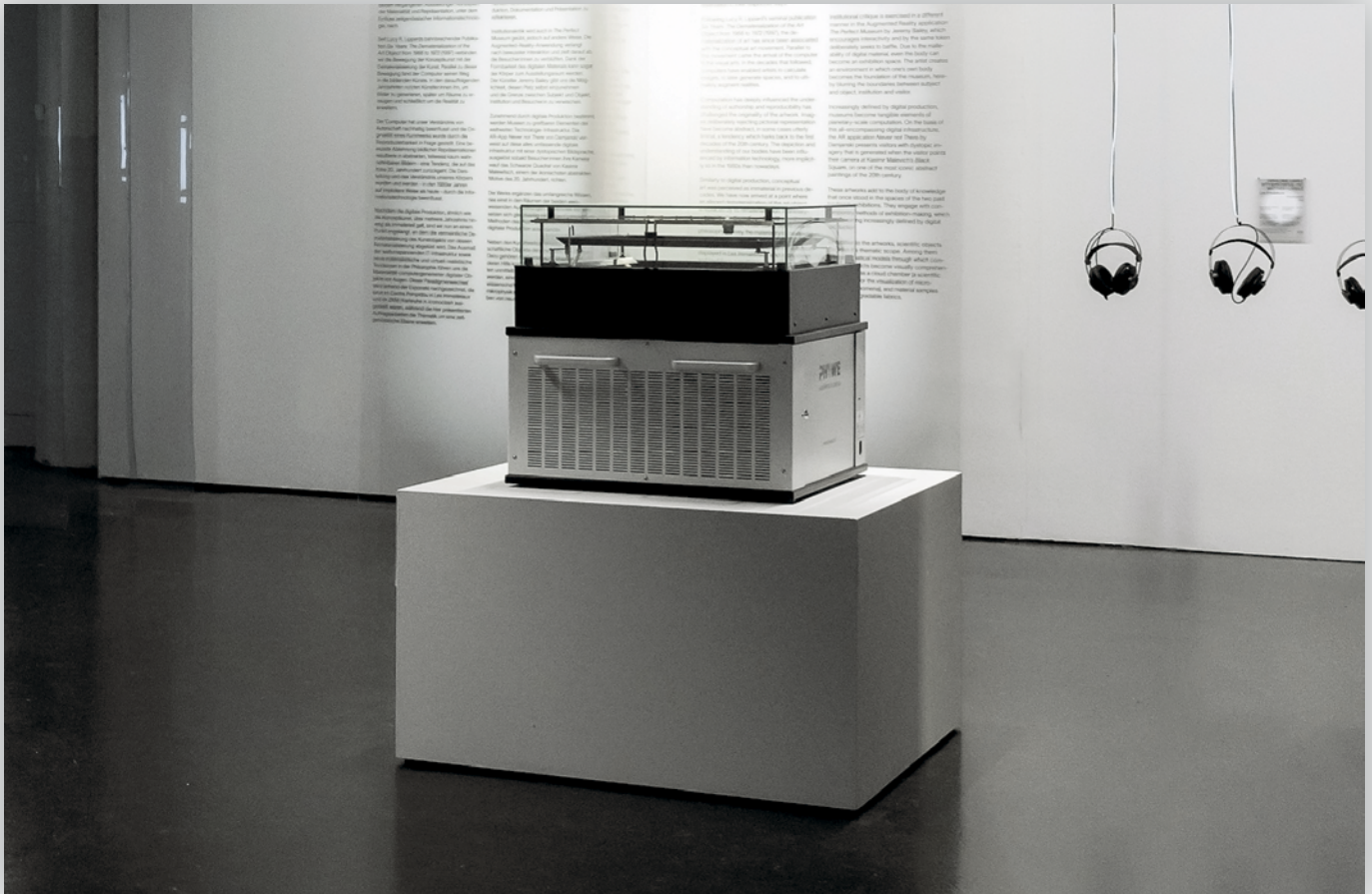
Cloud Chamber

Particle detector equipment for ionizing radiation
Courtesy of Karlsruhe Institute of Technology (KIT), Institute for Astroparticle Physics (IAP)
A similar device was part of the exhibition Iconoclash.

Materiality

In 1932, with the help of a cloud chamber, the US physicist Carl D. Anderson encountered the unexpected tracks of a positron: a positively charged particle with an electron's weight. This evidence of antimatter proved that, in accordance with Albert Einstein's theory of relativity, every particle in the universe corresponds to an antiparticle with an inverse electrical charge. Anderson received the Nobel Prize for his discovery in 1936, but only a few years later cloud chambers played an important role in a very different field: they were essential for research on implosions undertaken at Los Alamos by the Manhattan Project, which led to the first explosion of a nuclear weapon in the 1945 Trinity Test.

Representation

The cloud chamber was invented in the early twentieth century by Scottish physicist Charles Thomson Rees Wilson for particle visualization in experimental microphysics. While passing through the cloud in the chamber, charged particles leave visible fleeting traces; these traces enable the detection of specific particles or radiation types. Building upon Wilson's invention came other devices to capture particle movements, like the bubble chamber and those which track cosmic radiation with the aid of photosensitive nuclear emulsions. Today cloud chambers are mainly used for illustrative purposes, because researchers tend to opt for digital technologies for particle visualization.

Damjanski
Never Not There
2022

Augmented reality app, plinth, tablet
Commissioned by ZKM | Karlsruhe

Materiality

Using various scanning processes, recent art-historical research has revealed the existence of at least two other compositions underneath Kazimir Malevich's 1915 painting *Black Square*. It is thus no coincidence that an exhibition copy of the painting serves as a spatial tag and entry point to the app. Just as there are many layers behind digital images, other layers of material lie underneath the *Black Square*'s uppermost painted surface, the sum of which may be regarded as a protocol of the resources and ideas that went into the painting.

Representation

A smartphone camera reveals a web of interwoven cables, servers, and electrical devices that extend through the entire environment. This overlapping layer, automatically generated from images found on the internet, brings to the surface a dimension of the supposedly immaterial digital space that would otherwise remain hidden in high performance data centers or server farms—a gigantic volume of hardware without which neither digitality nor augmented reality could be thought of, let alone perceived.

Marcel Duchamp
À l'infinitif (In the Infinitive)
1966

Facsimile on paper and silk-screened Plexiglas case
Courtesy of Centre Pompidou, Paris; National Museum of Modern Art / Centre of
Industrial Creation; Donation of Arne Ekstrom, 1976
The artwork was part of the exhibition *Iconoclash*.

Materiality

The third and final volume in a series of portfolios made by Marcel Duchamp in relation to his seminal work *The Large Glass* (1915–23) provides insight into the artist's creative process. Housed in seven themed black folders, the seventy-nine facsimiles of notes facilitate an aleatory process through which the reader is encouraged to create their own understanding of the material. Titled *In the Infinitive* in reference to the non-finite verb form, the portfolio's indexical nature points towards Duchamp's *perlaboration* (working-through) and attests to an epistemological shift in image-making: in striving for transparency, open practices are characterized by semiotic analysis and departure from the image. The material ceases to lend form to the artwork; instead, it is the ideas that determine whether material will be used at all.

Representation

Published in an edition of 150 and including the pins, cellophane, and tape that were used to keep the original notes together, this collection of facsimiles is painstakingly accurate. That which is included in a facsimile—an exact copy of written material—is never the thing itself; it remains a representation. In this sense, the contents of the original are also a symbolic representation and nothing more than a conveyor of information. Its reality does not rely on whether it is an "original" manuscript or a facsimile, but rather on the reader's interaction with it and how it is performed in their mind. The divide between copy and original becomes obsolete. It is in the withholding of authorial organization of information and the revivification of repetition that new meaning is generated. The facsimile and other practices of copying materials can be understood as predecessors to digital reproducibility.

Marcel Duchamp
Porte-bouteilles (Bottle Rack)
(1914) 1964

Steel (galvanized)
Courtesy of Staatsgalerie Stuttgart, acquired 1985 with Lotto funds
The artwork was part of the exhibition *Iconoclash*.

Materiality

The readymade radically questions the modern concept of the author as subject. Artists no longer produce objects, but instead select and contextualize them. The creators of artworks are those who use elements from their surroundings, transform them, comment on them, or reproduce them. Marcel Duchamp was a pioneer of conceptual art who declared that an industrially produced everyday object can become an artwork through recontextualization, specifically through showing it in an art exhibition, without any material modification.

Representation

Marcel Duchamp's readymades rebelled against an understanding of art as a purely sensual experience, as a stimulus of the retina. By integrating a reflexive element into his artistic practice, the French artist drew attention away from the depicted object toward the way it was depicted. Duchamp's declaration of everyday objects as artworks, such as a bottle rack, a snow shovel, or a urinal, was a clear provocation directed against the art market, although ironically his readymades have now become collectors' items.

Eric Heller
Images Inspired by Science
1997–2001

The artworks were part of the exhibition *Iconoclash*.

Materiality

Compared to analog methods in the natural sciences, like the cloud chamber which can depict the tracks of particles, digital images like those created by Eric J. Heller represent a next step in the use of imaging techniques. Whereas scientists used to rely on material evidence, such as the tracks of charged particles on photosensitive film, such physical correspondences between cause and effect are not necessarily a given in digital calculations and simulations. Instead, these *Images Inspired by Science* are created with the aid of computers based on probability calculations and simulations. This renders them epistemologically less reliable, according to their critics.

Representation

Heller, a US professor of chemistry and physics, works on the relationship between classical and quantum physics using both scientific and artistic methods. His attempt to produce artworks aided by computers has often led to scientific insights, and vice versa. The patterns Heller visualizes appear in nature at very diverse orders of magnitude—for example, in the orbits of planets around a sun or in the movements of electrons around a nucleus.

Michel Jaffrennou
Ceci est une image (This is an Image)
2002

Courtesy of the artist
The artwork was part of the exhibition *Iconoclash*.

Materiality

With the statement "This is an image," French artist Michel Jaffrennou directs our attention to the materiality of digital images. Every image stored on a hard drive, disseminated via the internet, or rendered on a computer screen is dismantled into its original parts: it does not constitute an intact whole but a collection of discrete pixels. Even if a digital reproduction appears to resemble its analog original, the image is comprised of information which can be broken down into binary code. This means it is made up of the same basic elements as all other digital objects, even the program that created it. The user interface of Microsoft Excel is accordingly visible in the work.

Representation

For Jaffrennou, digitization can be understood as a way out of the crisis of representation. Always transmitted, transformed, combined, and redistributed, images are in a continual flow. Yet the rendering of an image differs so greatly from screen to screen that each individual instance constitutes its own original. Thus the digital image, at least in principle, overcomes the concepts of aura and authorship and the economic implications associated with them.

Geraldine Juárez with Bani Haykal and Matt Nish-Lapidus
Les émulateurs (The Emulators)
2022

Sound installation, interactive online platform
Commissioned by ZKM | Karlsruhe

Materiality

The use of a soundscape made the experience of *Les Immatériaux* remarkably immersive. This is what Geraldine Juárez took as a starting point while creating *Les Emulateurs*, an online work used to generate versions for its on-site extension based on multiple interviews with artists, theoreticians, and cultural workers, which include questions that pivot around the notions of "model" or "asset." In addition to its soundscape, a further point of reference is one of the 1985 exhibition's sections or "sites," titled *Monnaie du temps* (Currency of Time), which described the financial dematerialization that ensued as money freed itself from its original source of value. Time is the main preoccupation of capitalism, as well as the dimension where soundwaves propagate. Enabling the manipulation of the audio-track sequence via the online interface thus sets in train the generative relation between time and capitalist production that lies at the core of an asset. In the galleries of ZKM | Karlsruhe, sequences generated from the online interface accompany selected artworks that are on display; in this way the piece becomes a true emulator of the soundtrack put together by Dolores Rogozinski for *Les Immatériaux.*

Representation

Les Emulateurs is a subtle work of constantly evolving sounds, noises, and voice recordings framed by an online interface. In this it echoes the tenets of the *Matter. Non-Matter. Anti-Matter* exhibition. It takes the soundtrack and one scene from the past exhibition *Les Immatériaux* as its starting point, and manifests itself in a hybrid manner: an online soundscape triggered by cursor movements and prerecorded soundtracks distributed around the exhibition space. In computer science "emulator" denotes a program that creates an extra layer between an existing host and a target platform that is to be reproduced. An exhibition can also be seen as an emulator, a salvage program for worlds, belief systems, and realities that it retranslates into universal codes and interfaces. Even though they cannot bring all the facets and context of a past event back to life, models of exhibitions and their soundtracks allow us to play old exhibitions back—and generate genuinely contemporary experiences.
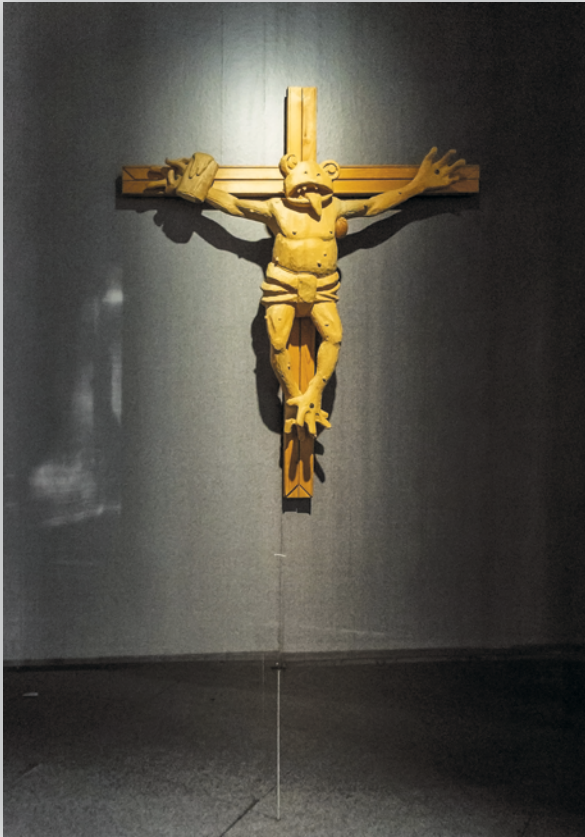
Martin Kippenberger
Fred the Frog Rings the Bell
1990

Carved wooden frog, wooden crucifix, steel nails
Courtesy of Skarstedt Collection
The artwork was part of the exhibition *Iconoclash*.

Materiality

Martin Kippenberger's *Fred the Frog Rings the Bell* consists of a wooden frog hanging from a cross made from wooden elements that are reminiscent of easels, commonly associated with artistic practice. With its tongue hanging out and gaping eyes looking in different directions, a beer mug in one hand and an egg under its other arm, *Fred the Frog Rings the Bell* shows the (self-)image of an artist who ridicules his own habitus to expose the snobbery that so often confers a special status on artists. "Every artist is a human being," was Kippenberger's comment on that phenomenon.

Representation

Fred the Frog Rings the Bell is one of Kippenberger's most important and controversial series in which the figure of the frog, usually crucified, appears repeatedly in paintings and in sculptures. At first glance the focus seems to lie on the humorous appropriation of a religious icon. With a little background knowledge, however, the frog proves to be a caricature of a self-portrait; Kippenberger created many works based on alter egos, among them Fred the Frog, which are essentially variations on that art-historical genre. His iconoclastic punk practice put the self-portrait through the wringer.
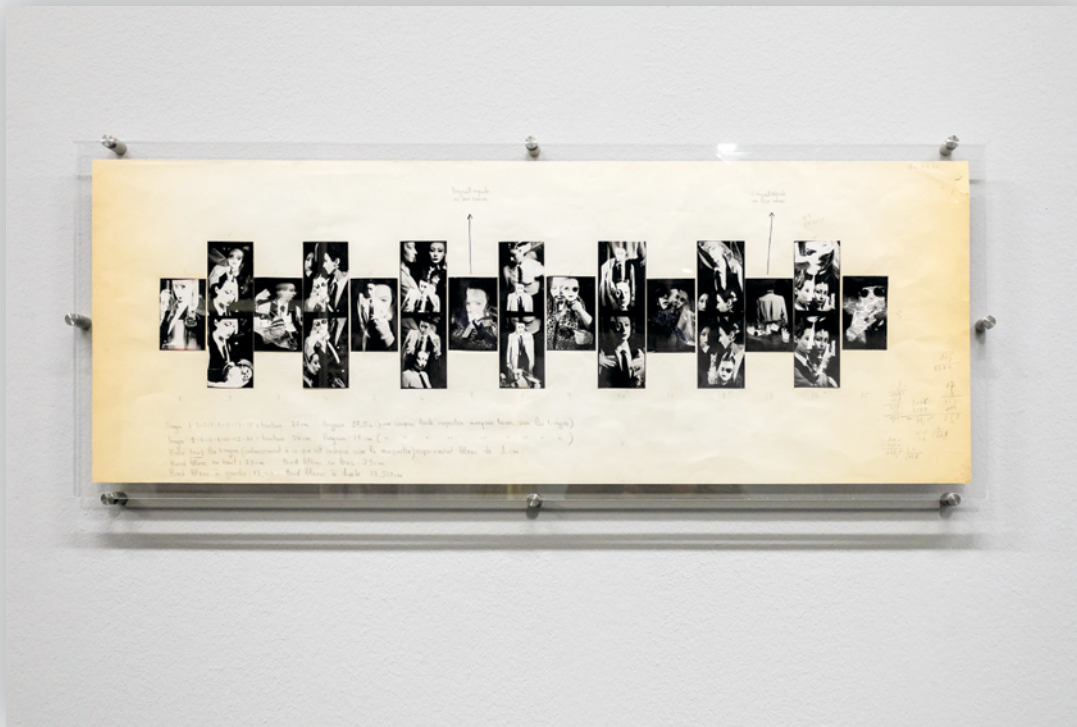
Maria Klonaris, Katerina Thomadaki
Orlando-Hermaphrodite II
1985

Black-and-white photographs on paper
Courtesy of the artists
The artwork was part of the exhibition *Les Immatériaux*.

Materiality

"The material body of one's own identity. To what extent can the desire to be other, to be the other, be 'inscribed' on the body?" This is how the exhibition catalog of *Les Immatériaux* introduced the section titled *L'ange* (The Angel), in which Franco-Greek artists Maria Klonaris and Katerina Thomadaki exhibited a frieze that was several meters long. All that remains of it today is this model and the photographic documentation they made at the time. Originating from the multiple-projection performance *Orlando-Hermaphrodite II* (1983), the photographs intermingle, fragment, and overlap with the artists' androgynous transvestite bodies. Enlivened by the playful exchange of glances and mirrored reflections, a fluidity is established between genders and within the images themselves.

Representation

Since the mid-1970s, Klonaris and Thomadaki practiced and theorized what they called a cinema of the body. They combined experimental cinema, theater, and visual arts in protean performances, offering experiences that appealed to all the senses. By representing bodies that do not conform to the norm—dissident bodies, so to speak—such as the hermaphrodite in *Le Cycle des Hermaphrodites* (*The Cycle of Hermaphrodites*, 1982–90) and the intersexual angel in *Le Cycle de l'Ange* (*The Angel Cycle*, 1985–2013), they challenged the symbolic systems that dominate representations of bodies, sexes, genders, desires, and romantic relationships.
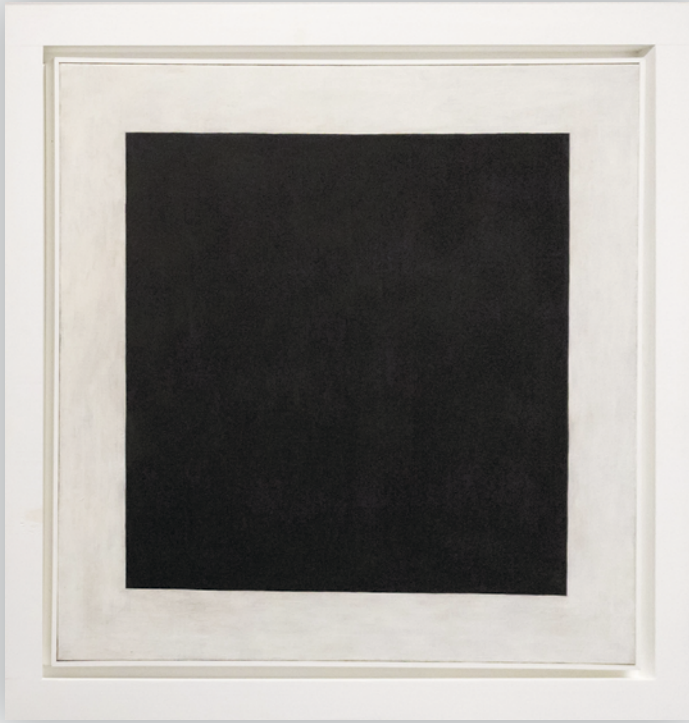
Kazimir Malevich
Black Square
1915 (first version) / 2002 (remake by Volker Möllenhoff)

Oil on canvas
ZKM | Karlsruhe
The artwork was part of the exhibition *Iconoclash*.

Materiality

Producing an exhibition copy is not only exciting from an art-historical perspective but materially and theoretically. To what degree of completeness should the copy represent the reproduced object? When is a copy more than just a replica? And what difference does it make when the surface of an object is merely recreated instead of a material reconstruction of the object down to the last detail? The answers to these questions can be quite different depending on one's perspective, as the meaning of cultural objects is closely linked to their context of origin. Whether copying is a conscious artistic strategy or serves visual or research purposes is decisive in determining what copies ultimately represent.

Representation

The reproduction of Kazimir Malevich's *Black Square on a White Ground* shown here was made in 2002 for the exhibition *Iconoclash*, as the original was already out on loan during the exhibition period at ZKM | Karlsruhe. *Black Square on a White Ground* is one of the most iconic artworks of the twentieth century and widely regarded as a milestone in abstract painting. Exhibited for the first time in 1915 as part of the legendary exhibition *0,10*, it was one of the first paintings in the Western painterly tradition to dispense with figurative elements. Malevich's explicit goal was to create paintings without objects that represented nothing more than themselves.

Kazimir Malevich
Gota 2-a (Architectone)
1923/1989 (reconstruction by Poul Pedersen)

Plaster, 80 original elements and 35 reconstructed elements
Courtesy of Centre Pompidou, Paris; National Museum of Modern Art / Centre of Industrial Creation
Similar works by the artist were part of the exhibition *Les Immatériaux*.

Materiality

From today's point of view, treating nonobjectivity as the highest form of representation would be utopian because it would imply the existence of meaningless things without attribution or concept. Kazimir Malevich's *Architectons* undermine this thesis, since pure objectlessness, insofar as it could exist, could only function without bodies. A visualization of the disembodied idea would be the ideal here. Time and again, models serve as aids for artists. Even if the *Gota Architecton* was not intended as the model for a larger realization, its model-like aesthetic is unmistakable.

Representation

In 1923, Malevich began producing his *Architectons*: architectural sculptures made from geometric plaster blocks. According to Malevich, their "architectural Suprematism" was the ultimate form of Suprematism; it surpassed painterly Suprematism, with which the artist had defined the endpoint of painting in 1919, on the basis of a white square on a white background (his *White on White*). Yet contrary to the convictions of Suprematism, according to which nonobjectivity was the highest principle, the *Architectons* can be seen as a template for functional modern architecture. By making objectlessness an object again through architecture, it demonstrates that deconstructing signs often leads to the emergence of new signs.

Piero Manzoni
Merda d'artista (Artist's Shit)
1961

Metal can
Courtesy of Staatsgalerie Stuttgart, Loan 2020 ADRIANSTIFTUNG
The artwork was part of the exhibition *Iconoclash* and *Les Immatériaux*.

Materiality

A Marxist criticism of commodity fetishism manifests here in a limited edition of ninety cans numbered consecutively by the artist and labeled with information about net weight (30 g), conservation type, and filling date in English, German, French, and Italian. Their standard industrial packaging and labeling make the artworks look like everyday consumer items. The commodity value of the cans was supposed to be the current market value of their equivalent weight in gold, the price that artist Piero Manzoni sold them for in 1961. Thus *Artist's Shit*, among numerous other interpretations, could stand for what Jean-François Lyotard has called the disappearance of both the gold standard and the taste standard.

Representation

Manzoni's conceptual work, interpreted as a direct and iconoclastic appraisal of value production in the art world, was an inevitable echo of Duchamp's readymades in terms of the post-1945 consumerism unleashed by the dawn of the 1960s. After making a series of achromatic paintings that Peter Weibel has argued formed "the third step of abstraction, which brought painting even closer to the border of its elimination," Manzoni had already started exploring the direct material representation of the artist in, for example, *Artist's Breath* (1960).

Mathematical Models from the Collection of the TU Dresden
Hyperbolic paraboloid with plane intersections, 1878, Surface of Peano, after 1911; *Triple connected Riemann surface, Möbius strip*, n. d; *Stellated octahedron (Keplerstern)*, 2005; *Wire model of the Klein bottle (Kleinscher Schlauch)*, n. d.

Courtesy of Collection of Mathematical Models, TU Dresden
Similar artifacts were part of the exhibition *Iconoclash*.

Materiality

Mathematical models are a clear example of what German philosopher Hugo Kükelhaus called "phenobjects": like exhibits in technical museums or science centers, they illustrate scientific concepts which usually evade visualization. Alongside the adjacently presented *Architectons* by Kazimir Malevich, they can be understood as abstractions that have become form. By virtue of their concrete reality as objects they also acquire an aesthetic dimension, creating an ambivalence that inevitably challenges their role as tools of mediation.

Representation

Such models were mostly built in the nineteenth century, often out of wire, plaster, and wood, to visualize mathematical functions. They featured in a conflict over the role of images within mathematics. While some mathematicians, such as Felix Klein, maintained that visualizations of mathematical concepts were crucial to their understanding, David Hilbert and others viewed mathematics as a combination of abstract rules, in which the illustrative character of models had no place.
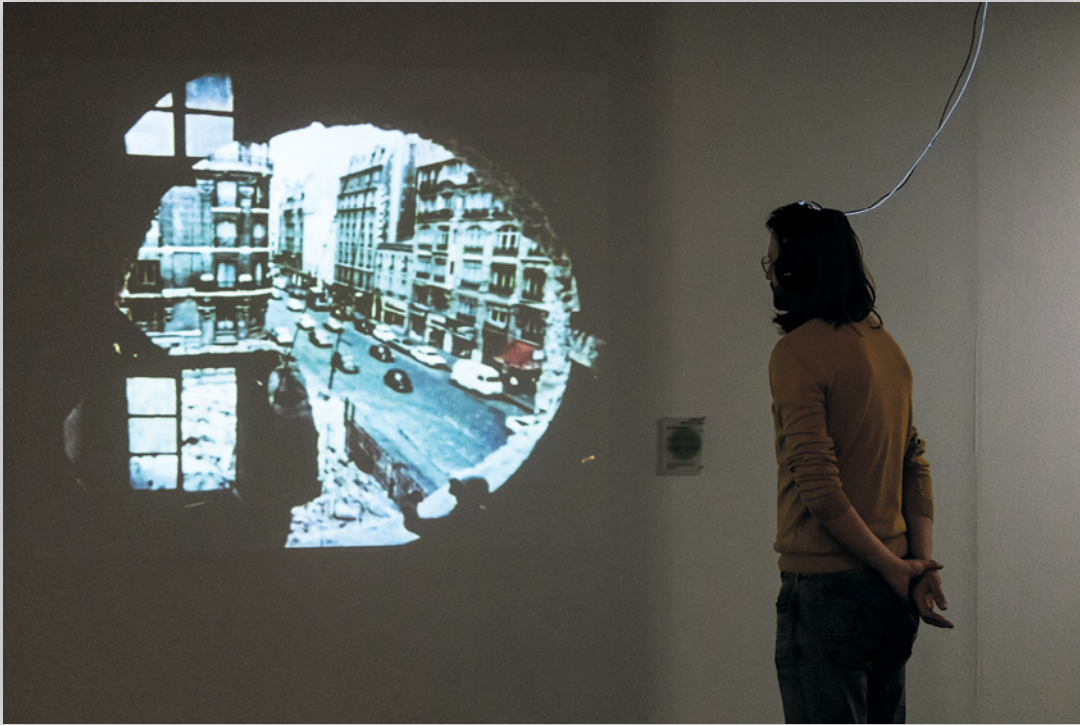
Gordon Matta-Clark
Conical Intersect
1975

Film, 16mm, color, silent
Courtesy of Centre Pompidou, Paris; National Museum of Modern Art / Centre of Industrial
Creation; acquired 1994
The artwork was part of the exhibition *Iconoclash*

Materiality

Gordon Matta-Clark's architectural intervention consisted of a large hole that cut through two historical buildings. It formed a cone-shaped hole through the roof at an angle of about 45 degrees from the street to the exit. The void described a negative space with a physical sculptural presence while also providing a glimpse of the structure's inner skeleton. Matta-Clark combined Conceptual art's critique of cultural institutionalization, Land art's direct engagement with the environment, and performance art's play with the meaning of action. He literally cut through abandoned buildings to form Piranesian perspectives out of hollow spaces and cracks.

Representation

Matta-Clark's art intervention took place in two seventeenth-century buildings in the Les Halles district of Paris, a neighborhood earmarked for demolition to make way for a new cultural center near the Centre Pompidou, which was still under construction. The accompanying video was first exhibited at the 1975 Paris Biennale, in which Matta-Clark criticizes urban gentrification. The resulting architectural scene can be described as both an anti-monument and as a reference to the poetics of urban ruins—one that can certainly be understood as a romantic gesture.
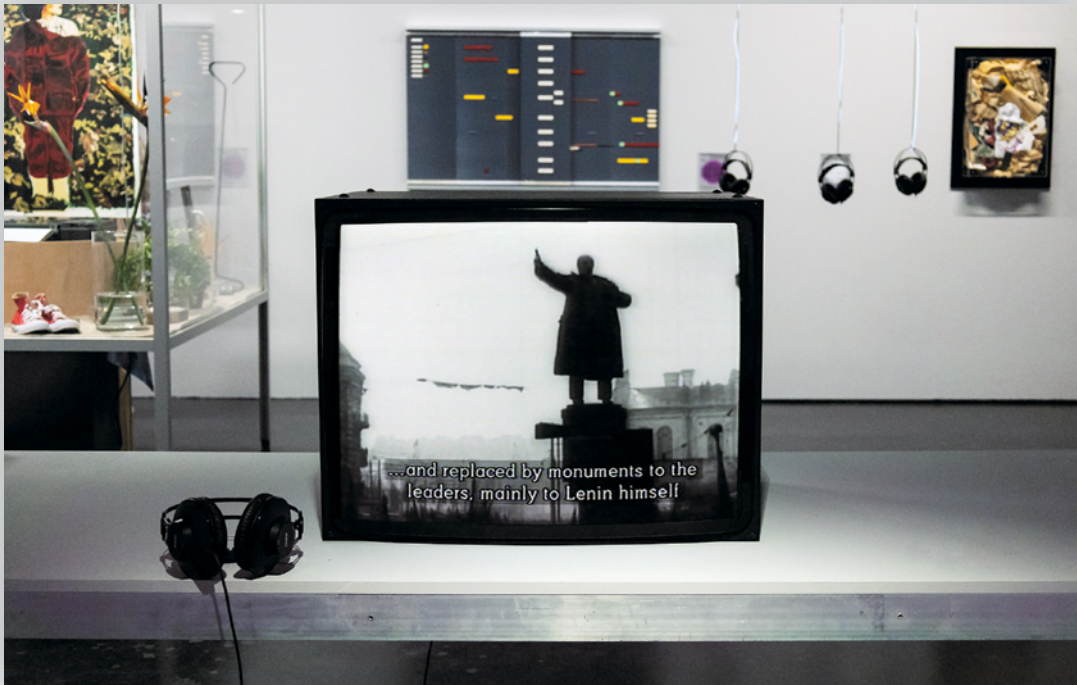
Laura Mulvey, Mark Lewis
Disgraced Monuments: Abandoned Monuments in Moscow
1994

Video, color, black-and-white, sound
ZKM│Karlsruhe
A similar artwork was part of the exhibition *Iconoclash*.

Materiality

The political forces behind historical events like revolutions, regime changes, or reform movements sometimes manifest in statues or other monuments that may be understood as material witnesses or even crystallizations of those events. This is one of many reasons why movements to dismantle them, often motivated by their own political forces, can cause controversy: destroying an object may mean erasing a part of history or at least repressing it. *Disgraced Monuments* explores how such acts of destruction after the fall of the Soviet Union marked "the start of the mechanism of history, when the mechanisms of the new ideology began to work again," as art critic Viktor Misiano puts it in the film.

Representation

The film captures the cycles of iconoclasm unleashed by the Russian revolutions over the course of the twentieth century. With each regime change, monuments to the old leaders were publicly dismantled and new monuments created to honor the new government. When the Soviet Union ended in 1991, a revolution occurred which can be said to have not immediately led to a new ideology; thus Misiano refers to it as the first "post-historical revolution."

Roman Opałka
Opalka 1965/1-∞ détail 3324388-3339185
1965–2011

Acrylic on canvas
Courtesy of Centre Pompidou, Paris; National Museum of Modern Art / Centre of Industrial
Creation; acquired 1983
The artwork was part of the exhibition *Iconoclash*.

Materiality

French-Polish artist Roman Opałka began working on this series of paintings in 1965 and continued until his death in 2011. Although the individual canvases display nothing but rows of consecutive numbers, in a very distinct way, they also represent the process of their creation: we see the uniformity of what is depicted, the materiality of the paint, brushstrokes, and the hand's trembling. The canvases are the same height of Opałka's body and this too references their creation. Opałka thought of his paintings as "psycho-grams" of his life.

Representation

Like many artists of his era, Opałka rejected figurative painting and the notions of representation associated with it. Instead, he espoused a systematic, mathematical approach. The series began with white numbers on a black ground; that lasted until 1972, when he decided to gradual-ly lighten the background over time, until he finally arrived at painting white numbers on a white canvas. Opałka's œuvre can be understood as a continuous and increasing-ly drastic refusal of figurative representation.

Nam June Paik
Zen for TV
1963/86

Manipulated television set
Permanent loan of ZKM | Karlsruhe
The artwork was part of the exhibition *Iconoclash*.

Materiality

By rotating the TV set by 90 degrees, Nam June Paik defamiliarizes this ubiquitous device and redefines its visibility as an object. The subtle intervention of *Zen for TV* shifts our focus to the usually disregarded infrastructure, the hardware of the medium, when usually it is the moving image on the screen that catches our attention. Paik used a similar strategy in *Zen for Film* (1964), a work in which an endless loop of unexposed film runs through a projector. We only see the spots, scratches, and specks of dust collecting on the film.

Representation

The Korean-born artist created the first version of *Zen for TV* in 1963 when he accidentally manipulated the cathode ray tube inside the TV set. Paik prepared the TV in question in such a way that just one single line would be visible on the screen, replacing the colorful flickering and ever-changing images of the usual broadcasts with a solitary meditative abstraction. Paik deconstructed television and his iconoclastic gesture reversed the purpose of the device from distraction and amusement to contemplation. Its abstract motif was used for the poster of *Iconoclash*, becoming a symbol of the image wars that formed the overarching theme of the exhibition.
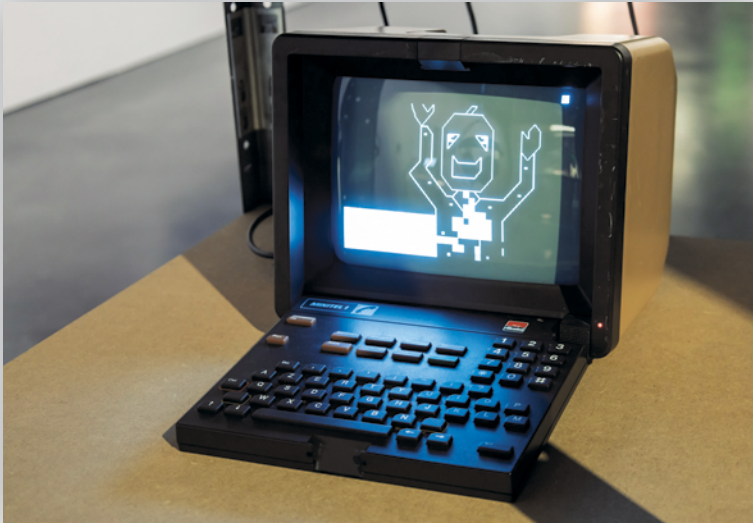
PAMAL_Group featuring Jacques-Elie Chabert and Camille Philibert
Lost & Found & Found
1985/2021

3 Minitel, 3 Arduino, 3 adapters, shelf
Courtesy of PAMAL_Group
The artwork was part of the exhibition *Les Immatériaux*.

Materiality

Specially created for the Minitel videotex service by the graphic designers of the Toi et Moi pour Toujours collective, *L'Objet perdu* (1985) is a multiple-choice telematic novel through which a multilayered narrative can be experienced. It compels us to consider how the omnipresence of new technologies disrupts established communication models. In *L'Objet perdu*, author and reader swap roles and collaborate. The narrative is no longer fixed, but varies according to navigation choices. Compared to writing on paper, the telematic technology and programming language of the Minitel network behind the onscreen pages constituted a dematerialization. As we understand it today, this phenomenon can be made clearer by using the neologism "immatériaux": dematerialization is not intangible or imperceptible reality, but one that requires the formation of new languages and lines of thought. It is in fact the graphic and technological materiality of this missing artwork that PAMAL_Group draws on for their media-archaeological reconstruction of it.

Representation

Lost & Found & Found is an installation created by PAMAL_Group using telematic artworks that disappeared with the closure of the Minitel network in France in 2012. In collaboration with Jacques-Élie Chabert and Camille Philibert, PAMAL_Group has reconstructed some of the screen pages and animations of *L'Objet perdu*. The parallel stories of Olga and Max, consisting of texts accompanied by animations, were displayed on more than 250 screens. Visitors could elaborate the story's tree structure using the keyboard. Based on Minitel technologies, the reconstruction was carried out using colored silkscreen prints of the monitor images that were originally intended for *Toi et Moi* magazine.

Anonymous
Pietà
1480/1500

Wood (Linden), color, carved, painted
Courtesy of Heimatmuseum Mühlacker
A similar artwork was part of the exhibition *Iconoclash*.

Materiality

Jean-François Lyotard's postmodern and Bruno Latour's nonmodern thinking seeks to overcome the Cartesian dualism of mind and matter, of *res cogitans* and *res extensa*, which is closely linked to a Christian worldview that posits a mortal body as the vessel for an immortal soul. To rethink that modern approach means not only overcoming the supposed mastery of mind over body, but also the supposed mastery of humanity over nature, of subject over object.

Representation

Many fourteenth- and fifteenth-century sculptural depictions of the Christian figure of Mary with the dead body of Christ show Christ's wounds in great detail. Throughout the European Reformation these renderings of the Pietà, like many other religious objects, were targeted by iconoclasts seeking to reinstate a biblical prohibition on images. Since these depictions make the destruction of the body of Christ so explicit, however, the iconoclasts could be seen as attacking images that had already been destroyed.
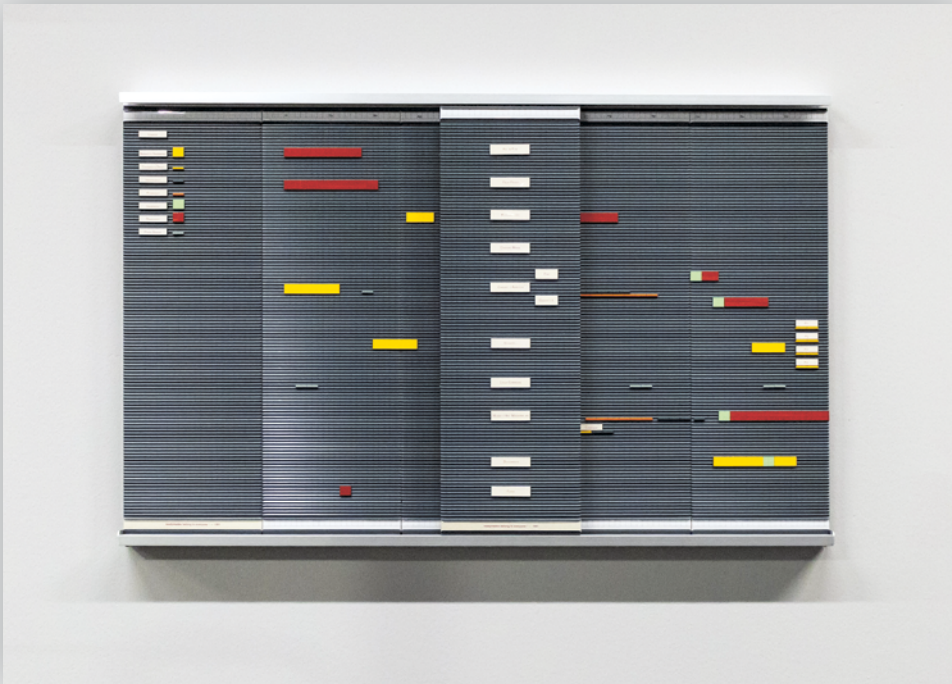
Readymades belong to everyone®
1991
1991

Planning board, magnetic symbols and silk-screened texts
Courtesy Centre Pompidou, Paris; National Museum of Modern Art /
Centre of Industrial Creation; donation of the Succession Philippe Thomas, 2008
Artworks of the artist were part of the exhibition *Les Immatériaux*.

Materiality

Philippe Thomas the artist who created Readymades belong to everyone® critically reflects on the art system and its forms of mediation, particularly in relation to the ways in which they condition artworks's reception. He questions the status of authorship by encouraging his collectors to assume the role of author of his works. For *Sujet à discrétion* (1985), presented in the *Négoce peint* (Painted Trade) section of *Les Immatériaux*, three different labels caption three identical photographs of a seascape: Anonymous, *The Mediterranean Sea* (general view), multiple; Philippe Thomas, *Self-Portrait* (view of the mind), multiple; name of the purchaser of the work, followed by *Self-Portrait* (view of the mind), single piece. The artist highlighted how the paratext of a work influences its immediate perception.

Representation

In 1987, Thomas created the agency Readymades belong to everyone®, which operated as a fictional and a critical tool within the artworld. It borrowed its codes of representation from business, media, and advertising, merging the work of art and the commercial product or commodity. *1991* is the magnetic planning board that lists all the activities of the agency for the year 1991. Such a board was produced every year between 1988 and 1993, when the agency shut down. The board is a hybrid of sculptural artwork—endowed with shapes and colors—and useful everyday object.

Karlsruhe University of Arts and Design (HfG Karlsruhe): Bio Design Lab, Product Design, and Art Studies courses
Second Skin n+1
2022

Bioplastics, kombucha leather, natural latex, bee's wax, etc.
Bio Design lab (HfG Karlsruhe); Seminar lead / concept: Freia Achenbach, Julia Ihls, Antheia Oestreicher, Lioudmila Voropai
Similar artworks were part of the exhibition *Les Immatériaux*.

Materiality

With transdisciplinary discourses around new materialisms, or what is known as the material turn, a radical rethink of the role and agency of matter began in the 1990s. Instead of anthropocentric polarizations such as active/passive and subject/object, the focus is rather on decentralized structures of non-human action. With reference to the site *Deuxième Peau* (Second Skin) in *Les Immatériaux*, the project group explored the functional, philosophical, and conceptual qualities of skin through a contemporary treatment of various biofilms made of bioplastics, kombucha leather, beeswax, and natural latex.

Representation

The skin is a boundary and a mediator, and therefore also a medium. It protects, separates, and connects all at the same time. It functions as the surface of a spatially differentiated object, whose form makes it perceptible to the senses. It is an interface between different material substances that enables interaction between them. The skin is also an obliging metaphor for everything that fulfills those functions. This gives rise to concepts and corresponding artifacts and materials that are referred to as a "second skin." In the context of an exhibition, they can only be presented as a purely aesthetic form by suspending their functionality and staging their materiality. Every act of aesthetic (re)staging thus becomes an intrinsically iconoclastic gesture that replaces an old form of representation with a new one.

Jeffrey Shaw
Golden Calf
1994/2020

AR App on a tablet, plinth
Application software: Gideon May (1994), Leoson Cheong (2020)
Courtesy of EPFL Pavilions
An earlier version of this artwork was part of the exhibition *Iconoclash*.

Materiality

Jeffrey Shaw's computerized installation reveals a multi-layered interplay between body and space and between object and spectator, raising questions about presence and non-presence in virtual spaces. Passive examination and contemplation transform into interactive involvement and immersion. The tablet functions as a window through which the virtual body of a golden calf is visible in the exhibition space. Its mirror-like surface reflects the entire space around it, except for the viewer's body. *Golden Calf* becomes an intangible object of fascination whose internal hollow space transcends the natural laws of physical objects and further emphasizes the immateriality of the augmented reality installation.

Representation

Golden Calf simulates a pagan object of worship. It is an ancient Old Testament relic brought back to life by digital technology. By holding the tablet and moving around the pedestal, viewers inadvertently perform a ritual dance. Blind faith or reverent worship? *Golden Calf* brings two antithetical worlds together. The monitor functions as an interface between material and ephemeral worlds. The fusing of art, virtuality, and religion harbors tensions. Yet it is precisely in this constellation that the harmonious coexistence of divergent realities succeeds. Through mutuality and simultaneity, we transcend the dichotomies that have defined the Western tradition.

Annegret Soltau
Auf dem Gebärtisch (schwangerWerden... schwangerSein... gebärenMüssen)
1980

Photographs, triptych, each 122 × 160 cm.
Courtesy of Galerie Anita Beckers, Frankfurt am Main
The artwork was part of the exhibition *Les Immatériaux*.

Materiality

During her two pregnancies, German artist and performer Annegret Soltau documented the changes to her body using video and photography, creating an expression of fragmented identity that juxtaposes the roles of woman, artist, and mother. By scratching, cutting, collaging, and stitching, the artist altered and reconfigured her photographic negatives. *Auf dem Gebärtisch* (*On the Birthing Table*) is a photographic triptych showing the naked body of the pregnant artist. Sitting on a birthing table, the figure gradually emerges from a white sheet that is draped around it like a shroud. The work raises questions about medically assisted reproduction, utilizing the physical body as both medium and subject.

Representation

Throughout much of Western modernity, pregnancy and motherhood were strictly confined to the private sphere. Breaking free from these societal conventions was central to Western feminist struggles of the 1970s, which were driven by women's urge to reclaim control over their own bodies. Annegret Soltau was one of the few artists who engaged with these subjects based on her own experience as an artist and a mother in the context of 1980s body art. Her works showed a new representation of the female body from a feminist angle, while emphasizing the physical and symbolic violence that it endures.

Klaus Staeck
Vorsicht Kunst! (Caution, Art!)
1984

Screen print on enamel
ZKM│Karlsruhe
The artwork was part of the exhibition *Iconoclash*.

Materiality

German artist Klaus Staeck's critique is directed toward fellow artists who, embracing the dissolution of the arts, make it increasingly difficult for museum visitors to distinguish art from non-art, partly because of their choice of materials. Since at the least the end of the 1960s, many artists turned their backs on traditional art genres to experiment with everyday objects and other practices, shaking up art's "classic" characteristics. The fact that Staeck identifies himself as the artist and author of the work—suggests that he, too, is playing a game with familiar symbolic forms. Caution is advised.

Representation

The yellow enamel sign bears the icon that symbolizes a danger of explosion, an icon still in use in German road and traffic signage. In combining it with the words "Caution, Art!", Staeck criticizes the established paradigms of art reception. Furthermore, he critically addresses a rhetoric popular among art critics that can be held responsible for giving works of art the ability to independently impose their own interpretation on the viewer. Following this logic, artworks possess the ability to act and, as the sign suggests, perhaps cause us harm.

Liliane Terrier
Toutes les copies
1985/2022

Installation, Plexiglas cabin, photocopier, various objects; 86 photocopies mounted
on a wooden panel, teleprinter
Centre Pompidou, Paris; National Museum of Modern Art / Centre of Industrial Creation;
donation of the artists, 2022
Design: Liliane Terrier and the students of the workshop L'objet-matrice (1984–85),
Arts et Technologies de l'image, Département Arts Plastiques, Université Paris 8.
Device: Jean-Louis Boissier. Reactivation in 2022 by Liliane Terrier in collaboration with
Jean-Louis Boissier and Béatrice Selleron
An earlier version of this artwork was part of the exhibition *Les Immatériaux*.

Materiality

In the context of the material path of *Les Immatériaux*,
namely in its *Infra-mince* (Infra-thin) and *Surface introuv-
able* (Undiscoverable Surface) sections, *Toutes les cop-
ies* explored the passage from object to image through
the medium of xerography, or analog photocopying. The
selection and arrangement of these "materials-objects-im-
ages," also referred to as "copigenetics," their placement
on the copier, the movement during the time of scanning,
the background and reflections, and the lighting and the
adjustment of the machine were all tangible processes
presented in the same way as the photocopies and the
device itself. The latter was designed as a vivarium, a space
for experimentation where multiple interactions between
bodies, objects, and technology could take place.

Representation

For Liliane Terrier, xerography is a form of electrographic
stamping that is like a monotype in traditional printmaking.
Unlike engraving processes, the electrographic template
is unique and specific to each transfer. Owing to the direct
contact of the object with the photoelectrically sensitive
plate and the almost immediate transfer to paper, this
technique has produced new image regimes and has been
present in art since the beginning of the 1960s.

Erwin Wurm
Der Durchbruch eines Künstlers (The Breakthrough of an Artist)
2002

Installation, wood, paint
Permanent loan ZKM | Karlsruhe
The artwork was part of the exhibition *Iconoclash*.

Materiality

Erwin Wurm's installation raises questions about the material spectrum of traditional sculpture and notions related to practice. For Wurm the human body is a decisive material component with all its applications, and he invites visitors to enter the installation; the material presence of the body as well as its immaterial actions, sounds, and responses are thus incorporated into the sculptural canon.

Representation

The Breakthrough of an Artist is an interactive installation that was made for the exhibition *Iconoclash* by Wurm, an Austrian artist, in 2002. It follows in the tradition of the *One Minute Sculptures* that he became known for in the 1990s. As in the other *One Minute Sculptures*, the visitors themselves become a part of the sculpture by taking up certain poses at designated places and holding their position for a certain time. Here, the visitors are asked to put their hands through the panel leaning against the wall. Photographic documentation completes this sculptural act. The title of the work embraces a self-referential aspect, as the series literally helped Wurm achieve his international breakthrough.

ZONE III.
Turning Virtual, Becoming Algorithmic

Different methods for the visual creation of computer-generated or virtual exhibition spaces have been developing parallel to each other, resulting variously in digital copies, models, and interpretations of past exhibitions and in newly assembled ones.

As a curated assembly of interpretable objects, an exhibition is an inherently spatial construct that manifests in certain surroundings and contexts at a given moment in time. As soon as that moment passes, the exhibition ceases to exist in its physical form. Despite considerable advances made in systems of digital representation, it is next to impossible to document or recreate the spatiotemporal and relational qualities of such settings, in which human and non-human actors interact and exchange information. One reason to attempt it, however, is the desire to research significant past exhibitions.

Presented here are walkable digital simulations of exhibition interiors, emulations that engage with the lingering tension between a physical exhibition environment and a computer-generated virtual space, as well as a timeline—if not absolute—of all historical exhibitions that have been curated purely online. Further initiatives avail of the malleability of computer-generated spaces to create unique architectures for each new exhibition, with others taking it a step further by employing algorithms in the curatorial process. This current shift reveals the agency that computers are gaining agency in collaborative and creative practices.

Beyond Matter VIEW Platform 2020–

Web-based project
Produced as part of the collaboration project Beyond Matter.
Commissioned by ZKM│Karlsruhe.
Graphic design: AKU Collective

Materiality

The *VIEW Platform* is situated on the website of the Beyond Matter project. It serves as a portal to various digital exhibitions created by artists who engage with the deconstruction and reconstruction of the notion of virtual reality through their born-digital artworks. Alexander Walmsley, Jazmina Figueroa, and Theodoulos Polyviou created concepts and generated virtual spaces that all refer to actual locations in Karlsruhe or in Tirana. Group exhibitions such as *Spatial Affairs* and the *Tirana Floating Archive* are also on view here, as well as models of the past exhibitions *Iconoclash* and *Les Immatériaux*. The *VIEW Platform* is an advocate of a virtual realism: its virtual exhibition spaces are on a par with the physical museum galleries.

Representation

Due to repeated lockdowns over the course of the Covid-19 pandemic, art institutions were forced to ramp up their online presence. Producers of online exhibitions were confronted with fundamental questions regarding the presentation of art in computational spaces: Should a copy of the physical space or a generated computational space be used? Are these new digital worlds compatible with mediating online art? The *VIEW Platform* features possible solutions for online exhibitions that emerged between 2020 and 2022. They are all represented as separate planets, referring to the world-making capabilities of computation.
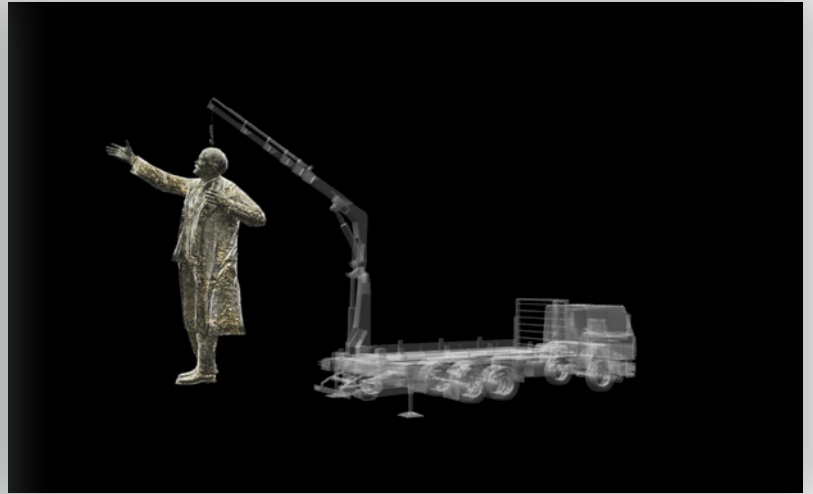
AR Statue Dangling from a Crane
2021

Design: AKU Collective
Web development: Jaan Sarapuu.
AR Statue Dangling from a Crane was developed within the framework of Beyond Matter.
It is a digital interpretation of the artworks *Project for the Modification of a Monument from the Communist Era* (1999, computer-assisted drawing), and *Untitled Installation (Statue Dangling from a Crane)* (2002, communist monument, crane) by Vitaly Komar and Alexander Melamid.

In 2002, more than twenty years ago, the artists Vitaly Komar and Alexander Melamid hung a statue of Lenin from a crane in front of ZKM|Karlsruhe for the exhibition *Iconoclash*. By recontextualizing a piece of visual propaganda, the artists infused it with new meaning. That ambiguous situation is now transported into the digital realm using augmented reality; an iconoclastic act of sculptural displacement is digitally perpetuated and becomes perceptible by means of a handheld mobile device.
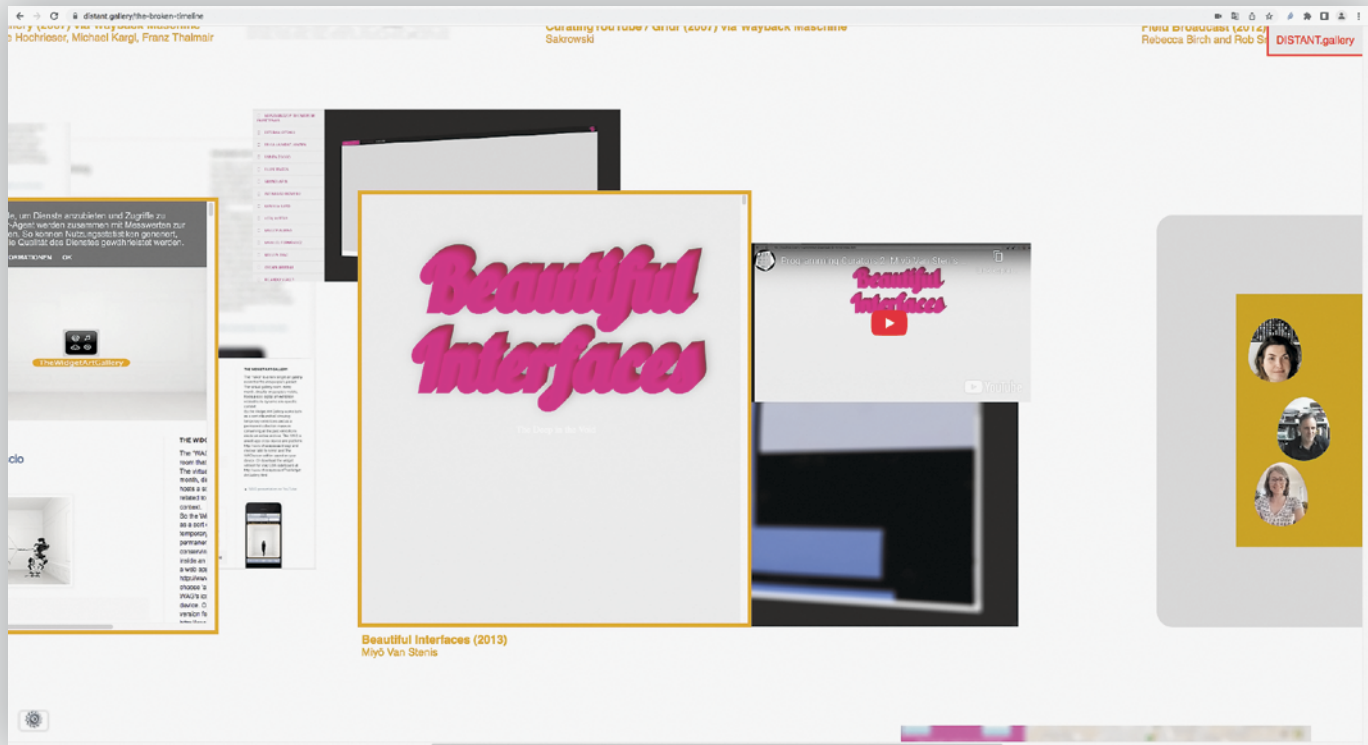
Annet Dekker, Marialaura Ghidini, Gaia Tedone
The Broken Timeline
2022

Web-based project
Courtesy of the curators

Materiality

The online exhibition projects included in *The Broken Timeline* (*TBT*) present alternative modes of audience engagement, question the value of authorship, and raise the possibility of reconfiguring traditional models and methods for presenting, accessing, and distributing art. Because the diverse projects featured in *TBT* enable a clear tracking of the specificities of online art mediation and of non-local networked exhibition infrastructure, it is an indispensable tool for further work in this direction.

Representation

The Broken Timeline (*TBT*) lists past exhibition projects curated online. *TBT* makes no claim to completeness and is inevitably subjective, but it does follow transparent criteria. For instance, it prioritizes projects that are web-specific and which propose intricate navigation or interaction modes or modify existing platforms. It disregards exhibitions that follow any conventional display logics of physical exhibitions and focuses on attempts that challenge how online art is experienced. *TBT* is a pioneering attempt to construct exhibition history in the realm of digital arts, which is still often neglected by mainstream art and art-history production.
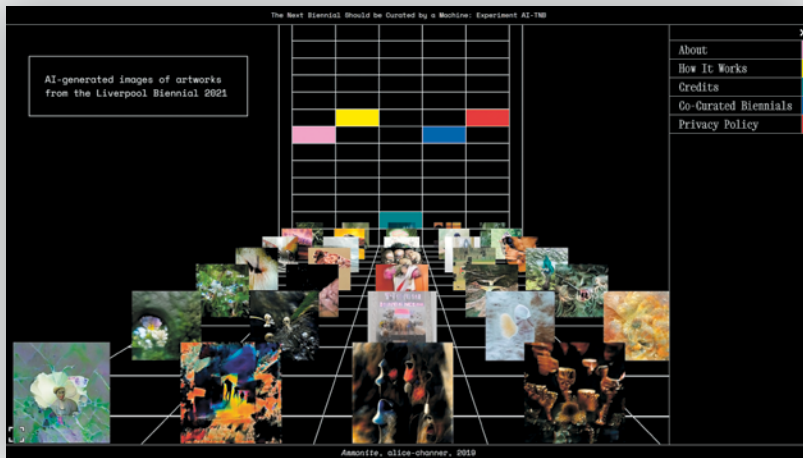
Joasia Krysa, Leonardo Impett, Metaobjects, and Sui
The Next Biennial Should Be Curated by a Machine, Experiment 2: AI-TNB
2021

Web-based project
Series curator: Joasia Krysa.
Series technical concept: Leonardo Impett. Experiment AI-TNB machine learning concept and implementation: Eva Cetinic.
Web development and design: MetaObjects (Ashley Lee Wong and Andrew Crowe) and Sui.
Commissioned by Liverpool Biennial, co-funded by the UKRI's Arts Humanities Research Council program 'Towards a National Collection' under grant AH/V015478/1

Materiality

By reimagining curating as a self-learning human-machine system and with reference to Jens Hoffmann's 2004 project *The Next Documenta Should Be Curated by an Artist*, which queried curators' privileged position, *The Next Biennial Should Be Curated by a Machine* explores machine curatorial agency through a series of experiments. In the first, *B3(NSCAM)*, the AI uses datasets from the archives of the Liverpool Biennial and the Whitney Museum, among other institutions. In the resulting model, textual and graphic elements come together in universes that represent a human-machine understanding of art.

Representation

The Next Biennial Should Be Curated by a Machine investigates the possibility of algorithmic agency in curatorial work. So far it has resulted in two algorithmic artworks accessible online: one was first shown in the context of the Liverpool Biennial in front of ZKM│Karlsruhe. The second experiment in the series, *AI-TNB*, uses data from the biennial exhibition as its source—the photographic documentation, titles, and descriptions of artworks—and applies machine learning (a subset of artificial intelligence) to generate new interpretations and connections. Similar to the digital exhibition model of *Iconoclash* (ZKM│Karlsruhe, 2002), as visitors navigate the project and create their own paths through the images displayed in a computer-generated space, a new iteration of the exhibition is created based on human-machine collaboration.
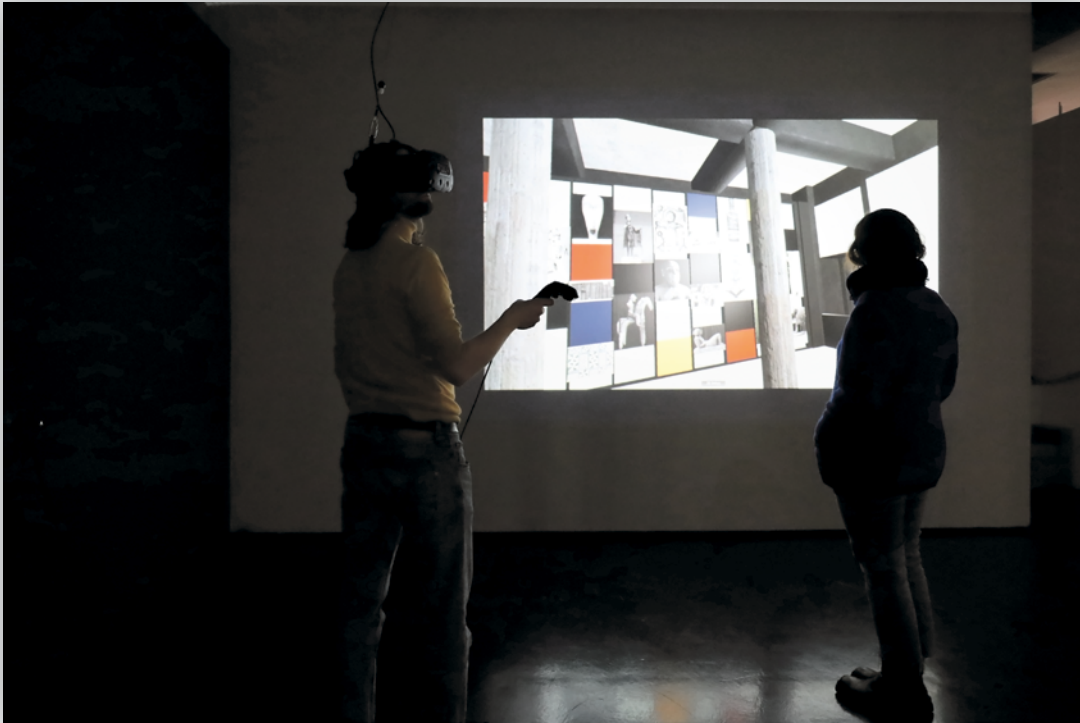
Kunsthochschule Kassel
(Project lead: Prof. Dr. Kai-Uwe Hemken,
IT: Simon-Lennert Raesch)
Documenta reconstruction
2019

PC, VR-goggles, transponder, adapter, keyboard, screen, video, color, silent
Courtesy of Kunsthochschule Kassel/Universität Kassel

Materiality

With the help of exhibition photographs made available by the archive of documenta and extensive research, almost all the works on display at the first documenta in Kassel were identified and cataloged. With the resulting data and images, it was possible to create a digital model of the Museum Fridericianum where documenta I was held. Wearing VR glasses, we can re-enter certain rooms in the Fridericianum as they were in 1955; today's visitors can comprehend the curatorial and conceptual achievements of the show, but also virtually develop a spatial feeling for the interplay between the architecture and the works of art.

Representation

documenta I of 1955 is still considered a milestone in the history of modern art exhibitions. Its initiator Arnold Bode, who together with Werner Haftmann, Kurt Martin, Alfred Hentzen, and Hans Mettel comprised the curatorial team, wanted to ameliorate a situation whereby many German museums and galleries were in ruins and access to modern art was not possible. Bode felt that it was only through the work of curators that the expressivity of modern art could come to the fore and be conveyed to the viewer. The virtual reconstruction provides new insights into the curatorial scenography of the first documenta.

Peo Olsson, Katarina Sjögren, Jonas Williamsson
Sorteras under: Le Travail / Björn Lövin
(File Under: The Work / Björn Lövin)
2019

Publication and installation, 4 color photographs
Courtesy of Null & Void Books

Materiality

The results of the research for the book *File Under: The Work / Björn Lövin* (2018, Null & Void Books) are renderings of computer-generated models based on Björn Lövin's fictional environments. The Swedish artist's concept for a large-scale exhibition is simulated on a computer, but then appears as a publication rather than an online exhibition or VR installation; this is in line with the concept of *The Work* because its environments (home interiors, a shopping street, etc.) are so close to actual reality that their very existence might call the notion of reality itself into question. The distance achieved here by representation appears necessary to enable critical reflection.

Representation

"Are they the same?" one might ask on looking at the two pairs of images on display, and then: "Real or generated?" There are considerable differences between the one and the other view of environments conceived by Lövin. The images in each pair are not identical; one is a rendering of a computer-generated 3D environment and the other is a photograph of the exhibition interior. What remains is an *Entscheidungsproblem*, a decision problem—a nod to the mathematical challenge posed by David Hilbert and Wilhelm Ackermann whereby an algorithm considers an inputted statement and answers "Yes" or "No" according to whether the statement is universally valid. Which image depicts reality?

Christiane Paul, Banz & Bowinkel, Tamiko Thiel, Ricardo Miranda Zúñiga
Dis/Location at DiMoDa
2021

Online exhibition
Courtesy of DiMoDa and Christiane Paul

Materiality

Unlike physical museums, DiMoDA (Digital Museum of Digital Art) has no permanent building of bricks and mortar. The space of this virtual museum is tailor-made for each new release. The virtual architecture of its latest exhibition, *Dis/Location*, consists of a structure that breaks up a city block of derelict New York townhouses, infiltrating and dislocating their architecture from basement to roof. Because computer-generated spaces are malleable, the artwork and its surrounding scenography do not have to be adjusted to the exhibition space; a computer-generated environment can be fitted to and thus fully support the curatorial concept.

Representation

DiMoDA (Digital Museum of Digital Art) has thus far released three exhibitions featuring over a dozen VR artworks. *DiMoDA 4.0*, curated by Christiane Paul, presents three artworks around the theme of dislocation. In Peter Weibel's words, a digital museum without a fixed location displaying digital art is a symptom of the process through which the society of proximity has come to an end. We are already at a stage where not only digitized representations of physical artworks but born-digital works of art and digital materials constitute an institution. This raises questions about reproducibility.

RESTORATIVE EMBODIMENTS THROUGH *THE IMMATERIAL DISPLAY*

Constança Babo

The Immaterial Display transfers the material world into the digital realm, creating a third space where real and virtual intersect, intertwine, and collide. While being a hyper, multiple, and ambiguous object, it exists and moves in a hybrid regime of apparent immateriality, transcending all physical limits. As such, it mirrors the present world, determined by the digital, the virtual, and new technologies. It invites us to reflect on today's ⬎ virtual condition, especially relations between different spaces and dimensions, the dissolution of the material-immaterial dualism, and its significance for art production, curation, and mediation.

    The Immaterial Display executes a *vaporous restoration* of the exhibitions *Les Immatériaux* (Centre Pompidou, 1985), and *Iconoclash* (ZKM│Center for Art and Media Karlsruhe, 2002). It is an art installation through which both are reinterpreted, restructured, and restored. Its aim is to recover the past, namely the two exhibitions and their objects and artworks, via virtualization, while expanding and freeing them from time and space constraints. As an innovative exhibition model, it constitutes an important contribution to the arts, especially for cultural heritage. *The Immaterial Display* marks a pivotal moment and is one of the most impressive accomplishments of the Beyond Matter project.

Fig. 1
The Immaterial Display, 2021–22, interactive installation. Installation view *Matter. Non-Matter. Anti-Matter*, ZKM│Karlsruhe, 2022–23.

The Art Installation

The Immaterial Display, presented within the context of the exhibition *Matter, Non-Matter, Anti-Matter* (2021–23), emerges from the intention of the Beyond Matter project to enable the presentation, visiting, and the experience of past exhibitions through new digital media (see fig. 1). While showcasing novel technological processes, it develops new solutions for exhibiting, curating, and mediating art by utilizing the exhibition as a medium, a mediator, and an interface.

As a traveling installation *The Immaterial Display* is adjustable to each location, which accentuates its hybrid character. Using space modeling via virtual reality, it presents *Les Immatériaux* and *Iconoclash* without the purpose of substituting them or making digital twins (see figs. 2–4). As explained by the coordinator of the project, Lívia Nolasco-Rózsás, the object acts as a host to both shows and the public.[1] It establishes itself as an emulator, in the sense of the word's use in computing technology to refer to software being transmitted on new hardware, in a system of a computer-host that also behaves as a guest.

Fig. 2
The Immaterial Display, 2021–22, interactive installation. Installation view *Matter. Non-Matter. Anti-Matter*, Helsinki Central Library Oodi, 2022.

Fig. 3
The Immaterial Display, 2021–22, interactive installation. Installation view of the prototype in *Matter. Non-Matter. Anti-Matter*, Tallinn Art Hall, 2021.

1   Bruno Latour and Peter Weibel in an online talk moderated by Lívia Nolasco-Rózsás "A Return of History," September 7, 2020 https://zkm.de/en/media/video/beyond-matter-a-return-of-history.

The two past exhibitions are presented through their browser-based digital models, located in this custom-made immersive display, a complete 360 degrees of virtual area on a three-dimensional computer-generated room. This is displayed in a large concave screen whose backside allows third parties to participate in the single-user motion and point of view, resulting in a collective event with multiple experiences. The highly interactive installation immerses visitors in a multilayered journey that unfolds and evolves from their own actions when occupying the "driver's seat," as the chair was called in Jeffrey Shaw's *The Virtual Museum* (1999)—an iconic work of new digital media art (see fig. 5) and a crucial reference for *The Immaterial Display*'s development. In both projects the action and movement are mastered through a hand-held controller. The Beyond Matter team also developed a self-sufficient handheld controller (see fig. 6), facilitating the installation's accessibility and thus its inclusiveness.

   The Immaterial Display can be understood as an exceptional example of a "permeable membrane between the physical and the digital to design the visitor's user experience as intuitive and seamless as possible,"[2] which they state is necessary for the present and future of museum activity in today's virtual context. Proposing this innovative exhibition model relates to the

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2   Lívia Nolasco-Rózsás and Yannick Hofmann, "The Museum as a Cognitive System of Human and Non-Human Actors," *The Garage Journal: Studies in Art, Museums & Culture*, no. 3 (2021): 1–15 (quotation on 7).

increasingly prominent idea of a virtual museum, one that expands beyond the main art institution as a stable and solid physical structure, usually a white cube rendered through a disposition of objects, light projections, and wall texts. *The Immaterial Display* demonstrates how a new, hybrid, and flexible museum can arise.

Another expansive action is the inclusion of new digital content, even though the virtual display aims to preserve and respect physical spatial qualities and object characteristics as much as possible. User experience is complemented and enriched by linked additional information regarding the presented subjects, key concepts for the installation, and the project itself. As such, *The Immaterial Display* becomes an effective mediator not only for revisiting and expanding knowledge on the two exhibitions, but also for a first acquaintance with them. In its low-threshold glimpse, presentation works on an elementary and accessible level yet still provides a dense, multifaceted experience (see figs. 7–9).

As well as connecting the real and the virtual realms, the installation connects the two exhibitions and their respective institutions—Centre Pompidou and ZKM | Karlsruhe—with its own scenography and with the physical space where it is placed each time. It relates different dimensions, times, and spaces, but, more than that, it also reverses chronologies, defies and problematizes the linearity of time and the limits of space, questioning these concepts in the context of a world determined by technology, especially the virtual.

Fig. 7
Landing page for entering the virtual exhibitions *Iconoclash* and *Les Immatériaux* on *The Immaterial Display*, 2021–22. Screenshot.
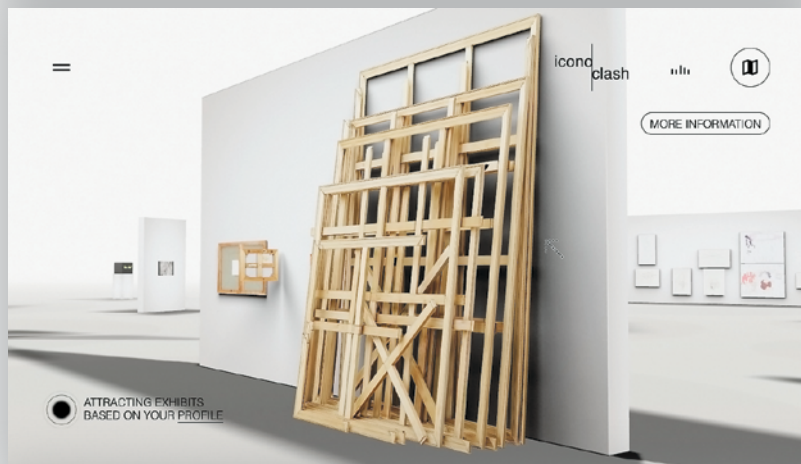
Fig. 8
View into the 3D environment of *Iconoclash as a Digital Experience* on *The Immaterial Display*, 2021–22. Screenshot.
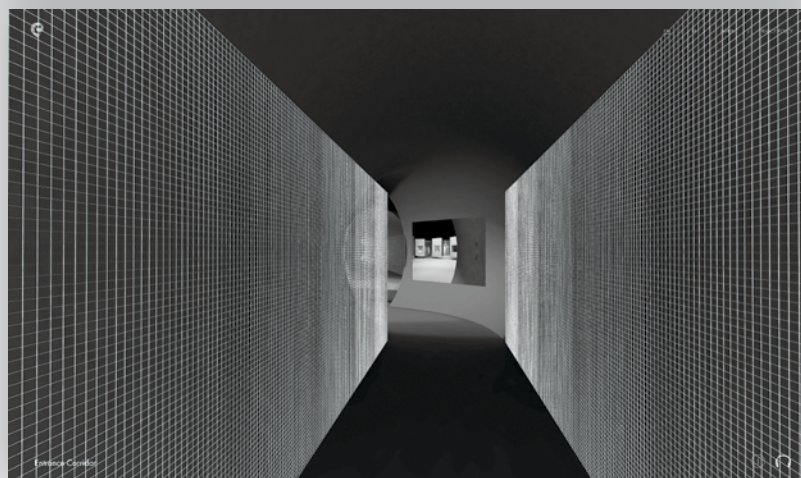
Fig. 9
Scene from the digital model of *Les Immatériaux: A Virtual Exhibition* on *The Immaterial Display*, 2021–22. Screenshot.

As argued by Nolasco-Rózsás,[3] a virtual condition has emerged in which computer-generated and immersive spaces are increasingly determinant not only in creation and production, but in everything that follows. This has "extensive implications for the spatial aspects of curating and mediating visual arts, as well as their reception."[4] The virtual condition is one of networks and clashes between computer-generated spaces, physical spaces, and cyberspace. This is mirrored in *The Immaterial Display*, being in constant transition between dimensions and between three-dimensional spaces and surfaces, blurring limits and distinctions. It shows how such spheres and dimensions are interconnected in an ecological manner, amid constant interactions, exchanges, and contaminations.

As proposed and explored throughout Beyond Matter, even the initials "VR" surpass the concept of virtual reality and can now be expanded. The concept of *vaporous restoration* is essential for the present analysis, considering its relation to the modulation of past exhibitions. *Vaporous* denotes a non-physical approach to *restoration*, translating an intention to restore elements with virtual reality in a process that ultimately reflects the virtual condition.

Matter and Non-Matter

The Immaterial Display is a hybrid object located both physically and digitally, transitioning amid the real, the virtual, and the online. It shifts between hardware and software, between the system that produces it automatically and mechanically and a system constituted by data structures and algorithms. It is ambiguous materially, physically, and object-wise, which leads to its comprehension, as summoned by its name, as an *immaterial* entity.

An immaterial entity, in the sense of *immateriality*, endorses the virtues of the digital while shielding the digital by apparently disallowing touch, handling, possession, or, in some cases, even visualization. The digital artwork is no longer an artifact or universal patrimony, but an inscription in a site, both real and virtual, an action, a presence, or an idea.[5] But *The Immaterial Display* constitutes an exceptional example, for touch and appropriation are still possible. What happens is that such actions are dislocated, they are not executed directly upon the presented object, since it belongs to the virtual realm; they are achievable through the technical support of the installation. The mechanical and instrumental constitution permits a handling of the digital and virtual object, but also its manifestation and expression. As explained by Edmond Couchot and Norbert Hillaire, the immaterial remains a material with little chance of functioning when released from the servitude of its utility.[6] Thus the etymological and conceptual negation implicit in the term *immaterial* are rejected.

Digital art does suggest a sort of dematerialization nonetheless, in a newly reinforced fashion of the phenomenon announced by Lucy Lippard in 1973. As Lippard stated, new media art is not bound to matter and its form is not fixed.[7] But for centuries evaluation and identification in the arts was based on physical and material properties. That's what Jean-François Lyotard fingered as a structural problem of Western thought over the past 2000 years: the idea that art should be

3   Lívia Nolasco-Rózsás on the virtual condition in curating and mediating art, https://beyondmatter.eu/news/towards-the-virtual-condition-livia-nolasco-rozsas-zhdk.

4   Nolasco-Rószás and Hofmann, "The Museum as a Cognitive System of Human and Non-Human Actors," 5.

5   Edmond Couchot and Norbert Hillaire, *L'art numérique. Comment la technologie vient au monde de l'art* (Paris: Flammarion, 2003), 236–37.

6   Couchot and Hillaire, *L'art numérique*, 225.

7   Lucy Lippard, *Six Years: The Dematerialization of the Art Object from 1966 to 1973* (Los Angeles: University of California Press, 1997).

understood in relation to matter and form.[8] That framework, projected long beyond modernity, has come to an end, especially since digital techniques preclude distinction between matter and form,[9] and between image and matter.[10]

It becomes increasingly difficult to comprehend and grasp new digital objects on a human scale. This constitutes an obstacle to the discipline of aesthetics, which, from the Greek *aisthesis*, operates within the sensitive, being inseparable from the subject and their pleasure, and is hence directed at the human universe, to our experience and perception (see fig. 10). New digital media transcends that dimension.
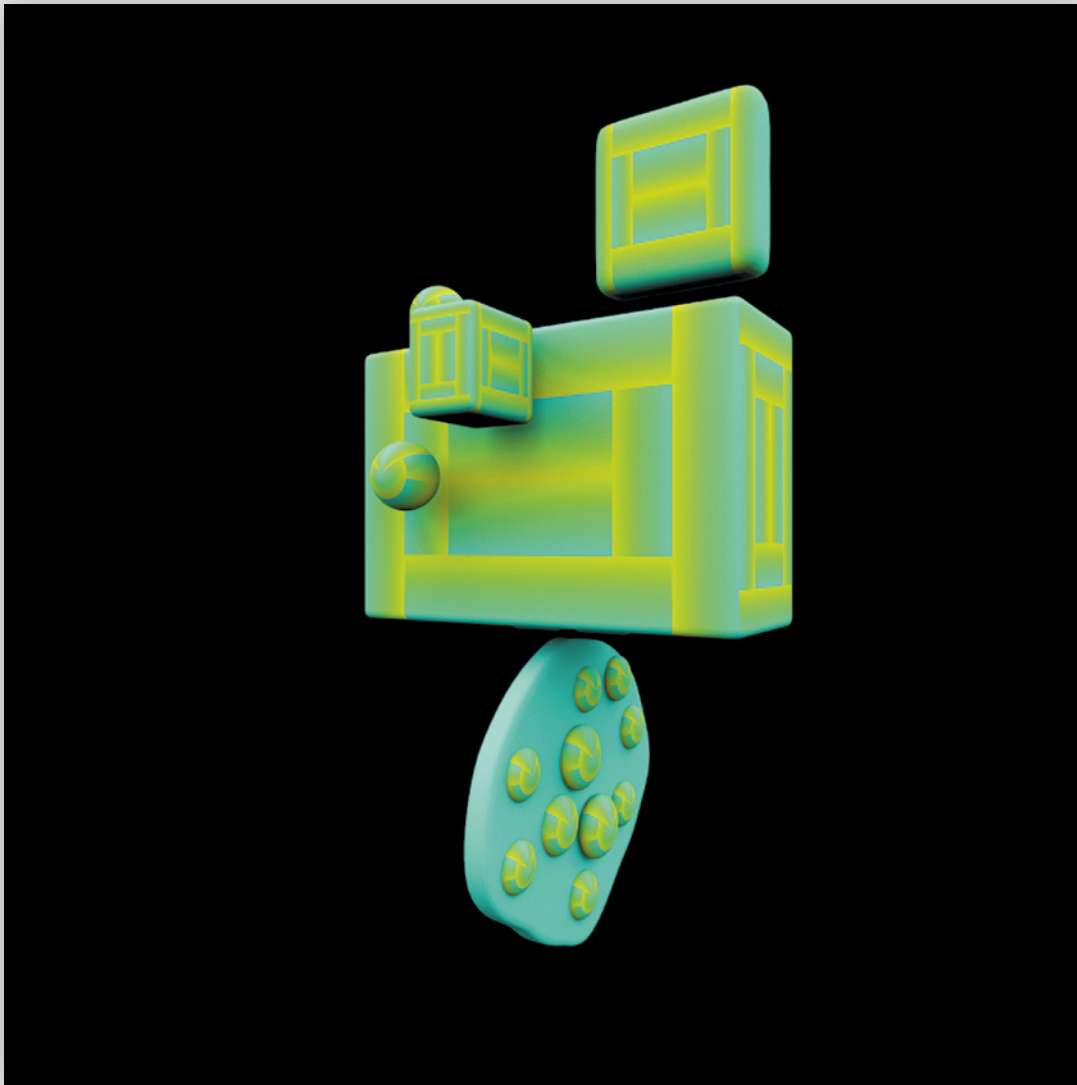
Fig. 10
The digital avatar of the artwork *Nearnext.com* by Rafaël Rozendaal created by The Rodina for *Spatial Affairs. Worlding*, the interactive virtual extension of the exhibition *Spatial Affairs*, Ludwig Museum, Budapest, 2021. Screenshot.

8　　Jean-François Lyotard, *The Inhuman: Reflections on Time* (Stanford: Stanford University Press, 1991).

9　　Bernard Stiegler, *L'Économie de L'Hypermatériel et Psychopouvoir* (Paris: Mille et une nuits, 2009).

10　　José Bragança de Miranda, *Corpo e Imagem* (Lisboa: Passagens Vega, 2017), 129.

So while in the arts the idea of the immaterial is clear—and established, for instance, with Conceptual Art—in technology nothing is truly immaterial. A suitable perspective would recognize the emergence of new materialities and new objects. It is worth referencing the concept of hyperobjects, as proposed by Timothy Morton to designate entities that are hybrid, fragmented, distributed in time and space, such as recent technologies.[11] *The Immaterial Display* is a hyperlink structure acquiring a hypertextual form, as it has several layers, networks, sets of information, and connections. Bernard Stiegler suggests a hypermateriality, which translates processes of exchange between an object's digitization and rematerialization as a complex of energy and information.[12] Hyerobjects, hyperlinks, and hypermateriality are more adequate than thinking in terms of *dematerialization* and *immaterials* completely devoid of matter, concepts which Lyotard dismantled on the occasion of the exhibition *Les Immatériaux*. As stated by Manfred Wolff-Plottegg, *Iconoclash*'s architect, the formal dynamics of that exhibition's display were a challenge, and using the digital may be the way to create a scenography impossible to fully materialize in physical space.[13]

Yet when contemplating virtual reality practices the challenges increase, since, as José Bragança de Miranda explains, they fuse what was once dispersed, being centered metaphysically over the invisible, questioning presence, absence, matter, and image, in a context from which stem various concepts that now increasingly reoccur, such as the virtual, the hyperreal, the simulacrum, and mediation.[14] *The Immaterial Display*'s "immateriality" is confronted with and must respond to the material nature of the sources that it transposes and transmogrifies to its digital format. But what do the presented remakes actually consist of, if they do fully embody virtuous restorations?

Remake and Restore

In recent years the use of digital technologies has increased significantly in all areas and disciplines. This was initially noticeable in the arts through the rise of new artistic practices, works, and forms, but it recently expanded to the museum sector through the spectrum of museological practices, from the conception and development of exhibitions to the display of objects to their reception, perception, and experience. Cultural heritage is salient here because the virtual deeply alters the way in which the past is revisited; the virtual affects how communities experience cultural heritage content by restructuring the way it is received. This can lead to increases in democratization and knowledge, providing new stimuli for audiences and in turn a new appreciation for cultural heritage.[15]

Since digital and virtual technologies dissolve the habitual division made in the field between tangible (like artifacts) and intangible (the discipline of cultural heritage itself), everything is placed on the same level of visibility and accessibility. This presents the potential of a global and hybrid digital cultural heritage that is independent from space and time. But for the time being we can take up the definition suggested by UNESCO in 2021:

11   Timothy Morton, *Hyperobjects: Philosophy and Ecology after the End of the World* (Minneapolis, MN: University of Minnesota Press, 2013).

12   Stiegler, *L'Économie de L'Hypermatériel et Psychopouvoir*.

13   Stated by Lívia Nolasco-Rózsás in a panel of discussion parallel to the exhibition *Matter, Non-Matter, Anti-Matter* at Tallinn Art Hall, November 19, 2021.

14   José Bragança de Miranda, "Da experiência dos espectros à espectralização da experiência," in *História e Verdade(s)* (Coimbra: Imprensa da Universidade de Coimbra, 2002), 41–84 (quotation on 85).

15   Maria Economou, "Heritage in the Digital Age," in *A Companion to Heritage Studies*, ed. William Logan, Máiréad Nic Craith, and Ullrich Kockel (New Jersey: Wiley & Sons INC, 2015), 215–28 (quotation on 216–17).

Digital heritage is made up of computer-based materials of enduring value that should be kept for future generations. Digital heritage emanates from different communities, industries, sectors and regions. [...] It is a heritage made of many parts, sharing many common characteristics, and subject to many common threats.[16]

Virtual techniques allow adding, modifying, and even creating new forms or representations of any object, which relates to the recurrence of postproduction proposals, such as Nicolas Bourriaud's identification of cultural postproduction as a product of new technologies[17] and Hal Foster's recognition of a renewed readymade, a new sense of avant-garde that does not radically innovate or refuse its precedents but activates past elements.[18] Such perspectives are connected to postmodernism, as defined by a preoccupation with the end of linear narratives, history, and a continuous search for progression, all of which structured modernity. As Hito Steyerl says, in recent years postproduction has begun to take over production wholesale, as the global culture of the information age problematized production and consumption, creation and copying. Manipulating existing media and archives, postproduction is production that is continuously recycled, copied, and multiplied, as well as dispersed, displaced, and renewed.[19]
As Lev Manovich understands, the process of simulation can add several new properties to a medium.[20] By conferring new forms and expressions onto any object, artifact, or artwork, and providing unique experiences, this is conducive to renewed understandings, meanings, and interpretations. Maria Economou indicates that for cultural heritage this can lead to doubts, however, that digitizing an artifact undermines the urge to conserve the "real thing,"[21] and interferes with the originals, their memory and value. As she points out, this depends on what the intentions are. Terry Smith insists that reperfomance and recurating are not about an "antiquarian repetition but rather to make a contemporary exhibition, one recommended as relevant to current concerns."[22] Despite the "inclination to evoke the ambience of the original exhibition," the aim should be "shooting it through with contemporary presence."[23] *Spatial Affairs* (2021) had multiple manifestations, including an online digital twin of the physical exhibition that took place at the Ludwig Museum in Budapest. That virtual platform, as an extension of the "original," enabled the exhibition to reach larger audiences, to expand in time and space past its defined timeline and the museum walls (see fig. 11). This was fundamental in the context of a global pandemic, but also to offer different perspectives, perceptions, and thereby experiences of the exhibition.

With *The Immaterial Display* not all layers of the two presented exhibitions are combined, although an attempt was made to identify approaches that would permit the homogenization of what appeared to be fragmented, in both the shows and their documentation and archives. As Bruno Latour stated in reference to *Iconoclash*, reconstructing the exhibition as it was would be a mistake; what must be replicated is its internal iconoclastic action.[24] The goal wasn't to develop photographic or exact reproductions. In fact, the debate around reproduction—namely the debate between copy and original, initially driven by photography, as announced by Walter

16   UNESCO, Concept of Digital Heritage, https://en.unesco.org/themes/information-preservation/
     digital-heritage/concept-digital-heritage

17   Nicolas Bourriaud, *Postproduction. Culture as Screenplay: How art reprograms the world*. (New York:
     Luklas & Sternberg, 2002).

18   Hal Foster, *Bad New Days, Art, Criticism, Emergency* (London: Verso books, 2015).

19   Hito Steyerl, *The Wretched of the Screen* (Berlin: Sternberg Press, 2012), 182–83.

20   Lev Manovich, *Software Takes Command* (London: Bloomsbury, 2013), 329.

21   Economou, "Heritage in the Digital Age," 224–25.

22   Terry Smith, *Thinking Contemporary Curating* (New York: Independent Curators International, 2012), 198.

23   Smith, *Thinking Contemporary Curating*, 198.

24   Bruno Latour in: Latour and Weibel, *"A Return of History."*

Benjamin[25]—is surpassed by new media. The digital reproduction may achieve an exact re-semblance to the original or not, depending, inter alia, on the technology used. Regardless, it is always only as if described—it remains absent, lacking its aura. Even virtual reality does not allow an exact correspondence with the real.[26]

Nonetheless, just as Cubism blurred the difference between form and background, the virtual dilutes the separation between art and reality. Digital technology tends to problema-tize frames of aesthetic representation by confronting the real, inaugurating new spaces, and operating between action and representation. As Peter Weibel put it, "media art is the third way between abstract and reality art. It changes and challenges the ontological assumptions of both. Media art is not about depiction, but about construction. It is not about mimesis of the real, but about simulation."[27]

The Immaterial Display is a prime example. It isn't defined by the habitual systems of representation; it challenges them. Its aim is not to present reproductions but to utilize the past exhibitions as media and units of cultural heritage from a new and contemporary perspec-tive. It proves that interference with any object, artwork, or exhibition is managed by settling a clear distance from the idea of representation, and instead proposing a reinterpretation. A new interpretative frame is proposed, and as result unique displays and exhibitions emerge. The installation provides an entirely innovative realm of possibilities for art to develop in—a virtually conditioned one.

25   Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction" (1935), in *Illuminations* (New York: Shocken Books, 1968), 217–51.

26   Nolasco-Rózsás in: Latour and Weibel, *"A Return of History"*.

27   Peter Weibel, "For Another Reset: Renaissance 2.0," in *Reset Modernity!*, ed. Bruno Latour and Christophe Leclercq (Cambridge: MIT Press, 2016), 516–41 (quotation on 525).

Final Thoughts

The Immaterial Display reveals how the virtual can restore the past material world. An object perceivable as vaporous, since it appears cloudy, misty, difficult to apprehend and grasp, it is in fact dense, complete, rich in layers and content. It proves that the digital object, the so-called immaterial object, is more than a replica of a physical object supplemented by interactivity or immersive scale: it is an entity on its own. The material cosmos summoned by *Les Immatériaux* and *Iconoclash* is restored through their remaking in a dynamic and complex process. As a result, innovative experiences unfold, defined by new possibilities of interaction, immersion, and action. The installation is an exceptional example of an object that enables numerous unprecedent relations and negotiations between public and art, while also establishing fresh dynamics and interactions between dimensions, spheres, times, and spaces, creating several new meanings.

In providing new solutions for handling memory and past happenings, *The Immaterial Display* proves that preserving, reconstructing, documenting, investigating, promoting, and even replacing and reusing cultural information through digital technologies is positive and fundamental for the continuity and development of cultural heritage in the digital era. *The Immaterial Display* represents the ecology of the virtual condition, which is notoriously conducive of new embodiments of art, objects, the world, and even of ourselves.

MATTER. NON-MATTER. ANTI-MATTER. A Traveling Exhibition

Between November 2021 and October 2023, the traveling exhibition *Matter. Non-Matter. Anti-Matter. Past Exhibitions as Digital Experiences* was staged in the various venues of the partnering institutions of the Beyond Matter project. Presented alongside *The Immaterial Display*—a hardware that has been specifically designed for the exploration of the digital models of the two past landmark exhibitions *Les Immatériaux* (Centre Pompidou, 1985) and *Iconoclash* (ZKM|Karlsruhe, 2022)—were different artworks all pertaining to the rise of a virtual condition in which the boundaries between physical and the virtual are becoming increasingly blurred.

Taking this ubiquitous tendency as a focal point, the exhibition explored the ways in which digitization impacts production, collection, and presentation of art, while also laying bare the material components of the digital. Each iteration of *Matter. Non-Matter. Anti-Matter* was unique in its own right. While some artworks were created especially for the exhibition, others were outcomes of the Beyond Matter residency program. The exhibitions at ZKM|Karlsruhe and the Centre Pompidou in Paris, in turn, also featured exhibits from the historical exhibitions. The extensive itinerary of the exhibition was complemented by an equally rich accompanying program in each location.

Fig. 1
Matter. Non-Matter. Anti-Matter at Tallinn Art Hall, 2021–22. Exhibition visual. Graphics: WWW Studio and AKU Collective.

Tallinn Art Hall, Estonia
November 19, 2021–January 16, 2022

The first iteration of *Matter. Non-Matter. Anti-Matter* at Tallinn Art Hall was simultaneously the inauguration of a prototype of *The Immaterial Display*.

Panel Discussion 1:
Matter. Non-Matter. Anti-Matter
November 19, 2021
Moderated by: Corina L. Apostol (Tallinn Art Hall)
Speakers: Kristaps Ancāns (artist and educator), Laura Kuusk (artist, Beyond Matter residency fellow), Lívia Nolasco-Rózsás (head of Beyond Matter, ZKM|Karlsruhe), Pia Tikka (filmmaker and scholar)

The panel discussion reflected on topical issues relating to *The Immaterial Display* and discussed the disparities between digital exhibition models and digital twins.

Online conversation with Boris Groys
January 10, 2022
Moderated by: Kristaps Ancāns (artist and educator), Corina L. Apostol (Tallinn Art Hall)
Speaker: Boris Groys (philosopher, essayist, art critic, and media theorist)

The online conversation centered around *AR Statue Dangling from a Crane* (2021), the digital interpretation of a sculpture performance by Vitaly Komar and Alexander Melamid that consisted of a Lenin statue hanging from a crane in front of ZKM|Karlsruhe for the exhibition *Iconoclash* in 2002.

Online conversation with Shu Lea Cheang
March 2, 2022
Moderated by: Kristaps Ancāns (artist and educator), Corina L. Apostol (Tallinn Art Hall)
Speaker: Shu Lea Cheang (filmmaker)

The conversation critically reflected on the internet and social media as technologies of body and gender politics within neoliberal capitalism. Central to the conversation were questions linked to the ways in which technology can be used to shape performances of gender, enable gender play, and transform bodies beyond conventional sensualities and sensitivities towards new horizons and away from established power structures.

Fig. 2
Matter. Non-Matter. Anti-Matter at Aalto University, 2022. Exhibition visual. Graphics: AKU Collective.

Aalto University, Väre building
March 14–29, April 25–May 5, 2022

From March until May, 2022, Aalto University hosed the traveling exhibition in three different venues across Helsinki, each of which had a very unique character and drew in different audience profiles. At Aalto University, the exhibition was located in the Väre building—home of the School of Arts, Design, and Architecture—and was well attended by the student body and staff.

Panel Discussion 2:
Matter. Non-Matter. Anti-Matter
March 17, 2022
Moderated by: Lily Díaz-Kommonen (Department of Art and Media, Aalto University)
Speakers: Harri Laakso (Department of Art and Media, Aalto University), Anne Mäkijärvi (Digimuseo.fi), Jussi Nuortena (National Archive of Finland)

Visiting Lecture:
Artistic Simulations and Building New Audiences for Historical Exhibition Reconstructions
March 15, 2022
Speaker: Andreas Broeckmann (Leuphana University Lüneburg)
Participants: Students of the MA research course "Systems of Representation: Culture Lab" at the Department of Art and Media at Aalto University

Helsinki Central Library Oodi, The Cube
April 20–25, 2022

The Oodi Library is situated in Helsinki's city center. It was co-designed with the residents of the city and serves as a "living and functional meeting place open to all" which is reflected in the many audience groups that it draws in.

Fig. 3
Exhibition view, *Matter. Non-Matter. Anti-Matter*. Helsinki Central Library Oodi, 2022.

Design Museum Helsinki
May 17–22, 2022

At the Design Museum, *The Immaterial Display* was presented within the framework of the discursive program *Co-designing VR Experiences* alongside other projects that focus on fostering participatory approaches to cultural heritage.

Exhibition: *Heritage as a Source of Knowledge in Art and Design Education*
June 10–18, 2022
ESPRONCEDA – Insitute of Art & Culture, Barcelona
Development and implementation:
Lily Díaz-Kommonen, Cvijeta Miljak

The exhibition showcased selected aspects of processes and outcomes of co-design methodologies employed in the virtual reconstruction of *Les Immatériaux*. It was presented within the larger exhibition *DIGITAL AWARENESS. From education to social impact and human identity* that took place at ESPRONCEDA as side event of the New European Bauhaus Festival and in collaboration with ISEA2022.

**Hybrid Seminar:
Co-designing VR Experiences**
May 19, 2022
Organized by: Design Museum Helsinki together with Lily Díaz-Kommonen and Cvijeta Miljak (Aalto University)
Moderated by: Leena Svinhufvud (Design Museum Helsinki)
Speakers: Julie Champion Lagadec, Marcella Lista (Centre Pompidou, Paris); Lívia Nolasco-Rózsás (ZKM | Karlsruhe); Lily Díaz-Kommonen, Cvijeta Miljak (Aalto University)

As part of the week-long exhibition *Co-designing VR Experiences* at the Design Museum in Helsinki (12–19 May, 2022), a seminar took place in which museum professionals and visitors came together to discuss different approaches to the amplification of

social cohesion and access to cultural heritage through 3D immersive environments. Project partners presented *The Immaterial Display* and the 3D models of the two past landmark exhibitions *Les Immatériaux* and *Iconoclash*.

Fig. 4
Matter. Non-Matter. Anti-Matter at Tirana Art Lab, 2022. Exhibition visual. Graphics: Paul Voggenreiter

**Tirana Art Lab –
Center for Contemporary Art, Albania**
June 25–August 28, 2022

The exhibition at Tulla Culture Center in Tirana— the temporary venue of Tirana Art Lab— featured artworks that were developed over the course of the Beyond Matter residency program in Tirana. Their projects incorporate extended reality tools and deal with issues of public space in the Albanian capital. The exhibition raised questions about past and current aspects linked to representation in art, while also widening the philosophical focus on the virtual and the physical.

Exhibited artists: HUNITI GOLDOX, Olson Lamaj (artists, Beyond Matter residency fellows), Valentina Peri (curator, Beyond Matter residency fellow)
Curator: Adela Demetja (Tirana Art Lab)

Figs. 5 and 6
Exhibition view, *Matter. Non-Matter. Anti-Matter*.
Tirana Art Lab, 2022.

Panel Discussion 3:
Matter. Non-Matter. Anti-Matter
July 20, 2022
Moderated by: Adela Demetja (Tirana Art Lab)
Speakers: Olson Lamaj (artist, Beyond Matter
residency fellow), Valentina (curator, Beyond
Matter residency fellow), Lívia Nolasco-Rózsás
(head of Beyond Matter, ZKM|Karlsruhe)

Fig. 7
Panel discussion at Tirana Art Lab. From left to right:
Lívia Nolasco-Rózsás, Valentina Peri, Olson Lamaj,
Adela Demetja.

Open Conversation:
Strategies of Narration in the
Virtual Reality
July 23, 2022
Moderated by: Adela Demetja
Speakers: Olson Lamaj (artist, Beyond Matter
residency fellow), Lívia Nolasco-Rózsás (head
of Beyond Matter, ZKM|Karlsruhe), Valentina
Peri (curator, Beyond Matter residency fellow),
Jon Stam (designer of *The Immaterial Display*,
Commonplace Studio)

As part of the satellite program of Manifesta 14,
Tirana Art Lab organized a talk at the Centre
for Narrative Practice in the host city of Pristina,
Kosovo. The conversation took the exhibition
Matter. Non-Matter. Anti-Matter as a starting
point to expand on "new practices and modes
of collective storytelling," the thematic leitmotif
of the 2022 edition of the Manifesta biennial.

Fig. 8
***Matter. Non-Matter. Anti-Matter* at ZKM|Karlsruhe,**
2022–23. Exhibition visual. Graphics: AKU Collective.

ZKM|Center for Art and Media Karlsruhe
December 2, 2022–April 23, 2023

The expansive iteration of *Matter. Non-Matter.
Anti-Matter* at ZKM|Karlsruhe delved into the
significance of digitality and computer-gen-
erated environments in regards to the material
understanding of art production and showcas-
ing. Through deep engagement with two past
landmark exhibitions and their philosophical
foundations, the exhibition lent insight into the
implications for contemporary curatorial and
artistic practices, including their mediation, that
arise from the assumption that the digital com-
prises a material layer. The online launch of the
digital exhibition models of *Les Immatériaux*
and *Iconoclash* took place in conjunction with
the exhibition opening. The exhibition was ac-
companied by an extensive program of events.
Regular guided tours through the *Beyond
Matter VIEW Platform* were offered throughout
the duration of the exhibition.

Curator: Lívia Nolasco-Rózsás (head of
Beyond Matter, ZKM|Karlsruhe)
Curatorial team: Philippe Bettinelli, Julie
Champion Lagadec, and Marcella Lista
(Centre Pompidou, Paris), Felix Koberstein and
Moritz Konrad (ZKM|Karlsruhe)

Artist Talk: A Conversation Beyond Matter with Carolyn Kirschner

October 7, 2022
Moderated by: Cecilia Preiß (ZKM | Karlsruhe)
Speaker: Carolyn Kirschner (artist, Beyond Matter residency fellow)

Carolyn Kirschner presented her audiovisual artwork *Iconoclash: Slow Squeeze* that she developed during her Beyond Matter residency program at ZKM | Karlsruhe and shared her insights on issues relating to the relationship between materiality, representation, and physical stimulation.

Exhibition Opening: *Matter. Non-Matter. Anti-Matter. Past Exhibitions as Digital Experiences*

December 2, 2022
Moderated by: Lívia Nolasco-Rózsás (head of Beyond Matter, ZKM | Karlsruhe)
Speakers: Arne Braun (state secretary in the Ministry of Science, Research, and the Arts of Baden-Württemberg), Helga Huskamp (COO, ZKM | Karlsruhe), Sybille Krämer (professor emeritus, Free University of Berlin), Frank Mentrup (lord mayor of Karlsruhe), Xavier Rey (director, Centre Pompidou, Paris), Olga Sismanidi (EACEA), Peter Weibel (CEO, ZKM | Karlsruhe)

A conference bringing together speakers from the arts, sciences, and politics marked the opening of *Matter. Non-Matter. Anti-Matter. Past Exhibitions as Digital Experiences* at ZKM | Karlsruhe. The special occasion was accompanied by a curatorial guided tour through the exhibition.

Fig. 9
Peter Weibel at the opening of *Matter. Non-Matter. Anti-Matter* at ZKM | Karlsruhe, 2022.

Fig. 10
Exhibition view at the opening of *Matter. Non-Matter. Anti-Matter.* ZKM | Karlsruhe, 2022.

Guided Tours through *Matter. Non-Matter. Anti-Matter* at ZKM | Karlsruhe

December 2, 2022–April 23, 2023

Guided tours through the exhibition were offered on a regular basis over the course of the exhibition period. In total, ten guided tours were held in English and in German for members of the public, school classes, cultural professionals, and research groups.

Online Guided Tours through the *Beyond Matter VIEW Platform*

December 2, 2022–July 31, 2023

The digital models of *Iconoclash* and *Les Immatériaux*—both accessible via the *Beyond Matter VIEW Platform*—were launched in conjunction with the opening of *Matter. Non-Matter. Anti-Matter* at ZKM | Karlsruhe. Until the end of Beyond Matter in July 2023, monthly online guided tours were held on the online platform of the project, where, besides the digital exhibition models, other VR environments and exhibitions that were developed within the framework of the project were explored in a group setting. Hosted in English and in German, these online guided tours appealed to a diverse audience, primarily researchers and museum professionals seeking to increase engagement with nonlocal audiences through digital programs in the institutions of their own.

PORe Workshop: Avatars & Poetry

December 8, 2022
Organized by: Lily Díaz-Kommonen and

Cvijeta Miljak (Department of Art and Media, Aalto University), Mona Feyrer and Felix Koberstein (ZKM | Karlsruhe)

Study groups and seminars were invited to explore *The Immaterial Display* in a hands-on collaborative workshop rooted in the participants' experience of the digital exhibition models. By merging images and words from the two historical exhibitions *Les Immatériaux* and *Iconoclash*, participants created their own digital avatars and poems which they shared with the workshop group in a virtual poetry session.

Workshop: Interdisciplinarity in Curatorial Networks

February 23–24, 2023
Organized by: Felix Koberstein (ZKM | Karlsruhe)
Moderated by: Andreas Broeckmann (Leuphana University Lüneburg)
Participants: Beatrice von Bismarck (Academy of Fine Arts Leipzig), Gabriele Gramelsberger (RWTH Aachen University), Lívia Nolasco-Rózsás (ZKM | Karlsruhe), Daniel Tyradellis (Humboldt Universität zu Berlin, Hermann von Helmholtz-Zentrum für Kulturtechnik), Barbara Vanderlinden (University of the Arts Helsinki)

In the workshop, the different structures of interdisciplinary curatorial networks were examined and discussed. The aim was to reflect on the research conducted on the two exemplary exhibitions, *Les Immatériaux* and *Iconoclash*, and to situate questions linked to the interdisciplinarity of art and science that were inherent to these case studies on a broad discursive basis.

Workshop Summary

Many exhibitions of recent decades, such as the two case studies analyzed within Beyond Matter, have not limited themselves to artworks or historical artifacts, but also included objects from fields such as science and religion, giving rise to the need to reflect on interdisciplinary curatorial processes. This workshop involved presentations by Andreas Broeckmann, Barbara Vanderlinden, Lívia Nolasco-Rózsás and Felix Koberstein, Gabriele Gramelsberger,

Beatrice von Bismarck, and Daniel Tyradellis. Interdisciplinarity was largely discussed with reference to the case-study exhibitions *Les Immatériaux* (Paris, 1985) and *Iconoclash* (ZKM | Karlsruhe, 2002), as well as *Laboratorium* (Antwerp, 1999), and the discussions were centered around three topics: (1) the notion of the exhibition as a laboratory; (2) interrelations between interdisciplinary exhibition projects and their (intended) audiences; and (3) the ethics and epistemologies of interdisciplinary curating.

Claiming an exhibition as a laboratory is a popular approach that is not without its inner contradictions. Curatorial endeavors tend to require an intense research phase, often only partially visible to the public, but an exhibition itself is only an act of research if it has an open-endedness to its process that enables unpredictable outcomes. An exhibition may claim to make a certain statement or discuss certain ideas, but without that orientation toward serendipity it is an illustration of the themes it sets out to deal with, a mediation of the research done by its curators, rather than research in itself.

Opening yourself up as curators to the risk of failure that is inherent in embracing unpredictability raises questions of accountability, especially when the project is financed through public funds. Another set of related ethical questions concerns the relationship between an exhibition and the public. While addressing a more professional or expert audience can advance a specific discourse, it may alienate a broader audience; on the other hand, working too closely to popular discourses may distort nuanced positions and fail to challenge visitors. Ideally, communicating complex ideas to casual visitors will make experts reframe their ideas and concepts, thus integrating new perspectives.

The prominence of interdisciplinary curating with a focus on difference and diversity is a result of cultural shifts in the 1960s and 1990s involving a critical investigation of the curator as well as a diversification of Western art worlds in terms of race, ethnicity, sexual orientation, and gender identity. Including multiple perspectives and fields of research can make the knowledge produced within an exhibition project more robust. It does not render collaborative exhibition-making inherently unproblematic, however, as high demand for individual experts

can create hierarchies, generating new dependencies and power dynamics which need to be subject to continuous critical investigation.

Workshop: Methodology of Researching Historical Exhibitions
March 16–17, 2023
Organized by: Felix Koberstein (ZKM|Karlsruhe)
Moderated by: Andreas Broeckmann (Leuphana University Lüneburg)
Participants: Francesca Gallo (University of Rome), Julia Gens and Kai-Uwe Hemken (Kunsthochschule Kassel), Jérôme Glicenstein (Paris 8 University), Kai-Uwe Hemken (Kunsthochschule Kassel), Marcella Lista (Centre Pompidou), Lívia Nolasco-Rózsás (ZKM|Karlsruhe), Luise Reitstätter (University of Vienna), Lucy Steeds (Central Saint Martins College of Art and Design)

Since more than three decades, the history of art and science has increasingly devoted itself to the study of exhibitions as sites of media of production, mediation, and negotiation. Based on the research being conducted on *Les Immatériaux* and *Iconoclash*, the workshop discussed the methods of a comparative exhibition historiography.

Workshop Summary
The exhibition reconstructions and research projects discussed within this workshop presented a wide scope of perspectives and tools for investigating exhibitions, including both formalized and implicit methodologies. Juxtaposing different approaches made it obvious that the ways in which researchers engage with their objects of study depends not only upon the desired outcome of their inquiry, but also on assumptions made about the concept of the exhibition in question. Presentations by Kai Uwe Hemken and Julia Gens, Luise Reitstätter, Jérôme Glicenstein, Lucy Steeds, Francesca Gallo, Marcella Lista and Julie Champion Lagadec, and Lívia Nolasco-Rózsas and Felix Koberstein were followed by conversations dealing with: (1) how research can be archived and made accessible after exhibition reconstructions; (2) practical and philosophical questions that emerge when approaching such reconstructions; and (3) how

reconstructions engage with the genealogies of individual exhibitions and their place within the canons of exhibition history.

As the work of researching historical exhibitions often depends on the availability of personal or institutional archives, the conversation on accessibility asked whether a reconstruction can itself be treated as a repository of archival materials for scholars and casual users—and what other strategies could be used to incorporate research into centralized collections such as institutional archives.

The second discussion developed around the question of what should be considered the object of an exhibition reconstruction, and by extension, what exactly constitutes an exhibition: Should a reconstruction center around the spatial ordering of objects or instead focus on the curatorial concept behind it? Should a reconstruction try to recreate the experience of the original exhibition's visitors or try to emulate its cultural context, and how? As no reading of a past event can recreate it in its entirety, asking how far researchers should go in the process of interpretation is pertinent.

Considering how to frame the concept of an exhibition connected to the discussion on how a single exhibition relates to other such events and can be compared to them. Attempting to trace the genealogy of an exhibition is inevitably connected to the construction of narratives within a canon of exhibition history, requiring an appraisal of whether various supposed connections should be understood as causalities and influences or instead as mere resonances and correlations.

With curatorial studies and exhibition history being relatively young fields of research, discussions such as those held here suggest that sharing methodological approaches and reflecting on their implications is important for advancing a conceptual framework for studying historical exhibitions.

Webinar Series:
What Matters for Virtual Museums?

Webinar 1: Virtual Museum Platforms and Strategies for Online Education
March 2, 2023

Organized by: Felix Koberstein (ZKM│Karlsruhe)
Moderated by: Barbara Kiolbassa
(ZKM│Karlsruhe)
Speakers: Gwendal Creurer and Véronique
Paradis (SAT – Society for Arts and Technology
Montreal), Don Hanson (newart.city), Lívia
Nolasco-Rózsás (ZKM│Karlsruhe), Ugo
Pecoraio (HEK Basel), Tanja Schomaker,
Jaqueline Seeliger (Lenbachhaus Munich)

Contemporary tendencies are pointing towards museum visits transpiring beyond the visit to a physical museum, with some taking place entirely online. This requires ideas and concepts for virtual platforms that combine a wide variety of purposes, represent museums, convey information, but can also serve as an extended exhibition space and knowledge sphere. The parameters that are decisive for the design of the user interface of such platforms was explored in this workshop with the invited speakers experienced in this field.

Webinar 2: Hard- and Software Technologies for a Hybrid Museum Experience
March 27, 2023
Organized by: Felix Koberstein (ZKM│Karlsruhe)
Moderated by: Barbara Kiolbassa
(ZKM│Karlsruhe)
Speakers: Carlotta Broggi (CCCB: Centre de Cultura Contemporània de Barcelona), Lily Díaz-Kommonen (Department of Art and Media, Aalto University), Roland Haring (Ars Electronica Futurelab, Linz), Patrick Keller (fabric│ch), Lívia Nolasco-Rózsás (ZKM│Karlsruhe), David Weigand (Futurium Berlin)

Digital interfaces in the exhibition space have been integral to museum scenographies since many years now. In most cases, these interfaces are used to convey and contextualize the exhibits. The hybridization of digital and physical spaces will presumably continue to progress in the future and influence the museum experience of visitors, as well as the internal structures of the institution itself. The webinar explored some of these questions by focusing on various case studies that were discussed by invited speakers.

Webinar 3: Next Steps on the Way to Becoming a Multidimensional Art Institution
May 11, 2023
Organized by: Felix Koberstein
(ZKM│Karlsruhe)
Moderated by: Barbara Kiolbassa
(ZKM│Karlsruhe)
Speakers: Duncan Bass (Singapore Art Museum), Marina Bauernfeind and Alina Fuchte (nextmuseumio), Teresa Darian (Kulturstiftung des Bundes – dive in funding program), Klaas Kuitenbrouwer (Het Nieuwe Instituut, Rotterdam), Lívia Nolasco-Rózsás (ZKM│Karlsruhe)

The idea of a metaverse that holds the potential to interconnect a wide range of digital areas of activity, and enables physical and virtual realities to steadily converge, harbors promising prospects for the museum field as well. As non-profit organizations, museums have a duty to help shape democratic, equitable, and accessible spaces, and to pursue decentralized approaches accordingly. Based on the approaches and realized case studies presented by the invited speakers, the aim of the workshop was to jointly draft possible future scenarios.

Finissage: *Matter. Non-Matter. Anti-Matter. Past Exhibitions as Digital Experiences*
April 21–23, 2023

For the closing of the exhibition, a rich program of workshops, guided tours, performances, and lectures offered a broad spectrum of thematic connections linked to questions that lay at the heart of the practice-based research that was conducted in the framework of Beyond Matter.

PORe-Workshop: Imagined Monuments
April 21, 2023
Organized by: Lily Díaz-Kommonen, Cvijeta Miljak (Department of Art and Media, Aalto University)

What happens as our lives partially shift to being in online spaces? In this workshop the participants were encouraged reflect on memory, re-mediation, and ritual in the virtual dimension.

They created their own unique "imagined monument," a reflection of their thoughts and feelings inspired by the exhibition, which was transferred on to a t-shirt to take home as a tangible and wearable souvenir.

Panel Discussion
April 22, 2023
Moderated by: Lívia Nolasco-Rózsás (head of Beyond Matter, ZKM|Karlsruhe)
Speakers: Jeremy Bailey (new media artist), Torben Ferber (KIT – Karlsruhe Institute of Technology), Alistair Hudson (CEO, ZKM|Karlsruhe), Julia Ihls and Lioudmila Voropai (Karlsruhe University of Arts and Design), Stephan Schwingeler (HAWK Hildesheim)

Running Lecture: Playful Interactions. Gamification, Games, and playful Media in the Museum
April 23, 2023
Speaker: Stephan Schwingeler (HAWK Hildesheim)

Fig. 11
PORe workshop at ZKM|Karlsruhe, 2022.

Running Lecture: Beyond Matter. Dark Matter
April 23, 2023
Speaker: Torben Ferber (KIT – Karlsruhe Institute of Technology)

Running Lecture: Second Skin of Institutional Memory. Material matters
April 23, 2023
Speakers: Julia Ihls and Lioudmila Voropai (Karlsruhe University of Arts and Design)

Performance-Lecture:
The Perfect Museum
April 23, 2023
Speaker: Jeremy Bailey (new media artist)

Centre Georges Pompidou
Exhibition: Les Immatériaux. Aperçus d'une manifestation postmoderne au Centre Pompidou
July 5–October 30, 2023

In the context of the traveling exhibition *Matter. Non-Matter. Anti-Matter*, the Centre Pompidou showcased the two exhibition models alongside archival materials related to the exhibition *Les Immatériaux* from 1985.

Curated by: Philippe Bettinelli, Julie Champion Lagadec, Marcella Lista

ISEA 2023 Roundtable:
Matter. Non-Matter. Anti-Matter.
Past Exhibitions as Digital Experiences
May 21, 2023
Speakers: Philippe Bettinelli, Marcella Lista (Centre Pompidou, Paris), Lívia Nolasco-Rózsás (ZKM|Karlsruhe), Marie Vicet (researcher on *Les Immatériaux*)

Moviment Festival: Beyond Matter Book Preview and Series of Artist Talks
July 8, 2023
Moderated and organized by: Marcella Lista (Centre Pompidou)
Speakers: Lívia Nolasco-Rózsás and Marianne Schädler (ZKM|Karlsruhe)
Artist talks: Jeremy Bailey, Damjanski, Gerardine Juárez, Patrick Keller (fabric|ch), Carolyn Kirschner, Anne Le Troter

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THE SIMULTANEITY OF THE NON-SIMULTANEOUS. An Introduction to *Matter. Non-Matter. Anti-Matter*[1]

Sybille Krämer

ZKM | Center for Art and Media Karlsruhe, a center dedicated to society's digital and virtual future, is presenting an exhibition that aims to "reanimate" past exhibitions. Is this a paradox? Do we have to look to the past to orient ourselves toward the future?

When a biological heart stops beating, it can sometimes be reanimated. If I were to ask what is analogous to the pulsating heart when it comes to art exhibitions, I might think of the term introduced by the late Bruno Latour and Peter Weibel: *Gedankenausstellung* (thought exhibition).[2] An exhibition's heart would then be the guiding thought which it materializes and which programs and designs it. But the equivalent to a cardiac arrest, the death of the heart, would not be the mere fact that these exhibitions have passed, for both *Les Immatériaux* (1985) and *Iconoclash* (2002) have already secured a place in our ⬊ cultural heritage. What, then, does it mean to revive something that has already entered cultural memory?

Maurice Halbwachs developed the idea of collective memory in the 1920s.[3] Just as the individual brain remembers the past only from the perspective of a lived presence, and thereby constantly remodels it, collective memory is not a storage place for dead objects. Collective memory takes the form of constant selections and reinterpretations related to and depending on contemporary problems. The ongoing behavior of a community is influenced by the identity-forming past sedimented in its collective memory.

What follows is that the digitization of *Les Immatériaux* and *Iconoclash* is work on collective memory, or, to reference to Aleida and Jan Assmann's work, on cultural memory.[4] Cultural memory is understood here as distinct from communicative memory: while the latter contains the narratives that are passed down generationally, cultural memory epitomizes symbolic and technical artifacts and the practices associated with them. If work on collective memory is not just to revive the past, but to reinterpret and put it into a transformed perspective urgent for today, what kind of reinterpretation is at stake and what kind of transformation is associated with a digital revival?

1   Editor's note: This text is based on a lecture given by the author on the occasion of the exhibition opening of *Matter. Non-Matter. Anti-Matter* at ZKM | Karlsruhe, December 2, 2022.

2   The four *Gedankenausstellungen* that Latour and Weibel curated jointly were *Iconoclash* (2002), *Making Things Public* (2005), *Reset Modernity!* (2016), and *Critical Zones* (2020–22).

3   See Maurice Halbwachs, *La mémoire collective* (1939) (Paris: Presses Universitaires de France, 1950).

4   See Aleida Assmann and Jan Assmann, "Das Gestern im Heute. Medien und soziales Gedächtnis," in *Die Wirklichkeit der Medien: Eine Einführung in Kommunikationswissenschaften*, ed. Klaus Merten, Siegfried J. Schmidt, and Siegfried Weischenberg (Opladen: Westdeutscher Verlag, 1994), 114–40.

At this point I would like to state my hypothesis: *Matter. Non-Matter. Anti-Matter* presents past exhibitions as a digital space in which time gone by becomes a genuine and immediate dimension of *spatial* representations and can thus be directly explored in its digital embodiment. The exhibition presents a simultaneity of the non-simultaneous that can be sensually experienced because digitality allows a synchronicity of the non-synchronic to be made perceptible to the human senses.

This might sound rather cryptic and abstract; it will be clarified. Let me start with a comment on spatiality. We live in a three-dimensional world, yet we are surrounded by illustrated and inscribed surfaces. From skin tattoos to cave paintings via the invention of writing, diagrams, graphs, and maps, then scoreboards, television, and film to the ubiquity of computer screens and smartphones, there is a running thread that I want to describe as a cultural technique of flattening.[5] We are caught in a rhetoric of depth: fruitful thinking is in-depth thinking, for what is essential lies behind appearances. Thinking oriented towards surface operations is discredited, if not taboo. The rhetoric of depth blinds us to the cultural productivity of artificial flatness.

Sciences, arts, complex architecture, and advanced technologies would not be possible without the use of flatness. Complex bureaucracy is not possible without forms, files, and all kinds of documents. Two-dimensional bodies do not empirically exist—the plane is a mathematical concept, not a physical reality—yet we treat illustrated and inscribed surfaces as if they have no depth. Artificial flatness causes the world to metamorphose into two-dimensionality. Everything that is, everything that is not yet, and everything that can never be can be projected onto a surface to be processed and shared with others. The creativity of flatness includes the graphic display of impossible, inconsistent objects.

THE ORIGIN OF OUTLINE.

We can draw them, but constructing them in spatial three-dimensionality does not work. To uncover the peculiar potential of operating in and with the two-dimensional, a look at the use of shadows is instructive. Shadows are a gift of nature to human culture because they present a natural form of flattening which can be applied to cultural tasks. Some have considered the legend of the potter Butades's

Fig. 1
"The origin of outline,"
in Walter Crane, *Line and Form* (London: George Bell & Sons, 1900), xvi.

5   See Sybille Krämer, "Reflections on 'operative iconicity' and 'artificial flatness,'" in *Image, Thought, and the Making of Social Worlds*, ed. David Wengrow, Freiburger Studien zur Archäologie und visuellen Kultur 3 (Heidelberg: Propylaeum, 2021), 252–72, https://doi.org/10.11588/propylaeum.842.

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daughter,[6] who drew her departing lover as a silhouette on the wall, as the origin of art, while some connect the use of sundials to the origin of science (see figs. 1 and 2).[7]

The cultural technique of flattening has huge creative and explorative potentials. Our body is characterized by three perpendicular axes: right-left, up-down, and front-back. We are physically oriented to the front: everything that lies behind us cannot be seen, let alone controlled (thought without a rearview mirror). But with artificial flatness we invent a special form of space that enables overview, manipulation, and control in a unique way. Cognition, computation, composition, and creation can take new forms on inscribed surfaces. Abstractions such as ideas, thoughts, concepts, or numbers become visible and can be displayed and operated on.

Media theory can tell us more about the secret of the efficiency of artificial flatness. By a medium, we generally understand a third element or middle in between heterogeneous sides, fields, or worlds, creating connections that enable exchange and new syntheses.[8] We usually consider time one-dimensional and

6   See Pliny the Elder, *Natural History*, trans. John Bostock and H.T. Riley (London: Taylor and Francis, 1885), 35.12.

7   See Marcus Pollio Vitruvius, *Ten Books on Architecture*, trans. Morris H. Morgan (Cambridge: Harvard University Press, 1914), esp. book 10. First published as *De architectura* (Venice: Giovanni Taccuino, 1511).

8   See Sybille Krämer, *Media, Messenger, Transmission: An Approach to Media Philosophy* (Amsterdam: Amsterdam University Press, 2015).

space three-dimensional; two dimensionality is something in between. What follows is that the formatted and inscribed surface can function as a medium for transforming time sequences into spatial relations and, conversely, spatial configurations into temporal performances. Oral speech can crystallize into text, musical composition into scores, artistic ideas into sketches, and machine instructions into computer programs. All of this can then be temporally liquefied, executed, and performed. As a manual for translation between time and space, an inscribed surface becomes a workshop of thought, a design space, and laboratory for arts, technologies, and architecture, a space to experiment with the invisible, and, last but not least, a repository for everything that is observed, counted, and measured. The exhibition *Matter. Non-Matter. Anti-Matter* would have been unthinkable without diagrams and sketches for anticipating and giving instructions about what would become a physical reality.

But what happens when the artificial surface is digitized and transformed into an electronic interface? To digitalize is to divide a continuum into discrete, independent units that can be encoded and combined. We tend to associate the digital with the computer. But this is a misunderstanding, or at best a shortcircuit, for the digital exists independently of the invention and use of the computer. Alphabets were already prototypes of the digital: the stream of sounds in oral speech was dissected by letters, which were then arranged spatially to form text. Decimal number notation, invented by Indian mathematicians and transmitted to the Europeans by the Islamic scholar Muhammed ibn Musa al-Khwarizmi, whose name gave rise to the term "algorithm," can also be interpreted as an early form of digital notation: the decimal system enabled Europeans to calculate in a purely written form for the first time.[9]
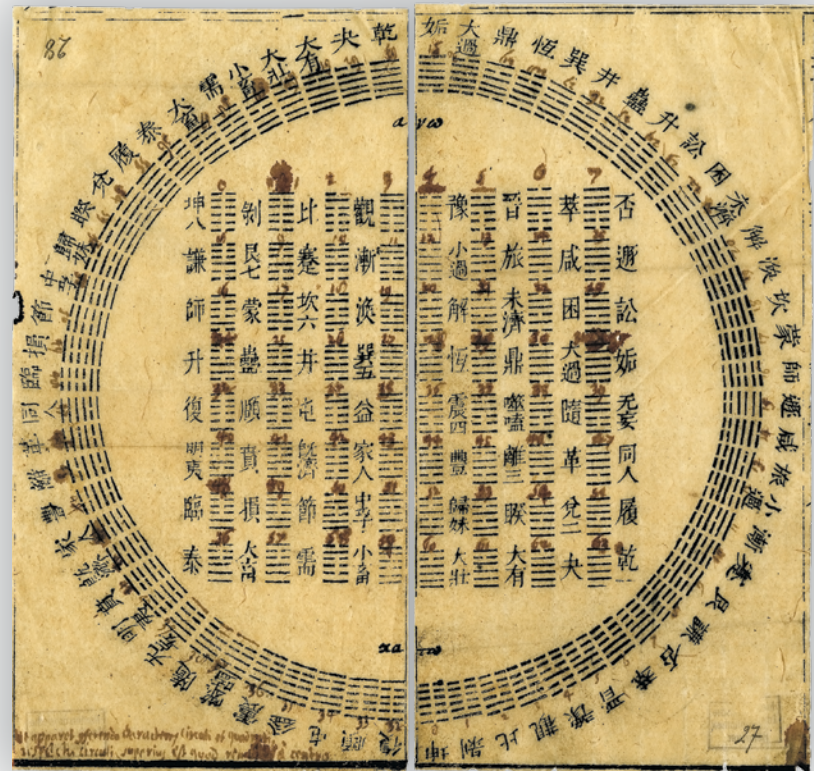
The breathtaking career of the digital would have been inexplicable if its embryonic forms had not already been formed in alphanumeric literacy.[10] But the prehistory of digitization was not limited to alphanumerics: the hexameters of the two-millennia-old *I Ching*, the Chinese *Book of Changes*,[11] were written in a binary code. Gottfried W. Leibniz's seventeenth-century invention of the binary alphabet was influenced by this Chinese coding practice, which he got to know through the Jesuit Joachim Bouvet, who had instructed a Chinese emperor in astronomy and mathematics (see fig. 3).

What I am pointing to here is the strong connection between computer-based digitization and the cultural technique of flattening. Ada Lovelace, daughter of the poet Lord Byron, wrote the first executable computer program for Charles Babbage's analytical

Fig. 3
Diagram of I Ching hexagrams **owned by Gottfried Wilhelm Leibniz, 1701. Gottfried Wilhelm Leibniz Bibliothek Niedersächsische Landesbibliothek, Hanover, LK-MOW Bouvet10, Bl. 27–28.**

9   See Kurt Vogel, *Mohammed ibn Musa Alchwarizmi's Algorismus: Das früheste Lehrbuch zum Rechnen mit ind. Ziffern* (Aalen: Zeller, 1963).

10   See Sybille Krämer, "Kulturgeschichte der Digitalisierung: Über die embryonale Digitalität der Alphanumerik," *APuZ. Aus Politik und Zeitgeschichte* 72, no. 10–11 (2022): 10–17.

11   See *The I Ching or Book of Changes*, ed. Hellmut Wilhelm, trans. Cary F. Baynes. (Princeton, MA: Princeton University Press, 1967).

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Diagram for the computation by the Engine of the Numbers of Bernoulli. See Note G. (page 722 *et seq.*)

engine of 1837, an engine existing only as a draft, a paper machine (see fig. 4).[12] In Lovelace's computer program *avant la lettre*, a written-down software of striking two-dimensionality, each row corresponds to the overall state of all the machine parts while the columns separate the parts from each other and show how each changes if a new operation is performed.

Still following digitality's connection to artificial flatness and in the process jumping to contemporary artificial intelligence techniques, another example consists of deep learning algorithms, through which software is not programmed but adapts itself by using huge amounts of data.

The hidden layers of these convolutional neural networks are diagrammatically visualized as a stacking or folding of surfaces. Nearly all drawn models of such networks' internal architecture show a multiplication of surfaces stacked one behind the other. Folding is a strategy to increase a surface by minimizing its spatial volume. Incidentally, and to offer a last hint of flatness's productivity, 3D printers work by piling layers on top of one another.

Even though early forms of the digital predate the computer, the technique of artificial flatness has changed radically with contemporary digitization. At the core of this change is the implementation of time on the inscribed surface. With diagrammatical artificial flatness, time was spatialized, and became a sensually perceptible but stable two-dimensional structure which could be converted back into processuality outside artificial flatness in the physical world. When Plato criticized writing,

Fig. 4
Ada Lovelace's "Diagram for the computation by the Engine of the Numbers of Bernoulli," in Luigi F. Menabrea, *Sketch of The Analytical Engine Invented by Charles Babbage*, trans. Ada Lovelace (London: Richard and John E. Taylor, 1843), 722, note G.

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12 See Sybille Krämer, *Ada Lovelace: Die Pionierin der Computertechnik und ihre Nachfolgerinnen* (Paderborn: Fink, 2015).

one of his arguments was that a text always has the same answers to all questions.[13] For centuries, the communicative achievement of writing was to overcome spatial and temporal distances by keeping its texture stable and immobile. But now we have written phenomena like activatable links, smartphone-readable QR codes, and the radio frequency technology that opens up and regulates the internet of things. The character of writing changes through self-movement and operational processuality in the interface.

An objection might be stated: isn't the essential aspect of *Matter. Non-Matter. Anti-Matter* the making of animated 3D models of the original exhibitions to replace two-dimensional pictures and diagrams, meaning that two-dimensionality as a spatial limitation is being overcome? That triumph is illusory. Computer-generated three-dimensionality is still based on artificial flatness, to which, however, the innovative insertion of the temporal dimension is a novelty—a novelty that cannot be fully explained within the framework of this short lecture-essay.

Here I want to offer just one example embodying my premise of time implemented as spatial flatness: the so-called Bigtable advanced form of digital storage technology.[14] The problem Bigtable has to solve is that on the World Wide Web some pages constantly change while others remain unchanged. If search algorithms could limit their search to modified files only, this would significantly reduce search time. The Bigtable database, developed in 2004 and used in Google Maps, Google Earth, YouTube, and so on, is based on exactly that principle.

It's informative to look at the diagrammatic models offered to demonstrate Bigtable's principles. As usual, the two-dimensional mapping of the database contains rows and columns, but here a timestamp for temporal indexicalization is added as the matrix's *third* dimension. Search algorithms can thus

consider only the most recent versions of the data. A digital search query can now deliver real-time results even for the largest data corpus. The phenomenon of real time is what I want to emphasize.

Since the theory of relativity emerged in the early twentieth century, we speak of space-time and use the term to emphasize that the three dimensions of space and the one dimension of time form a continuum. In classical physics, space and time were independent of each other. Classical space was conceived like a container which could be filled or emptied over the course of time. But the four-dimensional continuum of space-time indicates that space and time are interconnected, no longer absolute independent quantities.

Yet when time is implemented in the electronic interface, the physical reality of four-dimensional space-time is transformed into a human-created digitalized three-dimensional space-time, in which two spatial dimensions and one temporal dimension form a three-dimensional ontological modality. This idea of transfiguring and reducing four-dimensional space-time to a three-dimensional mode of flat space intertwined with temporality is still speculative in character, a hypothesis at best. Further research is necessary.

I use the word "transfiguration" here intentionally. The English term was originally religious, used in reference to the metamorphosis of the corporeal Jesus of Nazareth into the heavenly figure of Christ as God's son, experienced by the Apostles on a mountain and written down in the Bible.[15] In our context, transfiguration is used in a secular sense. If a transformation is a *transfiguration*, it is not a matter of mapping, translating, or mimesis; transfiguration is always more than mere transmission—it is a metamorphosis in ontological status. Just as artificial flatness in relation to the three-dimensionality of our living world is a special form of spatiality, used for goals that are epistemic, aesthetic, administrative, and so

13   See Plato, *Phaedrus*, ed. Stephen Scully, Focus Philosophical Library (Newburyport, MA: Focus Publishing / R Pullins Co, 2003).

14   See Fay Chang et al., "Bigtable: A Distributed Storage System for Structured Data," *ACM Transactions on Computer Systems* 26, no. 2 (2008): 1–26.

15   See Matt. 17:1–8, Mark 9:2–8, Luke 9:28–36.

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on, the three-dimensional space-time continuum opened up by digitization is a human cultural technique.

If this idea seems completely conceptual and abstract, it has immediate consequences for human perception of time. Three-dimensional space-time produces a novel modality of time: computer-generated real time or "micro-temporality."[16] Micro-temporality has been studied from many angles; here, only its phenomenal impact is of interest. The time of a computer operation can no longer be perceived by humans as a temporal interval, as a time-consuming event. What to the computer still embodies a time gap to us appears instantaneous. The philosopher Henri Bergson distinguished two forms of time: objectively measurable, spatialized time and subjectively experienced continuous duration.[17] But with computer-generated micro temporality, a third form of time is emerging.

At the beginning of this text I asked what the exhibition's counterpart to the reanimated biological heart might be. Perhaps we now have an answer. Exhibitions passed can no longer be brought back because of the directionality of time: past, present, and future cannot exchange places. Exhibitions can usually only be remembered symbolically as elements of collective memory. But the digitality of computer-generated spaces opens up a new experience of time: the simultaneity of the non-simultaneous can be appreciated as a *sensible* event. *Matter. Non-Matter. Anti-Matter* is not a memory theater of past exhibitions, but makes past exhibitions into a sensual experience of presence in the physical space-time continuum of ZKM|Karlsruhe. The artifice of advanced media technology itself thus turns into a curatorial strategy: to make the non-synchronous sensuously experienceable in synchronicity. It has always been a concern of the arts to not only use media but to expose and display each medium's mediality. Now this concern becomes a curatorial concept and strategy.

16 See Shintaro Miyazaki, "Algorhythmics: Understanding Micro-Temporality in Computational Cultures," *Computational Culture* 2 (2012), http://computationalculture.net/algorhythmics-understanding-micro-temporality-in-computational-cultures/.

17 See Henri Bergson, *Time and Free Will: An Essay on the Immediate Data of Consciousness* (1889) (Mineola, NY: Dover Publications, 2001).

ARS MEMORIAE PROSPECTIVE

Siegfried Zielinski

I.

Matter. Non-Matter. Anti-Matter. Insofar as they can be philosophically profiled, I can contribute nothing clever to the substantial terms in the title of the exhibition—with the exception of the fact that for two and a half millennia, thinking has been struggling with the construction of a world that could effectively confront the material, physically experienceable one, or even intervene in it. It is conceivable, it is thought, but ultimately eludes all attempt at description.

From the point of view of media archaeology, what is *matter*? Can there be a negation of it, or does the formulation of the question itself—in a spoken, written, or printed sentence, which necessarily involves the materialization of signs—entail a fundamental paradox?

Anti-matter is doubtless the most difficult concept of the three in the exhibition title. Even if I don't think about the UK rock band of the same name, I am dealing physically with a particularly intensive form of material phenomena or process. Jean-François Lyotard's 1973 text "L'Acinéma" should not be understood as anti-cinema, but as concentrating cinema in art and experimentation.[1] Many researchers understand quantum physics as the field in which physics and metaphysics coalesce in some magical fashion.

In 1991, Vilém Flusser began an essay on the "appearance of matter" with the following observation: "With the word 'immaterial' much mischief has been made. But when it comes to talk of an 'immaterial culture,' this mischief cannot be accepted anymore." The essay closed with this remark: "Whatever 'material' may mean, it cannot mean the opposite of 'immateriality.' Since 'immateriality'—or, strictly speaking, its form—calls forth material in the first place. The appearance of matter is its form. And that, to be sure, is a post-material assertion."[2] Let's take the occasion that Flusser presents and venture a first categorization of the simulations of the two past landmark exhibitions *Les Immatériaux* (Centre Pompidou, 1985) and *Iconoclash* (ZKM | Karlsruhe, 2002) as contemplative, playful, poietic experiments with the exhibitions' forms and frameworks.

Flusser wrote explicitly about *Les Immatériaux*, curated by Lyotard and Thierry Chaput in Paris, in the Essen-based magazine *Kulturrevolution*.[3] He was concerned above all with the vexed relationship between science and art, a dichotomy that he saw the exhibition as rescinding. From the media archaeologist's point of view, his critical commentary on conceptuality is helpful not least because it reminds one of the essentially material nature of everything cultural

1   I am referencing here Lyotard's superb text "L'Acinéma," in *Cinéma: Théorie, lectures*, ed. Dominique Noguez (Paris: Ed. Klincksieck, 1973) which is discussed concisely in Jean-Louis Déotte, "L'acinéma de J.-F. Lyotard," *Appareil*, no. 6 (2010), https://doi.org/10.4000/appareil.973. Lyotard's text is translated into English as "Acinema," in *Narrative, Apparatus, Ideology: A Film Theory Reader*, ed. Philip Rosen, trans. Paisley N. Livingston (New York: Columbia University Press, 1986), 349–59.

2   Vilém Flusser, "Der Schein des Materials," in *Bildlicht: Malerei zwischen Material und Immaterialität*, ed. Wolfgang Drechsler and Peter Weibel (Vienna: Europaverlag, 1991), 12–20 (quotations on 12 and 20).

3   Vilém Flusser, "Einige, die IMMATERIELLEN betreffende Gedanken," *Kulturrevolution*, no. 14 (May 1987): 16–18.

and aesthetic. One cannot have digital ⬊experiences. Digitality itself cannot be perceived. It is calculated, machines process it to be able to produce and control physical artifacts like machines, objects, images, sounds, and texts, which we can perceive with our senses. Only after the digital has joined with sensible matter (mechanical, chemical, biological, or electrical material) is it accessible to our experience. Otherwise it remains abstract in the direct sense of the word, that is, it cannot be experienced with the senses but can only through theory, as the fulfillment of Aristotelian happiness as vision.

With the 1985 exhibition *Les Immatériaux*, Lyotard knowingly contributed to a productive confusion of terms that, to us, had previously seemed perfectly familiar. In essence, the exhibition had to do precisely with this confusion in the labyrinth of relationships between *res extensae* and *res cogitans*, things extended and things thought. In dialogue with Jacques Derrida prior to the exhibition opening in Paris, he clarified it this way: "Immaterial is not immaterial; it describes a structure in which the conventional opposition between spirit and matter no longer has a place."[4] The opposition, when it becomes a border, is made fuzzier, blurred—like the fingerprint that oscillates into a spiral in the show's logo.

John Berger, one of the great materialist poets among thinkers and makers of art and literature, put this intrinsic dialectic of matter and form, real and imaginary, in clear and simple terms: "We are taught to oppose the real to the imaginary, as though one were always at hand and the other distant, far away. And this opposition is false. Events are always to hand. But the coherence of these events—which is what we mean by reality—is an imaginative

construction [...] Reality, however one interprets it, lies beyond a screen of clichés."[5]

With this, we can venture another careful categorization of the simulation's undertaking. In the best cases, simulations are concerned with the coherence of events belonging to past presents, with relationality, the networks, comprising an event.

When I first read the complete title of the Beyond Matter project, what came immediately to mind were the film projects undertaken by Swiss American literary scholar John Fuegi in the 1970s. By staging plays, primarily Samuel Beckett's, for the purposes of film documentation, he was attempting to preserve their ideal stagings through a gesture of instantaneous archaeology. The filmic artifacts were meant to help future generations of dramaturgs and directors stage the plays on the model of the master. Fuegi was a specialist in Brechtian theater. His laboratory practice represented an extension of Bertolt Brecht's *Lehrstück* and his own obsession with turning his productions with the Berliner Ensemble into model stagings—at once models and history.[6]

Perhaps the simulations that were developed in the context of Beyond Matter convey that the Gedankenausstellung in Karlsruhe and the *manifestation* in Paris have something to do with *Lehrstücke*—or *Meisterwerke*, as Peter Weibel and I recently tried to rechristen the concept.[7]

II.

Performances, manifestations, shows, and exhibitions all belong to a category of cultural phenomena which I have elsewhere designated as events. They are singular, irreproducible;

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4   Jean-François Lyotard and Jacques Derrida, "Plaidoyer pour la métaphysique," *Le Monde,* October 28/29, 1984. Quoted here after the German translation in Jean-François Lyotard et al., *Immaterialität und Postmoderne* (Berlin: Merve, 1985), 19–26 (quotation on 23).

5   John Berger, "The Production of the World," in *The Sense of Sight* (New York: Vintage Books, 1985), 276–81 (quotation on 279).

6   See also the catalog to the exhibition *Notation. Kalkül und Form in den Künsten* at the Academy of Arts Berlin (2008) and ZKM | Karlsruhe (2009), Hubertus von Amelunxen, Dieter Appelt, and Peter Weibel, eds., *Notation – Kalkül und Form in den Künsten*, exh. cat. Academy of Arts Berlin and ZKM | Karlsruhe (Berlin/Karlsruhe: Academy of Arts/ZKM | Karlsruhe, 2008), 310–11 and 395 in particular.

7   See the introduction by Peter Weibel and Siegfried Zielinski to the catalog *Art in Motion: 100 Masterpieces with and through Media* (forthcoming) for the exhibition of the same title at ZKM | Karlsruhe (2018–19).

they generate a specific aura in the here and now. They are conceived, planned, prepared, staged, and unfold from a particular social, political, economic, and cultural situation, sometimes over months, occasionally years, and pop—when they're of very high quality—at a particular moment in time, like a champagne cork that pressure has freed from the bottle. Thus it was with the exhibition at ZKM | Center for Art and Media Karlsruhe and with the show at the Centre Pompidou, a palace of culture that had opened just seven years previously. (Lyotard emphasized that he had never meant to mount an exhibition but to provide the time and space for a show; he found the gesture of a *manifestation* preferable.)

What characterizes these events is that each, in its own specific historical constellation, was in a position to stage, to project into an open, discursive space, provocative and thought-provoking contemporary themes that were on everyone's minds. At center stage of each event stood one or the other of France's greatest thinkers, who so often and so powerfully in the 1970s and 1980s unsettled, confused, and excited the cozy German philosopher's soul—in the case of *Les Immatériaux*, Lyotard, and with *Iconoclash*, the sociologist and historian of science Bruno Latour. What's at stake in Beyond Matter is clearly conveying their ideas in such a way that does not shrink from iconizing. As representations of research processes and findings, *Iconoclash* and *Les Immatériaux* were also very much collective undertakings. The author-subject was still clearly recognizable, albeit powerfully backed, supported, and relativized by others. Chaput was the second pair of hand in Paris, while Weibel was Latour's congenial partner from the domain of art and of risky transversal thinking; historian of science Peter Galison and art critic and philosopher Boris Groys were also among the participants in *Iconoclash*.

Events like these cannot be realized everywhere or anywhere. They need to be sparked. What Lyotard named as the moment of critical mass for his *manifestation*—namely, new technologies coming to replace not just

physical but intellectual labor—had a long tradition dating back at least three decades, or several centuries if we think in deep time, in the sciences, applied mathematics, and engineering technology. But the challenges posed by machines that can formulate and learn were becoming more urgent, in the arts, too, even in popular culture. As early as 1980, the German band Abwärts was singing *"Deutschland Katastrophenstaat – Wir leben im Computerstaat"* (Germany catastrophe-state / We live in a computer-state). In 1981, on tour in Japan for the release of their album *Computerwelt* (Computer World), the band Kraftwerk had robots appear on stage in their stead. In 1982, Weibel (lyrics) and Loys Eggs (music) performed a song called "Information" as the band Hotel Morphila Orchester. And in 1982/83, Michael Klier released his spectacular video *Der Riese* (The Giant), a montage of footage captured by surveillance cameras, which caused a sensation in the French intellectual scene. Anxiety over machine control may have increased in 1984—a year made iconic by George Orwell, and a year during which *Les Immatériaux* was in preparation. Which is why Lyotard wrote that "that the human mind is in turn a part of 'matter,' which it contrives to master, and that this matter, thus handled, can organize itself in machines that, in comparison with the mind, fare better."[8]

As for its own historical moment, *Iconoclash* was surrounded and permeated by direct violent attacks that produced devastating effects. In March 2001, a group of human-machines programmed with militant Islamist religiosity, bitter hate, calling themselves the Taliban, destroyed the centuries-old Buddhas of Bamiyan. In historical retrospect, this anticipated the far more murderous attacks in September of the same year against the icons of late capitalism, the twin towers of the World Trade Center, and against the center of military power in the West, the Pentagon. In response, the US began the second Gulf War. It was made definitively clear that the new millennium would not forego the option of war to resolve its political conflicts;

military interventions would still be seen as legitimate means, applied without much moral scruple, in various attempts to solve political and economic problems. At the same time, the World Wide Web entered a qualitatively new phase of mass media—namely, the activation of the user as producer and supplier of texts, sounds, and images of every conceivable variety (Web 2.0). The status of the image world as a potential site of conflict, not least in the context of armed conflicts, intensified considerably. Everyone suddenly acquired the opportunity to show everything to everyone. Regardless of whether they knew what they wanted to show or what they are showing.

Both *Les Immatériaux* and *Iconoclash* invested a great deal, in their conception, in the fact that they were not art exhibitions in the conventional sense. They could be described as projects of applied transversal thinking between the sciences and the arts. Expanded philosophy or even anti-philosophy in the sense used by Groys, who was substantively involved with *Iconoclash*. The events developed as poetic constructs; they wanted to be and should be artworks themselves, as Weibel said at the time about the project in Paris.[9]

I remember *Les Immatériaux* as dark or rather twilit—aesthetically cold and unwelcoming. The images arranged there neither provoked nor inspired me. Nor did the pathos that sounded through the headphone speakers like the pneumatic presence of an absent truth-teller. The idea of the postmodern as a critical intervention in modernity I only came to understand later; the *manifestation* did not help me with this at first. At the time, the expensive theater in the new temple of representativity in Paris seemed to me too affirmative of aggressive post-industrial capitalism, too apocalyptic, not interventionist enough in the Brechtian sense. My image and sound worlds were comprised of David Larcher and Harun Farocki's experimental films and videos, The Clash and Einstürzenden Neubauten's anarchist critique of capitalism, the riotous laughter that Die Tödliche Doris or Martin Kippenberger's cynicism could evoke, but also

the countercultures of media collectives like the early feminist project Paper Tiger in the US, MedienOperative or the Büro für ungewöhliche Maßnahmen in Berlin, and Sakofa or the Black Audio Film Collective in the UK.

Iconoclash seemed in many respects like the opposite of *Les Immatériaux*. Its images and sounds collided sensibly in the interdiscursively arranged museum environment of the former munitions factory where ZKM is housed. It was conceived like a powerful montage of attractions, an aesthetic strategy familiar to me from Sergei Eisenstein's films. One strode over long stretches, through brightly lit rooms that facilitated wakeful thinking more than the mythic, labyrinthine spaces of *Les Immatériaux*'s postmodern exploration of the transition from common automation to artificial extelligences. The Parisian curators and scenarists had relied far more on affect and—with the omnipresent soundtrack—on immersion. I remember well the impression left on me by the austere verticality of the scenario in Karlsruhe, which built, with the horizontality of my own movement, an occidental crucifix from which *Iconoclash* dynamically invited its visitors to descend.

Most importantly, both events posed explosive questions in a reality where the cards in the power game had been reshuffled—to whom did images and sounds belong, who commanded the information, who archived it, and for whom would it be deployed? Genesis P-Orridge's character in the film *Decoder* (1984) summed up a contemporary feeling: "Information is like a bank. Some of us are rich, some of us are poor with information. All of us can be rich. Our job, your job is to rob the bank, to kill the guards. Go out there and destroy power."

III.

None of this can be simulated. In the best case, it can be interpreted, emphasized, and described from the perspective of the present. What can be simulated are structures or

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9   See Peter Weibel, "*Les Immatériaux*: Lyotards Ausstellung zum postmodernen Zustand der Techno-Welt," *Wolkenkratzer Art Journal*, no. 8 (1985): 24–29.

grammars, in the broadest sense of that which can be formalized. In the case of an exhibition, we can point to the spatial layout and its relationship with the exhibition-makers' conceptual ideas, which are objectified in the chosen works of art and design.

In the process of model building, the relationship between image and text is co-determinative. How this is reflected and conceived determines the epistemic direction in which one can move a model and make it effective. Since antiquity, the cultural techniques of image and text have had a complementary, charged relationship in Europe. The diverse and robust inner relationships of image and text also generated the first fully formulated artificial memory practice, in which the Beyond Matter project exercises itself. Ancient Romans invented the *ars memoriae*, or art of memory, and the mnemotechnics associated with it in order to better visualize complex states of affairs that were expressible in speech, by way of an intermediate step of storing them in easily remembered rooms of a building. The philosophical technique of the *ars memoriae* that Frances A. Yates so admirably described more than a half century ago is premised on the fact that both things and words are optimally memorizable if we transport them into the visual memory of an imagined architecture.[10] Triggers for imagination might be particular places of the built urban environment like an amphitheater, a building, a bridge, a column, or even sculptures and images. In the process of remembering, imaginary spaces become agents and support the conscious actions of the intellectual subject in the present. "Mnemotechnics is the creation of an image archive in the mind," wrote Klaus Bartels in his fantastic essay "Zwischen Fiktion und Realität: das Phantom" (Between fiction and reality: the phantom) in 1987, shortly after Lyotard's *manifestation*

took place in Paris.[11] I would like to add: "For the purposes of the practical application of the *ars memoriae*."

In the simulations of the events in Paris and Karlsruhe, the phantoms become visually and auditorily concrete. They don't remain where they're strongest—in the imagination—but are projected into the sensible experience of new, real-time spaces (sound spaces and image spaces) and thus reified. *Memoria rerum*, the memory of things, and the memory of words, *memoria verborum*, are equalized in their epistemic status by way of their passage through digitalization. The tension between the two intellectual praxes of writing/reading and image-generation/viewing is thus rescinded, all but compelling a contemplation of the present and, more so, an intuition of the future. While the past becomes more unreal in the simulation, future constellations unfold in the space of possibility that lies before us in the here and now.

This means that opportunities for model building may reside less in retrospection than in looking ahead. By way of model building, the *ars memoriae* becomes a "pro-spective archaeology."[12] This is my term for the possibility to think, dream, project, and configure through past presents into those of the future. Prospective archaeology opens up an experimental space unlike any other—a space for action and thinking, an apparently paradoxical conceptual *mixtum compositum* for a praxis operating with two opposed arrows of time at once. One is vertically oriented towards a past deep time in the relationships among art, science, and technology, the other angled into a future that is permanently, stubbornly inaccessible to the now. The utopian potential of (media) archaeological activity resides in the possibility of placing both arrows in relation, such that the passengers in the time machine are not torn to shreds. It is boring to seek and

10   Frances A. Yates, *The Art of Memory* (London: Routledge & Keagan Paul, 1966).

11   Klaus Bartels, "Zwischen Fiktion und Realität: das Phantom," *Zeitschrift für Semiotik* 9, nos. 1–2 (1987): 159–81 (quotation on 187).

12   I have elaborated the concept of prospective archaeology, inter alia, in a volume I co-edited with Charles Merewether, *Art in the 21st Century* (Hong Kong: osage, 2020). It takes practical form in, for instance, the Banu Musa brothers' ninth-century musical automata, which I and my students built functional replicas of for the ZKM exhibition *Allah's Automata* (2015–16).

find again and again in the old, in what is past, that place of thrilling multiplicities and particularities that can't be accessed—because it no longer exists. But to learn and profit, intellectually and aesthetically, for the sake of future presents from the heterogeneity and the wealth of relationships in many past constellations is a thrilling challenge. Prospective archaeology is a pleasurable, a sensual activity. And this should pertain to making models of bygone exhibitions.

IV.

Beneath the surface, both exhibition-events are organized in a five-fold manner, like the fingers of a hand—digitally: *Iconoclash* along the lines of the five types of iconoclast Latour defined and which Merve Verlag visualized nicely on the back cover of his book.[13] *Les Immatériaux* follows the model of communication that US political theorist and sociologist Harold Lasswell developed in the 1940s. Via the five-fold structure, the proliferating details—films, videos, images, sculptures, objects, and texts, whether associative, poetic, commentative, all of them proliferating—more or less hold together.

Much has already been made of Lyotard's semantic play with the word root *mât*; he himself discussed it at length and there's nothing I'd like to add. Remarkably, what's received no commentary at all is the fact that the founder of postmodern thinking, in considering the structure of his *manifestation*, adhered to a model of communication that by the 1980s was already obsolete and lacking in theoretical complexity. The model was Lasswell's: in 1927, this prominent member of the Chicago School wrote his dissertation on *Propaganda Techniques in the World War*.[14] Lasswell trained as a psychologist and took a positivist view in his sociological work: if the masses

wished to be freed from the old iron chains of their technologically conditioned existence, they would have to accept new chains, albeit of a more precious metal. Lasswell provided the bridge from propaganda research to a general applied social psychology.

If you want to succeed in the marketplace of theory, you need to synopsize complex states of affairs in neat phrases that can ideally be formalized. Theorists who are able to invent such formulas must also accept that they will be used in place of the undergirding theoretical constructs for the sake of simplicity. The formula that Lasswell thought up worked linguistically with five simple "w" questions in American English; these were meant to express the essence of any given communication process that took place by way of technical devices: "Who (says) What (to) Whom (in) Which Channel (with) What Effect?" The medium here was conceived as an empty, neutral conduit. The extreme reduction in complexity as well as the supple linearity that was assumed as the basis of every practical telematic process instantly made the phrase a formula for this emerging and lucrative branch of research.

An entire industry of social science and information theory became attached to that formula. In his 1948 paper "A Mathematical Theory of Communication," mathematician Claude Shannon provided that industry with cutting-edge expertise on the information technology of his day. His schematic representation of a generalized communication system also consisted of five elements and was oriented in a linear manner like Lasswell's formula. It described how a message is effectively technically transported from its source to its destination, with the least amount of information loss (or "noise")—irrespective of whether the source of the message is a person speaking, a television tube, or a telegraph, and irrespective of whether its receiver is a

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13   See Bruno Latour, *Iconoclash oder Gibt es eine Welt jenseits des Bilderkrieges?* (Berlin: Merve, 2002). This text is also published in its entirety as "What is Iconoclash? Or is There a World Beyond the Image Wars?", in *Iconoclash: Beyond the Image Wars in Science, Religion, and Art*, ed. Bruno Latour and Peter Weibel, exh. cat. ZKM | Karlsruhe (Cambridge, MA: MIT Press, 2002), 14–37.

14   See Harold Dwight Laswell, *Propaganda Technique in the World War* (1927) (New York: Peter Smith, 1938).

person or an artifact.[15] In collaboration with Warren Weaver, Shannon cast his model into a simple functional diagram. This formula also did what Shannon could not: it was adapted with little scruple for psychology and other applications, although he repeatedly insisted that it described an engineering functionality and not a complex cultural process.

What's decisive here needs to be emphasized: Lasswell's model and the concepts built directly from it are oriented in a strictly linear fashion. They do not recognize feedback functions. The receivers in the communication processes are passive objects with no influence on the process itself, or the medium, or the message being communicated. This was criticized often from the 1960s and into the early 1980s. The "uses and gratifications approach" was developed as one of the sharpest competing models in the sociological study of communication and media; in place of the receiver of messages, the active user of technical media entered into the picture. With it came a move from "what do media make of humans?" to "what do humans make of media?" This paradigm shift is decisive with respect to the simulation of *Les Immatériaux*.

By 1985, the idea of a media-human—an active and critical, configuring and intervening agent within the complex situation of electronic and telematic communication—had ceased to be a revolutionary epistemic innovation, but was common knowledge within progressive communications and media research. Hans Magnus Enzensberger's "Baukasten zu einer Theorie der Medien" ("Constituents of a [materialist] Theory of Media," 1970), conceived in the Brechtian tradition, was already fifteen years old. Throughout the Western world, initiatives and collectives sprang up with practices based on emancipatory and critical interventionist conceptions of medial counter-production. In the UK, Channel 4's work with these ideas even led to the establishment of its own television network. And in the art

world an enormous variety of experiments and manifestations were developed in the two decades prior to *Les Immatériaux* that did not center any suffering at the hands of new technologies but instead celebrated a passionate critical and poetic engagement with telematics, the new digitality, and their possibilities. As early as 1974, Nam June Paik anticipated this in a report commissioned by the Rockefeller Foundation's art program titled "Media Planning for the Post-Industrial Society—The 21st Century is now only 26 years away." The electronic superhighway of the internet was already under construction. In 1984 Paik carried out his gigantic project "Good Morning, Mr. Orwell": on January 1, at 6:00pm in Central Europe, anyone could participate in an enormous happening at the Centre Pompidou in the French capital and in four variants in as many countries and seven cities broadcast over satellite. Twenty million people are thought to have tuned in. This degree of success was possible because Paik had cleverly organized a heterogenous mix of performances in a kind of electronic variety show. Global pop stars like the Thompson Twins, Peter Gabriel, and Laurie Anderson took part, as did Yves Montand as a star of international cinema, popular art icons like Salvador Dalí, and, at the heart of the event, key players in a wide variety of contemporary art and music scenes: Joseph Beuys, John Cage, Merce Cunningham, Allen Ginsberg, Phillip Glass, Charlotte Moorman, and others. This was a solid year before the opening of *Les Immatériaux*. Not a trace of that media stroke of genius by the Korean American artist and his comrades-in-play can be detected in the dark labyrinth of Lyotard's project, which took place in the very same location.

On the other hand, just how important Paik was for *Iconoclash* is clear from, among other things, the fact that *Zen for TV*, an early Paik work from 1963, took on a quasi-iconic character for the event in Karlsruhe. An image of the installation adorns the

15   Peter Weibel was an early translator of Shannon's ideas into German. A good ten years before the opening of *Les Immatériaux* he published Claude E. Shannon and John McCarthy's *Automata Studies* (Princeton, NJ: Princeton University Press, 1956) together with Franz Kaltenbeck as *Studien zur Theorie der Automaten* (Munich: Rogner and Bernhard, 1974).

legendary exhibition catalog and has become representative of the entire show. That work had emerged almost by accident. In connection with the exhibition *Exposition of Music – Electronic Television* (1963) at Parnass Gallery in Wuppertal, George Maciunas, then something of a father figure for the Fluxus artists, observed approvingly that Paik must have secretly studied electronics for a couple of years in order to be able to execute his various interventions in the television sets' electromagnetic fields. One of the cathode ray tubes in a black-and-white TV set had been destroyed in transit to the Parnass Gallery, and when electrical contact was reestablished, the screen showed only a single horizontal white line; Paik rotated the device 90 degrees, sending the electronic message as a flickering signal up into vertical space. Intervention, deconstruction, emptying out, and constructing a new (electronic) image world all came together admirably in *Zen for TV*.

The Karlsruhe exhibition thus signaled that critique of the medial landscape could continue to evolve even under conditions of inflationary image production and well-advanced image wars. The one prerequisite would be, however, that artists are intensively involved in both scientific and philosophical thinking and are prepared to engage with the material-technical foundations of their production and perception.

Translated from the German by Lauren K. Wolfe.

IMMATERIALITY, NEOMATERIALITY, AND HYBRID INTERSECTIONS.
Art and the Conditions of Digital Materialities

Christiane Paul

The materiality of the digital has been transformed as technologies have developed in recent decades. Within the Western art tradition, digital and networked art has commonly been classified as immaterial, an understanding that builds on the dematerialization of the art object in the art of the 1960s and 1970s (in Conceptual art, Happenings, Fluxus etc.) and emphasizes the coded, software components of the digital medium. In the past decade, in particular, discourse surrounding digital art has returned to the material realm. "◹ Post-digital" and "post-internet" art attempt to describe a condition of artworks and "objects" that are conceptually and practically shaped by the internet and digital processes yet often manifest in material form.

Bernard Stiegler has used the term "hypermaterialization" to describe a form of everyday reality where material appliances transform everything into information and subject it to endless transformation. While Stiegler's term captures the gathering, monitoring, and processing of information through material devices, it does not focus on the material residue of the digital process forming it or on the affective aspects of materials that are shaped by human data and mirror us to ourselves. Hypermateriality does not account for "the machines waving back at us," as James Bridle would put it.[1] I propose the concept of neomateriality to describe an objecthood that incorporates networked digital technologies, and embeds, processes, and reflects back the data of humans and the environment, or reveals its own coded materiality and the way in which digital processes see our world. Neomateriality is understood as different from the theories of neomaterialism that emerged in the 1930s and investigated relationships between human activities and the productive capacity of the environment within the concept of anthropology and evolution. I will use artworks by Clement Valla, Sterling Crispin, and Ashley Zelinskie as examples that reflect or become a residue of neomateriality.

The shift from the immaterial to the post-digital and its associated neomateriality has been complicated by the pandemic. As COVID-19 prompted the art world to move most of its programming online in 2020, the definition of an online exhibition became even more malleable. While distinctions between an online exhibition featuring web-based art

1 See James Bridle, "Waving at the Machines," transcript of a keynote presented at Web Directions South, Sydney, 2011, http://www.webdirections.org/resources/james-bridle-waving-at-the-machines/.

and an online showcase of documentation or components of work shown in physical gallery space had gradually become more permeable over the previous decade, the year 2020 amplified the fluidity of boundaries between online and physical space.

The following sub-chapters explore the evolution of materialities in the context of art and digital technologies. They trace the evolution from dematerialization and the immaterial to hypermateriality and then neomateriality, as a term capturing various disruptions that introduce new aesthetic paradigms. While neomateriality marks a "material turn," the fusion of online and corporeal space during COVID-19 constituted a shift to immateriality and an "online turn."

Post-digital and the New Aesthetic

As digital technologies have infiltrated almost all aspects of art making, many artists, curators, and theorists have pronounced an age of the "post-digital" and "post-internet" that finds its artistic expression in works deeply informed by digital technologies and networks, yet crossing boundaries between media in their final form. Both terms attempt to describe artworks and "objects" that are conceptually and physically shaped by digital processes and by the internet, whose language they take for granted, yet manifest as material objects such as paintings, sculptures, or photographs.

The condition indicated by the "post-" label here is new and important: a post-medium condition in which media in their originally defined format (e.g., video as a linear electronic image) cease to exist and new forms of materiality emerge. Yet the label is problematic in that it suggests a temporal condition, while we are by no means *after* the internet or the digital. Internet and digital art, like good old-fashioned painting, are not obsolete and

will continue to thrive. Nevertheless, post-digital and post-internet represent a condition of our time and form of artistic practice. They are also closely related to the "New Aesthetic," a concept originally outlined by James Bridle at the 2012 South by Southwest Conference (SXSW) in Texas and on his Tumblr since 2011,[2] which captures the processes of seeing like and being seen through digital devices. The post-digital and New Aesthetic provide us with a blurry picture, perhaps the equivalent of a "poor image" as described by Hito Steyerl: a "copy in motion" with substandard resolution, a "ghost of an image" and "a visual idea in its very becoming," yet an image that is of value because it is all about "its own real conditions of existence."[3] Whether or not one believes in the theoretical and art-historical value of the post-digital, the post-internet, and the New Aesthetic, their rapid spread throughout art networks testifies to a need for terminologies that capture a certain condition of cultural and artistic practice in the early twenty-first century.

From immateriality to neomateriality

The era of the post-digital and the New Aesthetic marks a new stage in the relationship between digital technologies and materiality. In the late 1960s and early 70s, Lucy Lippard theorized the dematerialization of the art object.[4] While Lippard did not explicitly talk about digital art, many now consider the art forms she examines—such as Fluxus and happenings—to be part of the lineage of digital art, having emerged in a cultural climate that was infused by cybernetics and systems aesthetics. Over the following decades a slow process of rematerialization occurred. While Jean-François Lyotard's exhibition *Les Immatériaux* (Centre Pompidou, 1985) appeared to highlight immateriality, it also argued that the immaterial is

2   See James Bridle, "The New Aesthetic," 2011–ongoing, http://new-aesthetic.tumblr.com/.

3   Hito Steyerl, "In Defense of the Poor Image, " *e-flux journal*, no. 10 (November 2009), http://www.e-flux.com/journal/in-defense-of-the-poor-image/.

4   See Lucy Lippard and John Chandler, "The Dematerialization of Art," *Art International* (February 1968): 31–6. See also Lucy Lippard, *Six Years: The Dematerialization of the Art Object from 1966 to 1972* (New York: Praeger, 1973).

matter subjected to interaction and conceptual processes. Stiegler likewise believes that there is nothing that is not ultimately in a material state, so the immaterial does not exist even on a nanolevel. Stiegler says:

> I call hypermaterial a complex of energy and information where it is no longer possible to distinguish its matter from its form… a process where information—which is presented as form—is in reality a sequence of states of matter produced by materials and apparatuses, by techno-logical devices in which the separation of form and matter is totally devoid of meaning.[5]

This, Stiegler concludes, is not dematerialization but hypermaterialization. As pointed out above, while Stiegler's term grasps the gathering, monitoring, and processing of information through material devices, it focuses on sequences of states rather than, for example, the affective aspects of materials that are shaped by data and mirror and reflect us and the environments we inhabit back to ourselves. Stiegler's hypermaterialization does not highlight the state of materials waving back at us or objects representing how the machines and software we created perceive us. I propose "neomateriality" to capture an objecthood that incorporates networked digital technologies and embeds, processes, and reflects back the data of humans and the environment, or reveals its own coded materiality and the way in which digital processes perceive and shape our world. Neomateriality describes a twofold operation: first, the confluence and convergence of digital technologies in various materialities; and second, the ways in which this merge has changed our relationship with these materialities and our representation as subjects. Neomateriality captures the embeddedness of the digital in the objects, images, and structures we encounter on a daily basis and the way we understand ourselves in relation to them. It finds various kinds of expression within contemporary culture and artistic practice through objects or artworks that

1) use embedded networked technologies, reflecting back their surrounding human and non-human environment; 2) reveal their own coded materiality as part of their form, thereby becoming themselves a residue of digital processes; and 3) reflect the way in which digital machines and processes, seemingly autonomously, perceive us and our world.

What distinguishes most digital art, and software art in particular, from other artistic practices is that its medium resides in distinct materialities. Paintings, for example, allow us to perceive the brushstroke or paint splatter that created them, and film consists of consecutive frames of images. In digital art the visual results of the artwork, no matter how painterly or cinematic, are derived from code and mathematical expression. The back end of the work and its visual front end typically remain disconnected. Code has also been referred to as the medium, the paint and canvas of the digital artist, but it transcends this metaphor in that it even allows artists to write their own tools—to create their paintbrush and their palette. Artistic practices engaging with conditions of neomateriality often highlight this condition by turning code and abstraction into the material framework of an object.

Ashley Zelinskie's *Reverse Abstraction* (2016) series (see fig. 1) engages with the different languages, concrete and abstract, through which humans and machines perceive the world. Objects and forms cannot be perceived by computers without layers of abstraction, while the codes that make computers run or execute operations are not necessarily readable by humans. *Reverse Abstraction* constructs traditional objects out of material representations of the hexadecimal and binary codes that allow a computer to construct them. If computers were to read the code that constructs the artworks, they would "see" the form that a human perceives. Transforming abstraction into material, Zelinskie's project strives to dissolve the duality of human and machine.

A different take on form as a coded materiality is provided by Clement Valla's *Surface*

5   Bernard Stiegler, *Economie de l'Hypermatériel et Psychopouvoir* (Paris: Mille et une Nuits, 2009).
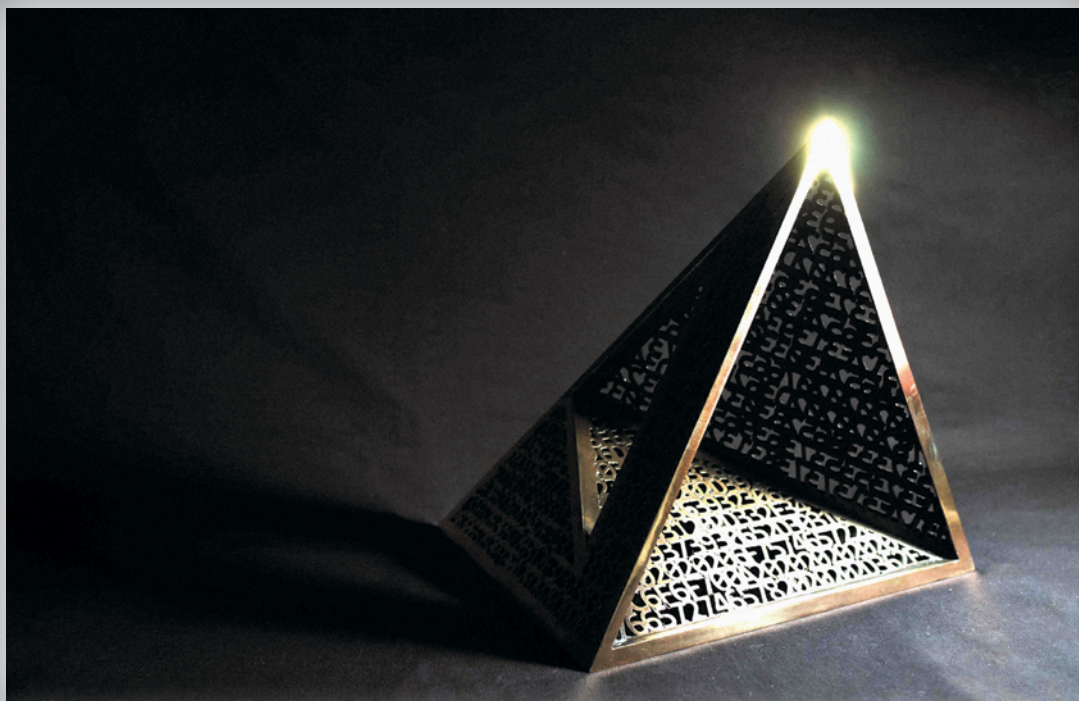
Fig. 1
Ashley Zelinskie,
Space Triangle, 2016,
sculpture. Cast bronze,
30 × 30 × 30 cm.

Fig. 2
Clement Valla, *Surface
Proxy*, 2015. Installation
view, xpo gallery, Paris,
2015.

Proxy series (2015), which consists of objects literally wrapped in their own representation (see fig. 2). The starting point for these objects were iconic, intact architectural fragments, all of French origin, from the Rhode Island School of Design Museum in Providence, Rhode Island, as well as the Metropolitan Museum and the Cloisters in New York. Valla employed these historical relics as a basis for a complex process of remediation. Using *123d catch*, an app that lets users create 3D scans of virtually any object, Valla produced 3D models of the architectural fragments. These 3D models where then digitally draped with cloth by means of 3D graphics and animation software *Blender* and the surface of the original object was virtually imprinted on the cloth. After this process of digital remediation, the virtual objects were translated back into the real world. The cloth depicting the image was printed using an inkjet printer and wrapped around a 3D print of the object's form. The object is re-skinned by its own image in an analogue version of texture-mapping. The image has to fragment and splinter itself in order to conform to the object it strives to represent. The

object's surface functions as both a stand-in and questions its own authority to represent the object. In the *Surface Proxy* (2015) exhibition at xpo gallery in Paris, this fragmentation unwrapped itself in only one instance. In the scanning of one of the original architectural fragments in the Cloisters, a plant was unavoidably captured too. Rather than wrapping a 3D print of a plant, Valla decided to exhibit an actual plant next to the relic and to display the unfolded version of the wrap generated from the virtual model of the plant on the wall next to it. Living nature thereby resisted presenting itself as iconic.

Sterling Crispin's *Data-Masks* (2013–ongoing), by contrast, reflect on the way digital technologies perceive us and construct our identities. Crispin uses face-recognition and face-detection algorithms to produce human-like faces that take the physical form of masks (see fig. 3). In Crispin's work, mathematical analysis of biological data becomes material form, revealing how software systems represent human identity. What distinguishes *Data-Masks* from other virtual representations of human faces and bodies—such as 3D

models or renderings—is the fact that their creation involves software designed to determine identity and thereby demonstrates their process. Crispin sees his work as an instance of the digital panopticon staring back into its own mind.[6] The 3D-printed face masks were algorithmically evolved to satisfy facial-recognition algorithms: the software creates a materiality that reflects a seemingly autonomous machine vision of identity.

New technologies of representation always introduce new complexities and render image flows and materialities problematic in different ways. Digital technologies have introduced new ways of seeing the world and of rendering objects. Digital materiality in the age of the Internet of Things (meaning the network of physical objects embedded with electronics, software, sensors, and connectivity) and the quantified self (as data acquisition on aspects of a person's daily life through wearable sensors and computing) means that objects are constructed by and understood through the language of the digital. The digital materiality of seeing like and being seen through digital devices has changed our relationship with objecthood and our representation as subjects.

Hybrid intersections

The post-internet era of expanded internet art brought about increasing intersections between physical and online space in exhibitions. These convergences were amplified by the predominantly online presentation of exhibitions during the Covid-19 pandemic. The referential context for web-based art is the internet itself; for an online exhibition of physical work, it is objecthood in corporeal space.

In his essay "Curating Online Exhibitions, Part 1: Performance, variability, objecthood," Michael Connor points to the categorical instability of the term "online exhibition," listing a small sample of the bewildering array of projects that might be covered by this term,

ranging from a crowd-funding campaign offering artists' multiples to backers and an exhibition in the virtual world of *Second Life* to a zip file downloaded to a user's computer and an HTML page featuring thumbnails and links to artists' works and a curated app offering selections of smartphone-based VR works.[7] Connor outlines how the online context puts stress on the traditional notion of an exhibition as an imposition of order on objects that are brought into a particular space and specific set of relations with one another. Firstly, born-digital artworks often perform objecthood rather than being objects themselves and may require enactment within complex ensembles of hardware and software, relying on audience participation or external websites. Secondly, online exhibitions do not take place in a unified, coherent space but may be experienced on a range of output devices, from mobile devices to desktops, and presented in very different pictorial spaces, from a 3D world to a browser. Finally, the sets of relations that are foundational to a curatorial goal may be refracted through the input of audiences and reshuffling of algorithms on the web. Connor consequently defines an online exhibition as "the performance of artworks and their objecthood in a particular mise-en-scène, brought into dynamic relationship with one another and a broader network context."[8]

Not surprisingly, the pandemic brought a renewed interest in skeuomorphic representation, the 3D recreation of actual galleries for viewing art. The 1990s in particular had seen experiments with creating virtual museums that referenced physical structures, whether they were re-creations of existing ones or designed and created from scratch in virtual space. Many of these explorations resulted in a realization that skeuomorphic representation of gallery spaces largely interfered with viewing the art, whether digital or physical, which was better experienced directly in a browser environment without being subjugated to the constraints of a 3D spatial model and

6   Sterling Crispin, "Data-masks," 2015, http://www.sterlingcrispin.com/data-masks.html.

7   See Michael Connor, "Curating Online Exhibitions, Part 1: Performance, variability, objecthood," *Rhizome* (2020), https://rhizome.org/editorial/2020/may/13/curating-online-exhibitions-pt-1/.

8   Connor, "Curating Online Exhibitions, Part 1: Performance, variability, objecthood."

Fig. 4a
Claudia Hart, *The Ruins*, 2020. Installation view Bitforms gallery, 2020.

Fig. 4b
Claudia Hart, *The Ruins*, 2020. Screenshot in Mozilla Hubs.

its navigation paradigms. One could argue that, during the pandemic, skeuomorphic gallery representation fulfilled a legitimate role as a "re-creation" of shows that had already been mounted and become inaccessible due to the closure of the space to the public. In this scenario, the simulated physical experience supports the original curatorial intent and gives visitors an impression of the spatial context in which the works were meant to be experienced in physical space.

An interesting relationship between physical and virtual space unfolded in Claudia Hart's exhibition *The Ruins*, on view in the fall of 2020 at Bitforms Gallery in New York City, and conceived from the start as both a physical exhibition and online experience in Mozilla Hubs (see figs. 4a and 4b).[9] *The Ruins* revises canons of modernist painting and manifestos of failed utopias through a series of animations, shown on large-scale monitors, of low-polygon replications of copyright-protected Modernist paintings by Henri Matisse and Pablo Picasso. The sound for the exhibition, created by Edmund Campion, was a remix of failed utopian ideologies: Thomas Jefferson's *On American Liberty*; *The Bauhaus Manifesto* by Walter Gropius; *Fordlandia*, Henry Ford's failed plantation in the Amazon rainforest; and Jim Jones's sermon *The Open Door*. A physical sculpture modeling a still life with flowers by Henri Fantin-Latour had been created through an elaborate process of copying, starting with a computer-modeled imitation of the 1881 original that was ultimately rendered as a physical object. While the virtual version of the exhibition on *Mozilla Hubs* is an exact replica of the exhibition in the physical gallery space,

it does not rely on physical space as a referent but exists on equal footing. To some extent, the physical space could be understood as modeled on the virtual space, since both the physical sculpture of the Fantin-Latour painting and the elaborate custom-made wallpaper borrowing motifs appearing inside the animations were born-digital and transformed into the real world. In 2020 the social space of *Mozilla Hubs*, which can be experienced online and through a VR headset, became a popular platform for curation, offering shared experiences and the potential for openings and tours led by artists and curators.

As the programming of museums, arts organizations, galleries, and art fairs have increasingly become more hybrid by creating online experiences of physical artwork, the models for online presentation of born-digital and web-based art have become more porous. Skeuomorphic representation is experiencing a revival and online platforms such as *Mozilla Hubs* or VR chat allow for immersive social experiences beyond physical spaces. The blending of physical and virtual spaces has taken multiple forms over the decades and will only increase in the future, which will entail a renegotiation of the authenticity of art experiences. We are already witnessing a fundamental ontological shift when it comes to the meaning of authenticity, which is increasingly mediated. The renegotiation of object boundaries prompts us to ask: what is the materiality of an object and of an artwork, given that most people will probably encounter it in an online representation? Current discussions surrounding materialities, matter, and anti-matter are raising profound questions about the categorical instabilities of representation.

9   See Claudia Hart, "The Ruins," 2020, https://bitforms.art/exhibition/claudia-hart-the-ruins/.

PHILOSOPHY OF AFFORDANCES.
The Interface, Gallery, and Workshop as Media Environments

Bernard Dionysius Geoghegan

After a few years of pandemic-induced *Zoom* conferencing, isn't it time we got back to gathering around seminar tables? And to arraying ourselves around objects displayed in galleries and museums? In the wake of the coronavirus pandemic and its many modes of doing-at-a-distance, these are questions that confront mixed-media experiments such as Beyond Matter. And we should face such common objections to digital environments head-on. At one point or another in the last few years, all of us have found ourselves in situations rendered uncannily sterile, artificially lifeless, from a botched digital staging. One reason digital platforms frequently disappoint is that we approach them as if they should or could reproduce non-digital environments and objects. But aiming for reproduction in digital space leads to second-rate knockoffs at best. A successful digital presentation usually embraces its status as a new work—not a mere ⬈simulation of an exhibition but an exhibition in its own right enlivened by new affordances, many of which have little correspondence to the original.

What is an Environmental Affordance?

The promise of digital affordances is revealed by revisiting the origins of the term. In its contemporary usage, "affordances" comes from US psychologist James J. Gibson's account of ecological perception in psychology.[1] In the 1960s, Gibson argued that how an organism senses and moves through an environment stem from possibilities embedded in that environment and its objects. Nestled in his analysis was a rejection of a sharp and fast distinction between natural and artificial environments: ecological perception is not a matter of the natural world and the God-given senses, but an emergent quality of dynamic interactions among materials, many of which come to the fore when technology enters the scene. Gibson's account derived partly from his World War II study of how pilots saw the world around them from airplanes, such as when trying to land or identify a target.[2] He found that seeing a target from the earth and from the sky presented two highly different perceptual problems. The organism stayed more or less the same, but the environment of a fast-moving plane and its uncanny view from above reordered the senses. Perception was a function of an environment whose potentials, or affordances, came into view through high-tech conditions.

Gibson's insight belonged to a much larger family of mid-century research into electronics, digital media, simulation, and human-machine amalgams in cybernetics, psychoacoustics, and

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1   James J. Gibson, *The Senses Considered as Perceptual System* (1966) (London: George Allen & Unwin Ltd, 1968), 285.

2   See James J. Gibson, "Motion Picture Testing and Research," in *Aviation Psychology Program Research Reports* (Washington, D.C.: Army Air Forces, 1947); and Oliver Gaycken, "Cinema Is 'I Fly': J. J. Gibson and the Work of the Army Air Force's Psychological Test Film Unit," unpublished.

the burgeoning field of computational simulation. Faced with environments moving at speeds that exceed all human perception and invested with technologies like jets and radar, Gibson and researchers such as Norbert Wiener, Kenneth J. W. Craik, and, more indirectly, George Miller, J. C. R. Licklider, and Alexander Bavelas, spearheaded studies of bodies in more-than-natural environments. They observed how pilots, gunners, tank commanders, radar operators, and astronauts worked with machine interfaces to predict and control the environment of warfare.[3] Simulation was, by necessity, never far from the scene. The pilots, astronauts, and operators studied by Gibson, Wiener, Craik, and their successors lived in worlds that only took shape according to spatiotemporal dynamics unleashed by radar, jet engines, and electronic consoles. However, the difference between a "simulation" and an "affordance" was often blurry; the environment itself was never simply at hand but depended on anticipations and extrapolation, which computers proved particularly good at helping humans do. This is why the earliest real-time multimedia interfaces were computerized consoles for aerial defense in World War II and the Cold War.[4]

Physical Worlds Released by the Digital Environment

Beyond Matter is not so much a step into new digital worlds as it is another iteration of the virtual and hybrid possibilities of the physical environment that researchers like Gibson helped us see through their studies. Computer-aided exhibitions continue an earlier generation of psychological, cybernetic, and ergonomic researchers's inquiries into perception as a partly virtual domain. Curators of digital spheres tap into affordances that, like the pilot's interactive screen, do not "represent" as much as "invest" or "fashion" the environment. Digital environments activate virtual and medial possibilities that were already there, unrealized, in the physical gallery.

The Beyond Matter team suggest a few terms for describing how an online exhibition can unlock new hybrid environments. They have referred to anachronics, heterochronics, and generative and networked spaces, all of which connote coherencies not restricted to mere spatial and temporal continuity of the sort defined by a pregiven sequential order. We could likewise speak of augmented media, hybrid realities, or the post-digital—where environments take shape through the tactical juxtaposition of elements, technical cutups layering media in users' lifeworlds. Once we recognize the gallery as a place of exploring affordances, we can see that Beyond Matter already fits within a genealogical strand of research into media affordances at work in the gallery.[5] Consider the pedagogical and curatorial pursuits of philosophers Bruno Latour (1947–2022) and Bernard Stiegler (1952–2020). As Latour was cocurator of the landmark Iconoclash exhibition, itself an exercise in making the gallery a space to explore

3   See Norbert Wiener, "Problems of Sensory Prosthesis," *Bulletin of the American Mathematical Society* 57, no. 1, part 1 (January 1951): 27–35; and Kenneth J. W Craik, "Theory of the Human Operator in Control Systems: I. The Operator as an Engineering System," *British Journal of Psychology* 38 (1947): 56–61. On the entry of astronauts into this program, see Nathan S. Kline and Manfred Clynes, "Drugs, Space, and Cybernetics: Evolution to Cyborgs," in *Psychophysical Aspects of Space Flight*, ed. B. E. Flaherty (New York: Columbia University Press, 1961), 345–71.

4   See Bernard Dionysius Geoghegan, "An Ecology of Operations: Vigilance, Radar, and the Birth of the Computer Screen," *Representations* 147, no. 1 (August 2019): 59–95, https://doi.org/10.1525/rep.2019.147.1.59. See also Christoph Borbach and Tristan Thielmann, "Über das Denken in Ko-Operationsketten. Arbeiten am Luftlagebild," in *Materialität der Kooperation*, ed. Sebastian Gießmann, Tobias Röhl, and Ronja Trischler (Wiesbaden: Springer Fachmedien, 2019), 115–67, https://doi.org/10.1007/978-3-658-20805-9_5.

5   As far as the gallery goes, one of the great investigators of these rapports was filmmaker Harun Farocki, who explored the intersection between aesthetics, operations, and images in his well-known series *Eye/Machine*, thematizing how operational and simulated realities increasingly surrounding us, even entering into aesthetics. These films developed his celebrated account of the "operational image," largely in reference to the human-machine systems of wartime operators of planes, drones, and related technologies. Farocki's accomplishment, in part, was to transpose these virtual spaces into the aesthetics and techniques of gallery installations and films.

the complex material affordances of images, his work figures centrally in Beyond Matter.[6] Also at the Centre Pompidou, Stiegler's 1987 cocurated exhibition *Mémoires du futur. Bibliothèques et technologies* (Memories of the future: Libraries and technologies) closely followed in the footsteps of the other major project presented in Beyond Matter, Jean-François Lyotard's *Les Immatériaux*. These exhibitions did not develop perception in the tradition of Gibson or Wiener, but modeled their own visions of the gallery as a space for multimedia voyage.

When I studied in Paris with Latour and Stiegler between 2007 and 2009, it struck me that they both engaged in a certain practice of thinking with affordances. Both returned again and again to how particular medial and technical practices afforded new possibilities for life and for thought. In settings like ZKM|Center for Art and Media Karlsruhe and Paris's Institut de recherche et coordination acoustique/musique (IRCAM) they found space for developing this line of thinking, which also permeated their activities in other environments, such as the classroom and the digital laboratories they respectively founded. Reconstructing some of their practices may help us understand the place Beyond Matter occupies in contemporary thought and perception. In their frequent recourse to multimedia and exhibitions, Latour and Stiegler made the case that critical reflection *on* technology demanded critical reflection *with* technology. Moreover, they both emphasized that such thinking and tinkering took place somewhere, in a specific setting, that shaped perceptions, which in turn

partook in producing that environment. They did not suggest that media took the place of thought or substituted for getting together in person, however. Rather, both seemed interested in multiplying the medial and environmental spaces that might afford new possibilities for collective thought. The gallery and digital space were further environments, albeit of a sort whose artifice helped uncover the affordances of the everyday outside world already around us.

Stiegler's Platforms

Cocurated with Catherine Counot,[7] Stiegler's exhibition *Mémoires du futur* sketched, in germinal form, his well-known anthropology that conceived of the human as a sort of media affordance, produced through an environmental genesis he termed "exteriorization."[8] Until the human reached outside itself, realizing itself in technical supplements, the human as such did not yet exist. This thesis implied no huge leap into the virtual domain with the invention of digital technology, for the simple reason that it saw humans as involved in virtual projection from their very beginning. As the press release for *Mémoires du futur* argued, "the computer and electronic recording reconfigure and intensify the work of memory. They extend a process set in motion by what was, in its own time, new media: alphabetic writing."[9]

The emphasis in *Mémoires du futur* on technological reconfiguration and intensification highlighted what would become Stiegler's longstanding interest in approaching media

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6   See Bruno Latour and Peter Weibel, eds., *Iconoclash: Beyond the Image Wars in Science, Religion and Art*, exh. cat. ZKM|Karlsruhe (Cambridge, MA: MIT Press, 2002); Bruno Latour and Peter Weibel, eds., *Making Things Public: Atmospheres of Democracy*, exh. cat. ZKM|Karlsruhe (Cambridge, MA: MIT Press, 2005); and Bruno Latour and Peter Weibel, eds., *Critical Zones: The Science and Politics of Landing on Earth*, exh. cat. ZKM|Karlsruhe (Cambridge, MA: MIT Press, 2020).

7   Catherine Counot also worked on *Les Immatériaux* and was responsible for the projects organized by the Bibliothèque publique d'information (BPI), especially in the last site, the *Labyrinthe du langage* (Labyrinth of Language), from which *Mémoires du futur* took off.

8   His landmark treatment of these themes is *Technics and Time, Vol. I: The Fault of Epimetheus*, trans. Richard Beardsworth and George Collins (Stanford: Stanford University Press, 1998).

9   The quotations come from the press release "*MEMOIRES DU FUTUR*: *Bibliothèques et technologies*," (Centre Pompidou: undated), 1, online (with a larger collection of documentation collated as a single PDF) at https://www.centrepompidou.fr/media/document/b4/50/b450c465ba5a483430c216c0c143103f/normal.pdf. See also a brief overview of the exhibit on the website of Centre Pompidou, https://www.centrepompidou.fr/fr/programme/agenda/evenement/cgjBE7k.

technology in terms of the worlds it afforded rather than the "simulacra" or "hyperreality" it threatened. Consider the spatial disposition of the exhibition. The exposition hall (see fig. 1) presented visitors with what was termed "the technological history of memory," organized into shifting rapports of mobility and speed, specific to historical articulations of alphabetic writing, mechanical reproduction, broadcasting, interactive multimedia screens, and other technologies. Subdivided workshops (*ateliers*) invited visitors to undertake exercises in writing, documentary research, reading, and macro-reading. Upon completing the circuit visitors had traversed a series of augmented realities; the physical space of the gallery coincided with a multimedia layering that the exhibition suggested already prevailed all around us, just as it had for our ancestors.

In the decades following that exhibition at the Centre Pompidou, Stiegler continued to interweave media philosophical writing with media-technical practices, calibrated to operationalize new affordances for philosophy.[10] A hallmark of these efforts was his interest in collaboration—how an analysis of media practice also facilitated new forms of media-afforded communities of thought. For this reason, to speak of "Stiegler's practices" as such is misleading—the cocurated *Mémoires du futur* being a case in point. The leap into exteriorization that is media is also a leap into an environment made lively and sustained by others. Consider the *Lignes de temps* platform (2006) for open-access collective annotation of moving images, developed with collaborators at the research lab Stiegler founded at the Centre Pompidou, the Institute for Research and Innovation (see fig. 2).[11] *Lignes de temps* sought to disclose how time- and space-shifting affordances of digital media extended an ephemeral word

or image into an enduring platform for collective work: networked and social annotation, division and subdivision of a topic into diverse questions, and the gradual production of new texts. Through the platform, which also annotated Stiegler's own lectures, a seemingly simple spoken lecture became a labyrinthine network of comments and tags, made available to users around the world. In this way, with the aid of free software, philosophy gradually became an environment for thought.

As many of those who worked with him have noted, the first and most decisive media environments for thought that Stiegler facilitated were those of the people he gathered around himself, at his lab or in various pedagogical exercises. In connection with *Lignes de temps*, I spent a few months in 2007 videotaping Stiegler interviewing colleagues such as N. Katherine Hayles, André Green, and Jean-Luc Nancy. The plan was to produce a movie on modernization to distribute via the online platform, but it did not take long to realize the filming was itself an environment for thought. As in the *Echographies of Television* interviews Stiegler made with his mentor Jacques Derrida, the occasion of gathering before a media apparatus produced a new set of conversations, a new collective for thought.[12] What at first looked like a conversation captured by a camera was in fact a conversation partly *produced* by that camera. The effort to engage in dialogue on camera gave rise to new sorts of dialogue, structured by the apparatus of camera, setting, and crew arrayed around the event. A recording was environment, in the sense of a lively ecology of elements that, by virtue of the temporal and spatial horizons it afforded, drew new thoughts out of the speakers that in turn disclosed yet new possibilities via exhibition on the interactive *Lignes de temps* platform.

10   On this point, see Harry Halpin, "The Philosophical and Technical Legacy of Bernard Stiegler," in *CHI '21 Extended Abstracts* (CHI Conference on Human Factors in Computing Systems, Yokohama, Japan: Association for Computing Machinery, 2021), 1–8, https://doi.org/10.1145/3411763.3450385.

11   For partial documentation of these projects, see Bernard Stiegler, ed., "Les Organisateurs des entretiens du nouveau monde industriel," in *Réseaux Sociaux: Culture politique et ingénierie des réseaux sociaux* (Limoges: FYP éditions, 2012), 6–9. See also the site online at https://www.iri.centrepompidou.fr/outils/lignes-de-temps/.

12   Jacques Derrida and Bernard Stiegler, *Echographies of Television: Filmed Interviews*, trans. Jennifer Bajorek (Cambridge: Polity Press, 2002).
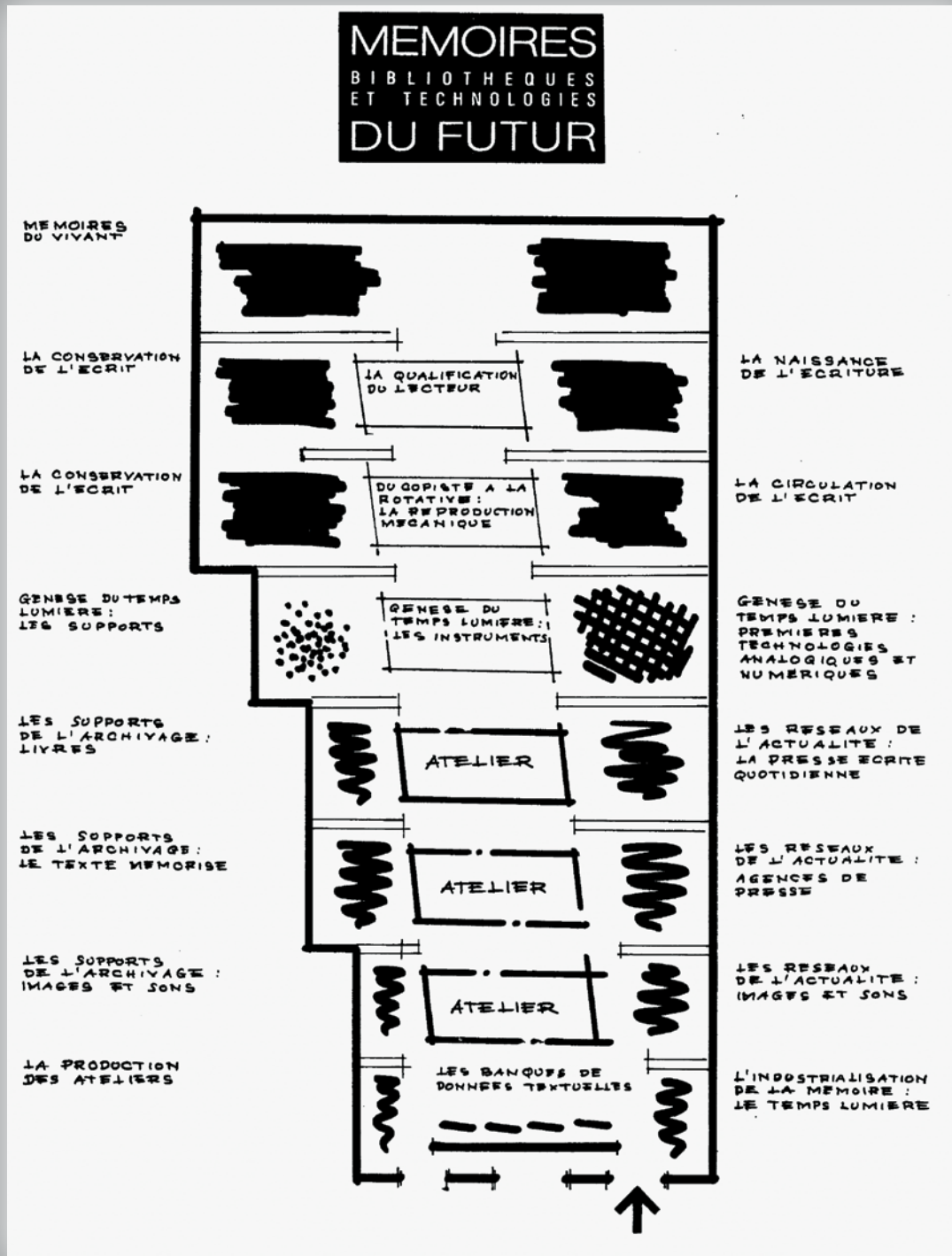
Latour's Adjusting Apparatuses

While Latour's exhibitions are relatively well documented, another site for his explorations of media affordances has been largely overlooked: his writing workshops (*ateliers d'écriture*) convened from the mid-1980s onward with doctoral students. Each time I spoke with a student who took part in those workshops I encountered distinct recollections, but what struck me was Latour's relentless attention to the media of research—to notes, texts, records, techniques of writing, and what they allow to exist. Ideas and concepts were secondary to the media that through which they existed. Latour opened his spring 2007 workshop by saying that "in this class, we won't discuss actor-network theory. We will not discuss my work or research. The class will be a writing workshop focused how you write a thesis. We'll have weekly exercises exploring different aspects of writing." From there, he quickly narrowed in on the writing and data practices that actualized research. During introductions, one student remarked: "I'm pretty far along; it's worked out in my head and now I just need to put it all into writing." Latour responded in a friendly but resolute tone: "if it's not written down, it doesn't exist." Ideas in the head didn't count all that much. What mattered was the traces and their work conditioning the ideas. As he once put it in an interview, "I strongly believe in adjusting the *forms* of writing," suggesting that a thesis-writing workshop functioned a bit like a scientific experiment, promoting an "adjustment of the apparatus to the object."[13]

13   Laurent Godmer and David Smadja, "L'oeuvre de Bruno Latour: Une pensée politique exégétique," *Raisons Politiques* 47 (August 2012): 125.

To get at these adjustments, Latour deployed writing exercises aimed at finding which mediations, situated in a text and among a group of readers, afforded the right kinds of entities to come into existence. This meant treating the text as a quasi-environment, for the mobilizing of virtual relations that were nonetheless decidedly real. There was the "box of data" exercise in which students brought in their notes, including annotations, stickies, and the like, and then, guided by Latour, retraced the trail of scriptural mediations that linked a source to its destination with small choices at the beginning shaping the kind of work that finally appeared in a thesis narrative. Another exercise paired off students to take turns summarizing and titling one another's theses to see how such haphazard adjustments brought about new research objects. A third exercise asked students to redescribe their work in a variety of voices and genres: a natural scientist publishing in *Nature*, a journalist for a national newspaper, as a hard-boiled detective story, and so on.

Approached in this manner, the classroom increasingly functioned as an exhibition hall, a laboratory for testing different modes of enactment. Seminars and texts became virtual spaces—perhaps what Latour once termed "centers of calculation"—the generative promise of which depended on one's success tracing a deliberate path forwards and backwards in representation.[14] Latour's classroom did indeed feel like a series of short-term exhibitions. Weekly exercises often had a show-and-tell quality as students put their work on display, seeing what material-semiotic event would then take shape in space and time. A class outing to a museum exhibition on the history of physiology modeled how students could think about their own work (see fig. 3); the bachelor's module on "Cartographies of Controversy" invited students to gather up traces of scientific controversies and stage

them in miniature classroom exhibitions for diverse audiences to observe and commentate.[15] In another class, a distinguished professor presented transcripts from a trial as part of a larger research project on how law parsed scientific facts. At Latour's insistence, the transcript was split into roles and divided up among the class, giving rise to an impromptu performance. The classroom was a theater and the exhibition hall was a classroom, a parliament, a workshop.

Face-to-Face and Virtual

Having completed that perhaps sentimental detour through my studies, we can return to the challenge posed by digital environments today. In the past few years, many of those professionally associated with museums and universities have not been able to help but wonder if pandemic-era techniques of doing-at-a-distance presaged a waning of gathering together to look and to learn. If digital environments promised a certain ease, economy, and safety, did they not also hollow out something peculiar to the in-person gathering? Part of the answer simply has to be *yes*. Part of what makes for a thought is the environment that participates in its production. Thinking is not just in the head, it is also in the room, in the seminar, in the gathering, on the stage. Every leap into new technical environments—as Gibson and his contemporaries found—is a revelation about the ecological constraints on thought and perception. This is as true of visitors to exhibitions as it is for pilots and astronauts.

Yet the promise of the gallery and the seminar room, philosophers of affordances like Latour and Stiegler seem to suggest, involves their commitment to the virtual conditions of thought. Exhibitions and digital methods do not embody poles that might be respectively assigned to "presence" and "simulation," to

14   See Bruno Latour, *Science in Action: How to Follow Scientists and Engineers Through Society* (Cambridge, MA: Harvard University Press, 1987), 215–57.

15   For accounts of the cartography classwork and presentations, see Tommaso Venturini, "Diving in Magma: How to Explore Controversies with Actor-Network Theory," *Public Understanding of Science* 19, no. 3 (2010): 258–73; and *Bruno Latour Talks about the Mapping of Controversies* (SciencesPo, 2012), https://www.youtube.com/watch?v=a5kExUGmSzM.

"material" and "immaterial." Rather, part of the reason we turn to the gallery is to discover something virtual at work in presence and part of the reward of digital and electronic media is to reinvest and revalorize what it means to listen together—even when it happens at a distance. Against the too simplistic contrast of face-to-face against virtual, the philosophy of affordances asks us to perceive modes of being that are face-to-face and virtual simultaneously. Beyond Matter belongs to this line of inquiry not as a way of simply recovering lost and expired events, nor as a supplement or extension to in-person gatherings, but rather as a fundamental technique of reconfiguring and intensifying affordances that are already there—if not fully realized—when we gather together in person.

3.
VAPOROUS RESTORATION.
Digital Models of Past Landmark Exhibitions

BEHIND THE VIRTUAL MODELING OF A PAST EXHIBITION.
Researching *Iconoclash*

Felix Koberstein, Moritz Konrad, Felix Mittelberger, and Amanda Tristão Parra

Structure of the ZKM│Archives

Since their institutionalization in fall of 2016, the ↘archives of ZKM│Center of Art and Media Karlsruhe have had a dual function. First, they store, index, describe, and make accessible the archives and estates of artists and theorists entrusted to ZKM: their written records, documents, notes, correspondence, sketches, and audiovisual recordings. Second, they are equally responsible for the history of the institution, its projects, events, publications and, above all, exhibitions. Around 700 exhibitions have been conceived and curated at ZKM│Karlsruhe since its founding in 1989. From the very beginning, it has been a hybrid collection of analog documents filed into record boxes and digital documents in the form of file collections on reserved server spaces. The analog files were collected from the departments that were central to and collaborated on the preparation of each exhibition: the curatorial, the museum and exhibition technical services, the publications, and the museum communications departments. Physical files linked to exhibitions are handed over to the archive after five years have passed. They are listed chronologically. There are no existing regulations for the transfer of the digital records; they remain on the server until further notice. A database is created on the basis of a common template for each exhibition, and it remains centrally stored after the opening of the event.

In the context of the Beyond Matter project, the research for the reconstruction and respective interpretation of the 2002 exhibition *Iconoclash: Beyond the Image Wars in Science, Religion, and Art* was based on archival documents and their structure. Starting in 2000, the preliminary preparations for the exhibition by a curatorial team lead by Peter Weibel and Bruno Latour were underway. The physical documents fill a total of forty-two file folders, and there are about thirteen gigabytes of digital documents. The photographic documentation comprises approximately 350 photos and slides, and the video documentation consists of roughly six hours of video footage. All sources of documentation practically end with the exhibition opening. No structured handover of the documents or a post-processing of the materials aimed at providing orderly access to the exhibition preparations took place, meaning that the archive was heterogeneous and incomplete. Neither the exhibition database, the lists of works and plans, the publications on the website, or the exhibition catalog could be considered a complete source for the archival research. Changes made in the bustling last days of preparations for the exhibition are not traceable in these documents. Even the so-called condition sheets of the restoration department only give information about the artworks' presence in the institution in the context of the preparations, but not about their actual location or even presence in the final show. Moreover, the digital records were not structured chronologically and only partially sorted into themes. The references between the individual archive records, whether digital or analog, were not highlighted, and duplicates were not identified or sorted out.

Creating a Digital Exhibition Model

In deciding to produce a digital reconstruction of *Iconoclash*, we were confronted with a some-what imposing pile of data material that, although rich, was not laid out according to any archival structure. Although it was necessary to bring the existing material into a comprehensible order, we realized that the required material would not be purely archival, since the model would be intended to recreate visitors' exhibition experience rather than visualize a topography of physical elements.

Digital exhibition models offer new possibilities for museology and exhibition history, but can also open up innovative dimensions of mediation for museum practice—indicating a whole spectrum of possible forms of presentation to be tested and explored. The demand for virtual exhibition formats grew especially during the Covid-19 pandemic, and they have become more present and multilayered as a result. Our project is best classified as an "exhibition emulation." In computer technology, the term emulation is used to describe a system that reproduces another system entirely or in part. This means that we are trying to recreate a past exhibition according to its original intention and to reproduce it in certain aspects, thus offering possible tools for experimental research approaches in particular. It should also be noted here that this exhibition model represents a prototype, on the basis of which a general software solution was developed for further use by other museums. The software, both front and back end has been published open source on ZKM's GitHub repository. With this in mind, there was a specific set of requirements that the project had to meet:

1. The intention was not to produce a digital reconstruction, a so-called "digital twin," but an interpretation focused on the clarification of some partial aspects in order to relay elements of the experience a visitor to the historical exhibition would have had.
2. It therefore also required a different way of processing the collected archival material, as it had to be organized according to specific parameters for visualization in interactive software and connected with relational information that allowed the objects to be interpreted within a certain thematic framework.
3. This triggered structural problems that affected the usual archival tools, such as the interfaces of archival databases, and required new competences and communicative interfaces within the team.
4. This was followed by a final specification, which concerned the direct uploading of data and information into the back end of the modeling software. Ultimately, it required a duplication of all the material, meaning additional workflows and work.

Iconoclash, today considered the first *Gedankenausstellung*, or "thought exhibition," was chosen for this endeavor. Apart from its significant role in exhibition history, this was mainly for pragmatic reasons: the indexing of archival material and primary sources is greatly facilitated when the exhibition is studied at the museum venue where it was produced. In this context, exhibitions are to be understood as structures that have emerged not only through curatorial practices, but from a complex network of content-related, logistical, administrative, and political correspondence between a multitude of social actors, between whom artworks are negotiated as symbolic forms of knowledge production.

Researching historical exhibitions is not a recurrent task for museum institutions—especially not with the aim of boldly reconstituting a remediated version with visual, spatial, and audible dimensions presented in digital media and proposing interaction to new audiences. Working within the Beyond Matter context pushed ZKM to revisit its own past through interdisciplinary teamwork. From the beginning to the first publication of the model, the research process took around two years. Researchers worked partly on-site and partly remotely, accessing digitized documentation from different countries and constantly communicating for around two intense years of the pandemic. It started as a focused process in early 2020, when the team approached curators, advisors, and key members of the 2002 exhibition. This communication helped collect initial data about exhibits and kickstart the historical research on *Iconoclash* for the scope of the project. The process had several phases and, as is usual in creative research projects, was planned as much shorter than the time it eventually required. The paths taken on this complex journey have provided great lessons about the future of documentation and preservation of events, experience design conceived in galleries, libraries, archives, and museums (GLAM institutions), and collaboration across different stakeholders and infrastructures.

A Kickstart for the Research: Contacting Curators and Accessing Archives

In the first stage of the reconstruction, our research team approached curators, advisors, and team members for testimonies and possible documents from their personal archives. We then formatted these communications into a series of important new records about the event's history. A series of video interviews were conducted with some of the curators (see figs. 2–5). We were then able to use these contacts to clarify specific doubts about the exhibition that had arisen during the investigation.

For the next step, we accessed the materials in the institutional archive and evaluated their reliability and the kind of information they contained. As mentioned above, these sources proved lacking in various ways and needed comparison and careful evaluation. Even though the visual documentation proved the most helpful, it too omitted certain parts of the exhibition, especially

Fig. 2
Lívia Nolasco-Rózsás in conversation with Joseph Leo Koerner (top) and Dario Gamboni (bottom) in the online talk "Allegory of Iconoclasm," October 10, 2020. Screenshot.

Fig. 3
Bruno Latour in the online talk "A Return of History," September. 7, 2020. Screenshot.

Fig. 4
Peter Weibel in the online talk "A Return of History," September 7, 2020. Screenshot.

Fig. 5
Peter Galison in the online talk "'Images scatter into data, …' – Iconoclasm and the Scientific Image," February 15, 2021. Screenshot.

complex installations and moving-image artworks. For future exhibition projects, to produce enduring archives that enable research into curatorial practice, we suggest planning for a phase of updated documentation after the opening. It is important to document the final form of the exhibition aurally, visually, and in writing.

Rights Acquisition

Legally speaking, an online exhibition is closer to a website or publication than a physical exhibition, which means that obtaining the permission of exhibits' creators or rights holders is necessary, while permission of owners or collectors is not strictly required. However, contacting the owners may still be helpful to obtain images of and technical information about the objects, either as references for producing the exhibition model and/or as assets for the information layer of the object in the model. At this stage, we identified owners and rights holders who were listed, contacted them directly or via associations and agents, and had their information updated.

Publishing artworks online, even as digital models, is still a sensitive topic for museums, artists, and private collectors. Memory institutions tend to handle the licensing of the works in their charge very cautiously and restrict reproductions to be displayed in predetermined image resolutions for specific media, depending on factors such as provenance, ownership, and confidentiality. Similarly, issues arise when licensing moving-image artworks or films for online use, especially when the platform is accessible worldwide, independently of commercial interests. Many distributors will charge significantly different fees than those typically associated with traditional offline exhibition formats. Issues can also arise in cases where artworks or other objects have changed hands, switched collections or—especially in the case of scientific exhibits—been destroyed or disassembled.

Many artists, estates, and rights holders will understandably want to reserve the right to preview and approve renderings or mock-ups of the works in question. These correspondences and associated feedback iterations are important to consider within the time frame of a similar project and require attention and organization. The legal status of each artwork and the preferred credit lines of the parties involved must be documented. For *Iconoclash*, due to the complexities described above and because the very list of exhibits was a case of continuous discovery, the licensing processes lingered on and were concluded only close to the moment of publishing the digital model.

Data Organization and Mapping through File Naming

Research in the experimental context differs from the world of classic archival practice. Our work as researchers in this creative project involved taking an analytical eye, serving the creative needs of different teams, and assisting in moving toward the desired outcome with sensitivity. It required comprehending different vocabularies, practices, and goals within the same project. We had to gather, organize, catalog, and often describe documents and data, but we also needed to interpret and present the rich content clearly.

Iconoclash presented an immense volume of documents to be processed and had a complex curatorial design. Our team had an editable clone of the historical database, a space in the cloud service, and ZKM's online repository, M@RS (from the company mediamid). The database was more than a source for consultation; it served us as a tool from beginning to end, incorporating, besides more typical metadata, conceptual terms useful for the programmers, trackers for status and pending actions, tabs with notes from the researchers, and other features. The online repository contained institutional videos and photographs, and avoided unnecessary cloud overload with overlapping content inside folders. The folders inside the cloud initially described their material sources and later transitioned into a structure created collaboratively to organize and identify all folders and files.
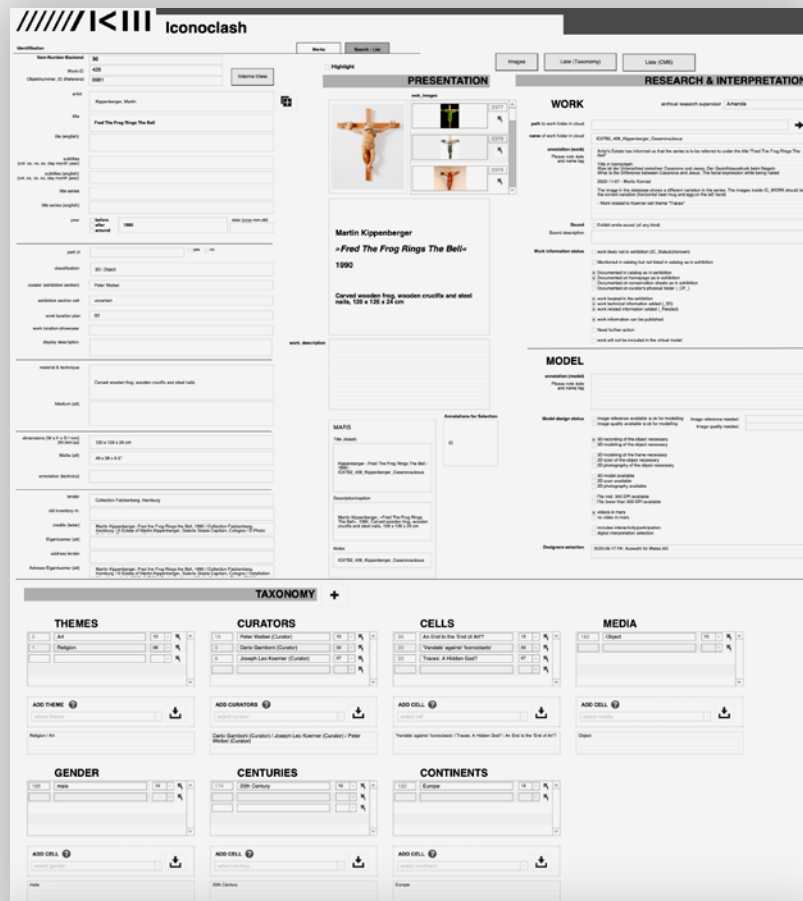
Fig. 6
Entry from ZKM's archived *Iconoclash* database (FileMaker). Screenshot.
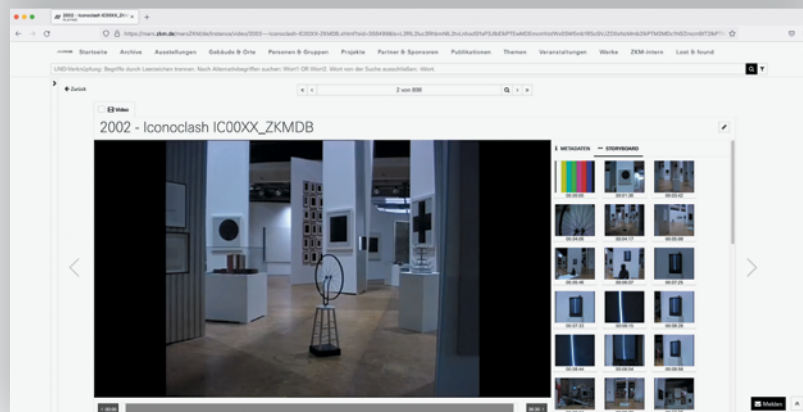
Fig. 7
Database entry from ZKM's digital asset management system (M@RS) for the organization of the media assets of the exhibition *Iconoclash*. Screenshot.

The naming approach became an important tool for the research as a formula that resulted in a unique code for each exhibit. Encompassing distinct useful information such as spatial orientation, the curator responsible for that exhibit, database number, a short title, and the author, as well as what objects were presented in the same vitrine, display case, or room, the unique code formula and the folder structure were described in a manual so they could be understood by designers, researchers, archivists, curators, and producers. Whenever a specific object or installation needed a clear mention during communications, this code was the searchable term to retrieve and connect all related information.

Reconstructing a spatial concept requires an extensive research process. Besides mapping the physical layout, the conceptual underpinnings needed to be understood more clearly. The exhibition was originally conceived in a structure of cells, areas, or groupings of exhibits that
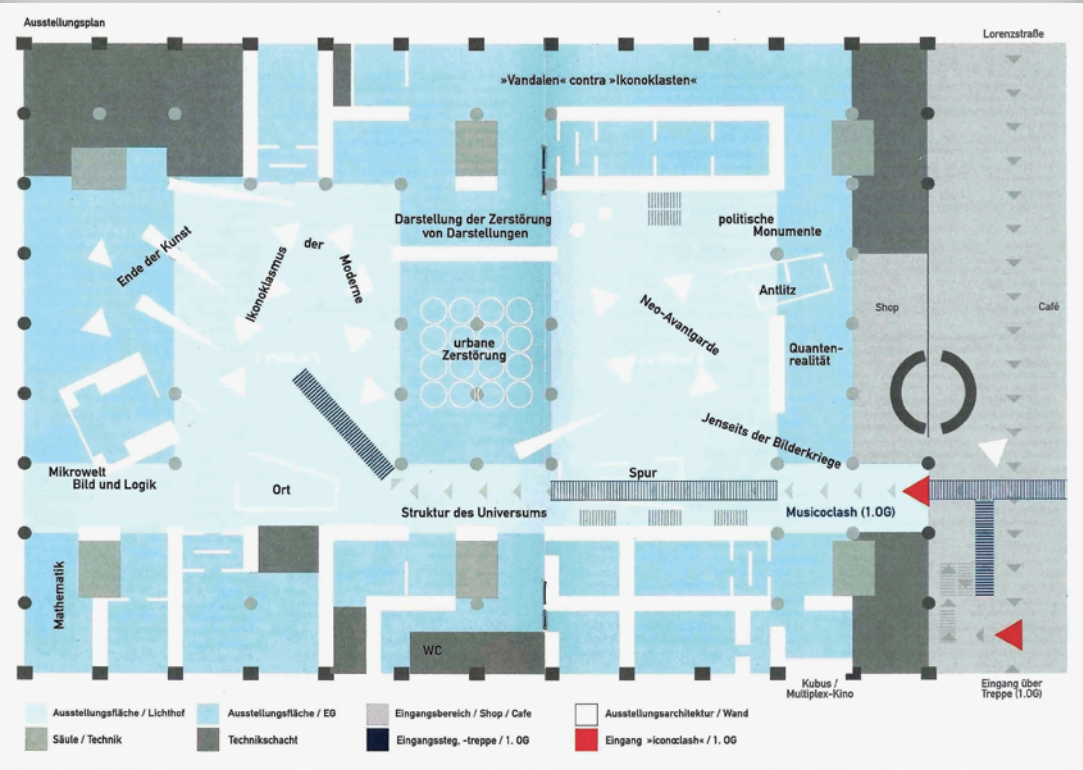
touched upon different topics. As there were multiple curators and advisors, the result was presented in a complex rhizomatic expography through which the visitor could move freely without following a specific track. Above the exhibition hall, hanging banners with questions and quotations prompted reflection and a critical outlook in the visitor. Besides consulting lists, old maps, and AutoCAD files, adding location information on the database and composing an updated map, the naming formula was key for mapping and easily retrieving information.

We reunited the content used for the 3D reconstruction, illustrating the artworks and artifacts presented during the exhibition with technical sketches, images, sounds and videos under the "3D" folder. The folder structure also contemplated an expansion of the research beyond the institutional walls. Inside the "related" folder, material that helped identify contexts could be found. We collected other works in the same series and new versions of those presented in 2002, which could spark ideas for the digital adaptation. This step of the research helped make up for missing documentation, and involved reconstructing the spatial layout of the exhibition using the documentation available and thus updating the documents as close to the final setup as possible.

The Transition to Model Concept Development

As most of the working folders had been created and filled with content, and most exhibits had been related to their curator, cell, and original place, our research drifted toward more conceptual work. We double-checked the technical metadata and compared it with the restoration files. The doubts and uncertainties we had listed were narrowed and mostly solved. In later consultations, when we posed relevant conceptual questions to the curators, some essential information could be pinned down. For instance, even some of the cell names and concepts in the exhibition were unclear until a very late stage, demanding work that could have been spared if there had been final lists and a definitive map of *Iconoclash*. Archival materials such as early presentations, meeting notes, and correspondence between the curators proved very helpful in grasping the concept of the individual exhibition cells.

After completing these steps, we could prepare a final selection of artworks to be modeled and included in the virtual exhibition model. Limiting factors included missing permissions from rights holders but also missing image materials. In cases where we could not gather enough references, the designers could not begin production on artwork models. This was especially an issue for complex spatial installations, which were difficult to document; or for objects that were incommensurable with a digital platform. Examples include mirrors, interactive objects, and installations which rely heavily on the physical presence of either object or viewer. Where possible, we attempted to adapt artworks with an interactive character to emulate their functionality in the digital realm.

Scenographic elements and texts from the exhibition space were gathered and found their way into the virtual model. While texts relating to the various curatorial cells were repurposed as artwork descriptions, we commissioned a sound artist to turn the quotes and exclamations from the banners into audio snippets using artificial intelligence, using them as part of the soundscape of the model. Both technical and conceptual information helped to create the kind of interaction proposed by the curators.

As it was essential to the historical exhibition that the visitors' paths were not fixed, the digital reconstruction took in this aspect by implementing a reshuffling algorithm, which dynamically changes the exhibition layout based on the user's behavior, thus rendering the scenography itself malleable as well as the visitor's path. Since the reshuffling algorithm picks up on the user's interests, the conceptual research served as the basis for the tagging system that fed it with data. The mutating scenography was directly related to descriptive terms present in the metadata. Digitization enables new areas for applying and using archival materials, just as it offers the archival field new forms of storage, structuring, and visualization.

In their digital form, archival documents—which in their analog form are usually condemned to languish in magazines and, in fortunate cases, occasionally see the light of day and interested eyes in the context of historical or archival exhibitions—can be transferred back into relational contexts that are structures of order and understanding. As seen in the example of the digital model of *Iconoclash*, translating exhibition presentations into virtual space also makes the spatial quality of exhibitions a conceivable aspect for archiving.

New design programs have opened up a creative space of possibilities for virtual 3D forms, with an inevitable impact on the documentation and archiving of exhibitions. By digitizing exhibitions—that is, transferring the components into a digital storage medium—not only the content but also the entire presentation becomes preservable and thus archivable. New interactive, revisited forms of access can thus be made available for wider audiences. The possibility to wander, explore spaces, and even play with the digital experience of a past exhibition may amplify its reach and perception—including of what it could have been. After all, this complex chain of adaptations and emulations designs something beyond any event that has ever taken place.

ICONOCLASH AS A DIGITAL EXPERIENCE

Felix Koberstein and Lívia Nolasco-Rózsás

ZKM| Center for Art and Media Karlsruhe has committed itself to examining the possibility of exhibition revival through experiential methods of digital and spatial modeling based on the case study of *Iconoclash* (2002). This landmark event was a complex "thought exhibition" (*Gedankenausstellung*) deployed through space that experimented with innovative juxtapositions between scientific, political, religious, and artistic practices.

Titled *Iconoclash as a Digital Experience*, the ⬎ digital model of *Iconoclash* is a novel approach to exploring exhibition histories, including the themes, curatorial methods, and engagement with representation and mediation the exhibition brought about. The aim was far from the elaboration of a "digital twin," as in a virtual copy of past assemblages of artifacts and the surrounding architecture; what we aimed at was the digital transposition of the exhibition in an experiential manner in line with its curatorial concept.
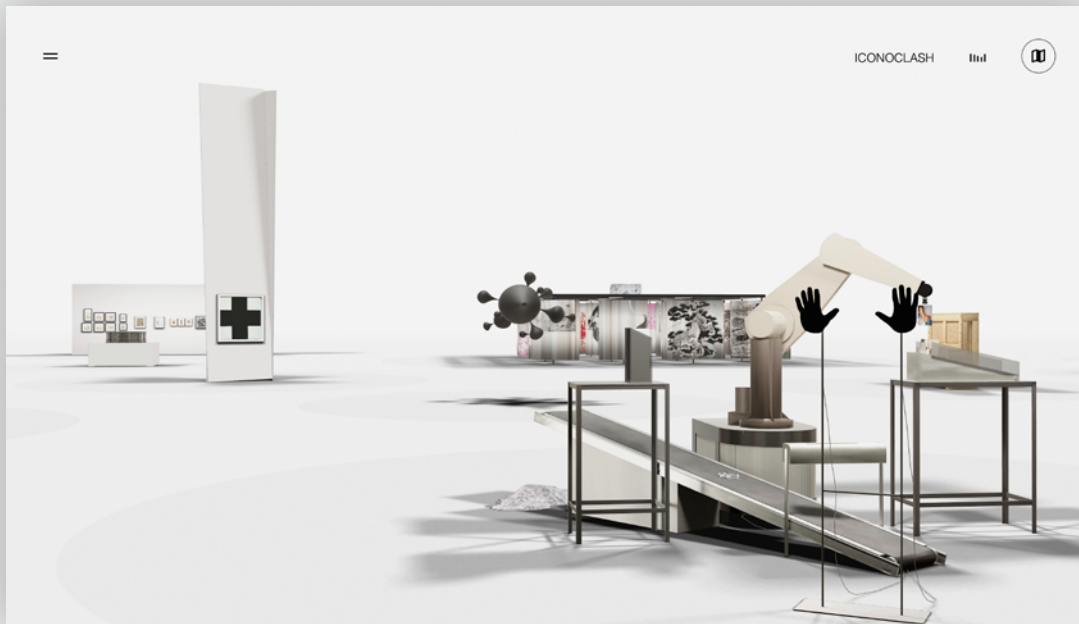
Fig. 1
***Iconoclash as a Digital Experience*, 2020–22. Virtual exhibition model. Screenshot**

Exhibition history emerged as a field in the 1990s,[1] and began as something that needed to be invented—to be constructed from archival materials and collective memories, and extracted from the social history of art. It has emerged concurrently with the rise of museum studies.[2] The

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1   See Anke te Heesen, *Theorien des Museums zur Einführung* (Hamburg: Junius, 2021); ARGE schnittpunkt, ed., *Handbuch Ausstellungstheorie und -praxis* (Stuttgart: Utb, 2013).

2   See Sharon Macdonald, "Expanding Museum Studies: An Introduction," in *Companion to Museum Studies*, ed. Sharon Macdonald (New York:Wiley, 2006), 1–12.

growing attention toward past exhibitions and curatorial practices was kindled by the effort to define a genealogy of curating and declare it a profession. Another recent side effect manifests in restaged or re-enacted exhibitions.[3]

Exhibition spaces are physical locations of knowledge production and exchange, where spatial qualities play an important role in the contextualization of information. Their virtual models should therefore maintain their spatial qualities. Since computer-generated spaces differ significantly from physical exhibition venues, digital twins of past exhibitions are unfit to mediate curatorial concepts and provide visitors with a fulfilling experience.

Thus, instead of using words containing a "re-" prefix—such as revival, re-enactment, recreation, or reproduction—that indicate repetition, and following a method predestined by such wording, our preferred term is "emulation," borrowed from information technology to indicate a changing framework but enduring concept. "Emulation" here describes the process, and the result is a digital exhibition model: a past exhibition as a digital experience.

Transmogrification of an Exhibition into Computational Space

The notion of "space" has preoccupied Western thought for centuries and its exploration has frequently changed direction across time. The contemporary and most dominant understanding of space is a modernist construct based on the concept of absolute time and space, which served as the theoretical foundation for Isaac Newton's laws of motion and derives from Euclidean geometry. In Newton's reading, Euclidean space is absolute, meaning only three-dimensional and with a fixed orientation. The numerous counterproposals laid out in philosophy and physics since the seventeenth century include those of Gottfried Wilhelm Leibniz followed by those of Immanuel Kant through to the general theory of relativity and its consequences, such as Minkowski space, which incorporates time as a fourth dimension. These are just a few of the notions of space that have directly impacted Western modernism.

Even if these theories have largely been overwritten, they have had a long-lasting effect and are essential to understanding shifting approaches to space in the visual arts, in terms of exhibition space, cyberspace, computational space, and their coalescence. As Matteo Pasquinelli has written, "The paradigm of computational space or self-computing space shares common roots with the studies of the principles of self-organization that were at the center of post-WWII cybernetics, such as John von Neumann's cellular automata (1948) and Konrad Zuse's *Rechnender Raum* (1967)."[4]

Computational space is a model in which our surrounding space is constituted by digits, not virtual reality, as in computer-based representations of physical space. Computer-generated three-dimensional spaces are accessible for our senses, while multidimensional vector spaces, or any other spaces of calculation, are essentially non-visual and practically inaccessible to human perception.

3   Harald Szeeman's *Live in Your Head: When Attitudes Become Form* (Kunsthalle Bern, 1969), for instance, was restaged at the Fondazione Prada in 2013. More recently, sporadic examples of virtual reconstructions of historically important exhibitions have been created: the first documenta was re-created as a walkable VR environment by a research group at the University of Kassel led by Kai-Uwe Hemken. The VR model can be accessed through a head-mounted display, and was presented as part of *Matter. Non-Matter. Anti-Matter. Past Exhibitions as Digital Experiences* at ZKM|Karlsruhe (2022–23).

4   Matteo Pasquinelli, "Three Thousand Years of Algorithmic Rituals: The Emergence of AI from the Computation of Space Journal," *e-flux journal*, no. 101 (June 2019), https://www.e-flux.com/journal/101/273221/three-thousand-years-of-algorithmic-rituals-the-emergence-of-ai-from-the-computation-of-space/.

William Gibson's original definition of cyberspace prophesized, most likely, the coming of a vector space rather than virtual reality: "A graphic representation of data abstracted from the banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding."[5]

If we start from phenomenological models of cognition, human consciousness is constituted by the immediate appearances perceptible through our senses. In particular, the sense of sight and the human binocular way of seeing spatially constructs our reference to the world—in this sense, everything that we cannot perceive cannot be experienced. Even if phenomena in a virtual space are mere simulations, their presence seems important for this reason, as they enable users to find their way around. Furthermore, virtual space offers possibilities to manipulate and play with space within the limits that we can perceive and comprehend and against the laws of physics. Transmogrification of a physical exhibition space, in this case of *Iconoclash*, into a virtual one takes the underlying structure of spaces of computation into consideration, while keeping some features of the three-dimensional physical space in which the exhibition manifested.

Features of *Iconoclash as a Digital Experience*

The translation and maintenance of physical exhibitions' spatial qualities into corresponding digital models are of central importance, so the physical scenography is understood to be a non-verbal and spatial expression of the curatorial concept. Throughout our research it became apparent that a digital model of an exhibition should not be presented as a timeline or assemblage of objects on a flat online surface. Three-dimensionality must be preserved if the scenography of the original show is to be recognized, its modes of access differ.

Every curator, scientific advisor, and manager of *Iconoclash* who answered our call was interviewed. Their memories of the process and aims of developing the exhibition's architecture enabled an experiential concept for the digital model to be extrapolated. The most central notions we identified were:

I   An exhibition is a rhizomatic network of artifacts
II   The scenography includes its own allegory
III Artworks shall be distributed in a non-hierarchical way
IV   A network-approach shall be implemented by the scenography (related artworks are clustered in space)
V   The path of the visitor shall not be predefined (free movement, encountering the artworks and artifacts in an optional order)
VI   Performative exhibition experience shall be taken into consideration, even if only temporarily (based on the experience of parallel guided tours by the curators after the opening)

The exhibition was intended to not only make visible the conflicts of representation in different social fields, but to juxtapose them. In doing so, a fundamental assertion was made that, according to the curators, is common to all conflicts: the destruction, manipulation, and deconstruction of images, symbols and signs always results in the creation of new images, symbols, and signs. This idea of cultural practice was to be translated into the reception aesthetics of the visitors.

5   Matteo Pasquinelli and Vladan Joler, "The Nooscope Manifested: AI as Instrument of Knowledge Extractivism," visual essay, KIM research group (Karlsruhe University of Arts and Design) and Share Lab (Novi Sad), May 1, 2020. http://nooscope.ai. Quote taken from William Gibson, *Neuromancer* (New York: Ace Books, 1984), 69.

Joseph Leo Koerner, one of the curators of *Iconoclash*, recalled a conversation among the curators throughout the preparations for the exhibition about a possible rhizomatic structure (I), referring to the Deleuzian notion of the "fold"[6] and Frank Gehry's architectural concepts, to underpin the curatorial concept: "we didn't want to juxtapose iconoclasm and iconophile or idolatry—we never liked using the word—we wanted to have a more of a folded structure and so the cell structure was a bit of an evocation of that."[7]

In reference to Marcus Gheerhaerts the Elder's etching *Allegory of Iconoclasm* (ca. 1566–68), Koerner states in his catalog text on the scenography: "We could not turn the galleries of the ZKM into a life-size equivalent of this amusement park monster."[8] Discussing the image in 2020, he confirmed the connection between the composite portrait and the scenography (II), describing its cellular structure and inscrutability:

> One of the things about the image is, it's inscrutable at the big scale and it's sometimes inscrutable at the small scale. At the big scale, you don't immediately see the head, at the small scale you can't quite immediately make out what's going on in the mouth and then you recognize the priest is elevating the host. [...] When the exhibition was staged, there was this wonderful repetition both of the conflicting aspects of idolatry and iconoclasm, and also a certain kind of a scenography of a complexity, chaos, indecipherability, which we wanted to instantiate architecturally.[9]

The chaos and indecipherability of the setup was also a result of the non-hierarchical placement of artworks (III). Only the prelude to the exhibition and its opening section was defined by the architecture as a linear narrative. After entering ZKM visitors passed through a cacophonic music installation, the *Cacophony Corridor* (2002),[10] after which they were led to a staircase they had to descend to arrive at an arrangement of Kazimir Malevich paintings and various artworks and appropriations of readymades by Marcel Duchamp (see fig. 2). From there, they could move around freely, as no predetermined course led them through the exhibition (V). As Peter Weibel put it in 2021:

> This exhibition was the first example of radical network thinking. We are used to having enormous amounts of data today. The only way to understand them is by establishing data networks. We wanted to look at twentieth-century art and determine what was iconophilic and what was iconoclastic, and that's a complex data network.[11]

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6   See Gilles Deleuze, *The Fold: Leibniz and the Baroque* (Minneapolis, MN: University of Minnesota Press, 1992). First published as *Le Pli: Leibnitz et le Baroque* (Paris: Editions de Minuit, 1988).

7   Joseph Leo Koerner in an online talk with Dario Gamboni moderated by Lívia Nolasco-Rózsás "Allegory of Iconoclasm," October 5, 2020, https://zkm.de/en/event/2020/10/allegory-of-iconoclasm; part of a series of talks within the Beyond Matter project "Beyond Matter? A Revival of Clashes between Materiality and Representation."

8   Joseph Leo Koerner, "The Icon as Iconoclash," in *Iconoclash: Beyond the Image Wars in Science, Religion, and Art*, ed. Bruno Latour and Peter Weibel (Cambridge, MA: MIT Press, 2002), 164–213 (quotation on 166).

9   Koerner, "Allegory of Iconoclasm."

10   The *Cacophony Corridor* was a spatial audio installation conceived by musicologist and curator Denis Laborde and produced for *Iconoclash*. It was a 9m-long and 2.5m-wide tunnel with six loudspeakers integrated into the side walls on the left and right, which simultaneously played mostly medieval pieces of music, creating a cacophony. The installation was the prelude to the exhibition and had to be passed through as a visitor.

11   Peter Weibel in an online talk with Manfred Wolff-Plottegg, moderated by Lívia Nolasco-Rószás, "Network thinking in scenography," March 1, 2021, https://zkm.de/en/event/2021/03/network-thinking-in-scenography; part of a series of talks within the Beyond Matter project "Beyond Matter? A Revival of Clashes between Materiality and Representation."
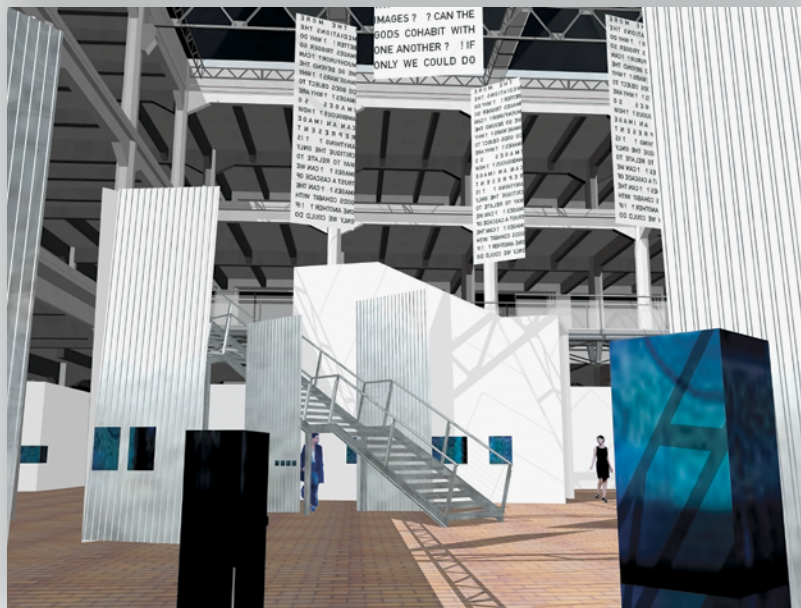
The exhibition's architect, Manfred Wolff-Plottegg, had already pointed at a possible way the exhibition's architecture could be transformed into a digital experience, which became a structural element of the digital exhibition model (IV): "The network theory, the modifiability, the contingency that is possible can obviously be achieved more easily, more efficiently and more intricately with virtual tools than the way we did it back then at ZKM."[12] As Weibel concluded:

In an analog space you can still create a network, but you can't shift the spatial elements and the nodes. That's the issue. We have the standing trapezoids, but they are fixed. But when you're using a virtual model, you can move the buoys around and re-shape the space, [...] the virtual space is a dynamic system [...] native to the observer. [...] Our hope for the future is to achieve an exhibition space that is a dynamic system native to the observer.[13]

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12   Wolff-Plottegg, "Network thinking in scenography."
13   Weibel, "Network thinking in scenography."
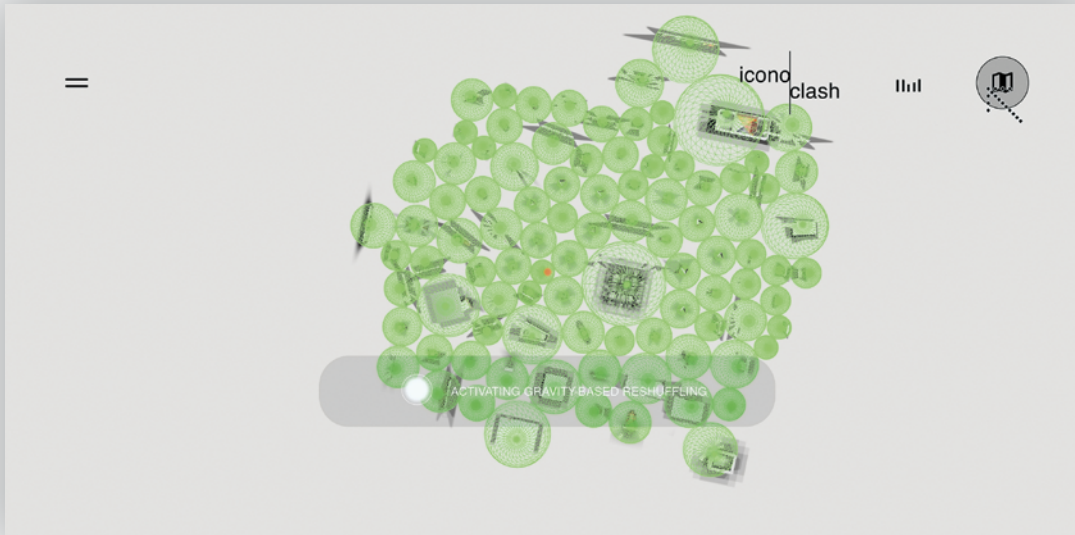
In a dynamic exhibition space, a constant automated performance of the exhibits in motion takes place (VI). What can hardly be iterated or emulated digitally is the interaction with and between visitors. An instantiation of these was a simultaneous guided tour conducted in multiple languages by the curators in the exhibition space, described by Peter Galison as a transformative experience: "when we each were showing around, the exhibit had a kind of radical effect on my conception about what a museum could be."[14]

Simultaneous plural points of views cannot really be achieved in a digital environment if the emphasis is on a personalized system that constantly regenerates itself. Yet the exhibition's performativity could expand into the sonic layer of the digital experience, which gave us a chance to evoke the guided tours. The sound design is partially based on the texts printed on banners that were hanging from the ceiling, which have been transformed into spoken words that appear and fade away as one moves around the space.

Both visual and audio layers of the digital model are strongly rooted in the concept of Wolff-Plottegg's original exhibition scenography, made in close collaboration with Weibel. Wolff-Plottegg, Weibel, and the other curators brought together by Bruno Latour agreed on a mode of display that would express a dynamic power interwoven with fluidity and instability, counteracting any freeze-framing. The digital scenography carries this concept forward and results in an ever-changing exhibition of multiple scenographies that circle the visitor in an intuitive way.

Since the concept was not site-specific, the inner architecture of the exhibition space at ZKM was eliminated in order to focus the attention toward the exhibits and their arrangement. The artworks remain attached to Wolff-Plottegg's temporary architecture while changing their positions within the space. The exhibition is not in constant flow, however: it only reshuffles when the visitor enters the "activation zone" that surrounds each artwork, so every exhibition experience is personalized. Artworks reshuffle and a cluster of related artworks emerge, while unrelated artworks drift away. Visitors can move around and explore each constellation of artworks that is generated as they choose; reshuffling stops as soon as they leave an activation zone and only restarts when they re-enter it or enter a new zone (see figs. 4 and 5). The sound level behaves according to a similar principle: the sonic environment of *Iconoclash as a Digital Experience* consists of an ever-evolving, generative soundscape that changes over time, based on user

14   Peter Galison in an online talk with Lívia Nolasco-Rószás, "'Images scatter into data, …' – Iconoclasm and the scientific image," February 15, 2021, part of a series of talks within the Beyond Matter project "Beyond Matter? A Revival of Clashes between Materiality and Representation." https://zkm.de/en/event/2021/02/images-scatter-into-data-iconoclasm-and-the-scientific-image.
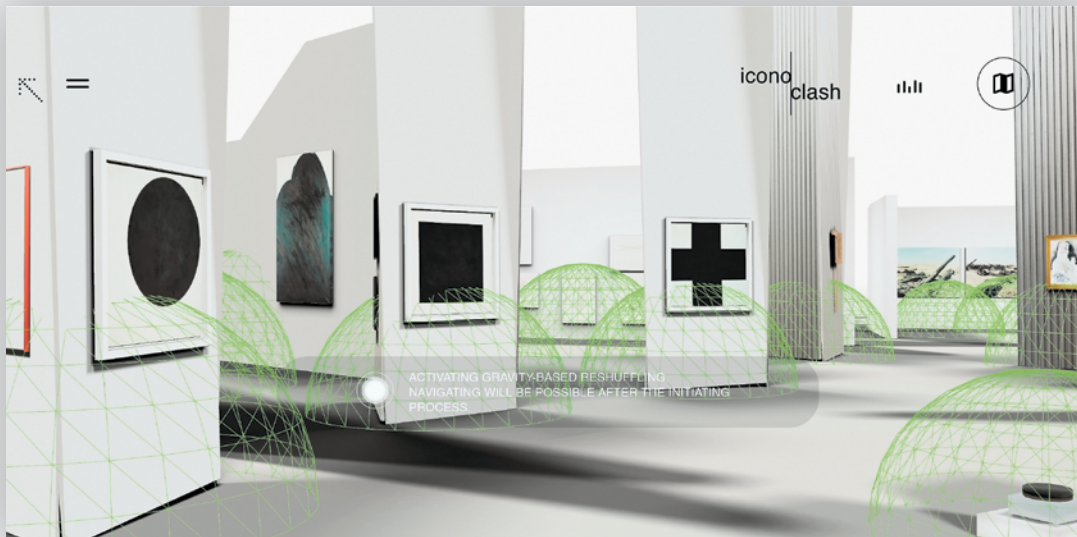
interactions, spatial events, and varying parameters that are carefully chosen according to the exhibition material. The tags that are applied to the exhibited artworks (types, format, structure, content, etc.) are used as a basis for parameter mapping to the sound system.

Visitor behavior thus determines dynamic spatial changes. Based on their actions, movements, and duration of interaction with any given artwork, visitors' profiles are continuously refined. Although no self-learning methods are integrated, the implemented algorithms let the digital exhibition behave as a cognitive system: it learns from and adapts to the viewer in order to modify itself and provide an ever-changing path through the assemblage of digital objects.

Exhibits as Digital Objects

Iconoclash was comprised of objects, artifacts, and artworks of various media. Although many of the objects and images were contemplative, various artworks could only unfold when the visitor interacted with them. The possibility of interaction is preconditional to the digital exhibition model. Each interactive artwork's presentation mode (e.g., multi-channel video installation or mathematical model), however, is dependent on the experiential aspect.

Information relating to the artifacts is embedded in the exhibition model. Upon entering the "activation zone" that surrounds the artwork, an information layer containing textual and visual information about each piece appears. Included in the information layers are original curatorial texts, sourced from the archive of ZKM, as well as the exhibition catalog.

The way in which each interactive artwork was reproduced was decided experientially. In some cases, interaction was embedded in the primary layer of the exhibition model; visitors are able to direct the rotation of the panels in the artwork *Electric Labyrinth* (1968/2002) by Arata Isozaki (see fig. 6), for example, or, through interaction with the robotic arm shredding images in the digital interpretation of *As Yet Untitled* (1992–95) by Max Dean (see fig. 7), determine if the arm should continue its activity. In other cases, the artists themselves took on the task of designing and programming digital interpretations of their works or digital updates of them in the case of born-digital pieces. The installation *ExAltarcation* (2002) (see fig. 8), for example, was interpreted and created as a website with three different spaces by the artists, Richard Aczel, Márton Fernezelyi, Robert Koch, and Zoltán Szegedy-Maszák—so the digital experience is based on the original, but is not a true copy.

Net-based, born-digital artworks were accessible via physical interfaces in *Iconoclash*. Concerning these works, reproducing their already obsolete interfaces seemed an inexpedient

Fig. 6
Iconoclash as a Digital Experience, 2020–22. Screenshot. In the foreground: Arata Isozaki, *The Electric Labyrinth.* Reconstruction of the space of Arata Isozaki at '68 Triennale di Milano, 1968/2002. Installation.
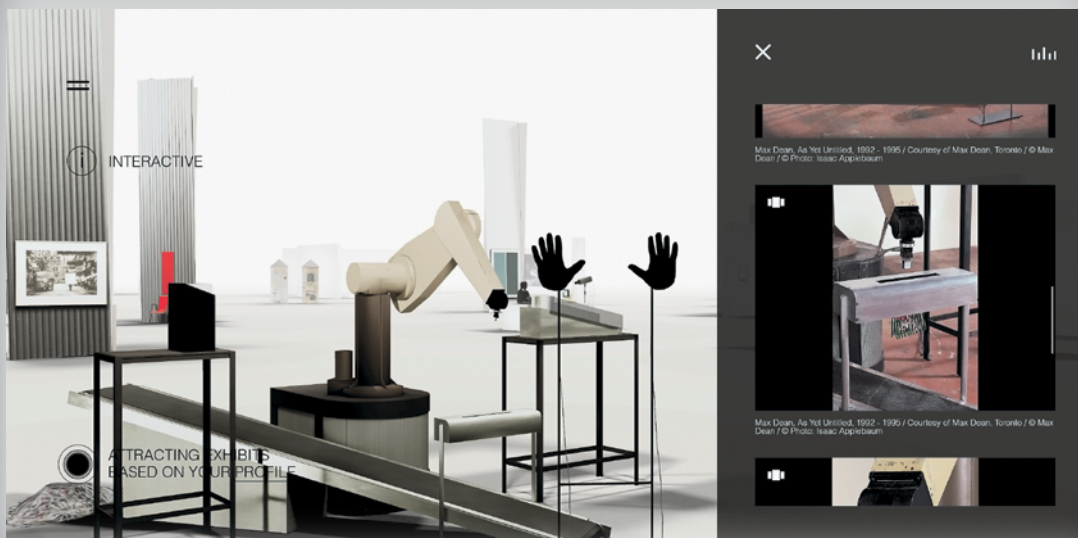
Fig. 7
Iconoclash as a Digital Experience, 2020–22. Screenshot. In the foreground: Max Dean, *As Yet Untitled*, 1992–95. Mixed media.
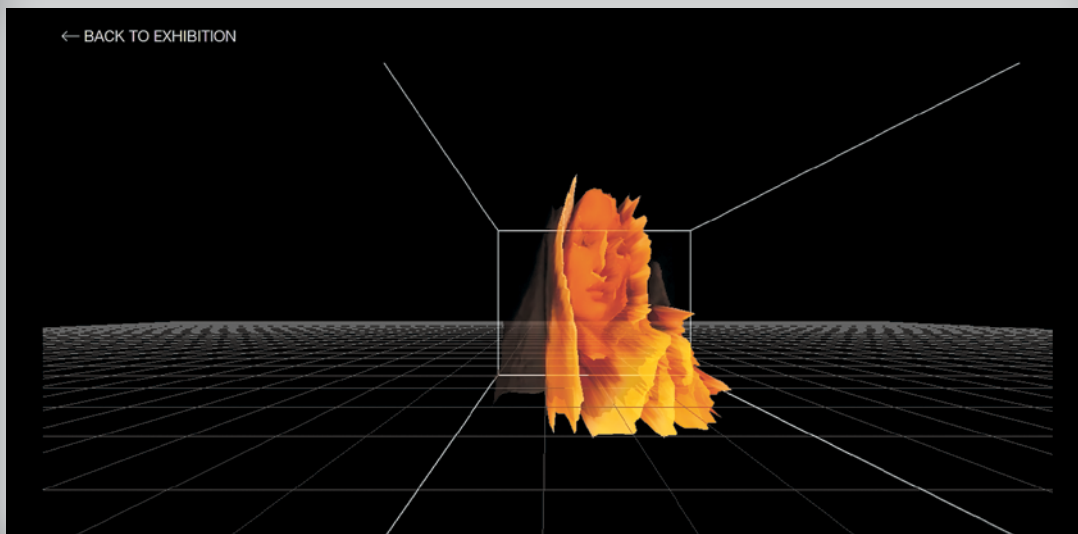
Fig. 8
Iconoclash as a Digital Experience, 2020–2022. Screenshot showcasing an interactive installation: Robert Koch, Richard Aczel, Zoltán Szegedy-Maszák, Márton Fernezelyi, *ExAltarcation*, 2001–02/2022. Multimedia installation.

solution. Moreover, access to the original work in its own "information space" should be assured. For artifacts and pieces that were originally in motion, animated, or functioning without visitor intervention, their continuous movement should be visible in the model, even if they are in the background.

Many of the spatial installations in *Iconoclash* were single- or multiple-channel video installations, either displayed on monitors or screened on the walls, in some cases in designated black boxes, or at least in separate locations where their sound could be heard. The soundscape of the audio-visual installations is incorporated in the exhibition model as well. In case of *Babel Series* (1999) by Candice Breitz, a digital interpretation of the piece was created in collaboration with the artist's studio.

The *Iconoclash* architecture, including the display cases for artworks and artifacts and further scenographic elements, were digitally reproduced based on the original 3D plans, photographs, and surfaces in the building, the original renderings and .dwg files of the exhibition's inner architecture created by Wolff-Plotteg's studio, materials from the ZKM archive, and artifact-related material accumulated throughout our research.

The analog objects, including artifacts and artworks with physical volume, were reproduced as 3D models. Their qualities and level of abstraction are synchronized with the other digital objects on display. Creating completely accurate reproductions, imitating every detail of each analog object, was not among the aims of modeling the exhibition.

Navigation and Taxonomy

The exhibition experience starts with a trailer that depicts the well-defined linear entry. After the video finishes, the visitor is left in the exhibition's iconic first scene. As soon as the re-shuffling process is activated, the exhibition ceases to be a reproduction of the original setup.

An algorithm developed for this purpose defines the position of the artifacts according to their hashtags. The more corresponding hashtags an exhibit has with the one that has been selected, the closer its placement to the visitor. The selection of keywords each digital object is tagged with indicates the affiliation of the work with the main themes of the exhibition, with the curators, and with curatorial categories, such as "Picturing the Destruction of Pictures," "Emancipation of Surfaces," and "An End to the 'End of Art'?"[15]

Iconoclash as a Digital Experience is browser-based and can be visited online: visitors can navigate through the exhibition space and access information about the exhibits, no matter if they enter on a smartphone, tablet, or desktop computer.

Users navigate via arrows or through scrolling on a mouse or touchpad, their eye level remaining constant (they cannot obtain a bird's-eye view of the ZKM atrium, for instance). Navigation in the virtual space is seamless, not a series of jumps from one point to another as is the case with Google Street View, for example. The visitor sees the exhibition model from a central perspective, not from an isometric point of view or the sky-down perspective, often used in computer games, that implies a view from above rather than immersion. The "sky-down perspective gives a feeling of total mastery and control,"[16] and this was another key argument against its use in the exhibition model, which follows a non-hierarchical structure not only among the artifacts but for the entire constellation of relations in the exhibition space, including

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15   The full list of tags can be found in the exhibition model.

16   Nora N. Khan, *Seeing, Naming, Knowing* (New York: The Brooklyn Rail, 2019), 15, https://www.are.na/block/10908843

the visitor's.[17] A zenithal view is embedded in one function, however, that gives the user the possibility to jump from one point to another after opening a map. This function was provided to let viewers escape the filter bubble they inevitably create around themselves through their personalized visit. Visitors do not have an avatar and the presence of other visitors is not indicated, since personalized exhibition visits don't allow interaction between simultaneous users. Navigating the exhibition model via *The Immaterial Display* is based on these same principles, the only difference being in the hardware. Instead of mouse and arrow keys, a chair and a handheld controller enable the visitor to navigate.

   The development of a virtual exhibition space for the digital revival of *Iconoclash* is intended as a pilot project to serve as a model and basis for further online exhibitions and to be of use to other museums. The software developed as a result of the Beyond Matter project will be made available online as a generic exhibition platform and can be accessed open source.

17   This approach relates to the ANT (actor–network theory) advocated, among others, by Bruno Latour, for example, in *Science in Action: How to Follow Scientists and Engineers through* Society (Cambridge, MA: Harvard University Press, 1988). First published as *Science en action: Introduction à la sociologie des sciences* (Paris: La Découverte, 1987).

THE ARCHIVAL RESEARCH ON *LES IMMATÉRIAUX*

Andreas Broeckmann and Marie Vicet

This text describes the archival research undertaken by its authors, art historians Andreas Broeckmann (Leuphana University of Lüneburg) and Marie Vicet (University Paris Nanterre / Centre Pompidou), on the exhibition *Les Immatériaux* (1985). It focuses on the period of the project Beyond Matter (2019–23), but it also covers the earlier phase of our research, which started in 2014.

The Archive of Les Immatériaux at the Centre Pompidou

The exhibition *Les Immatériaux* was presented at the Centre Pompidou in Paris from March to July 1985. It brought together five departments of the Centre Pompidou, being organized by the Centre de Création Industrielle (CCI) in collaboration with the Musée National d'Art Moderne (MNAM), the Bibliothèque Publique d'Information (BPI), and the Institut de Recherche et de Coordination Acoustique/Musique (IRCAM). The exhibition was curated by philosopher Jean-François Lyotard and design theoretician Thierry Chaput, then working as a project manager and exhibition curator at the CCI. The exhibition articulated Lyotard's concept of "immateriality" and his conception of postmodernity more broadly, while showing how the emergence of new technologies and materials transformed all aspects of everyday life and of artistic creation. The main publications accompanying the exhibition were a three-part catalog (comprising a theoretical textbook, *Épreuves d'écriture*, the *Album* booklet of preparatory materials, and the *Inventaire* site-by-site presentation) and the exhibition brochure *Petit Journal*.

The exhibition ↘ archives in the Centre Pompidou are composed of two separate collections, briefly described below. The first is the paper archive held in the public archives of the Centre Pompidou (Pôle archives, Service juridique et des archives, Direction juridique et financière, Centre Pompidou). The second is the photographic archive of the exhibition kept at the Bibliothèque Kandinsky, which forms part of MNAM.

The materials held in the public archives consist of forty-one standing folders (*boîtes*) of archival materials, the bulk of it on paper of A4 size, derived from the workplaces of various individuals employed by the Centre Pompidou: the members of the team who worked on the exhibition (these boxes include all sorts of preparatory papers, concept sketches, budgets, administration, correspondence, etc., mostly dedicated solely to *Les Immatériaux*), the Centre Pompidou's direction and the interdepartmental board of directors (with minutes of meetings, draft concepts, etc., related to *Les Immatériaux*), the Legal Department (concerning rights and contracts), as well as the MNAM, the Production Department (concerning the production of the exhibition, i.e., plans and documents produced by scenographer Philippe Délis and the Centre Pompidou's scenographic architect Katia Lafitte), and the Editions Department (concerning the catalog) (see fig. 1).[1] The core of this archive was collected from CCI team members Martine Moinot, Sabine

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1   We created a draft inventory for these 41 folders.

Vigoureux, Catherine Testanière, and Nicole Toutcheff. The folders are not kept together, but distributed in the public archives according to date and accession numbers. In addition to these archive folders, the public archives hold four ring folders containing the iconographic research (in the form of slides, prints, ektachromes) for the *Inventaire* catalog, carried out during the preparation of the exhibition on slides.[2]

The archive at the Bibliothèque Kandinsky includes photographic documentation of the exhibition (*reportage*), preserved in two dedicated archive boxes. It is composed of 478 photographic views taken by the Centre Pompidou's photographer Jean-Claude Planchet, which are divided into three sets: seventy-eight color photographs taken during the exhibition opening and the press conference on March 26, 1985; sixty-two photographs (twenty-six black-and-white negatives and thirty-six color slides) documenting the setting up of the exhibition in the weeks before the opening; and 338 photographs (black-and-white negatives and color slides) taken on different days during the public running time of the exhibition. All of these photographs have been digitized.[3] The photographs in the third set do not document the exhibition

2   There is a fifth folder belonging to this series, currently on a transit shelf in the Bibliothèque Kandinsky.

3   It is possible that there are further photographs taken by Planchet which have not yet been integrated into this set (see footnote 2). For a small number of the photographs, we proposed an exchange of holdings between the public archives of the Centre Pompidou and the Bibliothèque Kandinsky, in order to make the respective sets (exhibition documentation and catalog iconography) more consistent.

systematically; they were taken on different days and often focus on the exhibition visitors. As a result, not all parts of the exhibition were documented photographically.

Furthermore, the archives in the Bibliothèque Kandinsky include two boxes containing various types of visual documentation prepared in 1985 for the press, including selected slides and prints from Planchet's photographs and copies of images used in the catalog.

During the exhibition, a film was produced with the title *Octave au pays des Immatériaux*.[4] It shows sequences in which a young boy, Octave, visits the exhibition, alternating with interviews with various exhibition participants (including the curators Jean-François Lyotard and Thierry Chaput, scientific advisors Michel Cassé and François Recanati, artists Philippe Thomas and Jacques Monory). This film was very valuable for the reconstruction of the exhibition space, because it shows areas of the exhibition and exhibits that are not present in the photographic documentation. It often gives a better idea than the photographs of the exhibition space and the positions of certain exhibits in relation to each other.

Complementary Archival Sources

As part of our research into *Les Immatériaux* and in order to gain a better understanding of the exhibition, its conception, the plans and ambitions of the curators, and the difficulties they encountered, we—the authors of this text—have sought to complement the archival materials we found at the Centre Pompidou with materials from external private and institutional archives, and by holding an extended series of conversations with people who were involved in the realization of the exhibition in the 1980s and whom we could trace through our growing network of contacts.

To offer some examples, at the Bibliothèque littéraire Jacques Doucet in Paris, we gained access to parts of Lyotard's personal archives which contain—less importantly—a small number of texts and materials related to the preparation of the exhibition, mostly duplicates of what is also in the Centre Pompidou's Public archives, as well as—more importantly—his personal calendars, which supported our detailed chronological reconstruction of the preparation phase[5] This work on the chronology had started with the examination of the private calendars of project manager Martine Moinot, who noted down her own but also many of Chaput's and other team members' meetings during preparations for *Les Immatériaux* in 1982–85. Other interesting reference materials emerged from the private archives of Katia Lafitte, who preserved the personal holdings of Chaput after his premature death in 1990.[6]

We were also able to consult the archives of some participating artists: those of Jean-Louis Boissier and Liliane Terrier, who have photographs of the exhibition and archives of their own installations, namely Boissier's interactive video installation *Le Bus* (1985) and Terrier's Copy Art installation for the exhibition "site" *Toutes les copies* (All Kinds of Copies), (1985)[7]; the archives of the Minitel magazine *Art Accès Revue* held by the magazine's co-editor Fréderic Develay;[8] and the archives of Katerina Thomadaki, which includes photographs that complement Planchet's

4   *Octave au pays des Immatériaux*, directed by Paule Zajdermann, scenario Daniel Soutif (Centre Pompidou, 1985), 36 min.

5   Classification numbers JFL 42, JFL 538, JFL 545. See also Andreas Broeckmann and Marie Vicet, eds., "Chronology of Les Immatériaux" (version 2), *Working Paper*, no. 1 (2020): http://les-immateriaux.net/wp-content/uploads/2020/06/LIR-WP1_Chronology_v2_20200701.pdf.

6   After our contact with Katia Lafitte and, through her, with Chaput's mother, we are now quite sure that Chaput himself left no personal archives of his work on *Les Immatériaux* and that his papers were mostly integrated into the folders of the CCI. The related archival holdings of the exhibition scenographer, Philippe Délis, who passed away in 2014, presumably still exist in his family house in Bordeaux, but have not been accessed yet.

7   This installation has entered the collections of the MNAM in 2022.

8   Acquired by the Bibliothèque Kandinsky in 2022.

documentation, as well as a model of the photographic frieze Thomadaki created with Maria Klonaris for the site *L'ange* (The Angel) (1985). This additional archival research also led us to the original film documenting Jean-Pierre Ozil's scientific research on bovine cells shown in the site *Langue vivante* (Living Language) (1985), and among the holdings of the Service de la production audiovisuelle we were able to identify the audio tapes with the soundtrack which was played via a wireless transmission system throughout the exhibition, and which has since been digitized and integrated into the virtual exhibition.

A lesson to be learned from this experience is that it was worth searching and digging and insisting, even when a first attempt had not been successful. It was important that we made people aware of our keen interest, which in some cases led to discoveries by our interlocutors, who found things which they might have not taken as relevant if it hadn't been for our questions and the explicit indication of our extended and general interest in anything related to *Les Immatériaux*.

Since 2014, we have met with more than thirty people who participated in *Les Immatériaux* in one way or another: people who worked on the creation of the exhibition as employees of the Centre Pompidou,[9] artists and other participants who contributed to the exhibition,[10] and other people who were involved in the various aspects of its preparation and production.[11]

These interviews were essential for better understanding how the exhibition was conceived, and what the conceptual and pragmatic challenges were for those involved, but they also made it possible for us to gain a rich perspective on many of the archival materials. Knowing the people involved—and in some cases learning to identify the handwriting of specific individuals—turned those materials into "lively" sources connected to events in the past and to present memories.[12]

Research on Les Immatériaux Until 2015

Before the start of our research, other academic research had already been conducted on the exhibition and its archives, especially by art historians Antony Hudek, Antonia Wunderlich, and Francesca Gallo. In 2001, Hudek wrote his MA thesis in art history at London's Courtauld Institute of Art, titled "Museum Tremens or the Mausoleum without Walls," on *Les Immatériaux*.[13] A little later, two PhD theses were devoted to the exhibition and led to publications: in 2008, Wunderlich published the book *Der Philosoph im Museum* (The philosopher in the museum),[14] based on her thesis at Witten/Herdecke University, and Gallo published the book *Les Immatériaux: un percorso di Jean-François Lyotard nell'arte contemporanea* (A route of Jean-François Lyotard through

9   Among them were the project managers Martine Moinot, Sabine Vigoureux, Catherine Testanière, Chantal Nöel, architecture curator Alain Guiheux, visual arts curator Bernard Blistène, architect and scenographer Katia Lafitte, the photographer Jean-Claude Planchet, audiovisual producer Philippe Puicouyoul, and the composer Arnaud Petit. Many of these informally held conversations and interviews were audio-recorded.

10   Including Jean-Louis Boissier, Liliane Terrier, Katerina Thomadaki, Jean-Pierre Balpe, Marc Denjean, Catherine Ikam, Annegret Soltau, Frédéric Develay, Orlan, Daniel Buren, Dan Sperber, François Recanati, Camille Philibert, and Jacques-Élie Chabert.

11   Including graphic designer Luc Maillet, light designer Françoise Michel, TV producer Paule Zajdermann and author Daniel Soutif (who together created the film *Octave au pays des Immatériaux*, 1985), biologist Jean-Pierre Ozil, and the former employees of the SERPEA agency which facilitated the Minitel network and computer services in the exhibition, Pascale Deville, Gisèle Cloarec, and Hadmut Holken.

12   During these meetings we also learned to ask interviewees if they had any personal archives on the exhibition that could be useful for our research and to ask them several times, because in several cases it took a while for them to remember or realize that it was really *any* document that could be of interest for us.

13   Antony Hudek, "Museum Tremens or the Mausoleum without Walls: Working through *Les Immatériaux* at the Centre Pompidou in 1985," master's thesis (University of London, 2001).

14   Antonia Wunderlich, *Der Philosoph im Museum. Die Ausstellung "Les Immatériaux" von Jean François Lyotard* (Bielefeld : transcript, 2008).

contemporary art).[15] All three did in-depth research in the archive and interviews with people involved, establishing important foundations for our own research regarding the relationship between Lyotard's philosophy and his ideas about the exhibition, as well as providing more specific insights into its overall structure and content (Wunderlich) and the position of specific contemporary artistic practices within it (Gallo, Hudek). In these studies, little attention was paid to the preparation phase or to the role of contributors other than Lyotard.

There are otherwise several essays and research papers that deal with aspects of *Les Immatériaux*, which are apparently not based on extensive archival research. Among the noteworthy exceptions are several texts by John Rajchman, who bases his discussion of *Les Immatériaux* on first-hand experience of the exhibition and on conversations with Lyotard at the time.[16]

Several public conferences and symposia paid tribute to *Les Immatériaux* and brought together participants and researchers:

- "Retour sur *Les Immatériaux*," ENSAD, Paris, March 30, 2005, organized by Jean-Louis Boissier and Liliane Terrier[17]
- "Landmark Exhibitions: Contemporary Art Shows Since 1968," (with three contributions about *Les Immatériaux*), a collaboration between Tate Modern and Jan van Eyck Academie with the Royal College of Art and the London Consortium, October 2008, organized by Marko Daniel and Antony Hudek[18]
- "30 Years after *Les Immatériaux* – Art, Science, Theory," Leuphana University Lüneburg, May 21–22, 2014, organized by Andreas Broeckmann and Yuk Hui[19]
- "*Les Immatériaux*: Towards the Virtual with Jean-François Lyotard," Courtauld Institute of Art, London, March 27–28, 2015, organized by Sarah Wilson
- "*Les Immatériaux*, trente ans après," Centre Pompidou, November 27, 2015, organized by Christine Buci-Glucksmann and Thierry Dufrêne[20]

Reviewing and Describing the Archival Materials

Since our first rough overview of the archival materials in the public archives and the Bibliothèque Kandinsky in 2014, we have returned to them numerous times, leafing through and reading the various documents, trying to understand the folders' structure, and searching for materials on specific aspects of the exhibition, often distributed across several folders. We gradually created an inventory in order to navigate the labyrinth of folders and subfolders and to be able to refine our searches.

Germane to archival work in general is the importance of a particular set of questions or interests with which one approaches such materials. The archive remains almost mute and illegible if you don't approach it with specific questions. By the same token, the search easily grinds to a halt if your search comprises too many questions simultaneously—in which case too many details vie for attention. This dialogic structure of archival search also implies that you are

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15   See Francesca Gallo, *Les Immatériaux: un percorso di Jean-François Lyotard nell'arte contemporanea* (Rome: Aracne, 2008).

16   For a comprehensive list of research publications about *Les Immatériaux*, see http://les-immateriaux.net/publications/.

17   Video documentation http://www.arpla.fr/canal20/adnm/?p=3701.

18   Results published in *Tate Papers*, no. 12 (Autumn 2009), https://www.tate.org.uk/research/tate-papers/12.

19   Results published in Andreas Broeckmann and Yuk Hui, eds., *30 Years after Les Immatériaux – Art, Science, Theory* (Lüneburg: Meson Press, 2015), https://meson.press/books/30-years-after-les-immateriaux/.

20   Video documentation: https://www.centrepompidou.fr/fr/ressources/media/rBr0GcX.

likely to find different things when you go back to the same material with another set of questions. Moreover, we learned how essential it can be to go slowly and to pay attention to the more boring-looking documents, because sometimes even an apparently generic lending contract can contain an important detail (like a crucial hint at the withdrawal of an exhibit shortly before the exhibition's opening, which proves that it was not actually shown even though it is mentioned in the catalog).

If it hadn't been for the Beyond Matter project, which gave us the time and the incentive to do this systematically, we would not have done the detailed and comprehensive work—which included looking at all the folders several times, scanning many of the documents, allocating unique reference codes to each of them, and carefully analyzing and describing the photos and scanned documents. We had known beforehand that such work should be done, but the sheer volume would have been practically impossible to handle. The lively interest and continuous encouragement of the archivists both in the public archives and in the Bibliothèque Kandinsky also had a major impact on our morale and persistence.

On the other hand, the archival work that was necessary to realize the *Immatériaux* part of the Beyond Matter project would have been almost impossible without the work we had done in the archive previously. Extended time spent in the archive, the broad perspective gained through additional research trajectories, and a passionate pursuit of the topic over several years formed a crucial basis for gaining an ability to "read" the documents and photographs, and to place them in their respective contexts.

What we also learned (sometimes the hard way) is that, while every little step, every discovery and contribution to the disclosure of the archive is valuable, it is crucial that these steps are documented and made available in a manner that makes it possible for others to build on them. There were times when we regretted that, given the more informal way in which we first started our research, we didn't have a strong infrastructure in place for the documentation, collection, and organization of research results.

Reviewing and Describing the Photographs

While the archival materials in the public archives proved vital for understanding the history of the exhibition and its lengthy curatorial process, the involvement of collaborators, the sourcing and details of the exhibits, etc., and the photographic documentation were indispensable for the virtual 3D modeling of the exhibition spaces in the Beyond Matter project.

The presentation of the digitized photographs at the Bibliothèque Kandinsky and on their online "Archive and Documentation" portal, follows the order of the physical *reportage*, as is the case for all the *reportages* of the Centre Pompidou's exhibitions that is digitized and put online. This means that the photographs appear online in the same order in which the negatives and slides were taken or preserved. In the case of *Les Immatériaux*, the photographer did not photograph the sites systematically, but randomly walked around the exhibition to create its photographic *reportage*.

Since the scanned images are therefore in no comprehensible order, our first main task was to organize them and relate them to the parts of the exhibition in which they had been made. We described the photographs in detail, an important exercise which forced us to look carefully and minutely at each image, and which brought up observations of spatial constellations and views of exhibits that we had sometimes not been aware of previously. This investigation stepped up when we worked with the designers on the modeling of the 3D space, a process during which even architectural marginalia or light reflections and shadows could give us important indications of details that were not documented otherwise. There were several instances where photographs that we had looked at many times, or ones that we thought had nothing significant in them, suddenly revealed an important piece of information, in their

margins or in the distant background. Despite these forensic efforts, there are certain parts in the exhibition for which we have not found any photographic record,[21] whereas other sites are rather well documented.

Combining the evidence in the photographs with the entries in the *Inventaire* part of the catalog and documents found in the archives made it possible to identify almost all the exhibits and to determine their dimensions and precise or approximate positions in the exhibition spaces. For some of the exhibits this was not possible, however, a fact that was taken into account in their presentation in the virtual exhibition.

Archival Work as Individual, Cooperative, and Social Process

Much of the work described above is a solitary affair: browsing the archive, compiling lists, extracting and documenting data, writing descriptions—these are tasks often done most productively and efficiently alone. However, at every step there can be necessary or welcome moments of social encounter and exchange. In our case these were first with the archivists in the Centre Pompidou's public archives, who helped us find the archival materials we were looking for, but also pointed us in directions where we had not previously looked. For this, it was important that they understood the purpose of our research and the breadth of our interests. Like the perusal of archival materials themselves, this search in databases, catalogs, and inventories requires one to return on multiple occasions, and with multiple search requests. And it is greatly aided by the expertise of archivists who know the history of their holdings and the unavoidable idiosyncrasies that such a repository of the remains of human endeavors contain, aside from the holdings' more easily comprehensible, rational, and systematic structuration.

The memories held by people we were able to talk to were thus crucial for disclosing and understanding the material archive. The rich holdings of the public archives made it possible for us to speak to former CCI team members not only about their experiences in general, but to show to them specific documents, sometimes bearing their own handwritten notes, which triggered a wealth of memories about specific people, events and situations, and about the overall conditions of making *Les Immatériaux*. We learned that such artifacts were extremely useful for reviving such memories and that their effects could be quite unpredictable: while some people we spoke to still had no active memories even when we showed them their own elaborate handwritten notes from specific meetings, others could give detailed accounts of such meetings just on the basis of being reminded of a date or a particular person who was present. These processes could sometimes be augmented by bringing people together who had worked together in 1984/85 and had sometimes not spoken about their shared experiences for over thirty years.

These observations are not surprising and have been systematically studied under the rubric of oral history. We offer them here not only as anecdotal evidence of our own research process, but also as a methodological suggestion, namely to address those people who hold vital memories not only as interviewees in neutral spaces and with pre-structured sets of questions, but to involve them as active parts of the assemblages in which human memories, archival documents, photographic records, and enduring objects and spaces continue to interact whenever they are brought into contact with each other.

Besides those aspects which are positively documented and recorded, and those which are retained on the surface or in the depths of human memory, or in the backgrounds and outer margins of photographs, this type of insistent digging will sometimes also bring up what is not visible in the photos, or reflected in the archives in any way, yet did in fact have an impact on the object of study. In our case, these were, for instance, individuals whose work left significant marks on

21   This almost total lack of photographic documentation is notably the case for the sites devoted to visual arts, curated by Jean-François Lyotard with Bernard Blistène of the MNAM.

aspects of the exhibition, but whose impact it wouldn't have been possible to ascribe to them without the accidents of informal conversation. Two somewhat extreme examples are Gisèle Cloarec, the designer of the screens for the Minitel version of the collaborative online writing experiment *Épreuves d'écriture*, and Jean-Louis Boissier, who was not only a participating artist but also a personal friend to Chaput and a curatorial advisor, most of whose many suggestions and liaising activities went unrecorded and widely unnoticed even at the time, but could now be reconstructed from conversations with multiple people who got involved in *Les Immatériaux* only through Boissier's intervention.

Closing Remarks *(Chronos and Kairos)*

Most of all, the type of research described here requires a lot of time and access to the archival materials to study and return to them frequently. When Antonia Wunderlich composed the highly significant site-by-site description of the exhibition in 2005, due to the time constraints of her research stay in Paris and because of the then unstructured form of the photographic documentation, she had to do this analytical work almost blindly, based on written accounts in published reviews and the catalogs. This type of research, and everything that follows on from it, will be greatly aided by the new and organized availability of photographs, written descriptions, and scans of related archival documents, as they appear in the archive layer of the virtual exhibition, and will appear later in the online archival research data base of the Bibliothèque Kandinsky's website.

Having the opportunity to take the necessary time for this research since 2014 has been a pleasure and a privilege. During this period, besides the Beyond Matter project and the above-mentioned departments of the Centre Pompidou, our combined work has been supported in different ways by Leuphana University Lüneburg, Carl-von-Ossietzky University Oldenburg, the Academy of Fine Arts Leipzig, Deutsche Forschungsgemeinschaft (DFG grant BR 6317/2-1), the LabEx Arts-H2H, the Deutsches Forum für Kunstgeschichte Paris, the University of Picardy Jules Verne, the Amis du Centre Pompidou, and most generously by the Moinot family.

Chronos represents the extended time in whose necessary and irreversible flow events follow each other, building on each other sequentially. In its ideal form, the material archive exists in this chronological time and enables the gradual development of research. In contrast, *kairos* is the principle of the moment, an instant that holds the fleeting potential of an encounter, already gone again if you don't manage to grasp it when it approaches.

While some of the documents we found in the basement of the Centre Pompidou had been patiently awaiting their discovery for decades, many of the personal encounters which have formed the other backbone of our research endeavor reminded us of how ephemeral this type of work is. We quickly learned to cherish the moments when people were willing to share their memories with us, and we also felt the loss when such conversations couldn't happen in time. A growing number of people who were involved in *Les Immatériaux* have passed away, others have so far been elusive or disinterested. In quite a remarkable way, *Les Immatériaux* appears to have left its mark on everybody who was involved back then, whether as a contributor, observer, or exhibition visitor. We know that the testimonies of every one of these people would have provided further answers and insights, and shed new light on this important episode in the history of twentieth-century exhibitions.

LES IMMATÉRIAUX. Working Towards an Online Platform

Philippe Bettinelli, Julie Champion Lagadec, and Marcella Lista

As part of its activities, the European research project Beyond Matter has brought together an interdisciplinary team to study a major exhibition in the history of the Centre Pompidou and make it available to the public. Over a three-year period and using state-of-the-art digital tools, *Les Immatériaux: A Virtual Exhibition* was developed and through which the former landmark exhibition on which it is based is transposed into the present.

Les *Immatériaux*, produced by philosopher Jean-François Lyotard and design theorist Thierry Chaput, working with a scientific team, ran from March 28 to July 15, 1985 in the Grande Galerie, on the sixth floor of the building designed by Renzo Piano and Richard Rogers. Conceived as a total work of art with philosophical underpinnings, the event was intended to "evoke the feeling of the end of a period and the restless curiosity emerging at the dawn of postmodernity,"[1] an era in which new technologies were already profoundly changing humans' relationships to the world. In an entirely open area of 2,300 m^2, works of art interacted with artistic, scientific, and technological devices in some sixty partitioned spaces called "sites" (see fig. 1). Each site proposed a theme for reflection linked to the way in which arts, sciences, and technologies destabilize traditionally accepted categories in many areas of everyday life. *Les Immatériaux* was organized by the Centre Pompidou's Centre de Création Industrielle (CCI) in collaboration with the other entities of the young cultural institution: the Musée National d'Art Moderne (MNAM), the Institut de Recherche et Coordination Acoustique et Musicale (IRCAM), and the Bibliothèque Publique d'Information (BPI).

Modestly attended and criticized by some visitors for its opacity, *Les Immatériaux* elicited keen interest among artists, art historians, curators, and philosophers for its experimental approach. Lyotard was considered the first philosopher to curate an exhibition. Before the twentieth-anniversary colloquium in 2005 and the publication of two theses on the subject in 2008 by Francesca Gallo in Italy and Antonia Wunderlich in Germany, only very few academic works had focused on *Les Immatériaux*.[2] Through these milestones, awareness was raised about the contents of the exhibition, and primary sources that had previously had little visibility were disseminated more broadly than the catalogs, press articles, and few photographs that circulated at the time. This was followed by other publications, numerous articles, and colloquia, largely held outside France.

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1 *Les Immatériaux*, press kit (Paris: Centre Pompidou, 1985), 4, https://www.centrepompidou.fr/media/document/de/0d/de0d76bbe203394435216a975bea8618/normal.pdf

2 See Francesca Gallo, *Les Immatériaux: un percorso di Jean-François Lyotard nell'arte contemporanea* (Rome: Aracne, 2008); Antonia Wunderlich, *Der Philosoph im Museum. Die Ausstellung "Les Immatériaux" von Jean François Lyotard* (Bielefeld : transcript, 2008).
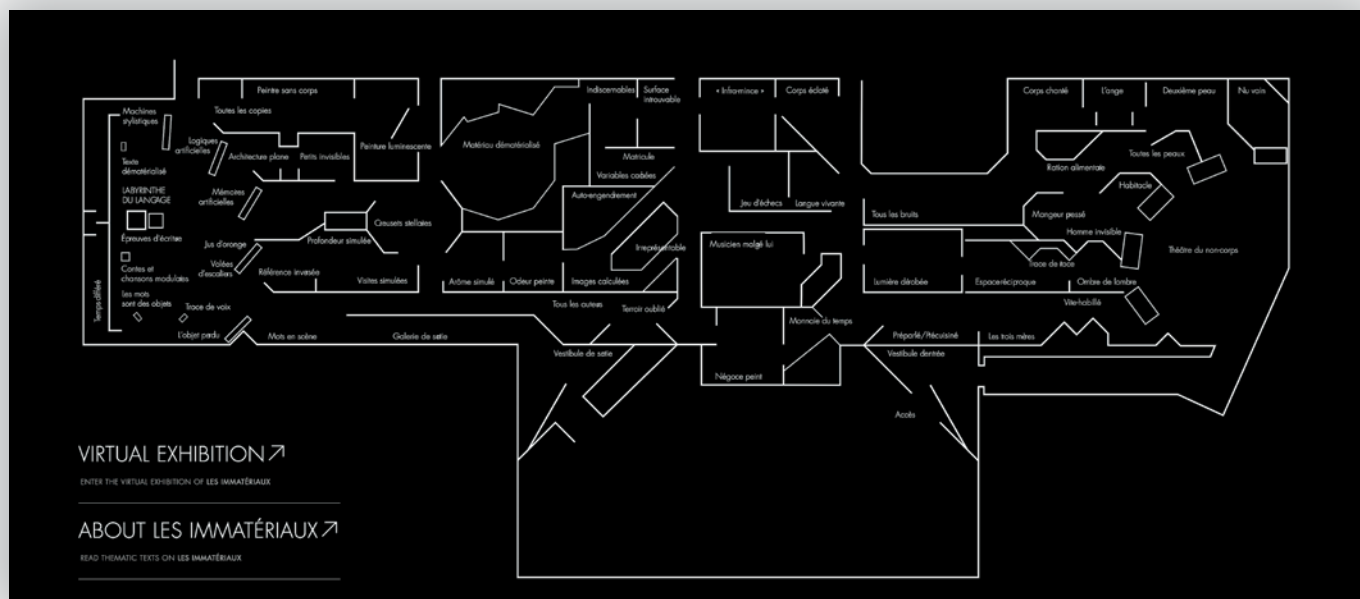
The Beyond Matter project was an opportunity for the Centre Pompidou to study its own ↘archives in depth, to digitize, describe, enhance, and make them accessible to allow for contemporary readings of *Les Immatériaux* and a questioning of its resonances in the present. The history of the exhibition now allows us to unpack multiple issues in the artistic, philosophical, political, and cultural fields, and in the history of media and communication.

To afford an understanding of what *Les Immatériaux* was, one option was to endeavor to reproduce it in conditions as close as possible to those of the original. Harald Szeemann's 1969 exhibition *When Attitudes Become Form*, for example, had been reconstructed in 2013 by the Fondazione Prada in Venice. Because their primary mission is not the study of their own history, cultural institutions rarely make this expensive and complex choice on a large scale. They are however increasingly exploring the potential of digital technologies as tools for archiving, analysis, and transmission. While these technologies are now almost insepara-ble from our everyday environments, they produce forms and content that differ profoundly from those of physical exhibitions. The processes of digitization, 3D design, computer code, and description implemented for on-screen consultation interfaces cannot provide access to *Les Immatériaux* in its temporal and spatial depth; its works and devices cannot be actively present, having mostly disappeared, nor can the same proprioceptive and multisensory inter-actions within the built environment or the intermingling of the singular experiences of each visitor that produces a collective experience. What resonates and gives food for thought, however, is the affinity of the virtual tool with the very theme of the exhibition, which antici-pated and questioned the profound mutation of our relationship to knowledge through the abstraction of computer code.

The researchers, curators, archivists, documentalists, designers, and developers who com-bined their skills for the Beyond Matter project proposed an online platform dedicated to *Les Immatériaux*. Carrying the title *Les Immatériaux: A Virtual Exhibition*, the 3D model offers both a reasoned overview of the archives preserved at the Centre Pompidou, and a spatial and sound walk through the space reinterpreted by 3D modeling.

The Working Method Within the Beyond Matter Project

Beyond Matter allowed for an experimental and interdisciplinary way of working, from the design of the project to its IT development. An intersection of different professional approaches was necessary to create a coherent online experience, where historical content and visual environment, navigation, and technical development parameters would work together organically.

The work was carried out in three stages: design from September 2020 to June 2021, formalization of the model from June to August 2021, and graphic and computer development from September 2021 to May 2023. The first phase of reflection brought together the team from the New Media department of the Centre Pompidou—Marcella Lista, curator and head of the department, Philippe Bettinelli, curator, and Julie Champion Lagadec, curatorial attaché—along with researchers Andreas Broeckmann and Marie Vicet, and the team from Aalto University in Helsinki, Finland. The latter was composed of design and architecture students Niklas Alenius, Punit Hiremath, Edoardo Piroddi, and Jiaxin Tao, as well as their teachers Lily Diaz-Kommonen and Cvijeta Miljak. This work was structured around three pillars: re-examining the conceptual implications of *Les Immatériaux*; deepening the knowledge of the archives and enriching them with new sources; and conceptualizing a digital object that could convincingly echo the historical exhibition using contemporary virtual design. The software development and graphic interface of the first model were discussed and evolved throughout the project, in what can be seen as a rare opportunity.

Designer and coordinator Matthias Heckel held weekly coordination meetings with the Centre Pompidou team and the Aalto University designers, and execution was handled by the company Netzbewegung.

The Scenography of *Les Immatériaux* Transposed into Virtual Space

Lyotard's first experimental move was to challenge the format and the very notion of an exhibition. He preferred the term *manifestation*:

> It is not a question of explaining but of making the public sensitive to this problematic through the forms in which it appears in the arts, literature, and techno-sciences, and in lifestyles. This event simply presents some of its effects to the eyes and ears as a work of art would. [...] It is intended to make us experience the feeling of the end of an era and the restless curiosity emerging at the dawn of postmodernity.[3]

Invited to experience a non-linear journey, visitors entered through the *Théâtre du non-corps* (Theatre of the Non-Body) (see fig. 2), while at the opposite end of the gallery presented the *Labyrinthe du langage* (Labyrinth of Language). The spatial concept of perspective had been challenged by modern theater and its experience of a mental space of representation. From this Beckettian idea of theater to the abstraction of computers and Minitel, the postmodern condition evoked by Lyotard was, from one site to another, the subject of profound questioning around the place of the body as the seat of perception of the world. As skin is now synthesized in a laboratory, can it still be considered the ultimate barrier between an interior and an exterior of the self? Can trans identity, hermaphroditism, and androgyny overcome the binary view of sex and gender as embedded in Western culture? Are our perceptions being transformed in an age when every object and event can be converted into numbers and studied by computer software? Do the collaborative writing and multiple-choice novels made possible by computers render the notion of authorship inoperative? The exhibition, acting as a space of experience, was designed to

3   *Les Immatériaux*, press kit, 3.

move these philosophical questions into the perceptive field: "We wanted to awaken a sensitivi-ty, not indoctrinate minds. The exhibition is a postmodern dramaturgy. No heroes, no narratives. A maze of situations organized by questions: our sites. A web of voices received by portable headphones: our soundtracks."[4]

Les Immatériaux was set in opposition to a model of the exhibition as universal, transparent, and didactic. Its scenography, designed by architects Philippe Delis and Katia Laffite, was based on ideas of immateriality and disorientation. The sites, delimited by suspended metallic weave partitions of varying opacity, produced a labyrinthine effect and a totally free path (see fig. 3). Starkly contrasting lighting had a theatrical effect. Visitors wore headphones playing soundtracks that varied as they wandered through the exhibition, triggered by a system of infra-red sensors. Composed of electro-acoustic music and readings of literary, philosophical, and poetic texts, this changing acoustic environment enriched layers of sensory experience and meaning. In addition, texts were projected at certain sites by means of an experimental system of "scrollers."

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4   Jean-François Lyotard, "Le partage des conséquences," in *Les Immatériaux: Album et Inventaire*, exh. cat. (Paris: Centre Pompidou, 1985), 5

Combining eye and ear, vision, reading, and walking, the innovative scenography was grounded in the notions of immateriality, disorientation, confusion, and blurring, but also that of filtering, through the various degrees of opacity and transparency of the metallic meshes, super-imposed in layers of varying thickness.

For the Beyond Matter project, the architecture of the sixth floor of the Centre Pompidou was first modeled in 3D in detail, including the structure of visible steel beams and pipes that is one of the building's signature characteristics. Then, through a cross-comparison of the famously stylized exhibition plan and archival photographs of the exhibition, a volumetric analysis was performed to accommodate what is currently known of the works and devices presented in 1985. The choice of a digital space in shades of grey made it possible to emphasize the spectral, diaphanous use of space which gripped the public at the time (see fig. 4). It was also a question of claiming a non-illusionistic space, where color was reserved for the archives and recent photographs of the works. The general principle was to render a conceptual topography sensible. While we lose the immersive and proprioceptive dimension of the historical visit, we gain the possibility of moving freely between the 3D model and the plan to understand our own path. An aerial view of the 3D space is not provided, however, for the idea was to preserve, within the virtual space, a haptic, groping progression through the labyrinth of the postmodern dramaturgy that Lyotard desired.
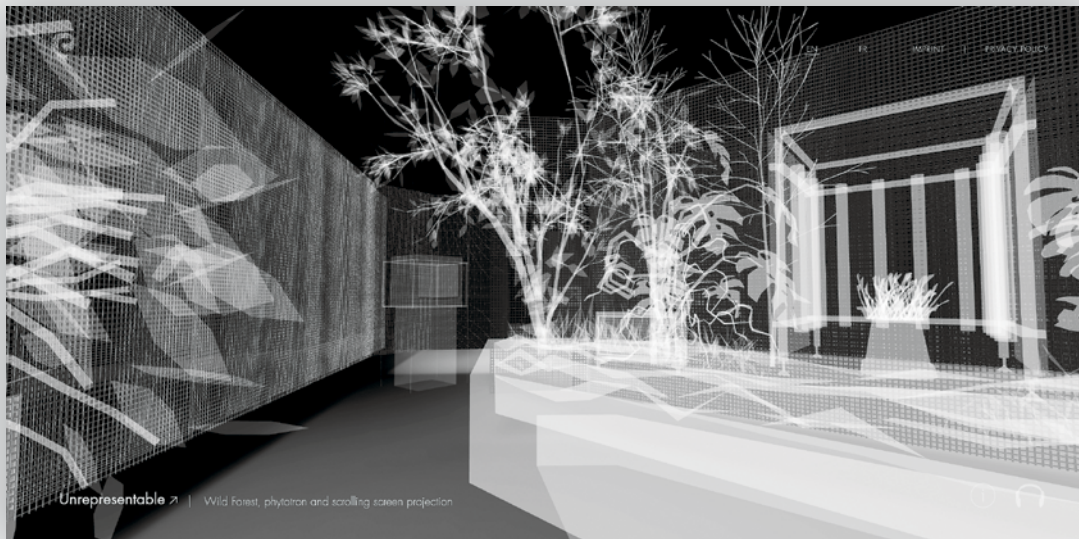
Fig. 4
View of the site *Irreprésentable* **(Unrepresentable) in the 3D exhibition model of** *Les Immatériaux*. **Screenshot.**

The sound zones, which can be listened to on headphones in the virtual space, actualize the feeling of introspection, even of individual reverie, that resulted from the use of infrared headphones in 1985.

Finally, the grey-toned virtual volumes allow several regimes of representation (or manifestation) to coexist in *Les Immatériaux: A Virtual Exhibition*, conceived as a topography to spatialize the exhibition archives.

A Virtual Topography of the Archive

The materials visible in the virtual exhibition are the result of a long process of digitization and indexing—first carried out by the Kandinsky Library as part of a 2010 project on the history of exhibitions at the Centre Pompidou, and then completed by Andreas Broeckmann and Marie Vicet. The three years of research under the Beyond Matter project have also enabled the development of a widely diverse oral history around *Les Immatériaux*.

Field and Moment of the Voice ↗
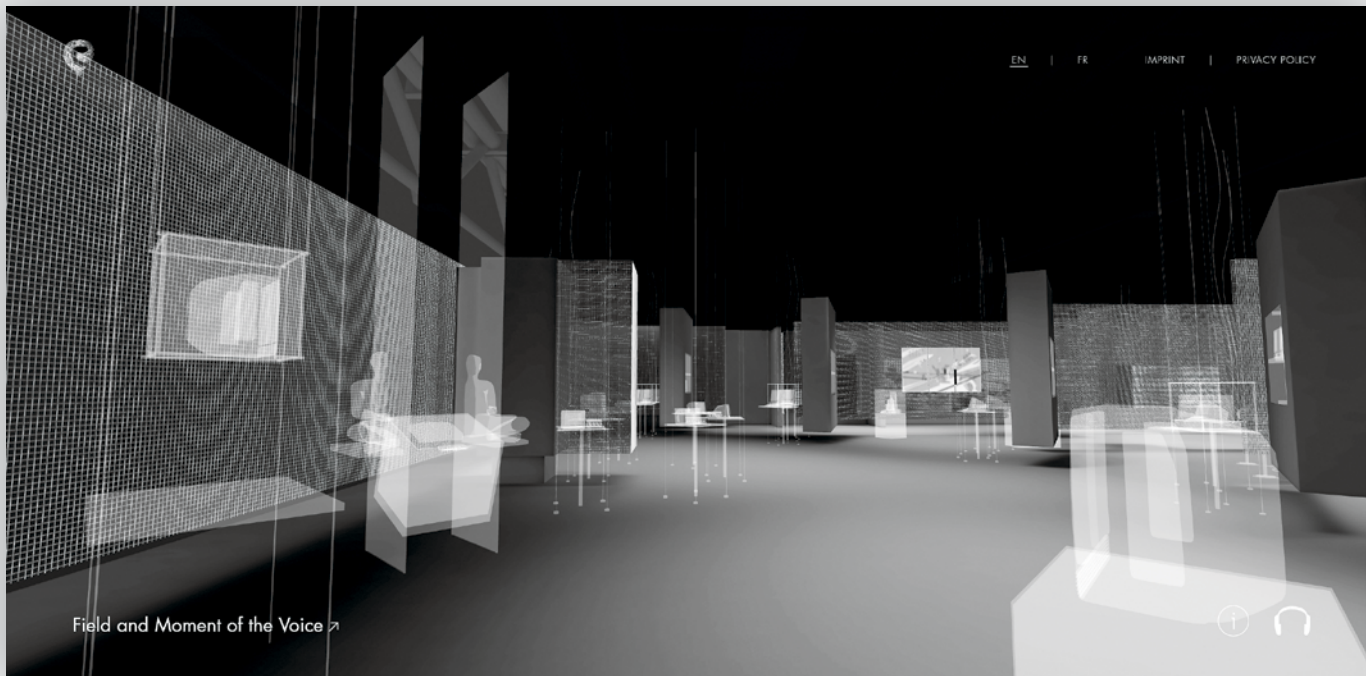
Each of the exhibition's sixty-five sites and some 120 works and devices are documented by selections of photographs and archival documents, which are described and contextualized. The archival documents are situated in the spaces to which they relate and the virtual experience is based on their historicity. This dual approach grants equal importance to all the primary sources—publications, photographs, written documents, sketches, audio recordings, films, oral testimonies—and presents them from several points of view, thus emphasizing the wide range of possibilities. The in-depth research carried out by the project's scientific team has made it possible to complete certain knowledge and clarify certain ambiguities in the documentation.

Like all archives, those of *Les Immateriaux* are incomplete, and there are still no identified photographs of some of the sites. While research is gradually filling these gaps, certain unknowns remain and the project intentionally acknowledges them. The 3D models of works and devices are of three types: those identified in the photographs from 1985 are represented in semi-transparent white; those whose appearance was documented but whose exact location in the exhibition spaces could not be established are represented in semi-transparent black, floating in the center of their respective sites; and those whose appearance and location are unknown are represented as black squares (see fig. 5). These visual codes are discreet, borrowing from Marcel Duchamp's notion of "inframince"—the title of one of the *Les Immateriaux* sites—which evokes micro-perceptions and representations of immateriality. In this sense, the virtual exhibition stands in deliberate opposition to spectacular uses of technology and sensory control.

In addition to the menus which, from the "ghosts" of the works, allow access to the detailed presentation of documents concerning the works and sites concerned, another way of presenting the archives has been developed. During the virtual visit, shots of the original exhibition appear each time the virtual perspective crosses that of an archive photograph (see fig. 6). This stratum appears unexpectedly, like a spectral—and perhaps rebellious—return of the historical material. With a different texture and chromatic range, it is an ephemeral collage that reflects the changing substance of images throughout history, and the temporal gap between their technical and material cultures.

Conclusion

Les Immatériaux: A Virtual Exhibition is intended as a tool for both the uninformed public to experience a discovery and for specialized researchers. It allows various degrees of access and investigation of a wide selection of archives, and has provided the project team with a platform for artistic and curatorial expression. A finding aid developed by the Kandinsky Library offers editorialized access to all the archives, grouped together from two collections: that of the Kandinsky Library and that of the Centre Pompidou's Public Archives, which preserves the entire professional archives of each employee of the institution. Combined with in-depth research into one of the most significant events in the history of curatorial practices, this project aims to raise awareness of, and foster debate on, the legacy of *Les Immatériaux* in the age of virtual reality.

Translated from the French by Liz Carey-Libbrecht.

LES IMMATÉRIAUX. Research and New Acquisitions for the Collection of the Musée National d'Art Moderne – Centre Pompidou

Philippe Bettinelli, Julie Champion Lagadec, and Marcella Lista

When its collection is inalienable, acquisitions can be seen as an indefinite extension of the museum's research activities. Beyond Matter is a long-term project that is compatible with the temporality of the collection entry process, and it has enabled the acquisition of several hundred items. Much of these testify to four essential contributions to *Les Immatériaux*: the works of Annegret Soltau, those of Liliane Terrier, the pioneering infra-red headset system used to broadcast the exhibition's soundtracks, and the Art Accès Minitel project by Frédéric Develay and Orlan.

These items, which have become part of the collections of the museum's Photography, New Media, and Design departments, as well as that of the Kandinsky Library, reflect the variety of traces left by the exhibition, from the works themselves to ↘ archived documents. One of the first stages of the research process they result from was the discovery that many of the material elements constituting the exhibition had disappeared. Several works produced specifically for it had not been preserved, and nor had the original scenographic devices; many of the installations had been based on devices that had subsequently fallen into disuse; and the photographic coverage of the exhibition had many gaps.

A major effort was made to find any elements that were still available, or to reconstruct them where possible. Significant gaps in French public collections were thus filled. Annegret Soltau's work was acquired for the first time in 2020, although this had no connection with her participation in the exhibition *Les Immatériaux*. Liliane Terrier's work was likewise absent before the Beyond Matter project began, despite a recent revival of French research on Copy Art. While many works by Orlan are present in the collections, her partner in the *Art Accès Revue* magazine, Frédéric Develay, was previously not represented. To our knowledge, no other collection on Minitel technology—the main French contribution in the history of telematics—exists in French contemporary art museums. Among these acquisitions, only the Philips infrared device completes a large pre-existing collection, with some sixty pieces in the Musée National d'Art Moderne's (MNAM) collections alone. Through television and radio, they testify to the manufacturer's contribution to the history of telecommunications technologies.

Annegret Soltau, *Schwanger I*, 1978

Three works by Annegret Soltau were acquired in 2020 and 2021 by the Photography Department of the MNAM, as part of a collection dedicated to performance and body art by women artists, created in the 1970s. *Ich als Kreuz* (Me as a Cross, 1978) is a series of photographs illustrating the scratching technique the artist developed in the 1970s after engaging with copperplate engraving. *Schwanger-Sein I* (*Being Pregnant I*, 1977–78) is a famous video that deals with the troubled state of the mother-to-be through a sequence of radical actions. *Gegenüber* (literally: "Opposite", 1980–82) is a large photographic collage, worked with scratches and multiple exposures, in which the artist interacts with her young child.

As part of the Beyond Matter project, a fourth essential work has been added to this collection. *Schwanger I* (*Pregnant I*, 1978) displays another of the artist's signature techniques: the stitching together of fragments of a cut-out photograph (see fig. 1). The young artist, who had graduated from the Hamburg Academy six years earlier, again uses her own body as a model. Her pregnancy inspired her to create a deconstructed image of herself. These disfigured and fragmented photographic representations are sewn together by hand, deviating from the care and discipline associated with the domestic sphere to release a plastic violence, reflecting feelings of distress and non-conformity.

Fig. 1
Annegret Soltau,
Schwanger I (Pregnant I), 1978. Photograph.
Gelatin silver prints
sewn together.

The curators of *Les Immatériaux* got to know Soltau's work during an exhibition devoted to her practice in March 1983 at Galerie Oudin, then located on the boulevard de Sébastopol in Paris. Strangely enough, while Soltau's triptych *Auf dem Gebärtisch* (On the Birth Table, 1978) was exhibited in the site *Maternité* (Maternity), *Schwanger I* was chosen by the curators for the site *L'ange* (The Angel), which examined the figures of the androgyne and the hermaphrodite. This theme was exemplified by the works of Maria Klonaris and Katerina Thomadaki, and by an installation of mannequin heads and mirrors. Soltau's small sewn photograph was reproduced and enlarged as a wall piece, becoming an emblem of the crisis of female identity. In *Les Immatériaux*, scenography, immersion, and design sometimes took precedence over the ideas behind the original work.

Liliane Terrier, *Toutes les copies*, 1985/2022

Originally conceived for *Les Immatériaux*, Liliane Terrier's installation *Toutes les copies* was reconstructed in the context of Beyond Matter and presented in the exhibition *Matter. Non-Matter. Anti-Matter* (ZKM | Karlsruhe, 2022–2023) (see fig. 2). The reactivation of the installation enabled Terrirer's installation, and a corresponding set of eighty-six xerographs that were produced during the exhibition *Les Immatériaux*, to enter French public collections for the first time.

From 1974 to 2011, Terrier was an academic researcher in the Visual Arts Department of the Université Paris 8, where she explored the relationship between text and image through typographic engraving, photocopies, the artist's book, the fax machine, and then the Web, in close connection with a form of urban Land Art spawned by GPS technologies.

In 1983, the Université Paris 8 research team in which Terrier worked designed the "Electragraphy" section of the *Electra* exhibition, which was held at the Musée d'Art Moderne de Paris (MAM) under the curatorship of Frank Popper. Following this, she was invited to design

Fig. 2
Liliane Terrier, *Toutes les copies*, 1985/2022. Reactivation of the installation with original photocopies from 1985. Installation view *Matter. Non-Matter. Anti-Matter*, ZKM | Karlsruhe, 2022–23.

the site *Toutes les copies* in *Les Immatériaux*, which, like other sites in the exhibition, hosted only one work: the installation of the same name. The work consisted of a glass cube measuring 1.80 meters on each side, containing a fax machine and a motley set of objects intended to be reproduced (see fig. 3). In the center of the cube, a student was in charge of answering visitors' questions. Once the xeroxes had been made, they slid out of the cube and could be taken away by the public.

This transparent, perforated, and suspended cube resembled a vivarium in which cohabited the operator in charge of its activation and the visitors invited to enter, along with plants and small animals (aquatic turtles), surrounded by numerous materials, objects, and images. The objects were selected for photocopying after a series of experiments carried out in the months preceding the exhibition in Terrier's studio at the university (see figs. 4 and 5). A set of fifty copies was also presented in the exhibition, on a panel near the installation. The artist poetically grouped them into four categories, depending on the relationship that was maintained between the object and its image through the glass of the copier:

1. The plane is a support for flattening, for arranging or crushing: an aquatic turtle, Brigitte's face.
2. The plane is a support for development: a bush hammer, iron filings and a magnet.
3. Things that are already flat: a prehistoric biface, milk.
4. An image: Chinese stamping on a scroll.

Figs. 4 and 5
Liliane Terrier, *Toutes
les copies*, 1985/
2022. Original set of
xerographs from 1985.
Collection Centre
Pompidou, Paris, Musée
national d'art moderne –
Centre de création
industrielle. Donation of
the artist, 2022.

Infrared wireless headphones and transmitter box from 1985

Each site of *Les Immatériaux* had a sound recording, generally composed of an original musical creation by the IRCAM and a literary or philosophical text chosen by Dolorès Lyotard and read by an actor. The sound contributed to producing a multisensory experience, developed certain themes addressed by the exhibition, and proposed new avenues for reflection (see fig. 6).

Fig. 6
Jack Lang and Claude Pompidou wearing wireless headphones in the exhibition *Les Immatériaux*, Centre Pompidou, Paris 1985.

This soundtrack, divided into thirty-one zones, was played through Philips WH200 infrared headphones, which allowed each visitor to experience the impact of a new technology (see fig. 7). The sound changed abruptly as the visitor moved from one area to another. This effect, identical to that of changing between one radio frequencies, was produced by the infra-red technology, which picked up wireless signals throughout the museum.

To date, this is the only headset found of those distributed to the public at the entrance to the exhibition (see figs. 8 and 9). It was kept successively by the architect Katia Lafitte, in the personal archives of her husband Thierry Chaput, and by the researcher Andreas Broeckmann. Eventually it was housed in the design collections of the Centre Pompidou, heir to the Centre de Création Industrielle, as a testimony to the institution's history and one of its emblematic exhibitions. It also bears witness to the history of sound in curatorial practices, from exhibitions of sound art to the development of immersive mediation practices, of which audio-guides are the most obvious example.

Fig. 7
Advertisement for the
Philips WH200 infrared
headphones from 1985.
Scan

Figs. 8 and 9
A set of infrared wireless headphones (model WH200) and an infrared transmitter box (model WT 200/00) that were used in the exhibition *Les Immatériaux*, **both from 1985.**

Fig. 10
Frédéric Develay and
ORLAN, publishers of
the magazine *Art Accès
Revue* (1984–86).

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LE POISSON ARDENT

agréable et pénétrante
à la fois terme et but
à plat ventre
aprés la tourmente glacée
attiré par des artifices
avance lentement
au fond du trou
bandes du printemps
bruit qui s'annonce
brûle les étapes
cache entre ses écailles
change de couleur
coule dans les veines
dans l'espace visuel
d'arrière en avant
déchirure de l'ecorche
delicates ébauches
deplacement du corps
depouillé de sa peau
derrière l'écran
devient simultaneité
d'un mouvement continu
écartement des côtés
écorche les mots
egendrée par le deplacement
en passant à travers
entame superficiellement
entre deux surfaces
figures dans l'espace
glissent dans les mains

AAR 88
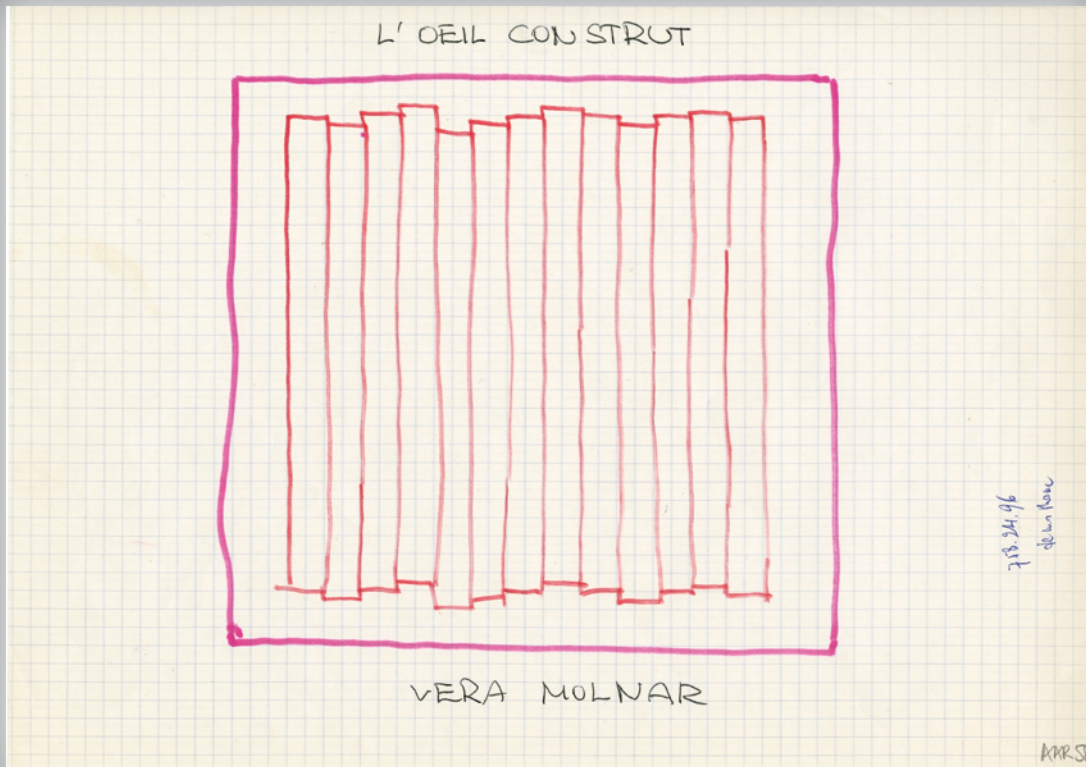
Frédéric Develay and Orlan, *Art Accès Revue*, 1984–86

Acquired by the Centre Pompidou as part of the Beyond Matter project, the archives of *Art Accès Revue* bear witness to the pioneering and singular project of an art magazine on Minitel, published between 1984 and 1986 by Frédéric Develay and Orlan (see fig. 10). Over three years, they invited a hundred artists, composers, poets, and writers to experiment with the graphic language of Minitel.

Each proposal was accompanied by a text of intent written by its creator and by a biographical note written by a critic of their choice. Invited personalities were diverse: French and international, well-known or lesser known, working with new technologies or not. They included Daniel Buren, Henri Chopin, Fred Forest, John Giorno, Jenny Holzer, Isidore Isou, Nam June Paik, Eric Maillet, Vera Molnár, François Morellet, and Lawrence Weiner. Many artists found that experimenting with the graphic and textual language of Minitel resonated with their own practices. Language games, instructions, combinations of text and image, and the evolution of forms through interactivity, among other things, offered rich potential (see fig. 11). Many integrated into their projects the participatory, even playful dimension, to which the medium lent itself.

Art Accès Revue was not only accessible on the paying Minitel network; its designers also presented it in exhibition pieces composed of several terminals. One of the first was designed for *Les Immatériaux* in 1985, for the site called "Labyrinthe du langage" (Labyrinth of Language). Five publicly accessible Minitel terminals were connected to as many CRT monitors arranged in a pyramid shape. While most Minitels could display eight shades of grey, these had colored screens, which was factored into the programming of the magazine's pages. Other presentations took place in the same year at the FIAC and the International Video Festival in Locarno. The diskettes on which the computer data were stored no longer exist, so the only remaining documents from the *Art Accès Revue* are more than 700 photographs and documents, including notes of intent, sketches, diagrams, drawings, and collages, as well as prints and photographs of the screens and work sessions (see figs. 12 and 13).

FAR AWAY, SO CLOSE.
Spatial Politics and the Use of Computer-Generated Exhibition Models in Curatorial Discourse

Elena Papadaki

Especially when focused on works of art reliant on younger technologies, curatorial discourse often points to the inadequate documentation of past exhibitions. This inadequacy excludes non-visitors from having an integrated view of the way the exhibits functioned in space and were inscribed within a wider cultural and political context.

Meanwhile technology itself is increasingly embedded within both exhibition practices and the creation of the works themselves, forging in turn new relations between creators, curators, and the public. Recent years have seen the rise of immersive technologies in museums, fairs, and festivals, while the use of VR headsets, smartphones, and apps now constitutes common museological practice. In this context, "digital doubles," meaning computer-generated exhibitions that exist virtually after the end of their physical counterparts, could become an ideal documentation tool and an all-inclusive resource.

Based on theoretical research and the project outcomes of the two landmark exhibitions that serve as case studies within the framework of the Beyond Matter project, *Les Immatériaux* (Centre Pompidou, Paris, 1985) and *Iconoclash* (ZKM | Karlsruhe, 2002), this

text explores spatial politics, the potential offered by digital ↘ models of past exhibitions and their positioning within contemporary curatorial discourse.

Being There

What is it about the exhibition experience that makes it so important for us to be there? From George Scharf's painting The Royal Academy Exhibition of 1828 (1828), which serves as an indicator of optimal display position within the cultural norms of that time and place,[1] to the "running through the louvre" scene from Jean-Luc Godard's film Band of Outsiders (1964) where we are shown, in a magnificent way, the designated linear pathway of the traditional museum structure, physical space and our own location within it are of essential importance for the so-called art experience.

This state of "being there" has been approached by numerous theorists, historians, and disciplines throughout the years. It is what provides the essential differentiation between the opticality of a single work of art and the experience of viewing it surrounded

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1 According to European exhibition-viewing customs of the time, for a painting to be "earthed" was perfectly acceptable, but to be "skyed" could constitute an insult for its creator. See Karsten Schubert, *The Curator's Egg: The Evolution of the Museum Concept from the French Revolution to the Present Day* (London: Ridinghouse & one-off press, 2000/2009) and Emma Barker, ed., *Contemporary Cultures of Display* (London & New Haven: Yale University Press & The Open University, 1999).

by and interacting with other works. In the 1960s, US art critic Michael Fried saw the latter as a new genre of theatre, and in this respect approached "objecthood" as the context of the "condition of non-art."[2] Fried famously spoke of "theatricality" when referring to the space of exhibitions, while in the 1970s Irish critic Brian O'Doherty explored the ideology of the white-cube form as the "authentic" aesthetic experience.[3] Many critics initially presented the act of physically being in the exhibition space and experiencing artworks, especially when those works dealt with space and time (as is the case for a great number of contemporary exhibitions), as the antipode of Modernist appreciation, where space and time are excluded from the equation of the art experience.

Recent years have seen a proliferation of touring exhibitions, with set designs and ready-made exhibition spaces being disassembled and re-assembled across the world to provide technically identical, if not very similar, museum experiences. With the rapid advancement of audiovisual technologies and their integration within contemporary art production and, subsequently, museological discourse, immersive practices have come to constitute common exhibition practice.[4]

At the same time, "the condition of being on display remains fundamental to the construction of the category 'art' in the modern western world," as Emma Barker put it, adding that display is "a form of representation as well as a mode of presentation." It is always "produced by curators, designers etc. As such, it is necessarily informed by definite aims and assumptions and evokes some larger meaning or deeper reality beyond the individual works in the display."[5] If we take as a starting point that exhibitions are essential contributors to the making of art history,[6] curatorial initiatives that produce meaning and direct the narrative in an exhibition space become increasingly important for the canon. As an indicative example, the curatorial choices for two exhibitions around a similar theme that took place around the same time in the same city created nearly antithetical narratives around the topic of technology. The exhibition Digital Revolution (Barbican Centre, London, 2014) focused on the coexistence of the "old" and the "new" in the exhibition space, often employing new technologies to complement equipment and tools that could otherwise have looked uninterestingly dated, as in the "Early Digital Animation" section. On the other hand, Electronic Superhighway (2016–1966) (Whitechapel Gallery, London, 2016) adopted a spatial separation between different eras; the "archaic" exhibits were presented in a mostly linear order on pedestals and on a separate floor from the main exhibition space, where the more contemporary works were placed. The first exhibition attempted to promote a symbiotic relationship with the technological past, while the second tried to provide an overview based

2   See Michael Fried, "Art and Objecthood" (1967), in *Art and Objecthood: Essays and Reviews* (Chicago, IL: The University of Chicago Press, 1997), 148–72.

3   See Brian O'Doherty, *Inside the White Cube: The Ideology of the Gallery Space* (1976) (Santa Monica, CA: The Lapis Press, 1986).

4   For an exploration of the varying applications of immersive practices within the creative arts, see Elena Papadaki, ed., *Radical Immersions – Navigating between Virtual/Physical Environments and Information Bubbles*, DRHA 2019 Conference Proceedings, September 8–10, 2019, Watermans Arts Centre (London: DRHA/University of Greenwich, 2020).

5   Emma Barker, ed., *Contemporary Cultures of Display* (New Haven, CT/London: Yale University Press/The Open University, 1999), 13.

6   See Walter Grasskamp, "For example, *Documenta*, or How is Art History Produced?" (1985), in *Thinking About Exhibitions*, ed. Reese Greenberg, Bruce W. Ferguson, and Sandy Nairne (London: Routledge, 1996), 67–78; Nanne Buurman and Dorothee Richter, "documenta: Curating the History of the Present," *On Curating* 33, ed. Dorothee Richter (June 2017): 2–8.

(mostly) on chronological order through the placement of objects in the space.[7]

Space often becomes inseparable from curatorial praxis, since this is where the exhibition field becomes what French philosopher Elie During has called "a field of action or of artistic intervention: we represent it, give it a theme, disturb its logic by displacing its spatial or temporal limits, by reversing its value or functions, etc."[8] With a similar logic, nearly two decades after the experience of the exhibition itself, artist Philippe Parreno said that "Les Immatériaux was an exhibition producing ideas through the display of objects in space."[9] If the essence of an exhibition is directly dependent on the placement of exhibits in space and the strategic decisions that are taken regarding the story that needs to be told, spatial politics and multisensory interactions constitute an essential component of the exhibition event.

Once in an exhibition space, the visitor is faced with multiple flows of information, not just the works themselves but often introductory texts, wall labels, and signage indicating a designated pathway. There is also a constant multisensory interaction with exhibits and other visitors. These overlapping flows of information function as what Mark Wigley describes as an "immersive environment and as a discursive system of detection, analysis and visualization."[10] Here, the "discursive" and the "immersive" elements seem to be presented as different poles.[11] Historically, the discursive element was a primary concern for the museological tradition, since it originally served a taxonomical and educational purpose; arguably, the raison d'être of exhibitions has been to inform and educate their audiences. On the other hand, immersion has been articulated in different ways over the years, although as Oliver Grau writes "the concept may appear somewhat opaque and contradictory":

> in most cases immersion is mentally absorbing and a process, a change, a passage from one mental state to another. It is characterised by diminishing critical distance to what is shown and increasing emotional involvement in what is happening.[12]

By promoting vision over the other senses, exhibitions automatically create a condition of "objecthood" and thus immersion within a pre-arranged environment. In practice, every exhibition is both immersive and discursive as it creates a new space of both physical and conceptual interactions.

Not Being There

This interdependent relationship between the discursive and the immersive is disrupted when the physical element (i.e., "being there") is taken out of the equation. Retrospective access to the staging of an exhibition has been so far extremely limited. Archival research usually offers documentation: a list of works, a floor plan, photographic material, and written communication between the organizers of the

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7   For a presentation of the two exhibitions and their curatorial approaches to digital histories, see Elena Papadaki, "Between the Art Canon and the Margins: Historicizing Technology-Reliant Art via Curatorial Practice," *Arts* 8, no. 3 (2019): 121, doi.org/10.3390/arts8030121. For a review of *Electronic Superhighway (2016–1966)*, see Matthew Fuller, "Eleven Pro-Tips for Art Plus Internet," *Mute*, February 16, 2016, http://www.metamute.org/editorial/articles/eleven-pro-tips-art-plus-internet; Lynton Talbot, "Electronic Superhighway (2016-1966)," *Art Monthly*, 394, March 2016. For a review of *Digital Revolution*, see Duncan Geere, "Barbican's 'Digital Revolution' exhibition is a triumph of ideas," *Wired*, July 2014; Daniel Rourke, "Digital Revolution at the Barbican: a review" *Furtherfield*, 2014, https://www.furtherfield.org/digital-revolution-at-the-barbican-a-review/

8   Elie During, Dominique Gonzalez-Foerster, Donatier Grau, and Hans Ulrich Obrist, *Qu'est-ce que le Curating?* (Paris: Manuella Éditions, 2011), 12.

9   Hans Ulrich Obrist and Philippe Parreno, *The Conversation Series*, vol. 14 (Cologne: Walther König, 2008), 17.

10   Mark Wigley, "Discursive versus Immersive: The Museum is the Massage," *Stedelijk Studies* 4 (2016): 1–11 (quotation on 1).

11   The terms themselves are arbitrary, as similar analogies have been presented when discussing the exhibition experience. Nicholas Serota's *Experience or Interpretation: The Dilemma of Museums of Modern Art* (London: Thames & Hudson, 1996) creates a parallel polarization. The important aspect here is the dichotomy between the cognitive and emotional element when navigating the exhibition space.

12   Oliver Grau, *Virtual Art: From Illusion to Immersion* (Cambridge, MA: MIT Press, 2003), 13.

exhibition (curators, administrators, museum staff, legal advisers, and so on) but not the experience of being within the exhibition space or accessing the narrative created by the juxtaposition of works. Inadequate information exists to recreate the systems of representation in place and examine the politics of display that built a narrative. Although ongoing discourse in art history, exhibition theory, and museology has insisted on the importance of the spatial aspect in understanding exhibited art, the documentation of past exhibitions, even in recent publications, tends to be similar to the list above, omitting standardized audiovisual material and computer-generated remodeling.

The 2017 virtual reality reconstruction of documenta 1 (1955) by the Art History and Theory Department at Kunsthochschule Kassel testifies to the growing attention to past exhibitions and the need for digital remodeling to gain a spherical understanding of exhibition events. In 1996, when Grasskamp discussed the historicizing of documenta in his seminal essay "For example, *Documenta*, or, how is art history produced?," he explained that while the exhibition organizer and curator Arnold Bode's "achievement, staging evaporated on the day it was disassembled," the art writer and academic consultant Werner Haftmann kept "what had proved to be enduring: his theoretical outlines and historiographical constructions, the canon of the works selected and, above all, even some of their photographs."[13] Due to the timeframe of documenta 1 and the technological means of mid-twentieth-century Europe, photographs of the works and the exhibition view were the best that could be achieved in terms of accurate documentation and subsequent historicization of the exhibition. Grasskamp expanded his argument further by suggesting that

more important than the original in the twentieth century is the reproduction, the photo. If it is available to the art historian, he can easily canonize an artist in the holy book and especially through color plates, for a picture is worth a thousand words and a color picture still more.[14]

Considering the possibilities currently offered by accessible technologies and online communication, audiovisual documentation and computer-generated digital remodeling of past exhibitions could constitute a powerful tool for a holistic understanding of exhibition spaces and the makers of art history.

Such digital models are called to fulfil a very particular role: they are neither a "copy" of a past physical exhibition nor a new virtual one. I suggest that they can be seen as proxies, assuming the cultural work of standing in for the actual event. In this capacity, they have the potential to "standardize knowledge,"[15] to use Dylan Mulvin's phrase, while providing a foundational storyline for exhibition histories.

The online platforms for the two digital models of *Les Immatériaux* and *Iconoclash* in the framework of the Beyond Matter project operate as proxies of the two exhibitions by evoking their spatial assemblages and curatorial approaches.[16] As Mulvin has shown:

Proxies function as the necessary forms of make-believe and surrogacy that enable the production of knowledge. Such knowledge production relies on accessible representations of the world, and proxies are the people artifacts, places, and moments invested with the authority to represent the world.[17]

13　　Walter Grasskamp, "For example, *Documenta* …," 74.

14　　Grasskamp, "For example, *Documenta* …," 74.

15　　See Dylan Mulvin, *Proxies: The Cultural Work of Standing In* (Cambridge, MA: MIT Press, 2021).

16　　See "Beyond Matter. 2022. Digital models of the exhibitions *Les Immatériaux* and *Iconoclash*," https://exhibitions.beyondmatter.eu/?terminal=1, accessed January 20, 2023. See also Jean-François Lyotard, "Les Immatériaux" (1985), in *Thinking About Exhibitions*, ed. Reesa Greenberg, Bruce W. Ferguson, and Sandy Nairne (London: Routledge, 1996), 159–73.

17　　Mulvin, *Proxies*, 4.
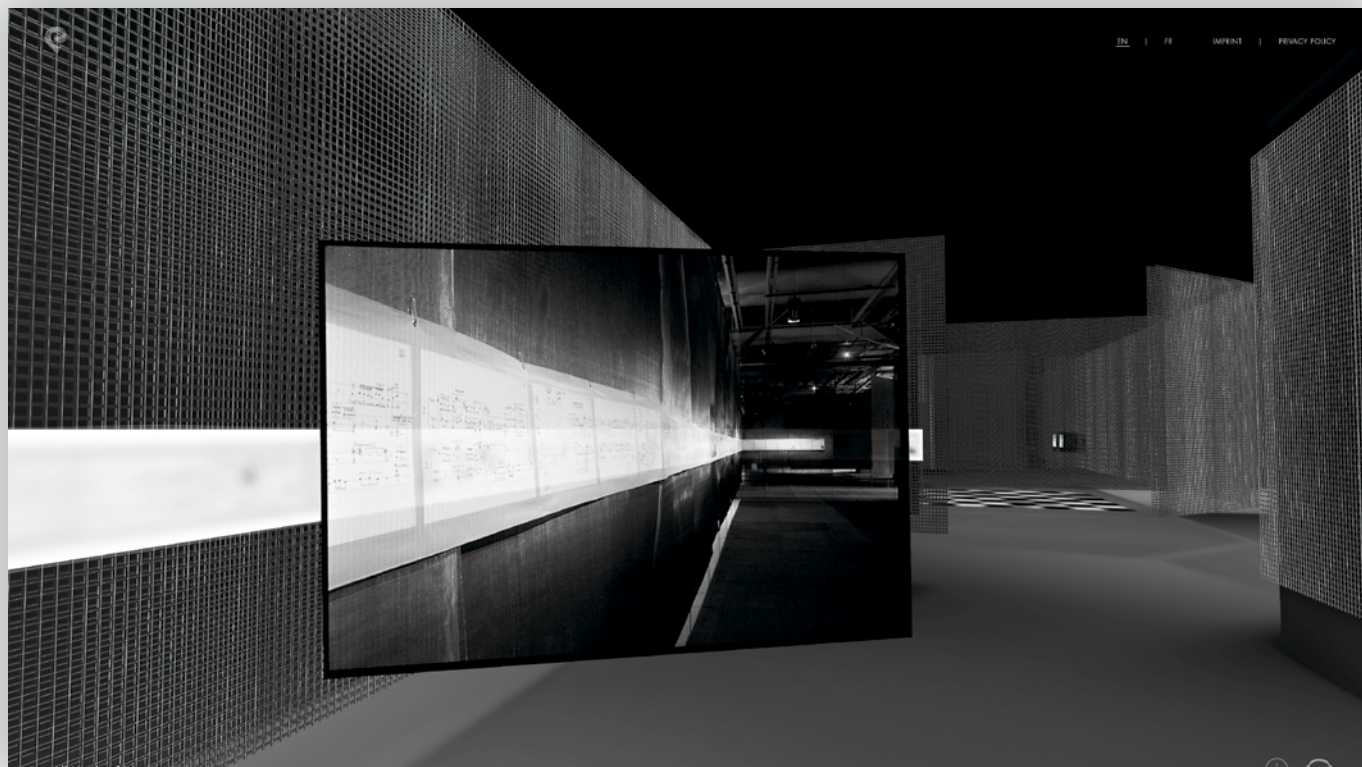
In their conceptualization and scope, the two computer-generated platforms present insightful and different approaches to exhibition remodeling. As explicitly stated in the Beyond Matter project information pack, they were never intended to be the "digital twins" of the two landmark exhibitions but rather reflect an experiential approach to exhibition documentation in line with the initial curatorial concepts.[18]

In the case of *Les Immatériaux*, the digital remodeling aimed at the faithful reconstruction of the curated event, to the extent that this was possible, and a virtual revisiting of the original spatial experience. The user can navigate throughout the exhibition and obtain an accurate account of the space, the exhibits, and the designated pathways (see fig. 1). A moment of revelation occurs for the viewer as Philippe Délis's and Jean-François Lyotard's detailed exhibition plans come to life; for the first time since the actual exhibition took place, an online visitor can visualize the curatorial choices that staged a series of interactions between the works in the space. Textual documentation

and archival information (see fig. 2), as well as an interactive version of the exhibition plan, exist alongside footage from the 1985 exhibition and the computer-generated exhibition itself. Missing information and the impossibility of assigning the correct space to certain exhibits are clearly indicated throughout. What is presented is thus a comprehensive and all-inclusive version of the exhibition.

At the same time, navigating on the platform can become a frustrating experience. There are glitches, and the viewer has limited control of their movement in space (they can only do this by using the arrows on a keyboard) and a sense of a limited viewpoint. To anyone accustomed to the aesthetics, speed, and functionality of commercially focused interactive platforms, the virtual visit to the two exhibition sites is distinctly different from contemporary interactive and/or immersive platforms. And yet this trait seems to amplify the platform's purpose in terms of its proxification and overall scope: to establish a virtual space as a pedagogical tool and the implicit imposition of a required timeframe for its exploration.

18 The computer-generated models of the two exhibitions were accessed from a personal computer during the period May to January 2023 and all comments in this text refer to that version of the platforms.

Fig. 2
Digital remodeling of *Les Immatériaux*. Screenshot of the textual documentation and archival information.
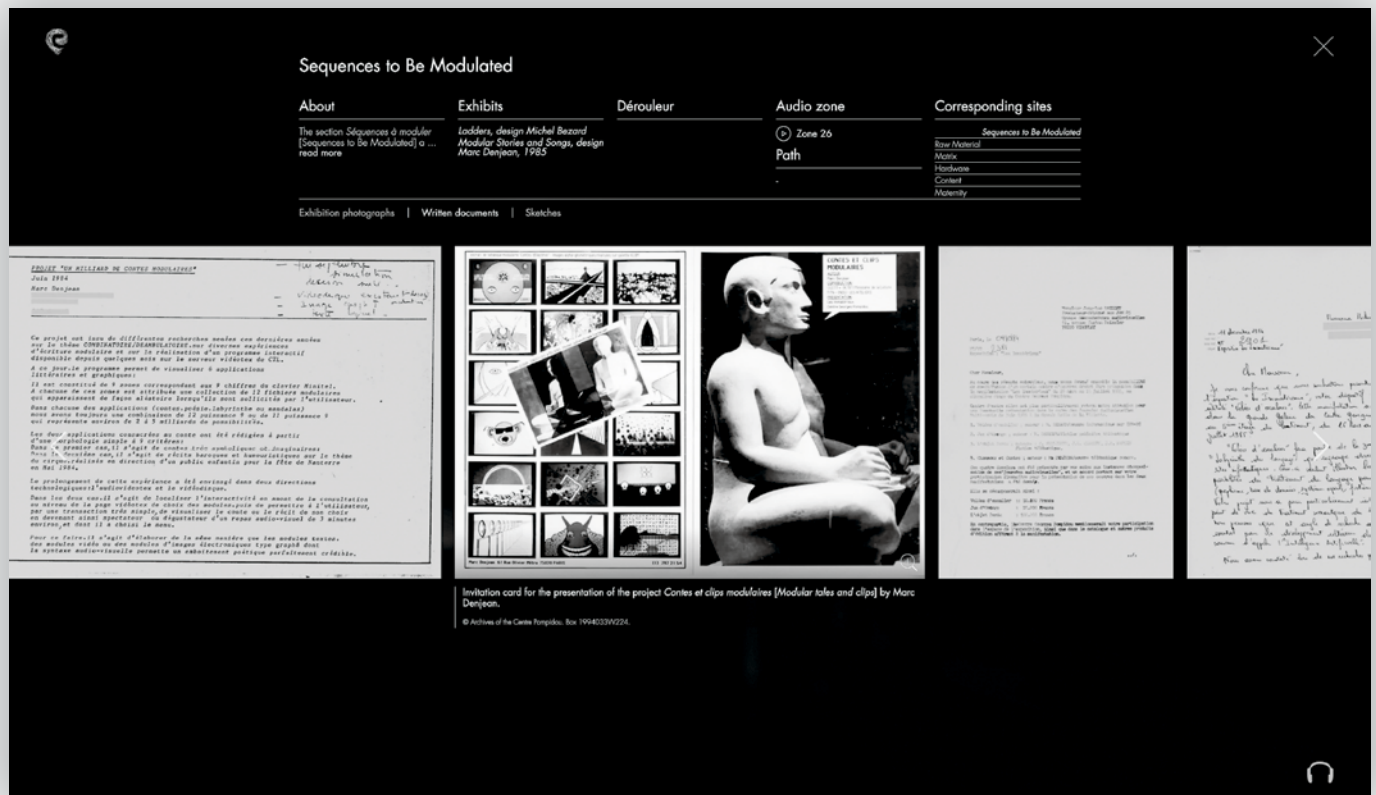
In the computer-generated version of *Iconoclash*, the remodeling follows a different principle while remaining faithful to the concept of the curatorial team: navigation and artwork selection choices are followed by a reshuffling of the elements in space. Although the first installation view accurately reflects the physical exhibition of 2002, when one artwork is selected those perceived as conceptually similar move closer to it while the rest move away.

Navigation here is smoother as the virtual space facilitates the arrow movements. An eerie sonic pattern, accompanied by manifesto-type statements from the exhibition (such as "No more representation!," "No more art!," "Scandal-mongers!," and "So much indignation!") provide an additional layer to one's overall perception of the exhibition space. Once a work is selected and the synthesis is reshuffled, archival photographic footage gives an insight into the 2002 curatorial setup.

The work here has the potential to integrate the viewer within a new re-mapped version of the exhibition space: the architecture of ZKM is

eliminated and the digital remodeling is based on the temporary architecture designed by Manfred Wolff-Plottegg. It is a proxy that also offers a newly curated exhibition experience. In creatively engaging with the exhibits and curatorial display choices, users are placed at the epicenter of the narrative, making their own choices and creating a tailor-made exhibition space. Once a visitor approaches a work, a selection is presented on the right of the screen, including the work itself and its surrounding exhibits. Additionally, archival photographic footage with the exhibited works features in the same space (see fig. 4).

In both cases, the computer-generated exhibition platforms alter the performance of the existing virtual space; users follow pre-designated pathways to experience the exhibition. Having emerged as the result of critical, cultural, and curatorial thinking about the original intentions and concepts of each exhibition, each remodeling becomes an indispensable research tool and an all-inclusive resource.

As proxies of the exhibitions they are addressing, the two models function along the
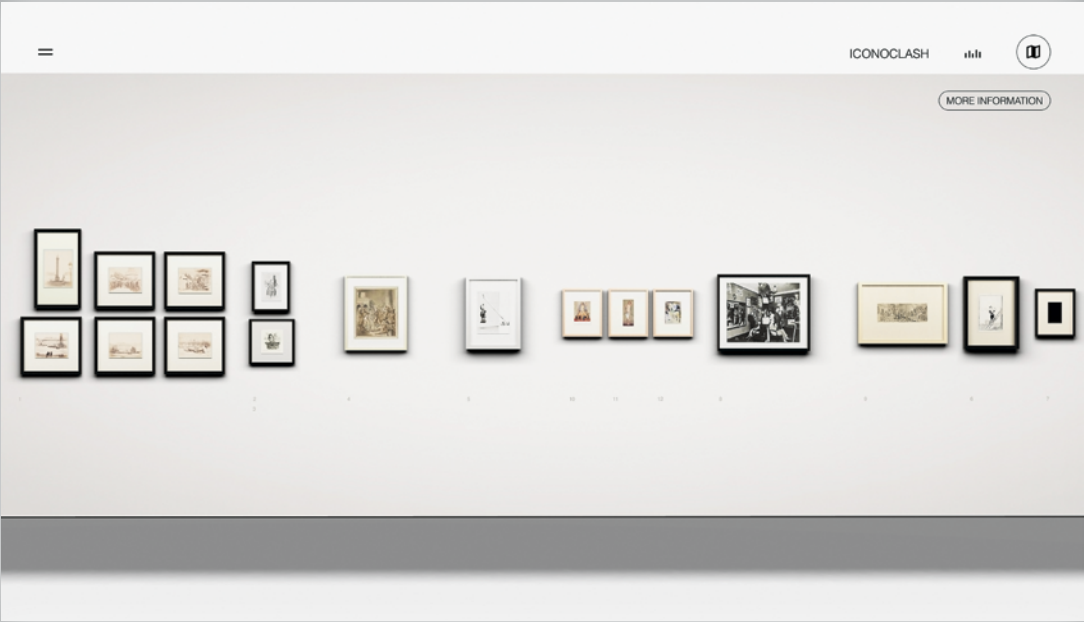
Fig, 3
Iconoclash as a Digital Experience. Screenshot of a wall with framed artworks.

Fig. 4
Iconoclash as a Digital Experience. Screenshot of an exhibited work with additional archival photographic footage.

lines of a "research exhibition," transforming objects into documents.[19] Even the rethinking of the space itself, together with the relationship between the conceptual axes of the exhibition narrative and the curatorial initiatives for the placement of the works, become *evidence* rather than *experience.*

Faraway, So Close

In the 1993 film *Faraway, So Close!*, directed by Wim Wenders, a continuous back and forth between black-and-white and color film is used to convey the alternately angelic and human points of view. Navigating the two computer-generated exhibition platforms brings a similar feeling of being in a constant limbo state whereby you recognize all the imagery from afar but are not exactly within it. The exhibition experience is both revelatory and distant. The indecisive moments of both being and not being there (discursive and immersive, thoroughly researched and yet impossible to complete, at times visually or sonically melancholic and yet overtly technical) seem to create an ongoing dichotomy between distance and closeness to the curated event.

There is also a sense of instant gratification when exploring the digital models of *Les Immatériaux* and *Iconoclash*; long-awaited answers to several questions are revealed and all the fragmented pieces of information are puzzled into place. What is subsequently created is the image of a whole, and with this the illusion of what Mulvin calls the standardization of knowledge. The two computer-generated exhibitions function as proxies and as such they offer a nearly holistic view of their corresponding landmark exhibitions as concepts

and events. They also call for a contextual reading that would consider their specific characteristics and be integrated within an interdisciplinary arts framework.

Having previously argued for documentation models that capture the essential elements of an exhibition,[20] I find that these virtual reconstructions of landmark exhibitions serve as valuable tools for comprehensive study and the accurate analysis of curatorial choices while placing them within a historical, political, and social context. This concerns the works per se, the dialogue that is created between them, and the space of the exhibition. Since new material continues to enrich the two computer-generated exhibitions, they are not merely an archival platform for documentation and preservation but also a living organism that keeps developing based on the elements added to its database. In a way, these are newly curated and enhanced versions of the original curated events. They don't act as doubles or as an accompaniment to the original points of reference; instead, they constitute a thoroughly researched and critically engaging project in which the audience is invited to participate. As a pedagogical tool, they are already an indispensable resource for the study of exhibition histories. It is hard to imagine a researcher or educator now talking about *Les Immatériaux* or *Iconoclash* without referring to the corresponding Beyond Matter project outputs. By approximating the exhibition spaces and painstakingly collecting all relevant documentation surrounding the curated events while remaining faithful to their initial conceptualization, the virtual re-enactment of the two exhibitions introduces a new standard for exhibition histories that can be established, learnt, and embodied.

19   See Wigley, "Discursive versus Immersive."
20   See Papadaki, "Between the Art Canon and the Margins."

AURA BEYOND MATTER

Graham Harman

New Materialism and its Challenges

One of the most significant theoretical trends of the early twenty-first century has been New Materialism, most clearly embodied in a key pair of books with similar titles: the 2010 anthology *New Materialisms* (co-edited by Diana Coole and Samantha Frost) and the 2012 monograph *New Materialism* (co-authored by Rick Dolphijn and Iris van der Tuin).[1] The former contains chapters by canonical New Materialists such as Sara Ahmed, Jane Bennett, and Rosi Braidotti, with Karen Barad perhaps the most notable absence (see fig. 1). The latter book, at least in its four prefatory interviews, ranges a bit more widely: here, alongside Barad and Braidotti, we find conversations with Manuel DeLanda and Quentin Meillassoux. And while DeLanda and Meillassoux could certainly be called materialists, they are notable outliers with respect to the main core of the New Materialism movement.[2] DeLanda is heavily committed to philosophical realism in a way that most New Materialists are not, while Meillassoux upholds a supremacy of mathematical access to the world that is by no means shared by others in the movement.

The best way to understand the appeal of New Materialism is to consider the excesses (inevitable in any period) of the style of thinking that preceded it. In the words of Coole and Frost: "It is true that over the past three decades or so theorists have radicalized the way they understand subjectivity, discovering its efficacy in constructing even the most apparently natural phenomena while insisting upon its embeddedness in dense networks of power that outrun its control and constitute its willfulness. Yet it is on subjectivity that their gaze has focused."[3]

It could hardly be said better. The 1980s and 1990s were not easy decades for anyone in the humanities with interest in topics beyond language and human power-plays; Jacques Derrida and Michel Foucault were the gold standard, and almost exclusively so, for all work that wanted to seem at the cutting edge. In this respect the advent of New Materialism opened the windows at last, allowing fresh breezes to permeate the room. Even so, there are at least five problems with New Materialism that might lead us to feel a degree of concern. First, in some quarters of the movement there is a premature tendency to affirm the oneness of the cosmos, as if the existence of distinct forces and zones were somehow merely the derivative after-effect of a primal whole. Second, the thought/world duality of modern thought is often secretly preserved at the very moment it is said to be overcome. Third, by too quickly defining what lies beyond thought as "matter," we run the risk of losing the very surplus or inscrutability that matter was supposed to designate. Fourth, there is a marked proclivity to valorize

Fig. 1
Rosi Braidotti.

1   See Diana Coole and Samantha Frost, eds., *New Materialisms: Ontology, Agency, and Politics* (Durham, NC: Duke University Press, 2010); Rick Dolphijn and Iris van der Tuin, *New Materialism: Interviews and Cartographies* (Ann Arbor, MI: Open Humanities Press, 2012). The latter work appeared in the New Metaphysics series at Open Humanities Press, which I co-edited with Bruno Latour until his untimely death in October 2022, and now edit alone.

2   See Manuel DeLanda, *Intensive Science and Virtual Philosophy* (London: Continuum, 2002); Quentin Meillassoux, *After Finitude: An Essay on the Necessity of Contingency,* trans. R. Brassier (London: Continuum, 2008). First published as *Après la finitude* (Paris: Éditions du Seuil), 2006.

3   Coole and Frost, *New Materialisms,* 2.

relations and interactions while downplaying individuals taken in isolation. Fifth and finally, most New Materialists hastily assume that dynamic flux is an unalloyed ontological and political good, with any concession to stasis and stability inviting little but intellectual rot and political oppression. Before moving on, let's look briefly at each of these dangers, which now risk becoming dogmas in their own right.

Jane Bennett has long been one of the most powerful voices in New Materialism, gifted with a lucid writing style and a trunk full of novel political ideas, including the liberating notion that non-human entities belong to the polis in ways that modern political theory (both left and right) has tended to efface.[4] My worry about Bennett stems from her sometimes excessive allegiance to the Spinozist side of the philosophy of Gilles Deleuze, whose claim to balance the "heterogeneous" with the "continuous" inevitably gives much greater weight to continuum over variety.[5] In a passage I have often cited, Bennett characteristically proposes that individual objects should be considered as "those swirls of matter, energy, and incipience that hold themselves together long enough to vie with the striving of other objects, including the indeterminate momentum of the throbbing whole."[6] If we assume such a "whole" exists, and that individual objects are merely "swirls of matter, energy, and incipience" within that whole, we adopt an almost pre-Socratic opposition between one pole of union and another of distinction that are

extremely difficult to bring into contact. The vibrancy that Bennett rightly claims to restore to matter ends up belonging primarily to this underdetermined wholeness, and only secondarily to the countless elements of the world that she otherwise seeks to empower.[7]

But monism itself is not the sole problem, as seen from comparable problems arising from a more dualistic form of New Materialism: that of Karen Barad, whose *Meeting the Universe Halfway* (2007) is probably the most systematic philosophical treatise to emerge from the movement so far.[8] In one sense, Barad adheres more to the old idealism than Bennett, who has a relatively flat ontology in which minds and things belong equally to the envisaged primal whole. For Barad, as for her eminent ⬎model Niels Bohr, the mind co-produces reality through its observations, a process she refers to strikingly as an "agential cut," comparable to the famous collapse of the wave function in quantum theory. There is much to be learned from Barad's marvelous book. Yet it also swallows whole the background assumption of mainstream modern philosophy—namely, the idea that the difference between human thought and everything else is the axis around which the entire universe revolves, even if we humans are just a tiny endangered species in a cosmos that becomes all the vaster with every new image from the James Webb Space Telescope. Stated differently, Barad resembles Slavoj Žižek (who appreciates her work too little in print) in treating human consciousness as a

4   See Gulshan Khan, "Agency, Nature and Emergent Properties: An Interview with Jane Bennett," *Contemporary Political Theory* 8, no. 1 (2009): 90–105. See also Graham Harman and Bruno Latour: *Reassembling the Political* (London: Pluto, 2014); Graham Harman, "Realism Without Hobbes and Schmitt: Assessing the Latourian Option," in I*dealism, Relativism, and Realism: New Essays on Objectivity Beyond the Analytic-Continental Divide*, ed. Dominik Finkelde and Paul Livingston (Berlin: De Gruyter, 2020), 259–75.

5   See Baruch Spinoza, *Ethics: Proved in Geometrical Order* (1677), ed. Matthew J. Kisner (Cambridge: Cambridge University Press, 2018); Gilles Deleuze, *Expression in Philosophy: Spinoza* (1968), trans. Martin Joughin (New York: Zone Books, 1992).

6   Jane Bennett, "Systems and Things: A Response to Graham Harman and Timothy Morton," *New Literary History* 43, no. 2 (2012): 225–33 (quotation on 227). Bennett was responding to the following articles: Graham Harman, "The Well-Wrought Broken Hammer: Object-Oriented Literary Criticism," *New Literary History* 43, no. 2 (2012): 183–203; Timothy Morton, "An Object-Oriented Defense of Poetry," *New Literary History* 43, no. 2 (2012): 205–24.

7   See Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham, NC: Duke University Press, 2010.)

8   See Karen Barad, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (Durham, NC: Duke University Press, 2007).

kind of ontological miracle, radically different in kind from everything else.[9] For why is it precisely *thought* and *world* that need to "meet halfway," as if they were the two chief negotiators in the room? Why not demand compromise, instead, between Saturn and gold dust, or fruit flies and black holes? The assumption that humans belong in one ontological basket and *everything else* in the other dates back to the works of René Descartes in the seventeenth century, and belong to an increasingly troubled modernism, as demonstrated by Bruno Latour in his widely-read analysis (see fig. 2).[10] My own technical term for this assumption is "onto-taxonomy," defined as the unjustified view that human thought is equivalent to half of the universe.[11]

Speaking of Latour, it is he who made the best case in advance for my third objection: the fact that materialists originally intended "matter" to describe the uncertainty of that which resists our understanding but always ends up taking the form of some dogmatic theory or other. As Latour argues in his underutilized article "Can We Get Our Materialism Back, Please?," materialist arguments have always had a paradoxically idealist flavor: "For a short while, materialism seemed to be a foolproof appeal to a type of agency and a set of entities and forces that allowed analysts to explain, dismiss, or see through other types of agencies … like morality, culture, religion, politics, or art."[12] Yet in doing so, materialism always chose one particular kind of agency as the only "real" one while consigning others to the flames. Initially the privileged agent consisted of tiny physical particles swerving through a void,

of which all else was said to be made; later, it became the reality of oppressive economic conditions, concealed by the ideology of a selfish ruling class. But more recently the "matter" of materialism has taken on a cultural form, as in the eloquent complaint of Levi R. Bryant: "Materialism has become a *terme d'art* which has little to do with anything material. Materialism has come to mean simply that something is historical, socially constructed, involves cultural practices, and is contingent."[13] But whichever of these agencies (particles, economics, practices) one prefers, it is stripped of its mysterious inner life and becomes a perfectly measurable force, capable of snapping everything else into line. Although materialists initially claimed matter as a supplement to rigid conceptualizable form with a taste of surplus darkness, it ends up becoming just another overdetermined weapon in polemical argument.

But if Latour is a valued guardian against this aspect of materialism, he remains compromised by the fourth flaw of New Materialism (despite his being merely a fellow traveler of the movement). I speak of an excessive fondness for relations over isolated individuals. Referring to the "actors" of his actor-network theory (ANT), Latour states that "there is no other way to define an actor but through its action, and there is no other way to define an action but by asking what other actors are

Fig. 2
Bruno Latour at "GLOBALE: Next Society – Facing Gaia. Panels & Round Table," ZKM | Karlsruhe, 2016.

9   See Slavoj Žižek, *Less Than Nothing: Hegel and the Shadow of Dialectical Materialism* (London: Verso, 2012).

10   See Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993). First published as *Nous n'avons jamais été modernes* (Paris: La Découverts, 1991).

11   See Graham Harman, *Dante's Broken Hammer: The Ethics, Aesthetics, and Metaphysics of Love* (London: Repeater, 2016), 237; Graham Harman, "The Only Exit from Modern Philosophy," *Open Philosophy* 3, no. 1 (2020): 132–46; Niki Young, "Only Two Peas in a Pod: On the Overcoming of Ontological Taxonomies," *Symposia Melitensia*, no. 17 (2021): 27–36.

12   Bruno Latour, "Can We Get Our Materialism Back, Please?," *Isis* 98, no. 1 (2007): 138–42 (quotation on 138).

13   Levi R. Bryant, *Onto-Cartography: An Ontology of Machines and Media* (Edinburgh: Edinburgh University Press, 2014), 2.

modified, transformed, perturbed, or created by the character that is the focus of attention."[14] In other words, things are real only if, and only insofar as, they have effects on other things. Martin Heidegger's famous question of the meaning of being is tacitly answered by saying: to be is to be in relation.[15] As liberating as this may sound, it faces an insurmountable objection: if there are no relata independent of their relations, there is no way that anything could or would ever change. That is to say, since everything would be entirely exhausted by its relational character here and now, any given object would have reached perfect ontological satisfaction in the present moment; nothing unexpressed would lurk in reserve, capable of disrupting the current state of things. Despite the recent tendency to link relations with vital and political dynamism, no ontology leads more directly than this one to utter and absolute immobility. As early as Ancient Greece, Aristotle made roughly the same objection to the Megarians, who also held that things are nothing more than whatever they are right now.[16] ANT can tell us a lot about what has already happened, but nothing about what might happen next, since if this theory were strictly true then nothing more could ever happen.

That brings us to the final prejudice of New Materialism: the notion that flux and becoming are always good, while endurance and stability are merely the fossilized catechism of cruel elder patriarchs. In recent years, the pro-flux standpoint has been argued most thoroughly by US philosopher Thomas Nail and prominent Estonian intellectual Rein Raud (pronounced "Rain Rowd") (see fig. 3).[17] Their ultimate intellectual ancestors are Heraclitus and Henri Bergson, by way of the recent mediation of Deleuze. One of the problems with this standpoint is that, by ontologizing flux, it ends up unable to make the distinction it wants to draw between creative becoming

and petrified stasis. If everything is in constant flux, then the traditionalist eons of Egypt or Rome are just as temporally dynamic as the Zapatistas or May '68. Someone merely cutting their toenails would already be an example of "flux," and the same if they fail to do so, or carve hieroglyphics in granite, or dance beneath an ever-shifting waterfall. Stated in reverse, the philosophy of flux has no way to account for why some things at least *seem* to be far more stable than others. Much like Bennett's ontology of incipient swirls in a throbbing world-whole, the ontology of flux treats endurance in terms of transient stable loops in the flow of becoming. Nail in particular is fond of the argument that while stasis can be derived from flux, an ontology of stasis can never explain change. I would make two points in response. First, Nail is able to derive only an *illusory* stability from his outlook, since at bottom everything would be changing all the time. Second, and more generally, it is by no means clear that either change or stasis can be derived from the other. The better option here is to agree with Aristotle that one aspect of reality is continuous and gradual (see the *Physics*) while another is chunky and abrupt (see the *Metaphysics*). There is a genuine problem with where to locate the interface between the two: for instance, how is it that a given room contains some definite number of people but an arbitrarily divisible space with no definite number of spatial units? (Until there is a workable theory of quantum gravity, we must assume that space and time bend and fold continuously, not in distinct Max Planck-like increments.) This genuine paradox must not be prematurely dissolved by claiming that all is flux, so that apparent individual units are only crude approximations of a deeper continuity.

Fig. 3
Rein Raud.

14   Bruno Latour, *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge, MA: Harvard University Press, 1999), 122.

15   See Martin Heidegger, *Being and Time*, trans. John Macquarrie and Edward Robinson (New York: Harper and Row, 1962). First published as *Sein und Zeit* (Tübingen: Max Niemeyer, 1927).

16   See Aristotle, *Metaphysics*, trans. Joe Sachs (Santa Fe, NM: Green Lion Press, 1999), Chapter 3, Book Theta.

17   See Thomas Nail, *Being and Motion* (Oxford: Oxford University Press, 2018); Rein Raud, *Being in Flux: A Post-Anthropocentric Ontology of the Self* (Cambridge: Polity Press, 2021).

Benjamin's Aura

Yet there is perhaps an even simpler way to summarize my point: the "matter" that all forms of materialism more or less vaguely invoke is not a useful notion, and can be eliminated without loss from discussion. The reason is simple: nothing exists but form. First, I would note that no one has ever experienced formless matter, for the reason that no such thing could possibly exist. Yes, we can speak in *relative* terms of matter, in the sense that a shirt is made of material called cotton, or a sculpture of marble. But obviously enough, cotton and marble are specific forms in their own right rather than amorphous blobs. Historically speaking, it seems to me that the main reason for the existence of the concept "matter" is to serve as an empty receptacle that can be subtracted from a thing so that the form is then free to enter someone's mind without alteration, at least in the ideal imagined case of perfect cognition of something. Consider Immanuel Kant's famous claim that the only difference between one hundred real coins and one hundred imaginary ones is a difference of "position"; since "being is not a real predicate," there can be no internal difference between real things and their purported imaginary counterparts.[18] The alternative missed by Kant is that the difference between real and imaginary coins is not just the binary one between existence and non-existence; there are other qualitative differences. While it is true that the real and the imagined versions of a thing generally have crude visual similarity for practical purposes, the two necessarily have different qualities: for the simple reason that they are composed of different pieces, with the former composed of a far more durable and palpable material than the colored visual pixels or whatever imagined

coin-components constitute the latter. This has consequences for Kant's critique of the ontological proof for the existence of God (which is the case under discussion when he makes his point about the coins), but more than that it demonstrates that cognition cannot consist in simply extracting the forms of things from their material substrate and bringing them directly into the mind. Forms are always altered in their passage from one place to the other, ensuring some distortion of message in the process we too piously call "knowledge." In the words of Latour, there is "no transport without transformation."[19]

If the removal of things from their material base thereby becomes less important than is usually believed, some additional consequences follow. One of them bears directly on Walter Benjamin's (see fig. 4) long-celebrated essay "The Work of Art in the Age of Mechanical Reproduction."[20] Although the reproduction of artworks has always been possible, Benjamin notes, the advance of technology from the printing press onward has made copying art for a mass audience a more essential part of the trade: "Just as lithography virtually implied the illustrated newspaper," Benjamin writes, "so did photography foreshadow the sound film."[21] With these new means for industrial-scale production of art objects, something particular is lost: "its presence in time and space, its unique existence at the place where it happens to be."[22] Benjamin is quick to identify the uniqueness of a thing with its "history," but this point does not follow. Historically speaking, to defend an individual from being reduced to a reproducible "type" is simply to take the side of Aristotle against Plato. Yet this by no means entails that individuality is a repository for a thing's entire history, since reality tends to be rather forgetful of the details of its
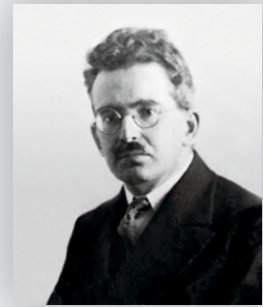
Fig. 4
Walter Benjamin ca.
1928.

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18   See Immanuel Kant, *Critique of Pure Reason*, trans. Norman Kemp Smith (New York: St. Martin's Press, 1965). First published as *Critik der reinen Vernunft* (Riga: Johann Friedrich Hartknoch, 1781).

19   Bruno Latour, *Aramis, or The Love of Technology*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 2016), 119. First published as *Aramis ou l'amour des techniques* (Paris: La Découverte, 1992).

20   Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction," in *Illuminations*, trans. Henry Zohn (New York: Schocken Books, 1968), 217–51. First published as "L'œuvre d'art à l'époque de sa reproduction mécanisée," *Zeitschrift für Sozialforschung* 5, no. 1 (1936): 40–66

21   Benjamin, "The Work of Art in the Age of Mechanical Reproduction," 219.

22   Benjamin, "The Work of Art in the Age of Mechanical Reproduction," 220.

backstory. It would be strange, for instance, to say that Pablo Picasso's *Les demoiselles d'Avignon* is unique *primarily* because of the various changes of physical/chemical composition and ownership through which it has passed. Instead, the uniqueness of the painting might well consist in features that are easily reproduced with colored ink or on digital screens, regardless of what nuances of brushwork are lost through this process. Moreover, even if something essential were lost in reproductions of the painting, it would not follow that the original was necessarily better, even if more "authentic." We are all familiar with cases, in music and elsewhere, in which digitization of original works is able to bring out a richer flavor in scratchy or damaged source material. Andy Warhol's depictions of Campbell's soup cans are no doubt aesthetically superior to the cans when found in supermarket form (see fig. 5).

Benjamin stuck to his guns with what is perhaps his most famous phrase: "One might subsume the eliminated element in the term 'aura' and go on to say: that which withers in the age of mechanical reproduction is the aura of the work of art."[23] The choice of "aura" as his term was an odd one. While its

etymology originally refers to a kind of breath or wind, in spiritualist circles it eventually took on its present-day meaning of a halo-like emanation around a thing. And such emanation, to say the least, is not what is accomplished by the pre-modern physical substratum in which every artwork was initially grounded, with its detailed history. If anything, one might be inclined to say that the aura of a thing is *heightened* when set free from its canvas, granite, or wooden corpse and set free into the ether so as to multiply itself indefinitely. In this respect there is an alarming note of nostalgia in Benjamin's take on the aura, similar in tone to Heidegger, as when Benjamin foreshadowed the Heideggerian critique of technology as providing a false nearness to things.[24] Yes, I realize that the difference between the two authors is obvious enough. Benjamin operates against a Marxian background in which the craftsperson loses the products of their work and is reduced to selling their labor as a commodity; for Heidegger, it is more a matter of complaining that removing a thing's underlying substratum, when it is translated into an image, removes the precious inscrutability of things and turns them in a calculable, present-at-hand

23   Benjamin, "The Work of Art in the Age of Mechanical Reproduction," 221.
24   Benjamin, "The Work of Art in the Age of Mechanical Reproduction," 223.

surface. For this reason, it is surprisingly easy to imagine Heidegger authoring a variant text of Benjamin's "The Work of Art in the Age of Mechanical Reproduction," or of Benjamin producing his own, more leftist-sounding version of Heidegger's *The Question Concerning Technology*.[25] However different the political destinations, the followers of Marx and of Heidegger share a sense of loss when a thing departs from its material base and enters upon a new and disembodied life. As Peter Weibel rightly notes: "In 1935, aura was already understood as an effect of distance and not of locality, proximity." It would be more correct to agree with Weibel's assessment of the term than Benjamin's. Weibel continues: "For a long time now, a growing crowd of non-local viewers—whose number is much higher than the number of local visitors—has become the basis for the economy, based on distribution and tele-technology. We therefore have several reasons to embrace non-local visitors."[26] To lodge the objections of "capitalism" or "neoliberalism" here would be nothing more than half an argument, given the expanded democratic access provided to those who cannot afford regular travel to exhibition sites.

Iconoclash and the Virtual Exhibition

With Weibel, then, I wish to draw attention to the notable presence rather than absence of something like aura in virtual exhibitions. Philosophers love to debate the old paradox of the Ship of Theseus, wondering whether the ship remains the same even if all of its pieces are gradually replaced by new ones. Those who respond in the negative assume that all aspects of a thing must be preserved if it is to count as one and the same thing. Yet

is the opposite not the case? To overidentify a friend with their specific clothing or hairstyle at the moment of our first meeting seems somewhat grotesque, as if they were mere mannequins supporting truly valuable details. Instead, we get to know a friend truly by interacting with them through many varying situations over the course of a decade or more. This is why I have argued in a recent article that in some sense, shipwrecks (and other ruins) often bring us closer to the real heart of a thing than any fleshed-out detailed version.[27] Virtual exhibitions are not just increasingly necessary in a world of pandemics and carbon pollution; beyond all nostalgia for a dying period of history, they generate new realities that could not have existed under the previous regime. Larger, non-local audiences are just one potential benefit.

When summoning a past exhibition once more in something like virtual form, the curators of the current project prefer to speak of "emulation" rather than anything involving a "re-" prefix. I can only salute this decision. As one of those who was fortunate to see both the 2002 *Iconoclash* exhibition at ZKM|Center for Art and Media Karlsruhe in person, as well as its 2005 successor *Making Things Public*, I find that my memories of those shows have become rather hazy (oddly enough, my memories of the ZKM|Karlsruhe building itself seem more robust, though I have only visited one time since). But even my freshest memories, in the immediate aftermath, might be considered too pale in comparison to the direct sensual experience of the exhibitions themselves. Of course, celebrating the direct presence of *Iconoclash* and *Making Things Public* during the period of their existence would run afoul of the powerful critiques of direct presence made in twentieth-century philosophy: first

25   See Martin Heidegger, *The Question Concerning Technology and Other Essays*, trans. W. Levitt. (New York: Harper, 1977). First published as "Die Frage nach der Technik," in *Aufsätze und Vorträge* (Pfullingen: Neske, 1954).

26   Peter Weibel, "Foreword," in *HyMEx – Hybrid Museum Experience Symposium 2021: Proceedings*, ed. Lívia Nolasco-Rózsás and Borbála Kálmán (Budapest: Ludwig Museum, 2021), 6.

27   See Graham Harman, "The Shipwreck of Theseus," in *Contemporary Philosophy for Maritime Archaeology: Flat Ontologies, Oceanic Thought, and the Anthropocene*, ed. Peter B. Campbell and Sara A. Rich (Leiden, The Netherlands: Sidestone Press, 2023).

by Heidegger, and later by Derrida.[28] Since Derrida is primarily concerned with a critique of identity, or the dismissal of the notion that there could be any such thing as an "original" exhibition of which all emulations would be mere copies, I am more interested here in Heidegger's account of the problem. For we can certainly speak of the original *Iconoclash* and *Making Things Public* exhibitions, while doubting whether any individual's direct experience of them ever got them quite right. Just as our many experiences of a childhood home do not add up to that home, no ZKM visitor in 2002 or 2005 can be said to have exhausted the reality or meaning of those exhibitions. That being the case, it is difficult to downgrade any virtual emulations of them as being a priori inferior to the originals. We can speak only of more and less successful emulations, just as we do with the many thousands of productions of William Shakespeare's plays that have occurred since his death in 1616.

Now, strategies for explaining the workings of emulation may differ. Some will try to argue that a "virtual" exhibition (or a "non-local" one, as Weibel prefers) can still be characterized by materiality, even if in a different sense from that of physical matter. My own standpoint, however, is that any invocation of matter in this context is likely to privilege the 2002 *Iconoclash* over its new instantiation, which is precisely what ought to be avoided. The original show was no more wedded to physical space than it was to the particular physical space of ZKM in Karlsruhe, as is easily seen from cases of traveling exhibitions, which retain a certain invariant core when moving between Munich, London, New York, or Vancouver. While the current project entails some physical transplantation, it is more a question of emulation across time. To boo and hiss this exercise as a loss of aura would make as little sense as trashing a 2022 production of *King Lear*. When we cease speaking of "matter," we can begin to speak instead of problems concerning the translation and relative preservation of form. The current project is one of the badly needed exercises that will help us sort out these problems.

28   See Heidegger, *Being and Time*; Jacques Derrida, *Voice and Phenomenon: Introduction to the Problem of the Sign in Husserl's Phenomenology,* trans. Leonard Lawlor (Evanston, IL: Northwestern University Press, 2011). First published as *La Voix et le phénomène* (Paris: Presses Universitaires de France, 1967).

ON THE EDGE OF THE RE(LATION)AL. Between and Beyond Cyber Realities

Ali Akbar Mehta

Consider the introduction of the "construct," a virtual workspace for running ⬂simulations, used as a loading program to create and launch virtual objects,[1] in scene thirty-nine the film *The Matrix* (1999). Where Morpheus asks, "What is real? How do you define real?" Where he then explains to both protagonist Neo and the audience that if what may be considered real is "what you can feel, what you can smell, what you can taste and see, then real is simply electrical signals interpreted by your brain"[2] (see fig. 1). Signals that convey the veracity, validity, and legitimacy of an individual's sensorium, within which is the implied foundation of a shared and consensus-driven experience: reality. Consider the implied tautology in the notion that for reality to be "real," it must be indistinguishable from reality, or at least indistinguishable from that aspect of perceptual

sensorial reality we trust. If reality, as anything that exists or by association is imagined, is based on sensory inputs firing neurochemical stimulations, then how may we even begin to identify a phenomenon for which there cannot exist any possible external frame of reference?

Alternatively, consider the overarching understanding provided to us jointly by the following: Vedic philosophies concerning *mithya* (dream state) and *maya* (illusion), stating that reality is an illusion; Plato's cave analogy which suggests that reality as we perceive it is a shadow world; Immanuel Kant's transcendental idealism, which sees space and time as mere formal features of how we perceive objects, not things in themselves; and Solipsism, the philosophy that only one's mind is sure to exist—an epistemological position of dreams within dreams that argues that if we cannot

Fig. 1
The Matrix, directed by the Wachowskis (Warner Bros., 1999), 136 mins. Film still of Morpheus and Neo within the "construct."

1 See "Construct," The Matrix Wiki, *Fandom*, accessed May 8, 2023, https://matrix.fandom.com/wiki/Construct#:~:text=The%20Construct%20was%20a%20virtual,operatives%20hacked%20into%20the%20Matrix.

2 See *The Matrix*, directed by the Wachowskis (Warner Bros., 1999), 136 mins.

even tell for sure whether we are dreaming, then how can we know, with any degree of certainty, any truth about the world in which we seem to exist?

Although these possible theories, whereby reality is composed of illusions, dream states, and shadow worlds, are positioned across multiple times and spaces of histories, they invariably point to a complex, inherently unknowable yet oversimplified Cartesian binary between the real and the virtual (in the sense used in computer science). The etymological leaps "virtual" has taken over the past centuries are massive, from indicating an intensely masculine, even patriarchal vigor to its present understanding of properties, affect, and of being in essence though not formally recognized. These leaps have a strong bearing in ways that collective futures may be imagined.

Right Now We're Inside a Computer Program?

The Situationist International used the term psychogeography to denote "the study of the precise laws and specific effects of the geographical environment, whether consciously organized or not, on the emotions and behavior of individuals."[3] Through the *derivé* or drift, a technique of rapid passage through varied ambiences, the Situationists suggested the city as code. Their practice of the "awareness of psychogeographical conditions" may be regarded as the relevant method for this paper, as a performance of cyberpsychogeography,[4] a free-flowing sensation of otherworldly drift, or what Sarat Maharaj calls a streamsbecoming,[5] moving out towards an imaginary horhizome.[6]

In an earlier scene of *The Matrix*, Morpheus asks, "Have you ever had a dream, Neo, that

you were so sure was real? What if you were unable to wake from that dream, Neo? How would you know the difference between the dreamworld and the real world?" He thus sets the stage (at least in the film) to equate the digital world with the dreamworld and vice versa—as worlds of pure consciousness that exist in infinity.

This text posits questions that problematize existing frameworks and speculative reconfigurations of what we know and understand to be "real" to explore virtual reality as a post-material construction. How can we differentiate between the real and the virtual? Are such categorizations necessary today? Rather than probing categories, it is useful to investigate the nature and post-materiality of the virtual as a phenomenon that holds increasing currency. That currency may be understood by delineating a brief history of the virtual in the contexts of, on the one hand, technodiverse reconfigurations of the utopian promise of cyberspace and the political potential of Net Art and, on the other, its acquired role within big tech and entertainment, its capacities for surveillance extractivism, and its increasing openness to neoliberal capitalist exploitation.

As another beginning to this text, it is important to recognize that the 1985 non-exhibition *Les Immatériaux* (a key reference in the project Beyond Matter) was, in fact, a move towards a counterculture, through which Jean-François Lyotard sought to articulate that the immaterial is fundamentally material. The point of that exhibition or *manifestation* was not to appreciate the new materiality of telecommunication technologies, but to question the relation between human and a human desire to become the master of matter. In the exhibition catalog, Lyotard wrote:

3   Guy Debord, "Introduction to a Critique of Urban Geography," trans. Ken Knabb, in *Situationist International Anthology*, ed. Ken Knabb (Berkeley, CA: Buerau of Public Secrets, 2006), 8–12. First published as "Introduction à une critique de la géographie urbaine," *Les Lèvres nues*, no. 6 (1955). https://www.cddc.vt.edu/sionline/presitu/geography.html.

4   See Mark Amerika, *Meta/Data: A Digital Poetics* (Cambridge, MA: MIT Press, 2007).

5   See Sarat Maharaj, "Know-how and No-How: stopgap notes on "method" in visual art as knowledge production," *Art & Research* 2, no. 2 (2009).

6   Roy Ascott defines the term horhizome as "The event horizon of the Net," in Roy Ascott, *Telematic Embrace: Visionary Theories of Art, Technology, and Consciousness*, ed. Edward A. Shanken (Berkeley, CA: University of California Press, 2003), 378.

In the tradition of modernity, the relation of the human with materials is fixed by the Cartesian programme: to become master and possessor of nature. A free will imposes its ends to the given sense data to divert them away from their natural sense. It will determine their end with the help of language which allows it to articulate what is possible (a project) and to impose it upon what is real (matter).[7]

In popular parlance, our future is often referred to as virtual or digital.[8] As described above, the etymology of "virtual" is endogamous and self-referential and, as such, limited to mean a hypothetical, formally unrecognized, simulated, and therefore an unreal or a "fake" state of being—a "non" reality if you will. Meanwhile "digital" implies an electromechanical, machine-encoded, or even theologically binary reality. Even in the specific contexts of this publication, these prefixes do not fully encompass the range of the relational spectrum that is our future. In the spirit of Lyotard's vision, I suggest that we recognize the new materiality, which may even be described as a post-materiality, of the virtual, and propose that our technological futures are neither virtual nor digital but cyber, where cyber reality is a reality that takes cognizance of a cybernetic relationship to itself by inaugurating a particular historical relationship between world and subject—the world as a system and the subject as an agent.

Cyber reality is an increasingly augmented, hybrid, symbiotic, and relational state of flux. It is a teleological regime in which systems or networks combine both "human and non-human agents in mutual communication and command"[9] for the sake a new kind of social management involving both human and non-human assets. With various parallel fields, cybernetics has come to dominate the production and regulation of society and culture. Its domain is the design and application of regulation and communication principles for behaviors rather than objects. It does not ask "what is this thing?" but "what does it do?" and "what can it do?" This framework of relations may be activated as a lens to view the world as a configuration of hyper-connected data-driven networked societies, as cyberspace (networked space) populated by cyborgs (networked individuals) or cybernetic containers of accessible, meta-tagged, cross-referenced, non-linear, transmedia data—observable systems that span several existing social and professional platforms to create a self-sustainable data multiverse.

Such a framework is not limited to how cyber, virtual, digital, or online spaces are imagined but also represents a way to philosophically rearticulate meatspace, worlds that are physical, analog, offline. Since numerous systems in the living social and technological world may be understood accordingly, cybernetics cuts across traditional disciplinary boundaries. Cyberneticians' concepts form a meta-disciplinary language through which we may better understand and modify our world. Indeed, the permanence and stability of what we recognize to be reality have transformed. Reality is already layered with manifest cybernetic relations, where relations between living beings and technology build on, augment, and even exceed older relationships between the living and non-living. The question of how we can perform our function within the construct of this cyber reality may not be new but is certainly topical, the root and crux of all of our engagements and pursuits.

7   Jean-François Lyotard, *Les Immatériaux*, vol. 2, *Album et Inventaire*, ed. Thierry Chaput and Jean-François Lyotard, exh. cat. (Paris: Centre Pompidou, 1985), 16. English translation from: Yuk Hui and Andreas Broeckmann, *30 Years after Les Immatériaux: Art, Science, and Theory* (Lüneburg: Meson Press, 2015), https://meson.press/wp-content/uploads/2015/03/9783957960313-30-Years-Les-Immateriaux.pdf.

8   "Digital": a term used following established media-theoretical precedent to signify the universe of digitally based structures and operations—by following the currents of the digital's structural components, energy expenditures, and residual wastes.

9   Alexander R. Galloway, "The Cybernetic Hypothesis," *Differences: A Journal of Feminist Cultural Studies* 25, no. 1 (2014): 111.

Residual Self-Image, the Mental Projection of Your Digital Self

When the doors of cyberspace first opened to public access, its reality was neither ambiguous nor in question. Its virtual quality, its virtualness if you will, was celebrated as a new frontier of experience pregnant with political utopian promise: a terra incognita free from the physical, economic, and political limitations of meatspace. Yet cyberspace and its virtual reality also became the primary example of what a non-reality could look like, with paradigm-shifting implications.

In a McLuhanesque sense, cyberspace was both an invention and a discovery of potential. Like fire, time, the wheel, letters, and language, it rendered previous experience obsolete and redefined human experience. Cyberspace became, and continues to be, the pinnacle of autoamputation.[10] Suddenly and all at once, philosophical and metaphysical fields of thought realigned themselves to fit how virtual reality existed and had meaning within their respective domains. New sciences were formulated, and speculative fabulations combining metaphysics, philosophy, and sciences emerged. Science fiction and its iterations became the first contact and a third encounter, with new implications brought forth by the emergence of possible realities, histories of futures long past, and the almost graspable present. Almost before we could completely comprehend the consequences of what such technology could mean for us, cyberspace morphed and was appropriated, giving way to the economic politicking of governments, Silicon Valley technocrats, and web 2.0. With that shift, speculative fictional historians transformed the telling of future histories.

The shift is also visible through the technization of communication and knowledge production systems, where the linear flow of historical time no longer streamlines our existence: we now operate on archival time. Technology has ripped us out of a linear stream of "past > present > future" as the model of experiential time, where time in the archives ceases to be. Instead, we have a quantum timeline—a multi-parallax to be scrubbed, tracked, jogged, scuttled, previewed, cut, composited, assembled, continued, generated, erased, wiped, rendered, montaged, or otherwise edited—where time as technology must be revisited. Modern, postmodern, post-postmodern, or contemporary, whatever name or misanthropic misnaming we may find appropriate, the relationship between a yet unknown past and an already occurred present is tangled. Our manipulation of the timelines of our individual and collective histories, memories, and experiences is so normalized that we do not notice it as a cyber experience or recognize it as a kind of fantastic time travel anymore. We are constantly wading through deltas of datafied time as they rush towards us. We are hyper-aware beings constantly running out of concepts to be "post" of.

Beyond Cyber Horizhome(s)

To cleave to the autoamputation analogy, any return to a pre-surveillance world would be as impossible as reattaching a severed limb after it has decayed. What is possible is to imagine a series of speculative futures where cyber reality and its implications are rehabilitated as an integrated limb on the body of our collective futures. There is simply no way back to a time or place before the history of relations of power and violence that are responsible for what we know today. Seeking a rewind is an absurd position that may even support the hegemonic power relations at play. In contrast, *unlearning* is not merely interested in finding ways to avoid hegemony but in formulating counter-hegemonic processes. Unlearning does not involve imagining going back to a time before the current power relations were in place or executing a clear-cut correction process. It is about naming and thus socially transforming histories of violence and the spaces of agency created by resistance and liberation struggles.

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10   See Marshall McLuhan and Quentin Fiore, *The Medium is the Massage: An Inventory of Effects* (New York, NY: Bantam Books, 1967), and Mark McCutcheon, *Medium is the Monster: Canadian Adaptations of Frankenstein and the Discourse of Technology* (Edmonton: Athabasca University Press, 2018).

It is a form of learning that actively rejects dominant, privileged, exclusionary, and violent forms of knowledge and action.

If our reality, a cyber reality, is a hybrid reconfiguration of cybernetic relationalities presented to us as a *networked time* populated with *networked* individuals in a *networked space*, then such reconfigurations have a complex impact on our conceptions of time, space, and scale. Recuperation through multiple modalities of critical repair is required. As a composite exhibition and research project, Beyond Matter is one such modality. Perhaps it is not coincidental that the virtual computer-generated exhibition space of *Iconoclash* is akin to the "construct" in *The Matrix*—the loading program. Perhaps such mimesis is not only apparent but necessary. Seeped in the aesthetics of technopolitics and cyberfuturisms, the environment and relational structure of *Iconoclash* as a model affords several possibilities for unpacking the potentialities of VR within a virtual exhibition space and in the context of artmaking.

Firstly, it allows the subject to experience art in a spatially different way than experiencing traditional two-dimensional art. While various methods of extended and enhanced representations (stereoscopic photography, 360˚, audio-enhanced, etc.) have existed since the advent of photography, VR offers profound differences with its persistence, multimodality, and the totality of the immersive experience. The possibilities of spatial and embodied presence vary as there are different degrees of immersion. At best, VR environments can be photorealistic while simultaneously surreal and otherworldly. This is directly and concretely reflected in the user's experience of the virtual content, altering our accustomed ideas of time and space.

The VR environment of *Iconoclash* operates outside the limits and bounds of physics, meaning that "physical" objects are not locational but relational, another characteristic of cyberspace. VR spaces operating on such "database logics"[11] are also archival spaces. Integration with archives occurs due to the quotidian use of archiving. In *Iconoclash*, archival space manifests as a relational network of artworks that presents a model or template of cyber reality.

Traditionally, institutional archives work with the same ideas that have governed museums as petrification machines—storing, encoding and suspending information deemed valuable in time. To archive something was a statement in the appraisal of its value, an assessment of its economic, political, cultural, or symbolic capital. Institutional legacy archives have been sites of segregation, racialization, and immobilization of communities. The data of archives, deeply entangled in power and violence, form the foundations of our knowledge societies.

The rise of the internet within the paradigm of knowledge societies is unprecedented and unquestionable. What we do with this rise is the question. The Internet of Things is already giving way to the "Internet of Awareness."[12] Increasingly, we find knowledge being shared, swapped, and transmitted for free. Freed from its economic shackles, the online domain provides knowledge to be free—not as an option but as an "inevitable destination."[13] As a pedagogical tool cyber archives born out of cybernetic relationalities mean our institutions, as the traditional models of knowledge production, must adapt or perish. Our pedagogy, scholarship, and disciplinary identities are inextricably bound up in the

11   See Lev Manovich, "The Database Logic," in *The Language of New Media* (Cambridge, MA: MIT Press, 2001), 218–221.

12   In terms of cyberliteracy, the Internet of Awareness is fueled by our agreement to be hyper-interconnected—not only to objects but to each other. Information in the contemporary forms of "feeds," "trends," and "stories" reach billions of people not within weeks but within hours. Dataclusters cross the globe are reported on and infect residents in other countries and cultures. Global awareness is becoming a reality, and the feedback loops of media, social media, and behavioral technologies all targeting, tracking, and bringing to the surface our deepest desires and fears have arrived. There is no going back to a simpler time; we must now confront what it means to have connected minds where everyone is constantly aware of everything. Awareness in this sense is the awareness of commons—the logical successor to the capitalist model of object-oriented thinking.

13   Chris Anderson, *Free: The Future of a Radical Price* (New York: Random House, 2009), quoted from Irit Rogoff, "Free," *e-flux journal* 14 (2010), https://www.e-flux.com/journal/14/61311/free/.

cyber archives we use today and design for the future. In all its postmodern glory, the archive today is the perfect or close to perfect antithesis of the modernist notion of a "meta-truth." Perhaps the idea of a museum as an archive of objects is no longer desirable. The process of renewing the understanding of museums as object archives has already begun. In the museum and its counter, the "para-museum," the process of archiving is being re-examined through the networked lens of hyper-interconnectivity. This realignment is causing fundamental structural changes in the way we think of such institutions, with further challenges to how digital artifacts can be stored, archived, and displayed with future media formats yet unknown.[14]

Letters, and the archive as their logical extension, have been heralded as tools for memory and for forgetting—an old binary, ineffective in attending to our experiential and epistemological complexities. Our cyber reality demands an encounter with newness that is not part of the continuum of past and present. It creates a sense of the new as an insurgent act of cultural translation, where the cybernetic system instructs us to seek relations not between but beyond the paradigm of past (existing knowledge) and future (perceived knowledge). As Nancy Adajania states in "Global Art: Institutional Anxiety and the Politics of Naming" (2011):

> Classical post-colonial theory was tremendously liberating and even formative for us, during the 1980s and 1990s, but it is imperative for us to go beyond it now, through the mode of sympathetic critique. We now need new cartography based on the mapping of continents of affinities, and a search for commonalities based on jointly faced crises and shared predicaments.[15]

We need to transform *between* into *beyond* to refine the idea of the archive.

For Homi Bhabha, "[t]he 'beyond' is neither a new horizon, nor a leaving behind of the past,"[16] where the present does not signify a break with the past or a bond with the future but a synchronic presence, a moment of transit where space and time cross to produce complex figures of difference and identity, past and present, inside and outside, inclusion and exclusion. It is a sense of disorientation, a disturbance of direction, in the "beyond": an exploratory, restless movement described as *au-delà*—here and there, on all sides, fort/da, hither and thither, back and forth. "Beyond" signifies spatial distance, marks progress, and promises the future, but our intimations of exceeding the barrier or boundary—the very act of going beyond—are unknowable, unrepresentable, and without a return to the present. Being in the "beyond," then, is also to inhabit an intervening space.

In practice and theory, exhibition models such as *Iconoclash* challenge the archive as having the potential to be complete: they claim archives to be contested sites of knowledge production where the democratic and dictatorial coexist in flux, entangled with taxonomies of value, power, privilege, authenticity, and objectivity. This exhibition model and subsequent iterations will be important as case studies to outline needs and methods to create politically conscious archives as knowledge systems of accountability, transparency, and responsibility towards the bodies and communities that produce and use them, revealing a system for an "accessible, networked, hypermediated, post-internet archive that is 'an active, regulatory, discursive system'—as a system of enunciability and functioning."[17]

14   See Stefan Sonvilla-Weiss, *(In)visible: Learning to act in the Metaverse* (Vienna, New York: Springer, 2008).

15   Nancy Adajania, "'Global' Art: Institutional Anxiety and the Politics of Naming," lecture at the Salzburg International Summer Academy of Fine Arts, 2011, http://archive.summeracademy.at/media/pdf/pdf815.pdf.

16   Homi K. Bhabha, *The Location of Culture* (London, New York: Routledge, 1994), 1.

17   Ali Akbar Mehta, "Cyber Archives as Counter Hegemony: Archiving as a Sustainable Counter-Hegemonic Practice," *Hākārā Journal* (2018), ed. Ashutosh Poddar and Noopur Desai, https://www.hakara.in/ali-akbar-mehta/.

A Computer-Generated Dreamworld

Classical epistemology allows us to think through objects that are complex in the sense that they cannot be characterized by one discipline alone. Using Contemporary Object "X" as a placeholder, my research argues that an archive is a complex object whose properties are distributed in unprecedented ways across interdisciplinary forms of knowledge and cannot be completely explained by a single discipline. What new relations must we form across social, economic, political, ecological, technological, and aesthetic dimensions of knowledge for a comprehensive understanding of archives today?

We are living in an age of rising ethnofascism and disintegrating democracies, where conflicts, pandemics, and human crises have become just another set of tools for capitalist societies to recycle pain. There is increasing information overload; online interfaces for knowledge are steadily becoming opaque, and the data we produce serves the capitalist pursuits of surveillance empires. By declaring ownership of their users' data and engaging in behavioral manipulations for data extractivism, surveillance empires have forced the creation of new categories to explain the production and accumulation of "value" in capitalism, such as the attention economy,[18] surveillance capitalism,[19] and computational capitalism.[20] This in turn reshapes political world orders based on disenfranchisement: creating necropolitical governments of management,

techno-legal architectures of control, and legalized policing through "direct, structural, and cultural violence."[21] We are living in an age of planetary entanglement.[22]

In 2001 Tiqqun wrote: "at the end of the 20th century, the image of piloting, that is, of management, has become the cardinal metaphor for describing not just politics but also every human activity."[23] Piloting is positioned as the facilitation of a self-corrective system in constant action, asking what is to be done. In this context "what is to be done?" must acknowledge the force of archiving as a resource, and its rhetorical discourse as a productive agent which defines the system and makes it available as an objective of and for action; to imagine a series of speculative futures where cyber reality and its implications are rehabilitated as an integrated limb on the body of our collective futures. A recuperation through multiple modalities of critical repair is required. The artistic-curatorial-research domain has begun to catch up with cybernetics. As artistic and curatorial practice, archiving is becoming enmeshed in systems and ecologies. Collaboration and transdisciplinarity are key themes. What's more, we now recognize that the major issues the world faces—the issues that matter—are all systems issues. What other new implications does virtual exhibition-making have within these contexts?

Computer-generated exhibition spaces contain the potency to fundamentally alter users' capacity "to be active participants in

18   See Thomas H. Davenport and John C. Beck, *The Attention Economy: Understanding the New Currency of Business* (Boston, MA: Harvard Business School Press, 2001), and Claudio Celis Bueno, *The Attention Economy: Labour, Time and Power in Cognitive Capitalism* (London, New York: Rowman & Littlefield International, 2017).

19   See Shoshana Zuboff, *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power* (London: Profile Books, 2019).

20   See Jonathan Beller, *The Message is Murder: Substrates of Computational Capital* (London: Pluto Press, 2018), https://library.oapen.org/bitstream/handle/20.500.12657/30759/1/642743.pdf.

21   Johan Galtung, "Violence: Direct, Structural and Cultural," in: Johan Galtung and Dietrich Fischer, *SpringerBriefs on Pioneers in Science and Practice*, vol 5. (Berlin, Heidelberg: Springer, 2013), 35–40.

22   See Achille Mbembe, *Necropolitics*. trans. Steven Corcoran (Durham: Duke University Press, 2019).

23   Tiqqun, *The Cybernetic Hypothesis*, Semiotext(e) intervention series 28, trans. Robert Hurley (South Pasadena, CA: Semiotext(e), 2020), 30–31. First published as Tiqqun, "L'hypothèse cybernétique," in *Zone d'Opacité Offensive* (Tiqqun 2), 2001.

the public sphere as opposed to its passive readers, listeners, or viewers."[24] Yochai Benkler argues for "archives as artistic practice" as an undeniable organizing structure in contemporary praxis for effective activism, containing the potential for community and world-building, burdened with the past and the idea of memory, but also acting as containers of imagination—through which we may envision a politically conscious future.

I Just Said It Would Be the Truth

Born in the early 1980s, my generation in urban India grew up during the cusp of the country's digital revolution. A transient generation, one that may have been born into the analogue but whose formative years were witness to a seismic change. In rapid succession, we witnessed the television, the color TV, the internet, personal computers, wireless telephony, and electronic retrieval systems of every size and scale. As digital natives, the translation of substance into immaterial form is a basic parameter of our lifeworld; with it comes the understanding that data flows rather than being confined and that images and episodes are part of ongoing, vast narratives rather than guarded pools.

There is no denying that the invention of VR as a specific technology, like cyberspace in its most expanded forms, is revolutionary and comparable to the invention of the press, the camera, and the television. As the 1990s saw total remediation of the postcard and the letter to the email, the 2000s saw the technization of almost all media into digital formats; we are witness to a paradigm shift in the ways we experience reality. In this era-defining

moment, VR is a potential space holder, an exchange interface between seemingly incompatible spaces of reasons: science and myth, theory and tale. Technologically, it positions us on the precipice of a great leap forward. Ethically, questions remain: will this technology facilitate an ecology of inclusion or exclusion, of spectatorship or participation?

To what degree will VR be technodiverse? No longer concerned exclusively with visual imagery, critical theories today lay emphasis on digital objects, including moving images and sounds, but also "deeper" digital objects—code, algorithms, data infrastructures, and network systems—as well as intangible ecologies, concerned with perception manipulation, manufacturing consent, political economies of knowledge, and architectures of control. "From a cosmotechnical standpoint, technics is fundamentally motivated and constrained by particular geographical and cosmological specificities."[25] What new epistemes can technologies of VR and virtual world-building unfold?

Despite the ways in which VR technologies are deployed to position the location of the real, and the multiple questions relating to the reality of virtual spaces, VR technologies point to the agency of the user in consciously deep diving into the immersion of VR. That immersive quality is important in making VR reality, and for the moment at least it is necessarily a voluntary decision, relying on individual autonomy and carried forward by the agency of the one being immersed. The agency of the viewer, audience, or participant is an important matter that orbits several frameworks of how we wish to re-evaluate technology as a means and space for digital commoning, generating and maintaining communities, and, most importantly, world-building.

24   Yochai Benkler, "Political Freedom Part 2: Emergence of the Networked Sphere," in *The Wealth of Networks: How Social Production Transforms Markets and Freedom* (New Haven, London: Yale University Press, 2006), 212–484 (quotation on 212).

25   Yuk Hui, "What Begins After the End of the Enlightenment?," *e-flux journal* 96 (January 2019), https://www.e-flux.com/journal/96/245507/what-begins-after-the-end-of-the-enlightenment/.

REAL VIRTUALITY

Anna Longo

What is the ontological status of a ⬊ recon-struction of a past exhibition in virtual reality? Is it a real object that, like a virtual library, accomplishes exactly the same function as its material counterpart by providing the same information? Or is it just a realistic representation that cannot substitute for the lost referent? Is a virtual exhibition a real exhibition or a fictional one? And do virtual exhibitions have the same social value as real exhibitions? To answer these questions, I will consider arguments supporting a realist account of VR and those leading to a fictionalist perspective before discussing a further option inspired by the notion of virtual reality introduced by Artaud.

Virtual realism

As David Chalmers explains, to be a virtual realist means to hold that "virtual reality is a sort of genuine reality, virtual objects are real objects, and what goes on in virtual reality is truly real."[1] He defines a real object as something independent of our minds and having causal powers, i.e., it can modify the state of another real thing. According to this definition, a stone is real while a dream or Santa Claus are not. So what about virtual reality? VR is a computer-generated environment that is immersive and interactive; for Chalmers a virtual object thus has to be considered a real object because it is grounded in a computational process (mind-independence) and it corresponds to a data structure that has the power to cause perceptions (modifications) in the interacting subject, that is, it generates the inputs that are processed by the user's sensory organs via VR headsets and suits. A virtual object can also provoke a change in another one—for instance, a virtual bat hitting a virtual ball or my avatar eating virtual sushi—and such interactions entail modifications at the level of data structures. Virtual objects must therefore be considered real mind-independent objects and events in VR must be considered the genuine effects of real casual interactions among data structures that are grounded in real computer processes. Chalmers compares data structures as digital objects to the atomic organization of phenomenal objects; a virtual object is the sensible appearance of a digital object in the same way a phenomenon is the result of an interaction between an atomic structure and a subject's sense organs. The fact that the brain produces the same image when it receives information from either an atomic organization or a digital structure means that digital and physical objects are equivalent, for they provide the subject with identical data streams. Hence, according to Chalmers, virtual objects are as real as material ones and experiences in VR are as valuable as those in the physical world. If this is the case, can we say that a virtual version of an exhibition can be equivalent to the original in terms of visitor experience and satisfaction?

Virtual fictionalism

In considering Chalmers' arguments, it seems to me that a virtual simulation of an exhibition might be considered equivalent to its physical counterpart only if we are exclusively interested in its information structure, meaning the objective spatial relations among items or parts of these items. However, it is doubtful at best that an exhibition can be reduced to an information

1   David J. Chalmers, "The Virtual and the Real," *Disputatio* 9, no. 46 (2017): 309–352 (quotation on 309).

structure and its displayed artworks to objective patterns of data. A digital library can be considered equivalent to a material one since we can extract the same useful information, but that equivalence fails from the perspective of a qualitative appreciation of the infinite number of details that make any single paper sheet different from any other. It seems to me that the same goes for art exhibitions, where we should be interested in fine details of such large numbers that it would take an extraordinary amount of time and energy to digitalize them. Hence, it would be more correct to say that a virtual version of an exhibition is a representation that cannot replace the original, in the same way that a digital copy of a painting by Vincent Van Gogh does not have the same value. As a representation, a virtual exhibition is a sort of fiction with which we engage as if it is the real one. This conclusion is in line with the position held by the so-called virtual fictionalists, like Neil McDonnell and Nathan Wildman, according to whom a digital object is a mere simplification of its corresponding physical object and a virtual object is a representation of a phenomenal one. As a data structure, a digital object provides the information needed to recognize it (a wooden table, a tree through the window, a soft red carpet) and to interact with according to the ends of the simulation, but it is misleading to argue, as Chalmers does, that physical objects also consist of such information patterns. McDonnell and Wildman[2] thus propose that we consider VR in terms of Kendall Walton's definition of fiction: "a fiction is a representational work that has as one of its functions the role of serving as a prop in a specific game of make-believe."[3] For Walton, representations—paintings or sculptures but also dolls and toy cars—are devices to make the spectator believe that they are engaging with the real object rather than with its representative; to treat an element *as if* it was a particular object, they must accept to engage with the rules of a game. Mimetic representations are like children's games where a

broomstick is believed to be a horse since it has same features in common with the real animal (for instance, one can run while holding a broomstick between the legs). Representations are then games of make-believe that are both imaginative and structured, as there are rules establishing what is correct to imagine and what is not. In putting VR in the category of *walt-fictionalism*, McDonnell and Wildman claim that digital objects are like props in a game of make-believe and that virtual objects are fictional equivalents of specific material objects. As props, digital objects still have some sort of causal power as they provide the rules for imagining and using a virtual object within a specific fictional situation (such as a video game or a simulation like *Second Life*), but they cannot be found to provide the subject with an experience equal to that of the represented object. Digital objects can be said to be real objects in the same sense as a painting or recording are real things (mind-independent) even though they are not what they represent. VR is then defined as a game of make-believe, a fictional space in which we engage with representations or props *as if* we were interacting with a real physical entity: our experience its perfectly real but it is the experience of fiction.

Following McDonnell and Wildman, can we then consider virtual versions of past exhibitions as games of make-believe? Is a virtual exhibition a representation with which we engage *as if* it was of the original one? To see why this is hypothesis is unsatisfactory, I point us to the thought experiment proposed by Jorge Luis Borges in *Pierre Menard, Author of the Quixote* (1939). This famous short story is an encomiastic commentary on the apparently absurd endeavor of a fictional twentieth-century author Pierre Menard to rewrite Miguel de Cervantes' masterpiece. Borges' narrator finds this attempt "possibly the most significant of our time" because it seeks to recreate rather than copy *Don Quixote*. The narrator contends that the result of this incredible operation is a text that is identical with the original but much

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2   See Neil McDonnell and Nathan Wildman, "Virtual Reality: Digital or Fictional?," *Disputatio* 11, no. 55 (2019): 371–397.

3   The philosopher Kendall L. Walton introduced his definition in *Mimesis as Make-Believe: On the Foundations of the Representational Arts* (Harvard: Harvard University Press, 1990), 51.

richer since it must be considered as a present creation, to be compared to contemporary literary works. What would be the value of *Don Quixote* if it was written today? We can ask a similar question about artistic events: what would be the sense of a historical exhibition digitally recreated and moved to a different historical and social context? If this question is meaningful, we cannot consider a virtual version of an exhibition as a simple representation but as a transposition of the original one to a different context. Can we then say that an exhibition and its digital counterpart are, like Cervantes' and Menard's works, two different social objects whose meaning depends upon their different historical environments?

Virtual objects as social objects

Peter Ludlow has introduced social objects into the discussion about the ontology of VR to challenge both realism and fictionalism.[4] An example of a social object is paper money, the function of which cannot be said to be related to or caused by its physical structure since it is completely socially constructed; virtual money is likewise real money because we attribute it a specific function by convention. Since we can use it to actually buy virtual and real objects, virtual money is not a fiction or a prop in a make-believe game.[5] According to Ludlow, it is due to previous conventional agreements that specific objects assume a function that is independent from their physical features and it is because objects have such a socially constructed function that their digital instantiations are used in certain ways rather than others. For example, eating virtual sushi with a friend's avatar in VR is neither a mere pretending occasioned by the digital object (a prop in a game of make-believe), nor an experience that is equivalent to the real one. According to Ludlow, the virtual dinner is rather the transposition of a meaningful social activity into VR—and the same goes for conferences, shows, and concerts organized in

virtual spaces. A social object is thus ontologically prior to the corresponding virtual object, and the causal power of the digital structure subsists only because it is grounded in social agreement. A data structure or a digital object has a meaning that depends upon its environmental embedding, that is, upon the social world outside the simulation. VR is therefore a social object, a specific cultural production the meaning and the function of which is relative to the context of its creation. The function of *Second Life*, for instance, can be properly grasped only by referring it to the historical situation in which it is embedded. Following Ludlow's argument, we can say that an exhibition and its virtual counterpart are both social objects but not exactly the same social object: they exert functions that cannot be properly evaluated without taking into account the human environments in which they are produced.

We can then argue that a virtual version of a past exhibition is a new social object the meaning of which depends upon the modified historical conditions. By visiting a virtual version of an exhibition, we are not experiencing the old one nor are we pretending to do so; we are rather engaging with a social object, the function of which rests on present conditions. Like Menard's recreation of *Don Quixote*, the digital copy of a previous exhibition is a contemporary work embedded in its own social context. This solution sounds much more satisfactory than the attempts above to provide an ontological definition of the virtual reenactment of an exhibition, but I am still not sure that art exhibitions such as *Les Immatériaux* and *Iconoclash* can be properly defined as social objects. It seems possible to extend the concept of a social object to any sort of object whose function derives from stipulation and established convention. Moreover, although temporally evolving and locally differentiated, social conventions establish normative rules for judging, they introduce criteria for recognizing the true and the false as well as for distinguishing between correct and incorrect. If great exhibitions have

4   See Peter Ludlow, "The Social Furniture of Virtual Worlds," *Disputatio* 11, no. 55 (2019): 345–369.

5   Ludlow explains that in *Second Life* it is possible to use virtual money to buy virtual objects that are delivered to the avatar and, in addition, material objects that are delivered to the physical address of the buyer. See Ludlow, "The Social Furniture of Virtual Worlds," 4.

effective value and real causal power, isn't it because they challenge conventional ways of conceiving of reality and organizing the field of social practices? Doesn't Borges' fiction actually challenge the platitude that readings depend on context by evoking an antihistorical way of defining creation? It is important to note that the short story's narrator insists on the complete autonomy of Menard's effort from the historical determinations that made Cervantes' work a "reasonable, necessary and perhaps inevitable undertaking"[6] at the beginning of the seventeenth century. In addition, he declares an appreciation of the way in which the twentieth-century *Don Quixote* introduces a new approach to the historical literary genre by disdaining the local color and accurate descriptions that are meant to provide readers with a reliable representation of a precise place and time.[7] Menard stages a novel from the past after having decided to avoid researching the environment that caused Cervantes' experiences, beliefs, and visions. Rather than conveying some historical truth, the contemporary *Don Quixote* shows that historical truth is merely "what we think took place,"[8] a conventional representation or a consensual fiction. Influenced by Friedrich Nietzsche,[9] Menard's work is no simple "historical masquerade," a "kitsch" imitation of the style of a past cultural object offering a pleasant fictional journey to far times and spaces (make-believe), but is considered by its author as metaphysical proof of the autonomy of meaningful creations from social and historical determinations. The excerpt of a letter Menard wrote to the narrator is enlightening: "the ultimate goal of a theological or metaphysical demonstration—the external world, God, chance, universal forms—are no less anterior or common than this book I am

now developing."[10] The success of the attempt to recreate *Don Quixote* is proof that the work, as a specific combination of ideas, *virtually* exists independent of the contingent historical context of its actualization; it is an event in thought that can be accessed and carried into existence by anyone. As another excerpt from the letter clarifies, "every man should be capable of all the ideas and I believe that in the future he will be."[11] Menard's success is proof that artworks are the result of combinations of idealities,[12] to which the secret method he elaborated allows access and actualization at any point in time and space. For this reason, it is also proof of our present "languor and barbarism,"[13] of the falsity of our conviction that artworks are mere social objects that exist as necessary effects of cultural and environmental determinations. According to this view, the recreation of *Don Quixote* is a challenge to the ordinary view of meaningful creations as consequences of established conventions and common places. What if we think of virtual exhibitions using same perspective? Can we think of *Les Immatériaux* or *Iconoclash* as events that challenge ordinary cultural determinations, events that can be grasped as pure virtualities that can be actualized at different points in space and time, for example today in VR? If this is acceptable, then a virtual exhibition is not equivalent to a material model nor is it a fiction (a historical masquerade), but the real actualization of a virtuality, an event whose incarnations are never the same (depending as they do upon historical and social conditions) although its extra-temporal value can be invariably ascribed to the way in which it defies the conventional conception of reality. It seems to me that this way of thinking of VR is in line with the notion introduced by Antonin Artaud.

6   Georges Luis Borges, "Pierre Menard, Author of the Quixote," in *Fictions*, trans. Anthony Kerrigan (New York: Groove Press, 1962), 45–57 (quotation on 51).

7   See Borges, "Pierre Menard," 51–52.

8   Borges, "Pierre Menard," 53.

9   See Borges, "Pierre Menard," 52.

10   Borges, "Pierre Menard," 49.

11   Borges, "Pierre Menard," 54.

12   The reference to Gottfried Wilhelm Leibniz's combinatorial method appears in multiple passages of Borges' text.

13   Borges, "Pierre Menard," 54.

Real virtuality

In his essay "The Alchemical Theatre," Artaud is the first person known to employ the expression "virtual reality."[14] He used it to stress an analogy between the extra-historical dimension of the objects, topoi, and signs used to construct actual theatrical representations and the archetypal symbols[15] that alchemists mix and combine in magic formulas for producing gold. Such symbolic forms are not like Platonic ideals—the reality in relation to which sensible things are mere appearances—but have a zero degree of being, not existing outside material mixtures that, at any given time, can actualize some of them to a certain degree. Artaud claims that "all true alchemists know alchemical symbols are chimeras just as theater is a chimera."[16] This is why the ontological dimension of these ideals is virtuality, the domains of the symbolic that are distinguished from both the real and the imaginary. As Gilles Deleuze, an engaged reader of Artaud, explains, the virtual is "real without being actual, ideal without being abstract"[17] and "the characteristic of virtuality is to exist in such a way that it is actualized by being differentiated and is forced to differentiate itself, to create its lines of differentiation in order to be actualized."[18] While the imaginary results from assembling empirical characteristics that belong to different beings to produce a mental image of non-empirically existing entities (fictions like unicorns, monsters, etc.), the virtual is the domain of the genetic elements that are supposed to produce empirical compounds that can be experienced in reality. At zero degrees of being, symbolic elements are pure potentialities among which distinction is positional—like the elements on the alchemist table—and they never exist in a pure state but only as reciprocally determined portions within the infinity of empirical beings that express them.

We can now understand what Artaud means when he says that theater, like alchemy, is virtual reality: it is the domain of extra-historical symbolic elements that incarnate in pieces that actualize some of their unexpressed potential. Theatrical representations are then alternative or virtually possible realities that, since they are different from everyday empirical realizations, aggress the subject, put us in front of a matter for which we have no concept. These *real virtualities* force thought to think, they violently stimulate the production of the concepts suitable for a totally new social organization. For Artaud, the positive role of theater, the role it has lost in contemporary culture, is that it is a virtual art, it does not produce fictions but put thought in motion against the consensual habits which repress its creative and disruptive vitality. By describing the original role of theater, Artaud explains that

> it reforges the links between what does and does not exist, between the virtual nature of the possible and the material nature of existence. It rediscovers the idea of figures and archetypal symbols which act like sudden silences, fermatas, heart stops, adrenalin calls, incendiary images surging into our abruptly woken minds. It restores all our dormant conflicts and their powers, giving these powers names we acknowledge as signs. Here a bitter clash of symbols takes place before us, hurled one against the other in an inconceivable riot. For theatre can only happen the moment the inconceivable really begins, where poetry taking place on stage nourishes and superheats created symbols.[19]

Theater as virtual reality does mean that it is a fictional representation of reality (make-believe), nor that it is a technique for producing

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14   Antonin Artaud. "The Alchemical Theatre," in *The Theatre and its Double*, trans. Victor Corti (New York: Grove Press 1958), 34-37 (quotation on 35).

15   This comparison is inspired by Carl Jung's research on archetypal forms in alchemy. Virtual reality is connected to the non-actual reality of unconscious architypes or symbolic forms that, according to Jung, inform human life.

16   Artaud, "The Alchemical Theatre," 35.

17   Gilles Deleuze, *Difference and Repetition* (London: Bloomsbury, 2014), 272.

18   Gilles Deleuze, *Bergsonism* (New York: Zone Books, 1991), 97.

19   Artaud, "The Alchemical Theatre," 18.

experiences equivalent to those of our empirical interactions with reality (what is true in reality is also true in theatrical representations). It does not entail that elements in theatrical representations are social objects, the function and sense of which become perfectly clear through considering the spatiotemporal context of the production of specific texts. Rather, theater is a real virtuality, the result of the difficult art of recombining archetypal, unconscious symbols in order to actualize a representation that challenges the consensual and normalized order, an order that represses rather than resolving the vital conflict through which thought exerts its creative power by continually disrupting its own productions.

Can we than think of exhibitions as virtual realities in the sense given to this term by Artaud? It seems to me that proposals like *Les Immatériaux* and *Iconoclash* were indeed projects whose ambitions were perfectly in line with this perspective. In both cases, the curators made the explicit effort of problematizing and reorganizing conceptual and representational spaces by reconnecting, disconnecting, and rearranging symbols to produce an overwhelming effect: a sort of violence against the ordinary and the consensual organization of the domain of representation that forces a rethink of the notion of the exhibition itself. So what does it mean to recreate such exhibitions in VR? Like the virtual exhibitions proposed within Beyond Matter, it does not mean duplicating the originals with the aim of producing the fake effect of experiencing the past, but to put them in motion by actualizing potential virtualities in a new thought-provoking alchemical mix that is truly faithful to the spirit, rather than to the letter, of those disruptive events.

IMMATERIALS IN THE METAVERSE.
On the Art Exhibition as an Apparatus of Ambiguity

Kim West

> Your devices won't be the focal point of your attention anymore.
> Instead of getting in the way, they're going to give you a sense of presence, the new experiences that you're having and the people who you're with. And these are some of the basic concepts for the metaverse.
>
> **Mark Zuckerberg**
> **October 28, 2021**

How should we understand the art exhibition as a cultural and technical form under post-digital conditions? Does the intense social integration of digital platforms and networks today create new opportunities for thinking about the art exhibition's potentials, dislodging it from what was previously thought to be its necessary connection to a particular space and time? Are we moving toward a state of seamless integration, where digitally mediated worlds and the worlds we physically inhabit become indistinguishable, where the material space of the art exhibition and the virtual space of screens or headsets merge into one? If that is the case, what are the ramifications?

A key outcome of Beyond Matter is a "virtual version" of the famous exhibition *Les Immatériaux*. Created by a team of programmers and researchers from the Aalto University and cultural institutions in Germany, Finland, and France, the ⬲digital exhibition model is a fully navigable audiovisual 3D rendition of the exhibition, which, as far as I can tell, remains faithful to the original. An impressive amount of museological research has evidently gone into producing it. For those of us who have spent some time reading critical accounts and recollections of *Les Immatériaux*,[1] there is a certain thrill to accessing it. The degree to which the experience of navigating the virtual exhibition is "realistic," however, should not be exaggerated. As a user experience it is not essentially different from how normal first-person gaming used to feel some years back. And the level of detail offered by the digital representations of the exhibited objects is relatively limited: they cannot be properly read or appreciated as representations of complex artifacts or artworks (although more

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1   See for example Yuk Hui and Andreas Broeckmann, eds., *30 Years After Les Immatériaux* (Lüneburg: Meson Press, 2015), and Daniel Birnbaum and Sven-Olov Wallenstein, *Spacing Philosophy: Lyotard and the Idea of the Exhibition* (Berlin: Sternberg Press, 2019).

extensive documentation of the exhibited objects has been added since I explored the virtual exhibition at the time of drafting this text in October 2022). Navigating the virtual version of the exhibition is also, unlike most exhibitions I have visited, a lonely experience: there are no other users or visitors around; the virtual spaces are deserted.

But the virtual exhibition does provide certain experiences unavailable to other representational techniques. Traversing its virtual spaces, I was most startled by the dominant character of the voiceover—a soundtrack of recorded texts that shift as you move between exhibition zones—in the overall impression. In all likelihood this was also the most startling, and curatorially problematic, aspect of the original exhibition: visitors were obliged to wear wireless headphones, to which the soundtrack was transmitted, effectively cancelling out most of the possible communication between visitors, and consequently reducing the exhibition's social, intersubjective dimension. The most important contribution of the virtual exhibition, however, is that it offers a sense of the exhibition's spatial configuration for a mobile visitor: of how the exhibited objects were staged, and of how their appearances and relationships would alter as visitors found their way through the exhibition maze. This is a capacity for which I cannot think of any technical equivalent. In that respect, the virtual rendition of *Les Immatériaux* shows that digital models might provide a rich complement to other, "traditional" types of exhibition documentation, such as installation shots, exhibition maps, architectural models, critical accounts, recollections, and so on.

But the ambitions of the team behind the project are not limited to developing an update to the existing array of exhibition documentation techniques, however significant that might be to future exhibition critique and historiography. They also want to pose a more general question about the relationship between virtual and physical spaces, and about how the possibility of digitally generating immersive virtual exhibition spaces might affect

our understanding of curatorial practices, or even challenge our idea of the art exhibition as such. "The option to generate virtual spaces," reads a prospectus put together by ZKM | Center for Art and Media Karlsruhe, "propels art practitioners increasingly to [...] mediate curated artistic knowledge and aesthetic components that are unbound from the physical location [...] where its exhibition takes place. The question therefore is: what is the significance of the space of the exhibition after a post-digital turn and how are art institutions advised to react to this paradigmatic shift?"[2]

I believe this is an important question, and needs to be addressed carefully. Let me try and spell out some of its assumptions. One: that the "space of the exhibition" has certain qualities that other technical and cultural forms do not. Otherwise, why should we bother about its "significance" after the "post-digital turn"? So what are those qualities? A second assumption: that something important is at stake in the question of the status of the space of the exhibition in relationship to the post-digital turn, which is by any account a process that impacts a field vastly larger than the domain of art exhibitions and which is not merely a technical shift but a globally scaled transformation with comprehensive social and economic implications. How should we understand that shift with respect to the space of the exhibition, and what is at stake in the relationship between the two, whether it be a relationship of integration, interconnection, or perhaps incompatibility, even contradiction?

Exhibitions as Media

The exhibition is a curious cultural and technical form. Materially elusive, we might say. If I were to try and isolate qualities specific to it, I would come up nearly empty-handed. The experience of an art exhibition, of course, cannot simply be reduced to the experience of the artworks it puts on display: in that case there would be no need for an exhibition, or at most the exhibition would be a fully transparent,

2   ZKM|Karlsruhe, "Beyond Matter, Within Space: Curatorial and Art Mediation Techniques on the Verge of Virtual Reality," two-page book concept, 2022.

self-effacing mediator, unworthy of critical attention. Nor can an exhibition be reduced to the architectural, scenographic, or institutional setting of the exhibited objects, although questions of spatial design and institutional mediation (in a wide sense of the term) are necessary to any exhibition.

At a very basic level, an exhibition is a transitive form as opposed to a reflective one. Its purpose is to *show* other objects, not to *show itself*. Its proper dimension, the domain over which it may exert an influence, is the dimension between subjects (the visitors who enter the exhibition) and objects (the exhibited artworks, artifacts, or things). It stages relationships between these elements—between subjects and objects, objects and objects, but also, unavoidably, subjects and subjects—in order to relay some sort of meaning to the subjects.

In that sense, the exhibition is a type of media. Like other media, it employs technical arrangements to give receivers access to signifying elements. But the exhibition does so in a particular way. The receivers—or viewers, or visitors—enter it and move around more or less freely inside; they do not remain outside of it. And their activities inside the exhibition—their perambulations, the vagaries of their gazes, the shifts in their attention, the fortuities of their interactions—*determine* the configuration of the exhibition's arrangement: the relationships between subjects, objects, and so on.[3]

The objects, in turn, are not merely signifying elements, fully integrated and reduced to one semiotic level, like sentences in a book or figures in a film. Instead, they maintain their integrity, their heterogeneity, we might say their autonomy, *even as* they form part of the larger signifying arrangement which is the exhibition as a whole. It can all seem rather simple: you place a few things in a room and voilà, you have an exhibition. And yet as a cultural and technical form it is quite complex.

An Apparatus of Ambiguity

To my mind, one of the most advanced theoretical accounts of the exhibition's specific mode of generating significance was put forward by the semiotician and "expologist" Jean Davallon in 1999. As he phrases it, an exhibition is not a text in the semiotic sense of a self-enclosed unity of meaning, but *a space where texts may be produced*, in and through the exhibition's more or less strictly programmed, dynamic event of reception.[4] Davallon's argument is intricate, but we may reconstruct some of its stages.

To begin with, an exhibition is, by necessity, and in certain senses of these terms, materially ambiguous and socially interactive. That is, it is based on a spatial arrangement of objects, where that arrangement establishes its own symbolic dimension—the significance that can be ascribed to the exhibition as a whole—while the objects also preserve their references back to their own worlds of meaning, their own symbolic dimensions—the particular significances of each artwork or artifact, which cannot be entirely reduced. And the specific aesthetic configuration of this ambiguous space, with its different relationships and so on, is determined during its reception, as visitors trace their paths through the space, negotiating the passages between its symbolic dimensions.

As a type of media, the exhibition is therefore refractory, or at least not inherently predisposed to what we might call dense semiotization, as in the way that meaning is generated by a semiotic object whose components and registers are mutually compatible, strictly correlated, or even fully integrated. For example, all sorts of aesthetic arrangements are conceivable for film viewing, but its various elements—visual figures, sounds, texts, screen, spatial organization—tend to be densely interconnected, their different levels of significance integrated, while the

3   For a pioneering study of different modes of visitor behavior, circulation, and interaction inside an exhibition, based on field studies conducted at the Centre Pompidou in 1982—three years before *Les Immatériaux*—see Eliséo Véron and Martine Levasseur, *Ethnographie de l'exposition: l'espace, le corps et le sens* (Paris: Centre Pompidou, 1983).

4   Jean Davallon, *L'Exposition à l'oeuvre: Stratégies de communication et médiation symbolique* (Paris: Harmattan, 1999), 18. See also Serge Chaumier, *Traité d'expologie: Les écritures de l'exposition* (Paris: La documentation Française, 2012), 33f.

combined messages they convey are governed by strict narrative codes and genre conventions. The same does not hold for an exhibition. "In the exhibition," Davallon writes, "it is not only the messages, the codes, and the 'languages' that are different, but also the objects, the messages, the semiotic ensembles (for example, the panels), the media (for example, videos or dioramas), and the techniques that serve as supports (for example, lighting and circulation systems)."[5]

This heterogeneity creates specific conditions, and indeed challenges, for facilitating legibility. Again, an exhibition is not a text with fixed and stable resources for achieving successful communication, but a highly unstable and inherently ambiguous space where texts may be produced and where various communicative strategies may guide the visitor toward an intended reading. Such strategies include the whole range of exhibition techniques, from mediation systems (texts, signs, guides, etc.) and scenographic and display systems (including lighting, programed traffic routes, immersive environments, etc.) to the more or less pedagogical organization of objects and spaces (chronological sequences, thematic clusters, etc.).[6]

Such strategies all serve to solicit and guide the visitor's productive interaction with the exhibition's arrangement. But as they do so, they may exert varying degrees of control over the event of reception. To simplify, we might say that exhibition-making in general takes place in the tension between two poles. On the one hand, it may seek to affirm the exhibition's inherent tendency toward contingency and denaturalization, so that the configuration of its aesthetic arrangement remains dependent on more or less aleatory visitor interactions, and so that the dual nature of the exhibited objects, split between their own symbolic worlds and

the exhibition's, is left exposed as opposed to managed and dissimulated by communicative strategies. At the endpoint of this tendency is the notion of the exhibition as an *apparatus of ambiguity*, which dislodges subjects and objects from their prescribed positions in the symbolic organization of social space.

On the other hand, the exhibition may deploy the whole arsenal of communicative strategies in order to assert control over the event of reception, meticulously programming every step of the visitor's trajectory, providing detailed protocols for every type of object or subject interaction, establishing filtering design templates that emphasize relations of isomorphism and compatibility between exhibited objects, and enveloping and engaging the full spectrum of the visitor's sense registers. The endpoint of this tendency is the notion of the exhibition visit as an exhaustively *administered experience*, where objects and subjects are reinscribed into determined positions within a naturalized, fully integrated design environment.[7]

These two tendencies, we might note, seem to have been an active, nearly open conflict in *Les Immatériaux*, in Paris back in 1985. On the one hand, Jean-François Lyotard, along with Thierry Chaput and their collaborators, understood the exhibition as an attempt to address a general crisis of the modern subject, whose relationship to the world had primarily been one of domination, but who was now facing a new, postmodern condition of generalized technoscientific interaction, as Lyotard phrased it in a lecture he gave to the curatorial team during the preparations.[8] They wanted the exhibition to not only reflect but also enact that crisis, suspending the terms of subjective domination inside the exhibition space and compelling visitors to confront new conditions of experience, thought, and action.

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5   Davallon, *L'Exposition à l'oeuvre*, 13.

6   Serge Chaumier sets up an instructive and amusing typology of modes of designing exhibition trajectories, in *Traité d'expologie*, 35ff. For a seminal study of the political ramifications of the organization of such trajectories, see Carol Duncan and Alan Wallach, "The Universal Survey Museum," *Art History* 3, no. 4 (December 1980).

7   In a more recent text, Davallon points to an increasing tendency for exhibition-making to prioritize the "organization of the visitor experience," and that we might therefore need to develop a "new conception of the exhibition." See Jean Davallon, "Le pouvoir sémiotique de l'espace: Vers une nouvelle conception de l'exposition?," *Hermès, La Revue*, no. 61 (2011), 42.

8   Jean-François Lyotard, "After Six Months of Work… (1984)," trans. Robin Mackay, in Hui and Broeckmann, *30 Years After Les Immatériaux*, 33–34.

On the other hand, seeking an adequate spatial layout and aesthetic arrangement for reflecting and enacting the postmodern crisis, Lyotard and the other curators opted for an exhibition format—we might call it a voice-over maze—that to a large extent rejected the exhibition's inherent tendency toward interaction and non-dominant, ambiguous modes of aesthetic organization. Throughout exhibition history, the labyrinth has often been evoked as a spatial layout that provokes visitor disorientation, precluding oversight and anticipation. It is the privileged exhibition format for the unexpected encounter. But it is rarely noted to what extent the labyrinth, as an exhibition format, is based on a strict control of visitor trajectories. While it rules out a synoptic approach, as Lyotard noted,[9] it also generally reduces the visitor's perambulations to a sequence of set choices—left or right, door one, two, or three, etc.—along an established network of more or less narrowly prescribed paths. Rather than an indefinite multiplicity of possible, and in themselves continuously aleatory, trajectories, as in more open spatial schemes, the labyrinth offers a finite number of determined routes.

This aspect was compounded by the presence of the voiceover, featuring texts by authors such as Samuel Beckett, Maurice Blanchot, and Lyotard himself. *Les Immatériaux* was not what we would call a visitor-friendly exhibition. As accessing its digital reconstruction suggests, hearing Jean-Claude Fall's grave voice inside the dramatic scenographic arrangement of the exhibition's "theater of the non-body" could generate unsettling, intellectually challenging montage effects. But it is evident that, as a general communicative strategy, the attempt to fully command but also individualize the exhibition's acoustic dimension further narrowed its aesthetic field of possible experiences and interactions. While the exhibition immersed visitors in a non-surveyable and sonically intrusive environment, thereby circumscribing their autonomy, it reasserted a dominant model of subjectivity at the level of the exhibition's organization as a whole.

A Platform of Presence

What happens when *Les Immatériaux*, the exhibition at the Centre Pompidou, becomes *Les Immatériaux: A Virtual Exhibition*? What happens with the space of the exhibition after the post-digital turn?

First of all, let us establish a truism (without suggesting that it describes the idea guiding the complex work of transmediation that has gone into producing Beyond Matter), namely: that the paradigmatic shift of the post-digital turn will not result in the substitution of the physical exhibition space with the virtual space of digital simulations of physical exhibition spaces. That is a strange idea, one which not even an old-school McLuhanist would support. It would be like suggesting that future TV viewing should involve watching TV shows on digital simulations of old-fashioned TV sets. Exhibitions are themselves a specific type of media, the characteristics of which fill certain functions and respond to certain needs. Some of those functions and needs may be transferable to other types of media, others not.

As the complex of media technological arrangements mutates—a process inextricable from social, political, and economic shifts, not merely technical—some functions of specific media may be taken over by other media (for example, exhibitions once had a much more dominant role in the social dissemination of visual culture), others may be more or less completely eliminated (for example, the social rituals of the cinematic experience have profoundly changed in recent decades), and yet others could be developed or enhanced through technical upgrades (for example, the exhibition has proved remarkably capable of integrating new cultural and technical forms within its existing technical framework).[10] In any case, the mutation of the general media complex establishes a new context within which the separate media constituting that complex face new conditions which may in prompt refunctionings of those media: the

9   See Hui and Broeckmann, *30 Years After Les Immatériaux*, 45–46.

10   See Olivier Lugon, "Introduction," in *Exposition et médias: photographie, cinéma, télévision,* ed. Oliver Lugon (Lausanne: Éditions l'Âge d'Homme, 2012).

opening and closing of social functions, of economic opportunities, of formal artistic possibilities, and so on.

The historical development of media technological shifts, then, is an intensely intricate, multilayered process, that puts simple models of causality and substitution out of play. In this respect it is interesting, although somewhat perplexing, that a tech giant such as Meta can stake its future on what appears to be an anachronistic if not simply antiquated model for media interfacing and interaction: virtual reality. An understanding, however cursory, of the particular ambitions and scope of the so far ill-fated metaverse project may lead us some way toward comprehending the political implications of the "post-digital turn" with respect to the "space of the exhibition."[11]

At a first glance, the metaverse seems designed deliberately to confirm a certain misguided postmodern paranoia about the replacement of reality with simulations. It is as if the corporation misunderstood its own business model, based on an arguably more sophisticated framework for integrating their digital platforms into everyday social relations and behaviors.

But Meta's project becomes less confounding if we try to grasp some of its wider ramifications. They are not trying to shift every service and subsidiary in their corporate portfolio over to their VR platform, expecting every poor *Facebook*, *Instagram*, or *WhatsApp* user to devise an avatar and bounce around in a global troll forum combined with *Second Life*. The VR platform is one element in a complex of platforms, services, and devices connected to one coherent yet malleable, cross-media nexus of user interfaces, extending across virtual space, physical space, and screen surfaces. They ultimately seek to mediate all social relations within this mixed reality.

Taking up the term from Davallon, we can see it as an attempt to establish a dense semiotization across all levels of social experience,

and by mediating all social practices and relations through their nexus of user interfaces to impose monetizable formats on them, and to provide services that can cater to and profit from the emerging markets. As laid out by Mark Zuckerberg and his Meta associates during their infamous presentation of the metaverse in October 2021, this project can be described as a three-stage enterprise.

First, secure a cross-platform compatibility for digital objects and services, so that commodities or functions acquired on one app may remain accessible and operative on other apps. "[Y]ou should be able to bring your avatar and digital items across different apps and experiences in the metaverse," as Zuckerberg explained.[12] There will be "a real sense of continuity where the things you buy are always available to you," one of his collaborators added. "One thing we've learned from today's digital platforms is that we can't artificially limit innovation."

Second, facilitate interconnectedness and smooth compatibility between screen, virtual, and physical spaces through existing social media platforms, VR, augmented reality techniques, the pervasive presence of digital objects in "smart" cars, homes, cities, and so on, establishing mixed reality as a coherent, meta-mediated user experience.

> You're going to be able to move across these different experiences on all kinds of different devices, sometimes using virtual reality so you're fully immersed, sometimes using augmented reality glasses so you can be present in the physical world as well, and sometimes using a computer or phone so you can quickly jump into the metaverse from existing platforms.

Third, and crucially, suppress all signs, marks, and traces of mediation; indeed, suppress the very *materiality* of mediation.

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11   This should of course not be taken to suggest that the specific digital, virtual version of *Les Immatériaux* is somehow technically or economically dependent directly on Meta infrastructure. It is not. The question here is a general one, of what a macro-scaled social and technological shift means for the conditions and possibilities of a particular media form.

12   All quotes from Meta's metaverse event on October 28, 2021 are adapted from the transcript available on https://www.rev.com/blog/transcripts/meta-facebook-connect-2021-metaverse-event-transcript.

Devices, as Zuckerberg stated, should not "get in the way" but simply "give you a sense of presence." The user experience should be smooth and effortless. Everything should be compatible. There should be no contradictions or conflicts. The Meta-mediated mixed reality should be entirely naturalized.

> I'm proud of what we've built so far and excited about what comes next as we move beyond what's possible today, beyond the constraints of screens, beyond the limits of distance and physics, and towards a future where everyone can be present with each other, create new opportunities, and experience new things.

Of course, suppressing the materiality of mediation in favor of this state of blissful, nearly rapturous presence—Zuckerberg was in Silicon Valley oracle mode—entails not just diverting users' attention away from the physical nature of the hardware they are running, and from the vast infrastructure of cables, server halls, power plants and so on that sustains it. It also means suppressing what we might call the *historically materialist* nature of the techniques of digital mediation: that they are, among other things, products of and tools for labor, and that they therefore depend on and perpetuate or exacerbate unequal social relations.[13] Naturalizing these techniques, in other words, is the same as naturalizing the plutocratic structure of contemporary cybernetic capitalism.[14]

Beyond the Metaverse

What does all of this imply for our understanding of the status of the art exhibition in relation to the post-digital turn? It should almost go without saying. To the extent that the post-digital turn is another name for the integration of all cultural and technical forms, including the exhibition, into some version of the metaverse—and it is no secret that Meta remains one of a small group of major corporations that have an oligopolistic hold over the social and technical infrastructure of contemporary digital platforms and networks—one thing is apparent: that those qualities which are irreducible to exhibitions as media could no longer be sustained. What I have described as the exhibition's inherent tendency toward ambiguity and denaturalization is incompatible with the dense semiotization of social space that dominant actors of cybernetic capitalism are now seeking to install at a global scale.

Of course, the post-digital turn could also mean something else. It could be the name of a project of radical democratization rather than of plutocratic consolidation. It could be a quest not for the integration of further stretches of social and cultural existence into the mediating platforms and networks of oligopolistic big tech, but for the development of platforms and networks that could be held accountable to democratic ideals, and that would serve to extend rather than contract the sphere of social and cultural self-determination.

The condition for the exhibition as a specific cultural and technical form to serve a progressive function within such a project would be precisely that the particular modes of social experience of that form—of the exhibition as an apparatus of ambiguity—be preserved, even enhanced, rather than suppressed, within that process of reconfiguration. Because what is at stake here is the existence of the exhibition as a space of potential critique, and it is only from within such a space that new zones of antagonism can be mapped out, and new possibilities imagined.

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13   Friedrich Engels and Karl Marx, *The German Ideology* (1846/1932) (New York: Prometheus Books, 1998), 41.

14   On "cybernetic capitalism", see e.g., Timothy Erik Ström, "Capital and Cybernetics," *New Left Review*, no. 135 (2022).

MESSAGES FROM THE INSIDE.
Les Immatériaux and the Persistence of the Revolution

Amanda Beech

The assertion that museological and artistic exhibitions are symptoms of, as well as legitimatize the catastrophic coalescence between discourses of enlightenment-centric thought and capitalist power, notwithstanding the histories of Colonialism that this involves, remains strong today. But the idea staked out from the historical avant-garde also remains strong: that exhibitions can resist and dismantle these two formations and even propose new ones. The exhibition *Les Immatériaux* can be considered a central and contentious figure in this story.

The realist power of world-making is the enemy of such a project. It builds false forms of unity between being and appearance in one systematic register of order—a "total world." As such, realism is a form of metaphysical reason that masks subjective idealism and imposes brutality, dominance, and inequality in the lived world. For Jean-François Lyotard, Hegelian epistemologies that subject this metaphysics to critique make the situation even more dire.[1] The Hegelian forms of the self-consciousness that split the subject after the crisis of Kantian metaphysics are thus annihilated; metaphysics is secularized in the corrosive site of an entropic postmodern condition. An indeterminate and uncaused nature eclipses all realist endeavors, not beyond the intersubjective space of humans and their technologies but in the very heart of such operations. Because

resistance to such endeavors now occupies the aesthetic landscape, it is important to see how it is leveraged in the context of culture and specifically exhibition-making. How can this labor in the context of culture perform resistance to the hegemonic artificiality of reason, resist the false dreams of unity that are connected to its politics? What revolutionary spirit can affect a space of critique that is not determined by its perceived oppressor, or by fantasies of escape? For Lyotard, this space of difference was found in the postmodern space of immaterialities: a deterritorialized space that granted an exit from the dominance of reason and critique, but not one of any kind of redemptive escape. This critique is marked by a full embrace of the ecstatic force of alienation that defines its own ontology as well as that of the postmodern.

While reason and critique must be understood as problematic, a coalescence with postmodern alienation promotes its own cultural, philosophical, and political problems: if the plural world of nature is determined by subjective descriptions of capitalist alienation, then any actions within this space risk being determined by those descriptions because and despite claims that the terrain is indeterminate. It is therefore clear that anti-humanist or posthumanist naturalisms must tackle the problem of what they take as their own ontology and how they define what

1   In Hegel's dialectics, the aim to unity prevents it and catalyzes a post-tragic condition for the problem of knowing. Here, the subject is caught in the "third man" problem of regressive ontologies, imprisoned in narratives of its own crisis because of a refusal to accept the reality of groundlessness.

reality is, for while negation is claimed in the "non" of immateriality—a space that exceeds the given of reason as well as the orders of space and time—negation discloses its own structures. In this case, aesthetics do not perform indeterminacy but rather explicate contradictions within the very idea of indeterminacy.

Inside the ontological thinking of the exhibition lies a question of order and knowledge: a question of what is negated, what is excluded, what persists and what returns. These specters of the modern are raised when we see how any attempt to grasp resistance in practices of unconscious action risks re-imposing forms of management, and expose the project as ironic and contradictory. If exhibition-making adopts the theory that our life as techno-beings is *intrinsically resistant* to unity and reason, via an appeal to the senses, then why make an exhibition that tries to manifest that theory? Would any claim to and/or ↘reproduction of this resistance demand and resuscitate, or more problematically (for its own claims), *reside within* the modern desire for unity and the need for reason? It is not only that we would see how this appeal to aesthetics initiates certain orders and structures to come (as Lyotard notes in his essay "Answer to the Question, What Is the Postmodern?"[2]), but also that this act of making that resists order relies upon forms of normativity as ground and initiates structures in its processes. Rather than pointing out how contradictions reveal the limitations of this project, we might suggest that resistance is a form of perverse labor that must be inscribed and live within its own unsettling contradictions. Between these secret orders that are pulled into view and the naturalization of contradiction, we start with the premise that there are lessons, to use Lyotard's term,[3] that can we learn from his non-critical critique in the non-world and the non-exhibition.[4]

The Anarchism of Reason

Lyotard's work advances a form of resistance that leans into the charismatic force of the modernist avant-garde spirit and explodes it, embedding itself within the desire that drove those dreams and liberating reason from order. Anthony Paul Farley has noted how the Kantian project of the categorical imperative demands a form of autonomy in reason that necessitates lawlessness, and that "law is the symptom of repressed desire."[5] Modernity is anarchic at its core because emancipation is a dream of a *final form*: an impossible equality, an equality that contains its own violence and horror of simultaneity and uniformity, whose project when manifest in life can only produce forms of social inequality as we struggle towards maturity. The cause is unity and the symptom is law, which diagrams, cuts, and disaggregates the unity of the dream. The ends are self-destructive. As such, Lyotard's work writes the undercurrent of modernity as an intrinsic form of violence that no longer needs its political project. As Lyotard argues in "Answer to the Question," modernity represses postmodernity, and postmodernism is the truth of the modern that precedes it. What is repressed is that there is *no reason for reason in itself*; the rules by which reason operates can only be attached to the comfort of the lie that reason tells itself. If reason has no reason for itself, then it must construct its own alibis and fictions to repress that lack. Lyotard identifies fiction with the void of reason in an aesthetics that collapses proliferation and

2   See Jean-François Lyotard, "Answer to the Question, What Is the Postmodern?," in *The Postmodern Explained* (Minneapolis, MN: University of Minnesota Press, 1992), 1–16.

3   See Jean-François Lyotard, *Lessons on the Analytic and Sublime*, trans. Elizabeth Rottenberg (Stanford: Stanford University Press, 1994).

4   Tara McDowell, "Les Immatériaux: A Conversation with François Lyotard and Bernard Blistène," *e-flux Crisisism*, accessed April 2023, https://www.e-flux.com/criticism/235949/les-immatriaux-a-conversation-with-jean-franois-lyotard-and-bernard-blistne. Here McDowell points to the relationship between immaterials and non-materials, and we can take this to refer to the exhibition in the same vein.

5   Anthony Paul Farley, "The Dream of Interpretation," *The University of Miami Law Review* 7, no. 53 (2003): 685–726 (quotation on 685).

difference, impotence and precarity. The re-pression of the real of reason is manifest in the forms of cultural life. This subjective alienation, Lyotard reminds us, is therefore entangled in existing forms of capitalist power that cannot be overcome. What is taken as non-rational is captured within the operations of postmodern capital *all the way down*.[6]

The suppression of the vacuity of rea-son by modernity discloses the imma-nent self-destruction of modernity itself. Postmodernity realizes this disclosure in a new aesthetics of disorder and complexity. Lyotard writes about how the rationalist dream terminated in the chaos of postmodern capitalistic forms, where one form of violence traverses to another unadulterated phe-nomenon. It is "the massive subordination of cognitive statements to the finality of the best possible performance, which is a technolog-ical criterion,"[7] that brings forth a new non-world of alienation—a space resistant to order that has surpassed and conquered the hubris of reason. Subjectivity is enthralled within nature, as nature is within the subject.

Lyotard's libidinal economy acts as its own apotropaic device that wards off the idealism of ends that the subject might initiate under the ideology of modernity in capital (realizing one's desire), metaphysics (realizing knowl-edge and appearance), or dialectical mate-rialism (realizing community): "To restart the revolution is not to rebegin it, it is to cease to see the world alienated, men to be saved or helped, or even to be *served*, it is to abandon the masculine position, to listen to feminini-ty, stupidity and madness without regarding them as evils."[8] This revolutionary attitude transposes the modernist ethics of a future orientation into a general refusal by harnessing the fragmentary and inchoate landscape of the postmodern condition manifested by late capitalism: an indifferent force that for Lyotard

exceeds the given of modernist reason but, as we will see, is not without its own reason.

As the wheels of modernity are now punctured by the chaotizing immateriality of high-speed systems of exchange, the technological man networks, and the noise that characterize the postmodern, then so too is any motor for becoming. The collapse of vertical registers in the nihilism of the non-world reflects Hegel's famous critique of *Naturphilosophie* in Friedrich Wilhelm Joseph Schelling's Absolute, which he fears is the claustrophobia of a night in which all cows are black. This is a world without edges or differ-ence, a collapse between matter and sub-stance; infinite territories that are contaminat-ed as matter without representational content. Space implodes upon itself as the fraught identity of the human, once captured in existential anxieties of the modern subject, is pluralized in the hyper-existential alienation of an indifferent darkness of difference-matter.[9] The deflation of epistemology to an ontology of (im)materialities worryingly overdetermines space in relation to time, bringing everything into the modality of the experiential present. This collapse of immaterialities into material phenomena demands the privilege of the now, which prevents us from tracing where we have been or thinking about where we are going; what we say about something is made equal to the something that we refer to. The idea that the immaterialities of postmodern capital are material in their acts is neces-sary, for it allows us to confront the fact that immaterial conditions have ideological force, material affects, and political consequences in our lives. However, this is not the same as claiming an absolute collapse of being and appearance to *everything* as substance and presence, which would ironically reinforce the division that it seeks to disavow, since difference is everywhere and yet its qualities

6   This crisis is not a purely philosophical problem, for it is denoted by acknowledging the relation between thought and world: the materialist devotion to the study of the subject as a product of its environment and the diagnosis of the impossibility of detaching oneself from one's milieu.

7   Lyotard, "Answer to the Question," 9.

8   Jean-François Lyotard, "Every Political Economy is Libidinal," in *Libidinal Economy,* trans. Iain Hamilton Grant (Bloomsbury: Indiana University Press, 1993), 119–20.

9   See G. W. F. Hegel, *Hegel's Preface to the Phenomenology of Spirit,* trans. and running commentary Yirmiyahu Yovel (Princeton: Princeton University Press, 2005), 94.

cannot be seen or recognized in relation to other things. The non-world that romantically describes the space of (im)materialities in this way does not resist representation, but rather produces an ontology of metaphors that it cannot deal with.[10]

The contradiction that persists is this: since resistance is mounted on ontological indeterminacy, it must deny all absolutes but at the same time include all possibilities, including the possibility of the absolute. Specific structures constitute this space of resistance, registered in the organic tensions between infinitude and death, the desire of the will and its substrate. But at the same time the contradiction invites another thought of ends that exceeds this space of difference, because something must be excluded for the demolition of verticality required by the claim to ontological indeterminacy. This brings us back to a Cartesian finitude that cannot relate to the plurality of a sensate life.

Les Immatériaux challenges art and itself to speak to the untotalizable relations between the atmospheres of our experience and ideological reality, to allow this negativity to be presented in forms of phenomenal experience. But as my observations make clear, the identification of such incommensurability with postmodern aesthetics struggles logically and politically to articulate that space of negativity: it (a) cannot resist the fatalism of the political that comes from the act of determining what reality is; (b) produces and relies upon consistencies (an aesthetics of indeterminism), and (c) makes exceptions (subjectivity and self-consciousness) that are actually counter to its aims. A denial of reason does not outrun an ethical attitude or modernist structures.

Negating the thought of how things ought to be by collapsing this with the designation of how things really are does not get one off the hook from the problem of the psychological perspectivisms that designate the latter and the causal connections that are made in transposing it onto the former.[11]

The Differend

In "Answer to the Question," Lyotard advances the complex character of his theorizations and projects, alerting us to the role and persistence of the modern in *Les Immatériaux*. He specifies some aspects of postmodernity that he seeks to support and some he seeks to combat, pointing out that this "may even be contradictory."[12] His appeal to the "differend" exemplifies this modern character, invoking an impossible space of resistance that is unequal to what he sees as the deeply problematic "academicism and kitsch" associated with realism under postmodern capital or the order and totalizing rationality of modernity and its Hegelian critiques.[13] For Kant the sublime opens us to the revolutionary reorientation of our being and knowing in the world, which cannot be manifest in phenomenal experience, but for Lyotard the differend performs this action in the phenomena of negation. Here, an exhibition that is postmodern—a construction that is paradoxically natural—subjects us to the trauma of the impasse that nature presents in this postmodern sublime.

By insisting that there can be an encounter within the world that delivers the immediacy of its incommensurability, Lyotard seeks to decimate both the quantitative forms of

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10 For example, to say "my love is a red rose" is distinct from saying "my love is like a red rose." Metaphors involve a violent determination that conflates two categories, often taken to be literal and conceptual, and graft them to each other to the point of synonymy. Thus, the metaphor has the capacity to exterminate the very distinction that grants it its initial force, making the new ideological abstract a force of empty metaphors. It is the latter concern that I reflect on in this instance.

11 For an analysis of the operations of human capital and the exclusions that are made to produce profit, see Michel Feher, "Disposing of the Discredited: A European Project," in *Mutant Neoliberalism: Market Rule and Political Rupture*, ed. William Callison and Zachary Manfredi (New York: Fordham University Press, 2020), 146–76. Feher details how neoliberal governments institutionalize policy that deliberately eliminates people who are not seen to be credit-worthy (i.e. profitable) indexes for capital, including but are not limited to the sick, migrant communities, unemployed youth, and the aged.

12 Lyotard, "Answer to the Question," 4.

13 Lyotard, "Answer to the Question," 7.

measurement that exist in modern rationality and the assertions that come from such measures. To do this, the exhibition bracketed an aesthetics of complexity, noise, and chaos inside its walls and was distinct from the world that existed beyond but also coterminous with it. Being both simile (it *is like* the world that it exists next to in the field of the given) and metaphor (it *is* reality in itself), this ambiguous aspect of the exhibition was a response to this question: how to claim reality in itself as the impermanent void of a real negation—a negation in the name of nature—that has no identity or image, but obtains within the production of culture?

As this island of alterity, we can see now how the exhibition asserts itself as the differend, as an expression of the sublime. The differend is the impasse that emerges from within the space of reasons, from within the state of intersubjective and contingent situations. Lyotard writes: "I would like to call a differend the case where the plaintiff is divested of the means to argue and becomes for that reason a victim."[14] The differend confounds and refuses an appeal to any referent or grounds, empirical or logical, and destroys the ability to compare between any relations from which it springs. It suspends any identicality between being and appearance. When we apply this to the exhibition, the structure of the differend allows us to recognize how the division between the exhibition and the world beyond are abolished: it suspends the validity of the border that it constructs. The impasse that is registered in this tension has an aesthetic form that is demarcated in the homology of and confrontation between two spaces. This double action of construction and refusal makes the exhibition an island in the sea of a homologous reality, part of it but also a symptom of it. In overdetermining Kant's work, Lyotard remains indebted to it, including the themes of transcendence, incommensurability, and a commitment to normative structures that prefigure the possibility of the appearance of the differend.

The Subject

In the introduction to *Libidinal Economy*, Iain Hamilton Grant spells out the issues at stake with the politics of refusal and border producing. At the center of this is a particular figure of subjectivity that enforces the differend: it holds being and appearance apart.

> These "islands," or "the Archipelago" as Lyotard terms this topography, these unconnected fragments no longer cry out for their reunification into a "proper body," but constantly seek recognition of injustices perpetrated upon them. Injustice can merely be witnessed in the arc's flashes, to which the "critical watchman" may bear testimony: fallout from the Enlightenment, burning fragments of the French Revolution and its Supreme Being illuminate the crisis. No longer the concentric cycle with its fixed futural reference, nor the eccentric eternal turn of the libidinal band, but a penitent's attempt to return to the crisis at the end of critique.[15]

The "penitent" demarcates the end of critique: the absolute finitude of thought as a form of stasis. Here, the proximity to death must be witnessed by the penitent and to do so, it calls upon another form of consciousness which must be distinct from the false consciousness that mobilizes ideological capital. Consciousness brings the subject back into the non-world of crisis, which refuses the possibility of any future identifications since the subject's awareness of their own alienation is causally connected to their seeing reality as it is: alienated. This ironically calls upon a form of non-subjectivity that according to Grant, it brings us to the impossibility and failure of human hubris and self-assertion. The subject as penitent shapes the destructive revolution that Lyotard seeks but is blind to the consciousness by which this revolution is constructed.

14   Jean-François Lyotard, *The Differend: Phrases in Dispute*, trans. Georges Van den Abbeele (Minneapolis, MN: University of Minnesota Press, 1989), 9.

15   Iain Hamilton Grant, "Introduction," in Lyotard, *Libidinal Economy*, xxx.

This form of consciousness is distinct from Hegelian dialectical forms of recognition and its predilection for the tragic because it refuses the resources of reason and consciousness to advance itself beyond the world that it sees, ensuring that any dominant notion of the ocular (ensconced in modernity) is overcome by the sensate environment. Because this is a non-world, without definitive limits, we cannot make any distinction between the world we perceive and the world we invent unless by appeal to reason, but this appeal to reason is denied since postmodernism *always already* transposes reason to desire. Despite this envelopment of reason in a world turned inside out, constructed in desire and aesthetics, we can see how an appeal to self-consciousness underwrites the revolutionary process. The posthuman cannot begin without a subject. What form of public does this private form of consciousness make?

We find ourselves lost, confronting nothing but alienation. In the necessity for this awakening the Kantian aesthetics of "purposiveness without a purpose"[16] persists, remaining equally subjective and necessary for the penitent to be penitent. Here, the modern subject is retrieved and sacrificed to generate a sense of the impasse between island and world, and yet the sacrifice lands in a fiction unequal to the real dissolution of subjectivity that Lyotard's critique drives at. Although Lyotard claims that there will be no longer a "cry out for their reunification into a 'proper body'"[17] the body itself remains as both a concept and a necessity. In other words, the "improper" body remains, the dream of unity remains captured in the indeterminacy of nature, and resistance cannot traverse the private to the formation of a public space while being incommensurable to the act of producing the normative agreements by which the body of the social constitutes and represents itself.

Utterance

The theme of the utterance gives us a different perspective on the non-exhibition's non-representationalism. Unlike the differend, which is immanent to experience and compelled to locate a subject at the end of the crisis of critique, here different borders are drawn that situate alterity before language or at its most minimal beginnings. We can remember at this point that the root of the word "mât" subtended the format for *Les Immatériaux*, and that the notion of a beginning without a determined trajectory acted as the catalyst for possibilities to form and take shape, ones that were yet to be inscribed.[18]

The utterance denotes the apolitical primal interiority of the word itself, a word hinged to the world but that which does not represent it, and which is not yet a part of any determined structure. This word appeals to the "crisis of legitimacy" that Lyotard recognized as the adulterated discourses of modernism. It denounces a priori reason as well as any unity to come, for nothing is before it, and nothing is established beyond it. It resists any transcendental structure for it exists beyond the implicit and future economies of realism that sense-making requires. It was there when visitors to the exhibition were asked to experience the sets of *many beginnings*, but was moreover a notion of potentiality experienced as divisions, territories, and orders constructed via private and often highly individuated forms of navigation (underscored by the use of headsets—even if some complained that they did not work). This scene asked for a traversal of space and time where the future was unknown and past steps were always forgotten traces, a kind of theater for the hopeless amnesiac constructed over the most minimal grounds of a language. In the essay "Sensus Communis," Lyotard writes:

16   Immanuel Kant, *Critique of Judgement* (1790), trans. Werner S. Pluhar (Indianapolis/Cambridge: Hackett Publishing Company, 1987), 65.

17   Iain Hamilton Grant, "Introduction," xxx.

18   Of course, this is now a worn out aphorism for contemporary art, which enjoys the notion that it is always already full of potentiality and equality, and that it cannot mobilize anything specific, thus releasing it from any instrumentality.

Thus it is a region of resistance to institutions and establishment, where is inscribed and hidden what happens "before" we know what it is and before we make it into anything at all. This pleasure is an inscription without support, and without code by which it can be read off. The task is to ... re-inscribe it, without filling it full, and without getting rid of it.[19]

We have been discussing how the inscription of resistance that emerges from contexts of language-use (the differend) and pre-language (the utterance) takes place in public. It is unclear which reading of alterity is the more fictive, because the former undermines what has been and the latter compromises the future. The utterance is taken as something that exists already but which we can never access or know; the differend is the excess of the given and the utterance is its withdrawal.[20] While I have argued that the annexation and expansion of the postmodern risks highly problematic forms of irony and conservativism, when we explore the possibility of something radically exceeding the capitalist imagination we return to the problem of how these "languages" as non-languages, these haunting fiction-images, impact other forms of language in the world. Are they simply expressions of misguided forms of aesthetic romanticism, dreams of the wanderer?

The Excluded Remainder

The destruction of the modern materials that have ruthlessly ordered life bear out the production of new forms of spatiality that slide between an appeal to a resistance to all hegemonic power and an appeal to the insidious violence in neoliberal capital. For Lyotard, as we have seen, the revolution is squared wholly with resistance or negation to what would seem to be all forms of dominance. But in this radical negation art finds itself in the bind of a new theology. In other words, if there is a commitment to negation in itself then the semantic particularities of an artwork must also negate itself in a sacrifice to the new cause of the reality of reason, of giving up on finitude and ends, while ironically committing to the ends of the infinite—a permanent mode of self-destruction. This incorporates a new body, a body of sadomasochistic suffering, calling upon Christ as much as the Marquis de Sade. We have seen it emerge and continue through the work of accelerationist aesthetics and today in the Milady culture of NFT markets that flirt past the edges of irony with cultic, nazified, and racists tropes. The idea that "art is back"[21] because it seems shocking and willing to devour any ethical commitment in the name of moralistic aesthetic game-playing is more proof that art cannot escape its Nietzschean tendencies and conventions, and even more that it identifies these conventions as the only game in town.

Resistance configures the field of *all causes*, and this is built upon the vacuity of the cause of reason. The means by which this repression is emancipated towards a newly alienated form of free-oppression is key. While *Les Immatériaux* led us through fields of difference, a blockage prevents us from confronting the question of the semantic value of discrete artworks. What is key to the question is the fact that there must be a difference between works that cultivate negativity and those that continue to invest in the myths of freedom and creativity provided by capital, but that there are no means to articulate what this structural or methodological difference is. The question of difference within the domain of aesthetics is obstructed because: (a) aesthetic experience is generally taken as an index of the irreducibility of our alienation from knowledge; (b) this

19   Jean-François Lyotard, "Sensus Communis," in *Judging Lyotard*, ed. Andrew Benjamin (London: Routledge, 1992), 1–25 (quotation on 24).

20   See Peter W. Milne for a similar reflection, "Exceeding the Given, Re-writing Lyotard's Aesthetics," *Cultural Politics* 9, no. 2 (2013): 107–16 (especially 111). https://doi.org/10.1215/17432197-2146057.

21   See Will Gottsegen, "Everything You Always Wanted to Know About 'Miladys' but Were Afraid to Ask," *CoinDesk*, May 5, 2022, updated May 23, 2022, https://www.coindesk.com/layer2/2022/05/05/everything-you-always-wanted-to-know-about-miladys-but-were-afraid-to-ask/.

produces an aesthetics of theistic kitsch built upon a new form of order that is naïve (sense comes first); (c) rules that are present in any aesthetic presentation are inadvertently taken to be premises, thus further constraining the possibility of the possible; and, (d) the appeal to objective knowing, consciousness, and reason faces its own repression.

What I am articulating here is that the field of negativity exposes itself as having a structure and rules, whether this is framed by the utterance, the differend, or, as I have proposed for *Les Immatériaux*, an amalgam of these two dynamics. Here we see a contradiction between resistance and openness, as openness cannot be fully open to all possibilities if it resists something in a possible world, and resistance can only be resistant if it has nothing in mind. Lyotard's work asks that we face this dilemma.

The Measure and Indifference

Les Immatériaux had representational qualities that were not standard, but rather performed as a kind of measuring machine, as a kind of seismograph of the postmodern condition. The notion of the seismograph is important in this case for it exudes the notion of an objective measure; it is an index without a mirror which establishes its own measuring rules independent from the thing that it measures. Using this term challenges Lyotard's view of the impossibility of objectivity, and his deep skepticism of scientific master narratives. But, on the other hand, it allies to his cause of producing a non-relational or indifferent territory of aesthetic experience that is capable of being internal to but not governed by the system that it measures.

The model of the seismograph reinforces the idea that *Les Immatériaux* engaged the spirit of the revolution in a modern and analytical sense—and that this tool remains central to the possibility to think beyond and without the structures of capitalist alienation, and without the occultic hyperbolization of the image. The

questions of order, structure, and knowledge persist at the core of postmodern, posthumanist, and new materialist critique, and it is clear that attempts to resist any form of representation, or to hold any indeterminate identity in the world (so as to not render more order, or to claim an inability to know the future as the premise for not daring to think of the future), are incorrect and dangerous forms of morality. But in considering the persistence of representation, structure, and order, we see how the appeal to resistance via non-representationalism and unreason demonstrates ethical commitments that hold the notion that we have never been non-modern.[22]

In the height of the postmodern era, theorists like Lyotard, Paul Virilio, Michel Foucault, and Jean Baudrillard were keen to describe, yet not fix or counter, the precarities that defined us in an era of political dominance. Of course, these descriptions, as we have seen with *Les Immatériaux*, solidified time in specific aesthetic and concrete political identifications. They defined and were defined by, for example, global technological "conflicts" such as the Gulf Wars and the new era of high-speed financialization. The dissonance of techno-aesthetics compounded and inspired a nihilistic space of immaterialities, read back to us as if this landscape of the new postmodern had no will or drive, no reason or determination. A fiction of the postmodern was necessary to think of a radical form of difference that would surpass the dominance and lie of repressive reason; it was a fiction that had to ignore all the structural and political machinations, and whose authors ironically invested in the ideology of their own negative autonomy in order to conjure it.

Today, the war in Ukraine is only one example of the limits of such ideas, for the cultural realities emerging from the war mix the poetics akin to Wilfred Owens' trench warfare and its propagandist stories of attrition with Euro-pop folk songs. Our inability to name this new reality is underscored by that impoverished aesthetic space. It is made of strange appeals

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22   See for the counterpoint, Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1991). First published as *Nous n'avons jamais été modernes* (Paris: La Découverte, 1991).

to correlate the analogical dynamics of old wars to the technological dissonance of this new war. It shows the paucity of our ability to think through the complexity of this moment, to diagram what is but also to speak to the condition of the new contemporary.

An appeal to nature cannot speak to our present crisis of legitimacy. Like *Les Immatériaux*, it remains key for the critical exhibition and art practice to think about how lived reality operates in the abstract contexts of alienation. I have hoped to defend the re-quirement that one must proceed by refusing to exclude matters of history, subjectivity,

representation, and reason. The merits of Lyotard and Thierry Chaput's exhibition alert us to the abiding dichotomy of the ethical and the ontological inside Lyotard's work, and in this the exhibition provides a territory for us to rethink the operations of art as a form of language and to ascertain the qualities and structure of the different forms of alienation it grants us access to. This is not to claim that such law-like languages of knowledge, because they are languages, will manifest in dominance, but it is also not to suggest that we should give up on defining what knowing is in the necessary force of rule and law.

4.
VARIABLE RELATIONS.
Navigating the Local, Non-local, and Interlocal

THE *BEYOND MATTER ONLINE PLATFORM*

Felix Koberstein and Lívia Nolasco-Rózsás

In the ⬊ virtual condition, spatial immersion is not bound to geographical location but to environ-ments, whether computer-generated or physical. Dichotomies such as presence and absence, real and simulation, material and immaterial will slowly lose their validity under circumstances that enable more spatial access to artworks. The *Beyond Matter Online Platform* was not con-ceived as a simple project website but as a venue that informs visitors about project activities and outcomes and leads to further online exhibition spaces through its *CRISIS SPECIAL* and *VIEW* subpages (see fig. 1).

CRISIS SPECIAL

At the very beginning, in early 2020, the plan already had to be slightly altered as the Covid-19 pan-demic hit. The extensive restrictions imposed by the crisis still have a significant impact on almost all areas of society that the state has not classified as systemically important. The cultural sector has been particularly affected by these measures, as the physical presence of visitors, obligatory up until early 2020, was no longer permitted. "Systemic importance" became a kind of buzzword giving rise to discussions about the significance and social position of respective cultural fields. Did the pandemic show that aesthetic experiences can indeed be neglected in times of crisis?

The answer is no—quite the contrary. It quickly became clear that such a calculation was not so easy to make in practice. The reality of domestic quarantine in which much of European society found itself revealed a gap in the online landscape that needed to be filled by cultural education and leisure activities. It was an erroneous thinking to detach museums from the overall social context and to deny them importance for social well-being. Social distancing cannot function without cultural distancing.

In the years prior, museum institutions had already been making efforts to digitize their mediation services and make them accessible online. Most museum collections were digitized and work was done on presentation formats for artistic projects that located in virtual space from the outset. Interest in this kind of digitization mainly came from circles of experts who, within the framework of academic discourses, had investigated the conservational, documentary, and, not least, mediating potentials of new media technologies. "Beyond Matter. Cultural Heritage on the Verge of Virtual Reality" is one of those few projects that was already working on the implementation of corresponding formats before the pandemic.

The lockdowns showed that the digitization of museums, beyond meeting museums' own need to find new mediation and distribution modes to remain accessible, has been demanded and gratefully accepted by the public.[1] Covid-19 brought to light a social need for cultural education, consumption, and exchange so clearly that even relatively small cultural institutions are now making their online presence more conscious and interactive. The pandemic can thus be seen as a catalyst, promoting the sensitization and need for digital formats.

Many museum institutions either showed their own initiative or quickly followed prominent examples to conduct virtual exhibition tours, discussions, guided tours, film streamings, and so on online. Since this acceleration has resulted in a high volume of such platforms, most of which did not originate from a research intention but nevertheless reflect an interesting trend, we would like to present the results of our partner institutions here and thus provide an excerpt of the strategies of virtual events developed in response to the sudden emergence of non-local audiences.[2]

The partner institutions of the Beyond Matter project responded variously to these challenges and developed several new formats and projects to reach their audiences. Even if these were not part of our collaboration, focusing on them and republishing them on the page we named *CRISIS SPECIAL* appears to have been the groundwork for our common practice-based research in retrospect (see fig. 2).

Tallinn Art Hall preceded the crisis with the release of a virtual exhibition platform inaugurated in 2019 and described by Corina Apostol as "Spooky Action at a Distance."[3] The site accumulates exhibition documentation, keeping the featured shows in a state of digital immortality (see fig. 3).

The Ludwig Museum – Museum of Contemporary Art, Budapest reacted to the lockdown with its #museumfromhome initiative, which distributed various materials on their exhibitions, collection, and mediation program. Instead of spatial documentation of their venue, the curators opted for an informative website for the exhibition *Slow Life. Radical Practices of the Everyday* (2021),[4] featuring documentation of each work, interviews with the artists, and extensive miscellaneous materials (see fig. 4).

1   See Stefan Hartmann, *Museen, Covid-19 und digital heritage*, paper (Augsburg University: 2020), 5: "In general, the expansion of online content corresponded to an increase in the number of users. […] Fifty percent of the institutions provided at least two different online services. These were institutions with at least 5,000 to 10,000 visitors. More than half of the museums recorded an increase in the number of users of their online services; for the rest, the user figures were either not recorded or no comparison with previous user figures was possible. In 10 percent of the museums, the number of users did not increase." https://opus.bibliothek.uni-augsburg.de/opus4/frontdoor/deliver/index/docId/77944/file/Museen_Covid_19.pdf.

2   See Peter Weibel, "On the necessary step of digitalizing cultural institutions" *Eikon*, no. 114 (June 2021): 55.

3   Corina Apostol, "Spooky Action at a Distance: Tallinn Art Hall's Digital Exhibition and Engagement Platform," in *HyMEx – Hybrid Museum Experience Symposium 2021: Proceedings*, ed. Lívia Nolasco-Rózsás and Borbála Kálmán (Budapest: Ludwig Museum, 2021), 71–76, https://hymex.beyondmatter.eu/.

4   Curated by Petra Csizek, Jan Elantkowski, József Készman, Zsuzska Petró, Viktória Popovics, and Krisztina Üveges, Ludwig Museum, Budapest, July 14–September 5, 2021.

Fig. 2
Beyond Matter Online Platform, CRISIS SPECIAL subpage, https://beyondmatter. eu/crisis. Screenshot.

Fig. 3
Beyond Matter Online Platform, presentation of Tallinn Art Hall's virtual exhibition platform, https:// beyondmatter.eu/crisis/ tallinn-art-hall-virtual- exhibition-platform. Screenshot.
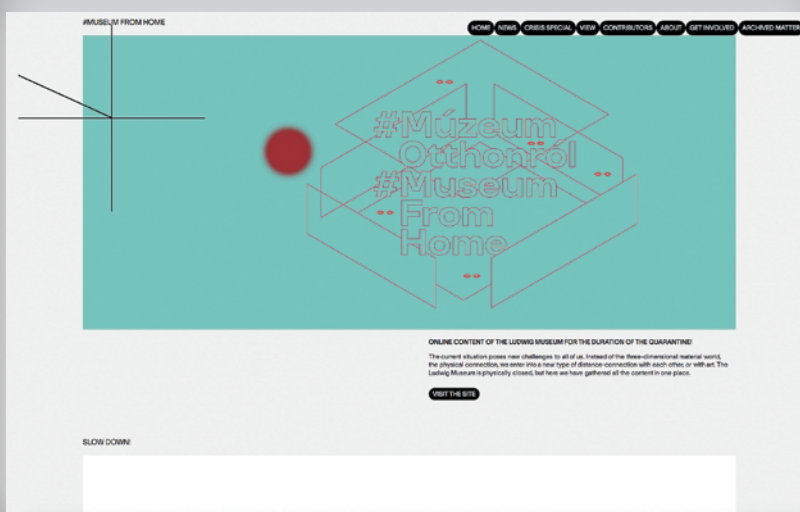
Fig. 4
Beyond Matter Online Platform, presentation of the #museumfromhome initiatied by Ludwig Museum, Budapest. https://beyondmatter. eu/crisis/210. Screenshot.

While in Tallinn and Budapest our partners concentrated on digitizing their analog content, at Centre Pompidou a purely online exhibition was launched in 2021. *Sans Objet. 9 Abstract Works made for the Web* (2021)[5] highlighted software-based artwork and thus returned attention to the canvas-like qualities of the web browser (see fig. 5). Due to social distancing, digital art created for the internet came into focus again after the first wave of net art in the 1990s and the following tides of born-digital artistic output created for the web.
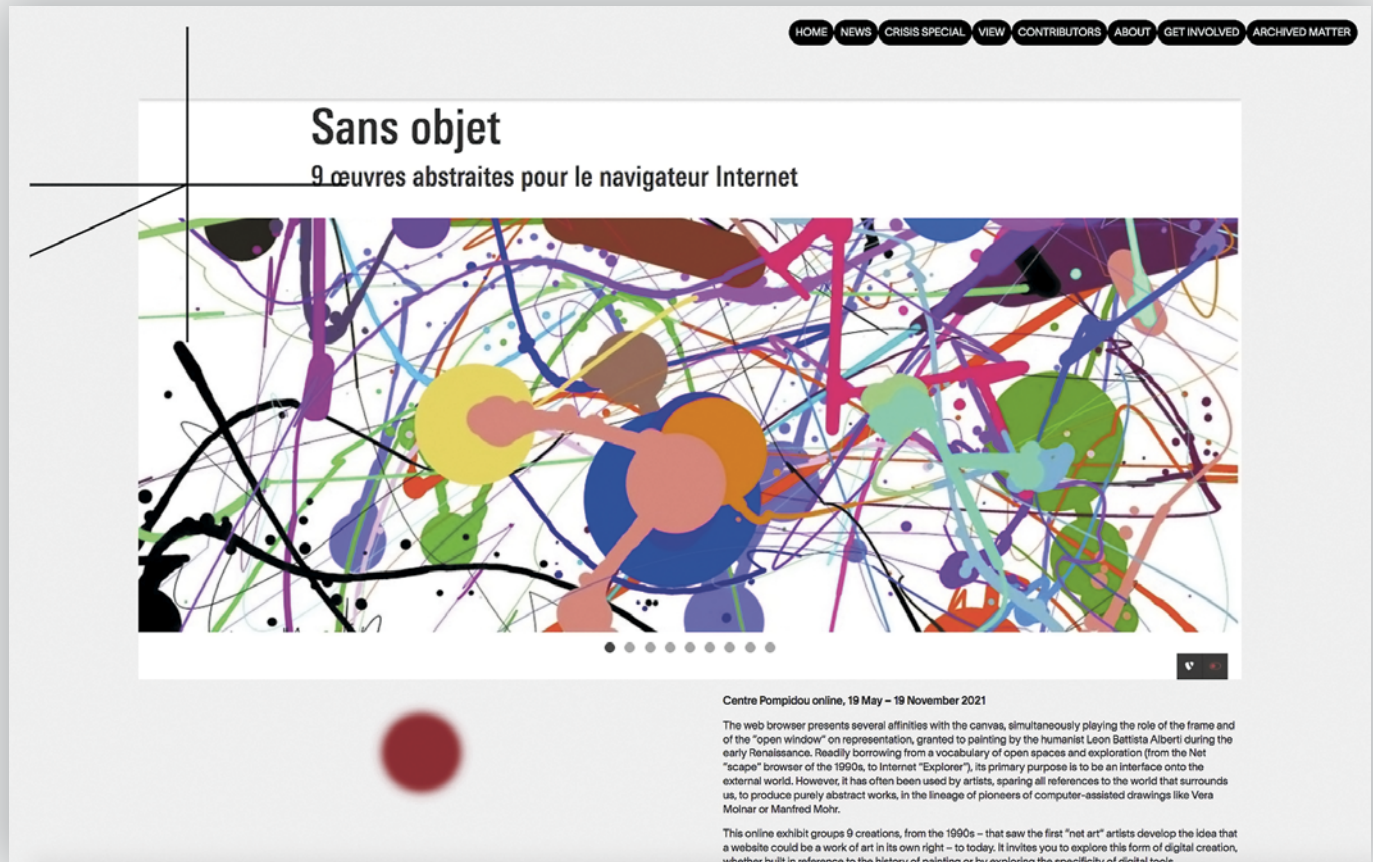
ZKM | Center for Art and Media Karlsruhe gave many alternative answers to the question of how to reconnect with audiences when the physical institution is closed. One of these was the online platform created parallel to the physical exhibition *Critical Zones: Observatories for Earthly Politics* (2020–22),[6] which doesn't try to resemble three-dimensional physical space but evokes spatiality through an endless scroll, hinting at a route in an exhibition space. Although visitors don't see each other, the number of "entities" is indicated on the site, which has remained online after the physical exhibition was dismantled. Another, solely online experiment at ZKM was entitled *Computable-Incomputable* (2020–21),[7] created in collaboration with the Digital Art Hall of German television channel ZDF. After Konrad Zuse,[8] it asked whether we can

Fig. 5
***Beyond Matter Online Platform**, presentation of Centre Pompidou's exhibition* Sans Objet. 9 Abstract Works made for the Web. *https:// beyondmatter.eu/ crisis/sans-objet-9-abstract-works-made-for-the-web-browser. Screenshot.*

5   Curated by Philippe Bettinelli, Centre Pompidou online, May 19–November 19, 2021.

6   Curated by Bruno Latour, Peter Weibel, Martin Guinard, and Bettina Korinthenberg, ZKM | Karlsruhe, May 23, 2020–January 9, 2022, online platform: https://critical-zones.zkm.de/

7   Curated by Lívia Nolasco-Rózsás and Teresa Retzer, Digital Art Hall of ZDF, October 30, 2020–September 30, 2021.

8   See Konrad Zuse, *Calculating Space – Translation of: Rechnender Raum*, trans. by Aztec School of Languages, Inc. (Cambridge, MA: Massachusetts Institute of Technology, 1970). First published as "Rechnender Raum," in *Schriften zur Datenverarbeitung*, vol. 1 (Braunschweig: Friedrich Vieweg+Teubner Verlag, 1969).

imagine the universe as a big computer. Mostly born-digital artworks, represented by avatars depicting cellular automata and engaging with the question of whether our surrounding reality is entirely computable, were featured in this online exhibition, situated in a digital copy of one of ZKM's exhibition atriums.

VIEW

Throughout the course of Beyond Matter, exhibitions emerged that were specifically created for online space, and they were all published temporally on the *VIEW Platform*. The platform explores the reciprocal relations between physical and virtual spaces via various solutions, as examples of how an exhibition can be created and mediated via the internet. A tenet of all these experiments was that an exhibition's spatial features constitute one of its most decisive qualities, and that these should be retained; this was done using technologies from photogrammetry to game engines and 3D modeling. The design of the VIEW landing page itself possesses spatial qualities, consisting of a movable grid with spheres attached to it, each indicating an exhibition, whether it is a result of a residency, a curated exhibition, or a model of a past exhibition (see fig. 6).

Fig. 6
Beyond Matter Online Platform, VIEW subpage, https://beyondmatter. eu/projects. Screenshot.
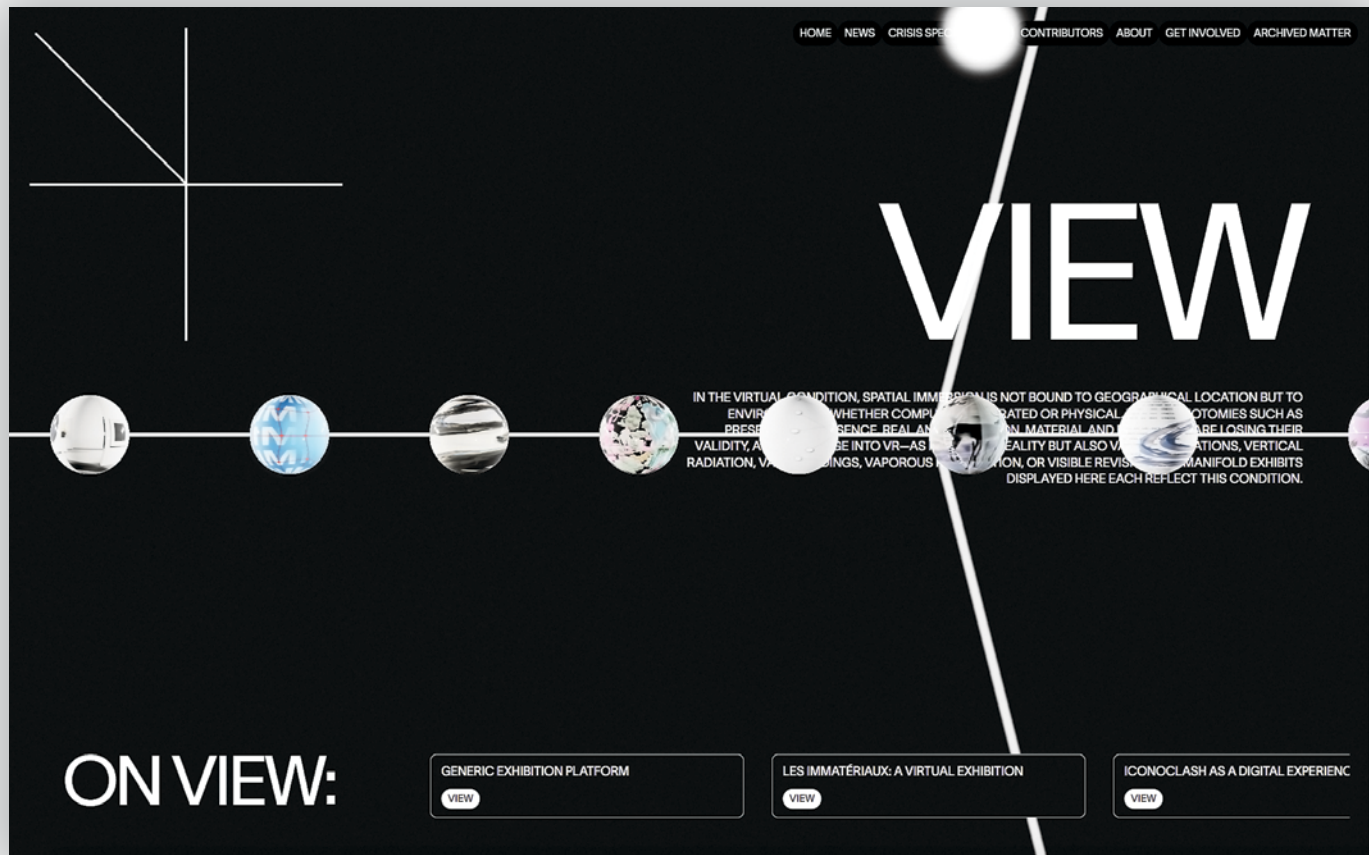
The pandemic genuinely influenced the way the platform was established and how the residencies were conducted: some of the resident artist had to realize their planned projects remotely, and some, partially due to remote work, opted for online presentation. Ami Clarke, Jazmina Figueroa, Theodoulus Polyviou, and Alex Walmsley decided to use online space, in some cases with strong ties to a physical space, for their project presentations.

Curated exhibitions realized in the framework of Beyond Matter feature in various ways. The photogrammetric documentation of *Spatial Affairs*, as a digital twin of the physical exhibition

at the Ludwig Museum, Budapest, and the born-digital *Spatial Affairs. Worlding* were shown on the platform,[9] as was the virtual documentation of the exhibition *Immerse!* at the temporary venue of Tallinn Art Hall. The *Tirana Floating Archive*, being a hybrid of curated show and online archive, inhabits its own planet on the platform, as do the two virtual models of past exhibitions, *Iconoclash* (2002) and *Les Immatériaux* (1985). Also featured is the Generic Exhibition Platform, which is not an exhibition on its own but a demo and manual in one for curators and institutions who would like to create their own online exhibitions based on the open-source code developed for the *Iconoclash* model.

All these spheres and the exhibitions encapsulated in them, world new worlds that have looser or tighter connections with our surrounding spatiality, generating narratives out of a seemingly non-narrative void of yet unknown digital realms, keeping in mind that "It matters what stories make worlds, what worlds make stories."[10]

On multiple levels of the Beyond Matter project, we have not only been "exploring the tools of virtual reality but also the space that it inhabits. By going beyond the physical, the virtual realm harbors many opportunities; be it emotional or philosophical, the virtual spans all that is not physical."[11]

9   *Spatial Affairs* (http://spatialaffairs.ludwigmuseum.hu/) and *Spatial Affairs. Worlding* (https://spatialaffairs.
        beyondmatter.eu/en) were online until July 31, 2023.

10   Donna Haraway, *Staying with the Trouble. Making Kin in the Chthulucene* (London: Duke University
        Press, 2016), 10.

11   Adela Demetja, curator and director of Tirana Art Lab, in the panel discussion "Strategies of Narration in
        the Virtual Reality" with Lívia Nolasco-Rózsás, artist Olson Lamaj, and curator Valentina Peri (the latter both
        fellows of the Tirana Art Lab Residency Program), Center for Narrative Practice, Pristina, July 23, 2022.

GUIDED TOUR SOFTWARE TOOL FOR *SPATIAL AFFAIRS. WORLDING.*
In Conversation with Janine Burger, Beatrix Szörényi, and Vit Ruller

Lívia Nolasco-Rózsás

In collaboration with the design studio The Rodina, a new software tool was developed for the online multi-user exhibition environment *Spatial Affairs. Worlding – A tér világlása* that facilitates guided tours through its online space. The aim of this joint endeavor was twofold: to draw on and enhance the potentials of visits to virtual exhibitions, and to avoid using supplementary video-conference apps to host or participate in online guided tours. In this approach to online art mediation, visitors enter as avatars with the option of participating in guided tours directly broadcast in the space and interacting with other participants using the chat function. The development of software such as this lays the foundations for novel approaches to hosting guided tours in digital environments while also fostering new modes of ↘ interaction between audiences within online exhibition spaces.

As a multi-user online space, *Spatial Affairs. Worlding*, an extension of the exhibition *Spatial Affairs* at the Ludwig Museum in 2021, facilitates a communal experiencing of digital art and interaction with fellow visitors, similar to exhibitions in Mozilla Hubs, GatherTown, and comparable game-engine-based environments. The past few years have seen a surge in the creation and range of solutions for online community and exhibition spaces, with the Covid-19 lockdown waves sparking increased demand for diverse levels of interaction beyond the physical realm. Some mediate online content and organize online guided tours. In the Mozilla Hubs Art Camp project,[1] for example, avatars of visitors and a guide are present and only the guide can broadcast sound, as in *Spatial Affairs. Worlding*. Another example on Mozilla Hubs is the exhibition space *Liminal Latitudes* of the exhibition *Bunch of Kunst in Quarantine // Paradox Paradise* (2020) which was initiated by curator Tina Sauerländer, who also gave a guided tour through *Liminal Latitudes*.[2]

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1   For a guided tour of Mozilla Hubs Art Camp project by founder Judit Navratil, see https://www.youtube.com/watch?v=AHvYI4Gnp_w&ab_channel=JuditNavratil.

2   *Bunch of Kunst in Quarantine // Paradox Paradise* is a virtual exhibition curated by Mara-Johanna Kolmel and Tina Sauerlaender for Kara Agora – Online Art & Research Center. It turns its lens on artistic production during the Covid-19 pandemic and poses the question of how visual art can open up alternative paths for reflection, transformation, and solidarity. For a guided tour of the exhibition and Liminal Latitudes with curator Tina Sauerlaender and the artists Martina Menegon, Chiara Passa, Katharina Arndt, and Ornella Fieres, see https://www.youtube.com/watch?v=053mP4Q3Vgo.

While the modus operandi of these tours shares similarities, in *Spatial Affairs. Worlding* specific features enhance the range of possibilities of the guide, whose avatar is able to point at artworks, send joint messages to everyone, and play videos on the stage within the virtual exhibition space. Its guided tour tool fosters online mediation to a greater extent.

The tool's development process required a combination of expertise and skillsets in art mediation, curatorial practice, and software development. Artist and independent art mediator Beatrix Szörényi, helped shape the tool for her own professional needs, contributing to the software's development but also devising a new interactive format for guided tours and workshops. Comprising of Tereza and Vit Ruller, The Rodina collective was involved in the realization and visual process of *Spatial Affairs. Worlding*. Vit guided the process of bringing the ideas of the project team to fruition based on our comprehensive wish-list for a guided tour tool, while Tereza designed the guide avatar.

The Museum Communication Department at ZKM | Center for Art and Media Karlsruhe, led by Janine Burger, generously supported us throughout the process and integrated the new tool within the wide range of formats utilized in online art mediation, mostly prompted by lockdown periods throughout the pandemic.

LÍVIA NOLASCO-RÓZSÁS Janine, over the course of the last two years many new ideas for online art mediation have emerged. It is near to impossible to gain a comprehensive overview of the different initiatives that have surfaced in such a short time, which is why I wouldn't say that our tool is completely unique. Do you know of similar mediation practices? Are there other mediation practices at ZKM | Karlsruhe that could be considered as predecessors of this approach?

JANINE BURGER The mediation format we offer at *Spatial Affairs. Worlding* is currently unique—I don't know of a similar platform or similar guided tours. Innovative digital mediation formats are only just beginning to emerge and expand, but the pandemic has demonstrated how long overdue this development is.

Before offering guided tours through *Spatial Affairs. Worlding* in our outreach program, we had success experimenting with other digital tours. Besides our recorded tours, which are available on demand, we have offered live-stream tours of our exhibitions since 2020. The *Instagram TV* live tours, for example, are accessible to everyone. They pose a challenge to our art educators, as they walk through the physical exhibitions with their mobile phones in their hands presenting individual works—always keeping an eye on the quality of the images and the light. Viewers can ask questions in the chat, which is supervised by another mediator. Tours streamed on *Zoom* are technically more sophisticated, delivering high-end digital quality without losing the live, on-site character. This involves a technical team accompanying the art educator through the exhibition. The camera is fitted on a tripod and guided by a person who ensures balance between mediator and artwork. The sound is picked up by a microphone boom or a radio microphone, which also needs to be held by another person and is mixed live. The audio is transmitted via *Zoom*, so that the participants, who are required to register to receive the link so as to prevent any possible disrupters, are able to participate directly. Questions can be asked in

the chat during the tour, which is also supervised by a member of staff, or at the end of the tour with the mediator and the other participants. What makes these tours unique is that the curator or artist can join the session and discuss artworks and exhibition concepts, regardless of where they are.

LNR Vit, do you generally use open-source tools when programming these kinds of software solutions?

VIT RULLER We find it more interesting to work with open-source code and edit it rather than write everything from a scratch. That's why most of the tools and libraries we are using are open-source. This applies to the code editor, the game engine, and parts of underlying infrastructure.

LNR Do you publish your developments?

VR The code can be found and accessed on *Github*. Since this particular virtual environment started as an experiment and was created specifically within the framework of Beyond Matter, we haven't documented it in detail.

LNR Do you know of other programmers who use similar tools and platforms to exchange ideas—or is your work based on self-conducted research?

VR There are many programmers and collectives working with similar tools and investigating similar topics. We keep up with each other's work and share our code over *Github*, *Slack*, and *Discord* forums. Debate mostly centers around technical aspects and lacks an artistic angle. We consider ourselves more as designers or artists than professional programmers. So we find the most interesting discourse to be outside the realm of the programming community.

LNR Beatrix, could you describe the workshop you conceived for the online environment and the way you host the guided tours in *Spatial Affairs* and *Spatial Affairs. Worlding*?

BEATRIX SZÖRÉNYI The online environment of *Spatial Affairs. Worlding* was conceived in such a way that the exhibited web-based works have been left in their original places on the net and are represented within the platform by avatars moving in virtual space. On the other hand, the digital twin of the physical exhibition *Spatial Affairs* is also situated on a screen within the environment as a video recording of the photometric 3D exhibition tour. Another extension is an extra mode for guided tours, in which the guide, identifiable by a red avatar, can be followed; they guide participants to different "sites" in the 3D environment and can point out objects with a long red extendable stick that resembles a nose. The voice of the guide is transmitted via the platform, and the guide appears in a small window on the website as a live video screening. Direct interactive communication between visitor and guide takes place exclusively via the chat window. These modifications place an increased value on the experience of being in
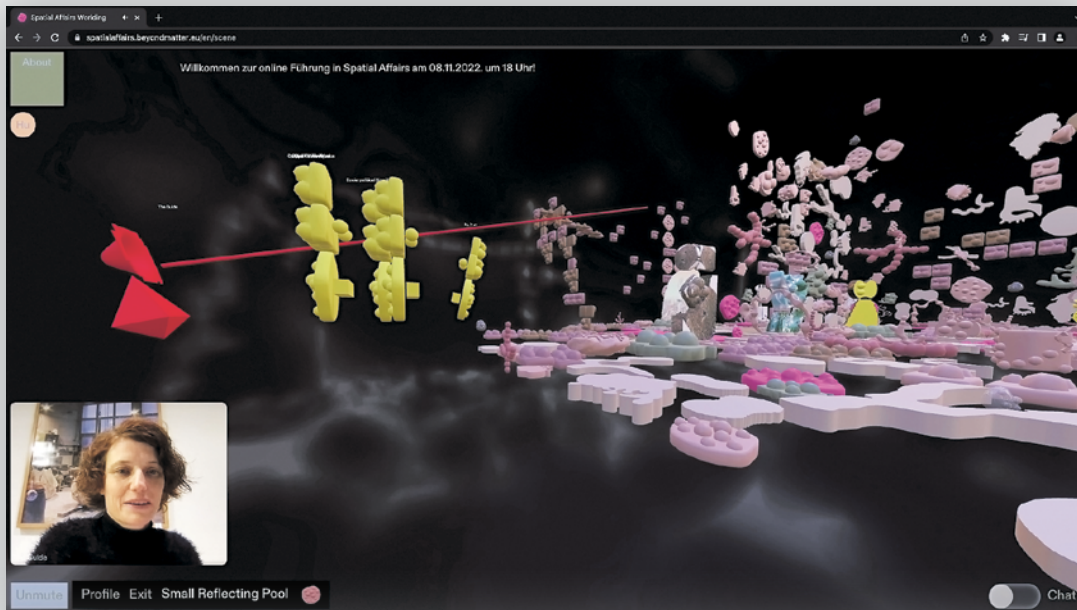
the virtual environment of *Spatial Affairs. Worlding* as it is no longer necessary to change or leave the room to view other websites or use an external video conferencing tool.

In the same way that guided tours take place in physical space, participants meet in the online environment and following the red avatar from one spot to another, such as the screen with the 3D exhibition tour of *Spatial Affairs* and to some exemplary net.art work, as well as to hidden areas containing sound excerpts from artists' manifestos related to the internet and digital space. Participants can explore the various net.art works autonomously with the voiceover of the guide. Another special feature is that the tours are open to all—no registration or invitation link is required. Everyone present in the online environment can take part in the tour or disregard it and explore the works individually.

LNR Tell us about your experience—did the new tool and guide avatar change the way the visitors react to the exhibition and to each other? How would you compare holding a guided tour via a videoconference platform and holding one with the new tool?

BS By situating the tour exclusively in the virtual environment of *Spatial Affairs. Worlding*, the audience and the guide no longer have to switch between platforms. This places the focus of the tour and the participants on the experience in the virtual environment.

Artworks, participants, and the guide are all visible as avatars, and navigating the virtual environment overloaded with moving items is both unusual and challenging for some visitors. For the guide it can be challenging to keep track of the participants and questions in the chat. The absence of an external videoconferencing application imposes certain barriers that both the guide and the participants have to overcome. It's difficult to lead a dialogue that builds on interaction with the audience, so often the chat serves to solve technical problems, to ask content-related questions, or to provide feedback at the end. The perception of the participants is altered because the physical people behind the screen are not visible. As the guide you likewise have less of a connection to the participants than in a video conference, because you address avatars who can at best respond in writing. The sense of restriction imposed by the technology is an inherent to the tour.

With these conditions, and especially in comparison to familiar tour formats, the online environment of *Spatial Affairs*. *Worlding* creates an unusual and experimental tour, exhibition experience, and communication scenario that thematically questions virtual space by means of its appearance and functions.

Translated from the German by Marianne Schädler.

VIRTUAL VEIL. UNMASKING THE POLITICS OF IMMERSION
Curatorial Concept of *Immerse!*
Corina L. Apostol and Lívia Nolasco-Rózsás

Imagine yourself drowning without suffocating. Your senses are fixated on the surroundings you are submerged in. You are being consumed but you do not cease to exist; despite being swallowed by a generated environment, you are very much alive.

Paradoxically, this is nothing extraordinary—it's a casual occurrence. You switch modes of existence several times a day as you drift between certain seemingly intangible realms. You do it at will and you are certainly not the only one. Every day, billions of people alternate between being absorbed into and expelled from one or another digitally constructed virtual environment.

Immerse! is an international group exhibition on the various facets and epistemological, cognitive, and political implications of the ⬊immersion made possible through computation today. It poses questions such as: How have knowledge production and spatial relations been resituated within new immersive relationships and virtual entanglements that act as mediators of space and presence? And how do we keep a critical distance when the distinction between real and virtual, between computer-generated and tangible, defies perception?

With the recent worldwide acceleration of digitizing the arts during the Covid-19 pandemic and the ensuing crisis, this exhibition and its catalog serve as a timely resource to reflect on and analyze some of the latest artistic solutions and platforms that enable remote access to knowledge and culture in unique and effective ways.

The exhibition is realized within the framework of Beyond Matter of which Tallinn Art Hall has been part of since the start. *Immerse!* and the accompanying catalog mark the conclusion of this multi-year endeavor.

The exhibition asks visitors to reconsider their relationships to the virtual dimensions of reality: How can virtual reality–understood as being computer-generated public space–contribute to current political and social discourses? What is the potential of virtual reality within the field of art?

Over the course of our three-year collaboration, we have gathered prominent artistic insights with a focus on Central and Eastern Europe. We also included a majority of the artistic projects conceived and realized through the Beyond Matter residency program in this exhibition. *Immerse!* thus asks urgent questions related to the world that we inhabit and our relationship to the virtual world.

Throughout our research, we observed that today's reality intertwines the physical with the virtual, broadening our perspective of time from linearity towards the multidimensional. This has a comprehensive impact on spatial dimensions when crafting, curating, and mediating visual arts, as well as their reception. The art institution transmogrifies into a hybrid entity integrating a geographical location with various digital platforms; instead of one, an affluence of exhibition spaces—an extended but also porous system of multiple dimensions.

These observations led us to various questions: How have knowledge production and spatial relations been resituated within new immersive relationships and virtual entanglements that act

as mediators of space and presence? And how do we keep a critical distance when distinctions between real and virtual, computer-generated and tangible, defy perception? What does this 'new'now look and feel like?

The artists in this exhibition shape and shed light on this moment through their ruminations on what we are losing, how we are changing, and what the digital poster children or virtual totems of the current crises will be. You are about to experience artworks commenting on today's interconnected issues through the lens of the virtual condition in its many forms and archetypal experiences, with political urgency. *Immerse!* takes place adjacent to the war waged by Russia against Ukraine, in the midst of vestiges of Soviet culture in Estonia, and in a neigh-borhood that is predominantly Russian-speaking. Our daily witnessing of the atrocities of this proximate war on our digital screens suggests that the end is near, and whatever new beginning may come will be unrecognizable to us, judging by the recent past.

THE POLITICAL IMPLICATIONS OF VIRTUAL REALITY.
A Conversation between the Curators of *Immerse!*

Corina L. Apostol and Lívia Nolasco-Rózsás

The following excerpts are from an edited transcript of a conversation between the curators Corina L. Apostol and Lívia Nolasco-Rózsás that took place on the occasion of the opening of the exhibition *Immerse!* at the Lasnamäe Pavilion of Tallinn Art Hall in February 2023. A recording of the conversation can also be found online.[1]

    Immerse! is a culmination of almost four years of research and continuous exchange. In the lead-up to the present exhibition we organized a number of activities in the framework of the umbrella project Beyond Matter. Among them a residency program, a series of talks, as well as the first ever presentation of *The Immaterial Display* at Tallinn Art Hall.
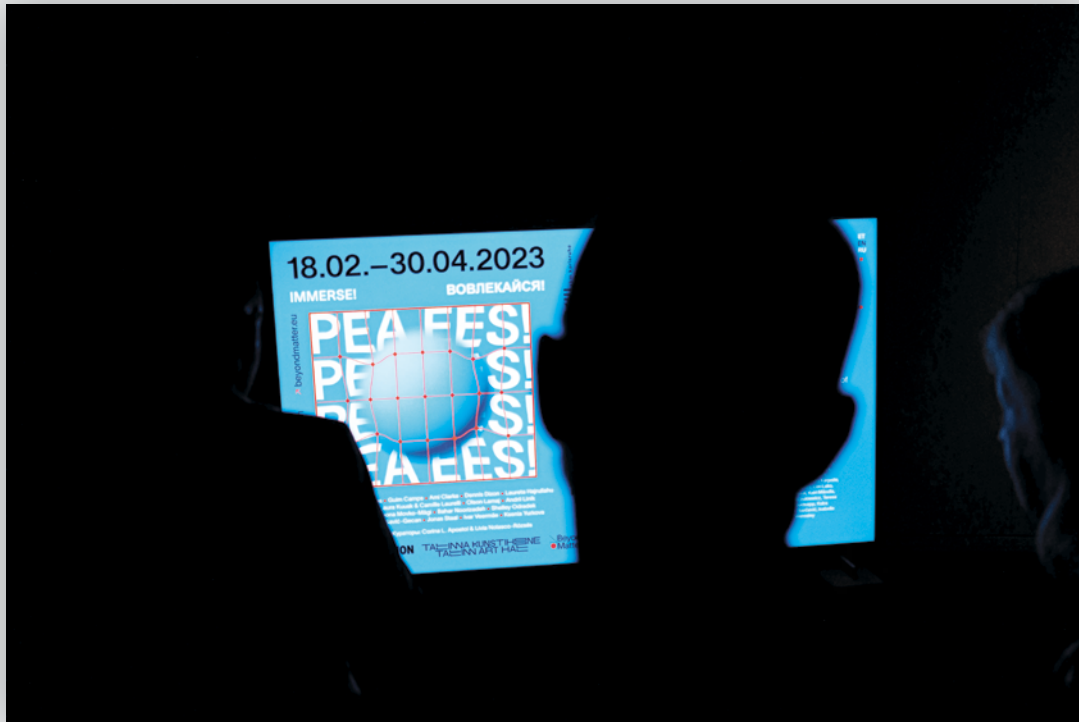
Fig. 1
Visual identity of the exhibition *Immerse!* of Tallinn Art Hall at Lasnamäe Pavilion.

1   See https://www.kunstihoone.ee/en/programme/immerse/.
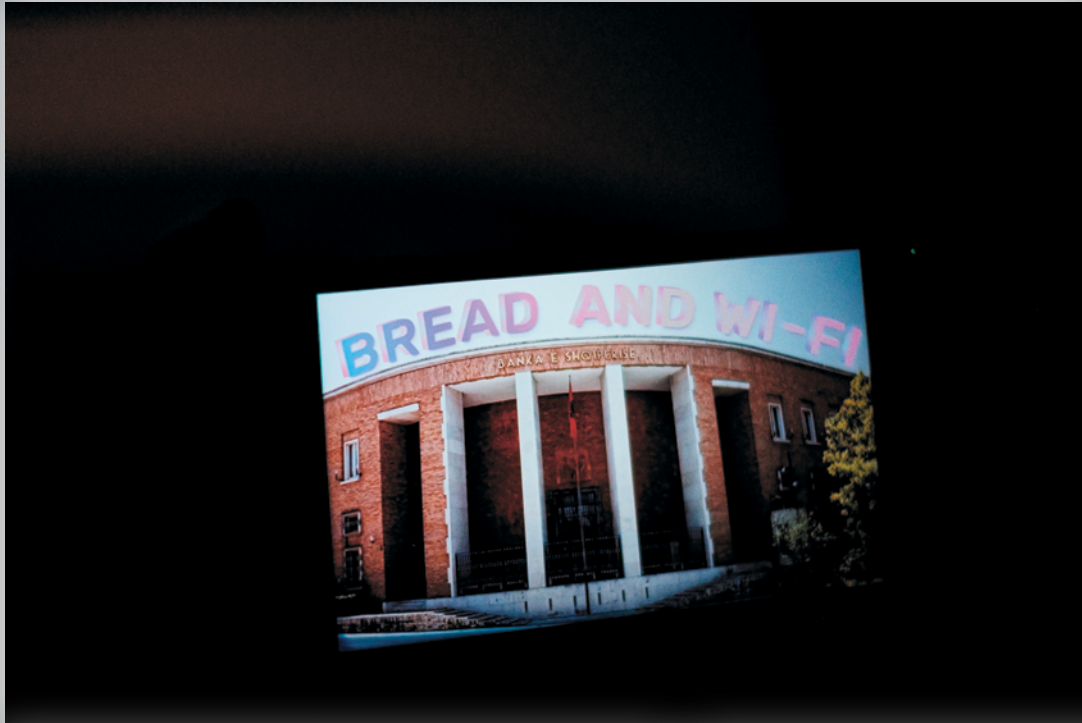
Fig. 2
Olson Lamaj, *Pixel and Blood*, 2022. Installation view Tallinn Art Hall, 2023.

Fig. 3a and 3b
Ksenia Yurkova, HOLD OFF: *The Time of Fun*, 2020. Installation view Tallinn Art Hall, 2023.
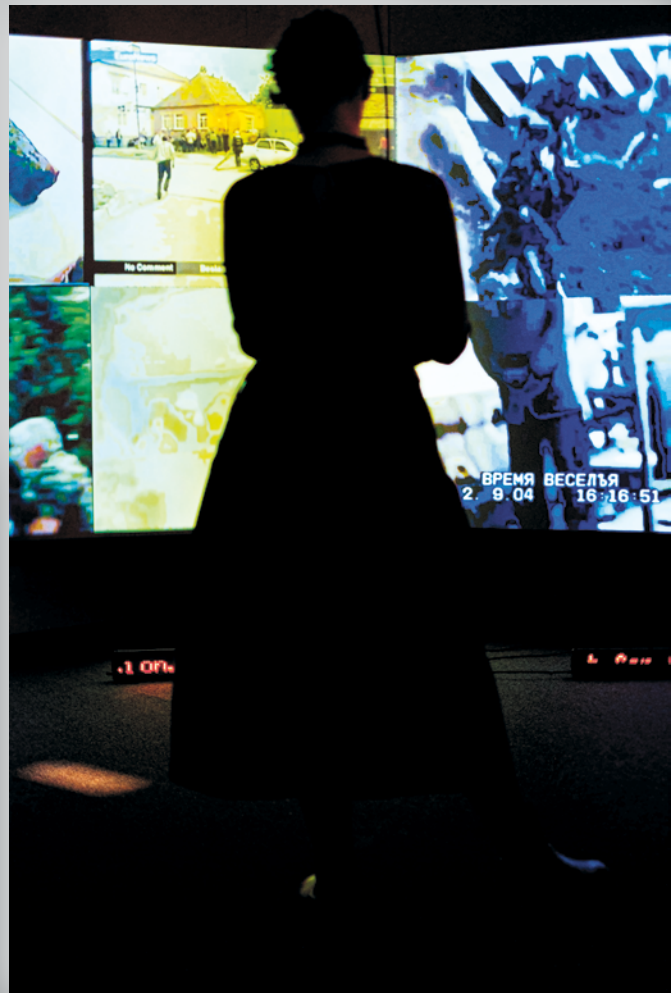
Fig. 4a and 4b
Anna Manankina, *Fog of War*, 2022. Installation view Tallinn Art Hall, 2023.

**Fig. 5
Dennis Dizon, *Ritual as Protocol as Ritual*, 2023. Installation view Tallinn Art Hall, 2023.**
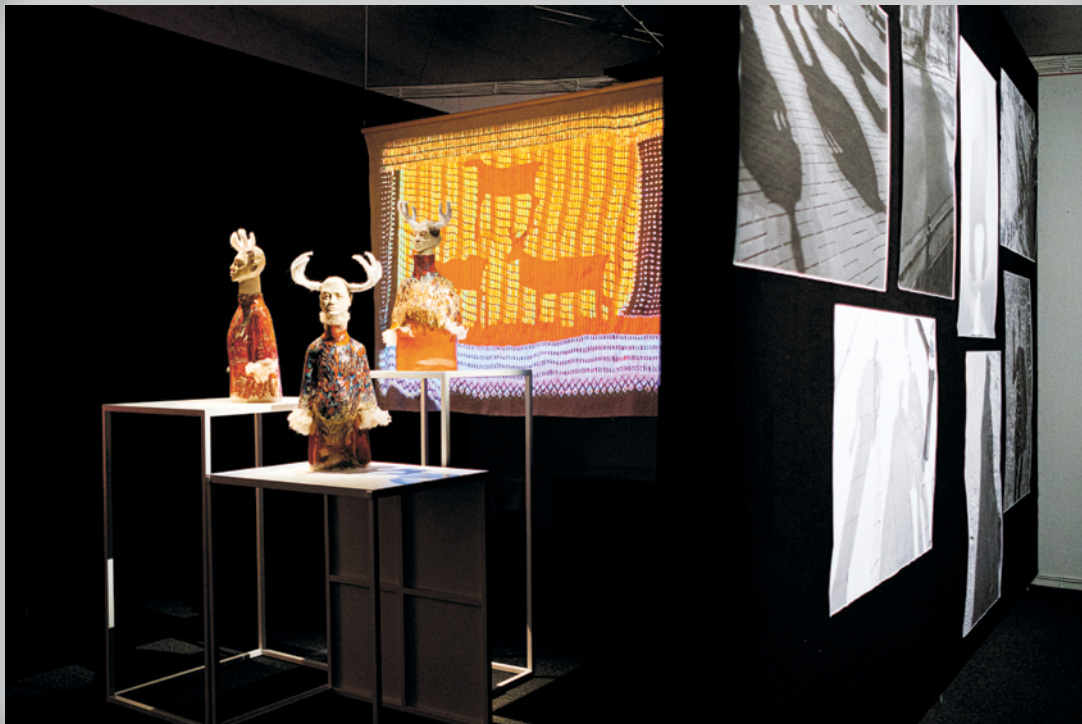
**Fig. 6
Alyona Movko-Mägi, *Beyond the River*, 2023. Shelley Odradek and Katie Zazenski, *Shadow Archive*, 2023. Installation view Tallinn Art Hall, 2023.**

Fig. 7
Laureta Hajrullahu,
*Post-Reality Comes In
a Flashing Light*, 2021–.
Installation view Tallinn
Art Hall, 2023.

Fig. 8
Tomo Savić-Gecan,
Untitled 2022/2023,
2022/23. Installation
view Tallinn Art Hall,
2022.

The topic of ⬊immersion in the virtual world and the understanding of the exhibition space as a hybrid one—between online and physical space—has only been propelled by the pandemic. Subsequently, this has resulted in an acceleration of digital practices: Our daily lives are inundated by digital tools.

Immerse! highlights artistic positions from Estonia and the Baltics, but also places emphasis on a wider international region, with many of the exhibiting artists dealing with the sociopolitical implications that come to the fore through the proliferation of virtual worlds. This exhibition is of its time and markedly so, especially with view to the pandemic but also the war in Ukraine, which many of us have been witnessing digitally.

The exhibition raises questions about the political implications of virtual reality and computer-generated networked spaces, whether they are virtual environments or online platforms, or other types of metaverses. The scope of the exhibition is expressed through the rich assortment of exhibited artworks and the underlying concepts on which they are based. Multimedia installations, performance, tapestries, image archives, as well as artworks incorporating VR, AR, and even AI collide together to form a whole in which the visitor is immersed.
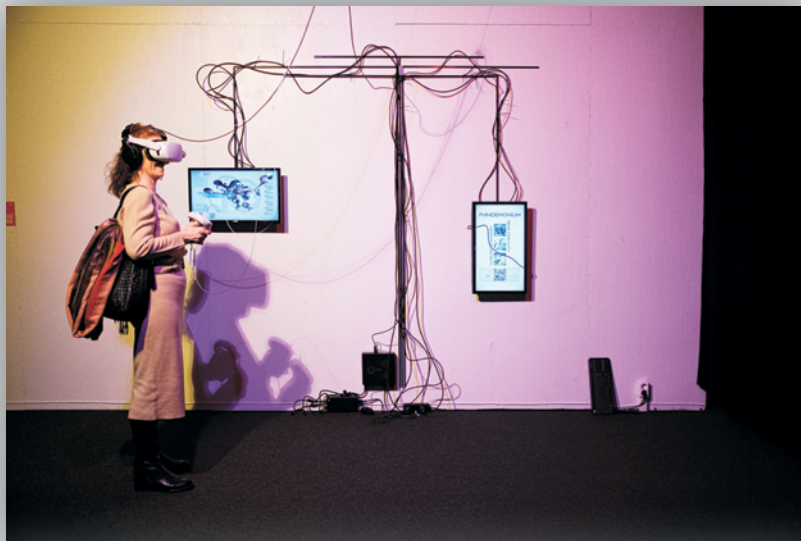
Fig. 9
Ami Clarke,
Pandemonium (*Do
***Androids Dream of*),**
2021. Installation view
Tallinn Art Hall, 2023.

Fig. 10
Ivar Veermäe,
***Universals I*, 2020–22,**
and *Universals II*, 2019–
22. Jonas Staal and Jan
Fermon, *Collectivize*
***Facebook*, 2020–.**
Installation view Tallinn
Art Hall, 2023.

We have become accustomed to slipping between the virtual and the physical so frequently and seamlessly that it rarely stops us in our tracks and causes us to reflect. The implications—political and economic—are multifaceted and affect the way our information is being processed and, as a consequence, also affects our fundamental freedom. However, these implications harbor a lot of potential as well and can invigorate the vision of a better world. The exhibition captures the positive and empowering components of virtuality while also investigating its darker aspects. The virtual and the physical are flipsides of each other. The one cannot be extracted from the other.

Fig. 11
Kristaps Ancāns, *Polar Rainbow* over Lasnamäe district, 2023.

Polar Rainbow (2023) is an artwork by Kristaps Ancāns that was commissioned for *Immerse!*. It shows a virtual double rainbow, a symbol synonymous with the LGBTQ+ community. By means of the corresponding AR app, *Polar Rainbow* can appear in any environment, anywhere. Even in contexts where the rainbow as a symbol is banned, as is still all too common in many parts of the world where the LGBTQ+ community is met with hostility and oftentimes also violence. By projecting it into the physical via virtuality, it cannot be removed or taken down. In this way, technology is used to send an empowering message.

Zach Blas' artwork *IUDICIUM* circles in on Silicon Valley and the tech elite behind major companies situated there—Google, Facebook, and similar metaverses—that are using our data and entrapping us in very dark ways. *IUDICIUM* imagines a future "healthscape," in which salvation—the work is based on Michelangelo's *The Last Judgement*—is promised only for that elite and the rest of us are prisoners in the larger web.

For this exhibition we edited a catalog, published by Hatje Cantz,[2] in which the artworks are featured in the form of visual essays. Some are more text-based whereas others consist of images that act as extensions of their exhibited works. Curatorial texts and contributions by invited authors, whose research is rooted in immersion, capture the essence of *Immerse!*

Exhibited artists:
Kristaps Ancāns, Zach Blas, Guim Camps, Ami Clarke, Dennis Dizon, Laureta Hajrullahu, Hanna Hildebrand, Laura Kuusk & Camille Laurelli, Olson Lamaj, Andrii Linik, Anna Manankina, Alyona Movko-Mägi, Bahar Noorzadeh, Shelley Odradek / Katie Zazenski, Kirill Savchenkov, Tomo Savić-Gecan, Jonas Staal, Ivar Veermäe and Ksenia Yurkova
Curators:
Corina L. Apostol, Lívia Nolasco-Rózsás

2   Corina L. Apostol and Lívia Nolasco-Rózsás, eds., *Immerse!*, exh. cat. Tallinn Art Hall (Berlin: Hatje Cantz, 2023).

GREETINGS FROM LASNAMÄE!

Paul Aguraiuja

The historical building of Tallinn Art Hall on Freedom Square has been undergoing extensive renovations since November 2022. While looking for temporary premises for the two-year renovation period, we considered several options, from moving away from Tallinn to spending two years on a train. During the discussion, however, we came to one of the most pressing problems in Estonia: the lack of integration of the Russian-speaking community.

There are deep ethno-linguistic gaps between the Estonian-speaking majority and the Russian-speaking minority—in family life, places of residence, and school education as well as the labor market,[1] and there is no sign of a quick improvement in the situation. Operating in the city's Lasnamäe district, which has a Russian-speaking majority, we can most effectively contribute to increasing the cohesion of society through contemporary art.

At the end of November 2022, Tallinn Art Hall thus opened its Lasnamäe Pavilion (see figs. 1 and 2). Our life in Lasnamäe over the last few months has been quite an adventure, but we are more and more convinced that we have gone to the right place. We went there to change. What are our experiences so far?

Fig. 1
Tallinn Art Hall's Lasnamäe Pavilion situated in Lasnamäe district, Tallinn. The building was designed by the Estonian architecture studio Salto.

1　See Kristiina Kamenik, Tiit Tammaru, and Ott Toomet, "Ethnic segmentation in leisure time activities in Estonia," *Leisure Studies* 34, no. 5 (2015): 566–87.

A Matryoshka Doll Full of Surprises

With the first exhibition, we generated a lot of interest and excitement. Over the course of two months, about 5,500 people visited the Lasnamäe Pavilion—a pleasantly big number for Tallinn Art Hall. Usually, only the annual *Spring Exhibition*—a favorite among our traditional audience— gathers more visitors than that. But even more pleasing than the audience numbers is an evident change in audience composition.

On weekends, more or less the same segment of the population is seen at the exhibition hall that visited us on Freedom Square: families with children, young people more financially successful than average. The only difference is that almost all visitors who came to our previous venue were native speakers of Estonian, whereas now half of our weekend visitors are Russian speakers. Also, our visitors now are more evenly distributed between social groups of different income. On weekdays, our average visitor on Freedom Square was a native Estonian-speaking woman, aged over fifty, who would regularly visit contemporary art exhibitions. Here, our visitors include groups of children on their way home from school, young mothers with small kids, and senior citizens on a walk. These three groups are mostly Russian-speaking and have had little exposure to contemporary art. That lack of experience is reflected in the fact that visitors have started to communicate with the Art Hall's tour guides. They ask more questions and express their own opinions more than our previous audience members. Russian-speaking people in particular take a sincere interest in exploring what is displayed.

Some of the visitors see us as an "embassy" of the Republic of Estonia, and their opinions are divided: On the one hand, people come to thank us, grateful that the state has finally brought something significant to Lasnamäe and is thinking about the people there. On the other hand, people scold our tour guides, saying it is insulting and humiliating that an institution presenting modern Estonian culture has been brought to Lasnamäe; there is a loud demand to show Russian classics of the nineteenth century ("real art," that is). Also, the Art Hall tour guides have received criticism for speaking Russian with an accent. On our part, we try to create a discussion with everyone and explain to people with different art experience why contemporary art is worth viewing—and how to do it.

The Long and Winding Road to Integration

We can feel the results of thirty years' worth of integration undone by the state on our own skins. Operating in an environment where 75 percent of the population do not speak Estonian as their mother tongue, we can see in practice that the linguistically segregated school system has supported the creation of ethnically segmented social networks[2]—and continues to do so. Looking at the people who come through our doors, it is evident that friendships and marriages between members of the majority and the minority are indeed rare in Estonia,[3] and since a large part of the Russian-speaking population does not follow Estonian-language media,[4] the majority of our Russian-speaking audience have never heard of Tallinn Art Hall before.

The partially negative feedback was predictable, and the first months have shown that the work we are doing is necessary and that we are moving in the right direction. We are introducing contemporary art in Estonia to a new audience. We hope to make a major contribution to the integration process. Participating in cultural events encourages people to enrich their social networks and can thus help reduce ethnic divides in a multicultural society.[5] If leisure habits become more uniform, there is potential for desegregation, interethnic communication, and inclusion of

2   See Kamenik, Tammaru, and Toomet, "Ethnic segmentation."

3   See Külliki Korts, "Inter-ethnic attitudes and contacts between ethnic groups in Estonia," *Journal of Baltic Studies* 40, no. 1 (2009): 121–37; Maarten van Ham, and Tiit Tammaru, "Ethnic minority-majority unions in Estonia," *European Journal of Population*, no. 27 (2011): 313–35

4   See Peeter Vihalemm, "The Infosphere and Media Use of Estonian Russians," in *Estonian Human Development Report 2007*, ed. M. Heidmets (Tallinn: Eesti Ekspressi Kirjastuse AS, 2008), 77–81.

5   Sanne Boschman and Manon van Middelkoop, "Residential segregation and interethnic contact," paper presented at the European Network for Housing Research Conference, Prague (June 28–July 1, 2009).

minorities in mainstream society. A 2015 study found that the largest ethnic gap in Estonia could be seen in the consumption of culture during leisure time: members of the majority participated in all forms of culture more than residents representing the minorities.[6]

Studies have also shown that people of different mother tongues do not move outside their habitual areas very much in Tallinn. Estonians whose circles of acquaintances mainly include other Estonians and who live in the southern districts of Tallinn do not go to Lasnamäe, while those Russian-speaking people whose networks consist mainly of other Russian-speakers rarely go to Nõmme or Mustamäe.[7] Segregation of school education will end soon, but it will take many years to see the results. I am convinced that we should also reduce urban spatial segregation to become a more cohesive society. Based on the initial experience of Tallinn Art Hall, it can be said that by moving cultural functions to districts populated by minorities it is possible to create positive points of contact between two social groups. However, such work must be systematic and long-term (see fig. 3).

More Culture for Lasnamäe

Tallinn Art Hall currently plans to operate in its Lasnamäe Pavilion for two years before moving back to Freedom Square. I have two suggestions here. First, together with the state and the City of Tallinn, we could start discussing how to use the Lasnamäe Pavilion and Estonian modern culture for the benefit of integration after the Art Hall has moved back to the city center. Could the Lasnamäe Pavilion, for example, become a place where joint lessons in art and culture are held for children of different mother tongues? Also included in the discussion should be other cultural institutions that see opportunities for integration in culture and opportunities for culture in integration. Second, in light of the limited space issue faced by the National Opera, I would like to ask why all big and important cultural institutions have to be located in the city center. By building a new dazzling opera house in Lasnamäe, we would give a completely new value to the living environment there. We would also open up the Estonian cultural space to the local population, and opera and ballet would flourish on the big stage.

In the meantime, however, please come to Lasnamäe! We have an exciting lineup of exhibitions planned, and there are two restaurants offering delicious food nearby, to which we will be happy to guide you after your visit.

6   See Kamenik, Tammaru, Toomet, "Ethnic segmentation."

7   Siiri Silm et al., "The Relationship between Ethno-Linguistic Composition of Social Networks and Activity Space: A Study Using Mobile Phone Data," *Social Inclusion* 9, no. 2 (2021): 192–207.

TALLINN ART HALL'S VIRTUAL EXHIBITION PLATFORM

Johanna Jolen Kuzmenko and Siim Preiman

Tallinn Art Hall's virtual exhibition platform is an opportunity to reach a wider audience and build an exhibition ⬡ archive. It functions as an extension of our physical exhibition space through which to reach non-local audiences and others who don't have the opportunity to see the exhibitions physically at Tallinn Art Hall. By presenting our exhibitions on the virtual exhibition platform we not only continuously shape a portfolio of our institution but also a strategic way to market our exhibition profile. This is essential for informing a wider international audience about our exhibitions and to attract new visitors, but it's equally important for our local audiences.

Tallinn Art Hall films all of its main exhibitions for the virtual exhibition platform. In this way we create an archive, a useful resource for anyone who wants to experience and study past exhibitions. Broadcasting our exhibitions by means of the virtual exhibition platform during the first Covid-19 lockdown, when all exhibition spaces were closed for unforeseeable length of time, was essential for our work and gave us a chance to stay in touch with our audience. It was a tool for our education team, who created specific programs for schools in which entire classes could participate. In replacement of our usual tours, our curators gave interactive virtual tours. After the lockdowns, we continue to organize virtual public programs.

Having curated a number of shows that are now accessible through the platform, Siim Preiman, curator at Tallinn Art Hall and co-author of this text, sees great value in being able to experience an exhibition that people were not able to see in the physical space, especially for researchers who are interested in delving deeper into the exhibition from afar. Until recently,
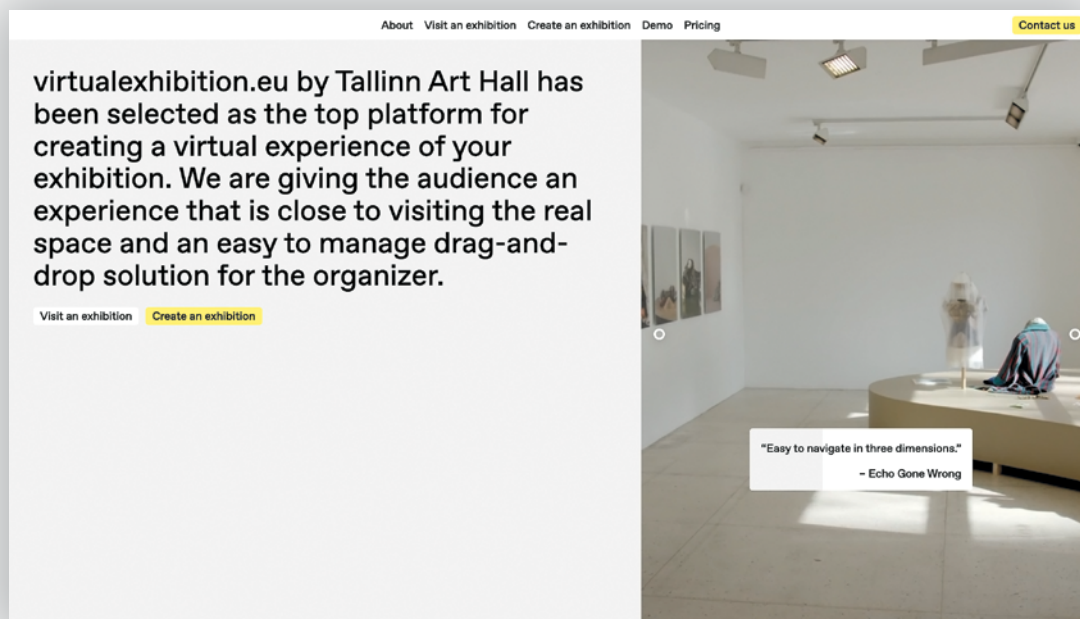
Fig. 1
Virtual exhibition platform of Tallinn Art Hall. Screenshot.

exhibitions have been tied to a specific time and place that shape the exhibition and dictate its thematic directions and the perception of detail. After all, almost every exhibition is both a sequel and a prequel, a stopgap in an artist's or curator's ongoing oeuvre. The virtual exhibition doesn't replace the physical exhibition, but serves to preserve it, creating an exciting tension between the temporality of the exhibition and its timelessness.

One of the fundamental aspects of our virtual exhibition platform is the way it is filmed. By way of the slowly panning the camera through the exhibition space on eye level, the user experience resembles a physical visit. The goal is to give an overview of the whole space, not just close-up shots of the artworks, although these too are usually available. Every exhibition layout is different, which requires us to consider how to best capture it time and again (see, on this topic, the text by Elen Lotman, 318–325).

The aesthetics of the platform draws inspiration from exhibition documentation photographs, which serve to depict artworks and exhibition spaces in a neutral way and in ideal lightning conditions. The virtual exhibition takes this one step further by adding slow camera movements and ambient sounds to increase the sense of immersion. Another criterion was to achieve ease of access through a simple point-and-click interface that works on any device with a screen and internet connection.

Over the course of the pandemic, the virtual exhibition platform became a mainstay for Tallinn Art Hall. It has provided us the opportunity to expand our reach, which is one reason why it is important that we continue building our platform. In collaboration with the graphic designers at WWW Studio, it has evolved into a tool from which other exhibition venues can benefit— meaning that the platform will also act as a stand-alone universal project, offering a user-friendly solution to capture exhibition experiences virtually.

FILMING VIRTUAL EXHIBITIONS

Elen Lotman

↘Practice-based research can take various forms, and while its scientific validity has some-times been contended there are many reasons to take it seriously. Doing and reflecting upon the doings allows us to share findings which come from implicit and tacit practices. "Science" and "share" come from the same Proto-Indo-European root, *sker*: to cut, to split. Whether we use the scientific knife to cut things into smaller pieces to extract knowledge, or we use reflec-tive practice to cut experience from subsequent reflection to make it shareable, we create a wider understanding about the makings of the world around and inside. The reflection in this text therefore serves to share lessons I learned as a professional filmmaker in creating a virtual exhibition experience in video form, in the hopes of furthering discussions about how to better give access to artworks from a distance, and about if and to what degree this can be comparable to actual physical presence.

In 2019, Taaniel Raudsepp, then-director of Tallinn Art Hall, commissioned me (and subsequently our team) to create a virtual exhibition. It was pre-Covid-19 times, so the idea of distance participation was in its infancy. During our first meetings the virtual exhibition was mostly discussed as offering accessibility for those who cannot experience exhibitions first-hand due to physical limitations. In hindsight it feels surprising that physical limitations in 2019 did not yet include lockdowns, travel restrictions, and all the other mechanisms of distance we know now in the brave new hybrid world. I have come to an understanding that the immense potential of crossing limitations of time and revisiting exhibitions that were long ago closed did not cross my mind at all back then. It seemed that we were doing something much more niche than what I know it to be now. I was not aware of the real potential of a virtual exhibition, because the affordances of exhibitions were mostly connected with visiting them physically during the period when they happened. In the post-Covid-19 world, where it has become a standard that people can visit lectures, conferences, meetings, and presentations in three ways—physically, virtually, or by watching recordings afterwards—or even combine them for one event (e.g., be there physically at the start, then run to kindergarten to pick up kids, continue listening to it from headphones in the car, and then revisit some moments of it that you missed in the traffic jam), it is logical that these affordances should also be embraced by the art world.

Through the process of creating the first exhibition we learned a lot. So much that when Covid-19 happened we were unexpectedly ready, able to react with incredible speed, so that in the throes of the first weeks of global lockdown, with Estonia experiencing the 2+2 rule (two people could be in the same room at the same time, with two meters distance between them), we were able to produce and open direct access to three exhibitions at Tallinn Art Hall in a matter of days. I worked from quarantine at home while motorized camera operator Ivar Taim and produc-er Madis Tüür where in the space live-streaming the images to me; I was giving directions via live chat. The exhibitions made their way to the *New York Times'* and *Wallpaper* magazine's selec-tions of top 2020 virtual exhibitions. We hadn't realized how much we had foreseen the future while planning for a niche bonus option to real presence.

There are many ways to do virtual exhibitions, from 360-degree installations to rooms made fully out of computer-generated imagery (CGI). But Taaniel Raudsepp thought, when looking for a tech solution for the future virtual exhibition, that as the film industry has over a hundred years of experience of simulating the illusion of reality, why not use it? This is why I, a filmmaker with no prior connections to contemporary art, was invited to plan and execute the first virtual exhibition at Tallinn Art Hall in 2019.

It was the weirdest commission I had ever had. Usually when a filmmaker is hired, they are hired to bring in their unique vision. I had never been told, as the first instruction: make sure nothing of you is visible in the end result. You need to figure out a way to erase all signs of yourself from the videos. It has to be the artwork itself as the artist intended it, with no additional layer of meaning created by the you as the filmmaker. This task was so complicated that it became fascinating. I was introduced to a new world of art documentation through photos—neutral light, neutral distance, neutral lenses, everything done to simulate zero influence on the art being documented. Yet every filmmaker knows, from the first lectures in film school, that no camera angle is neutral. Even the most "observational" shots include a point of view. And reinforced neutrality can become an even stronger point of view than standard filmmaking, which include practices intended to be "invisible" by simulating direct perception. Thus, for example, a decision to cut from one shot to another angle can be much less invisible than not cutting, as cuts adhere to active perception. See the work of Tim J. Smith, who has extensively researched how classic editing imitates active perception and thus feels invisible to the audience in its best forms.[1]

So my unlearning process started. Or rather, my process of trying to understand, while filming a physical exhibition, the available area between the limitations enforced by the physical space and the degrees of freedom until my own influence as a filmmaker starts showing in the resulting moving images. This area could be worded in a set of "rules," which are not universal, but can be seen as point of departure for anyone who wants to create a virtual exhibition.

"Rules"

1. Creating a new artwork should be avoided when filming. A work of art should be filmed as neutrally as possible, so that during filming no additional meanings are created that the artist had not intended (study the space and work with the curator to understand what the artist's aim was in order to choose the right spot for the camera).
2. The purpose of the recording is to simulate a sense of being physically present, so decisions are based on transferring the needed information for the viewer to be able to build an internal perceptual model of the virtual space and then allow them to approach the artworks at will (one problem with 360-degree videos is that the viewer is stuck at the place where camera was).
3. The recorded material must be suitable for presenting online on the selected user interface.
4. The recorded material must be organized and named in such a way that it allows for a clear association of shots with the user interface.

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1   See Dale J Cohen and Todd Berliner, "The Illusion of Continuity: Active Perception and the Classical Editing System," *Journal of Film and Video* 63, No. 1 (2011): 44–63.

Fig. 1
Behind the scenes:
Setting up for filming an
exhibition for the virtual
exhibition platform of
Tallinn Art Hall.

Fig. 2
Behind the scenes:
Setting up for filming
the exhibition *Matter.
Non-Matter-Anti-
Matter* at Tirana Art Lab.

Fig. 3
Behind the scenes:
Elen Lotman's set up
for filming an exhibition
for the virtual exhibition
platform of Tallinn Art
Hall.

More Detailed "Rules" For Those Who Embark on this Process on Their Own

1.1.   Avoid the creation of a new work of art.
1.1.1.   Use no additional light, only the light as the work of art is exposed, aiming to keep a consistent lighting throughout the day if there are windows in the room (as filming often took days, we planned to film during the fleetingly short days of Estonian winter to make sure that when the audience enter the exhibition, the last room would still have the light outside, not darkness, otherwise it can create a feeling that the viewer spent much longer in the exhibition than the visit would physically entail).
1.1.2.   Avoid lenses with very short and very long focal lengths. It is preferable to use medium-range lenses, as it has been

> found that people's preferred viewing distance when looking at pictures leads them to view long-focal-length pictures from too near and short-focal-length pictures from too far. Perceptual distortions occur because people do not take their incorrect viewing distances into account. By following the rule of thumb of using a 50 mm lens, photographers greatly increase the odds of a viewer looking at a photograph from the correct distance, where the percept will be undistorted.[2]

There are exceptions to this rule, like miniature works or other features of a particular work that suggest the artist's desire for the viewer to look at the work either very closely or from very far away, which should then guide the lens choice (see fig. 3).

1.1.3.   Selecting shot size should be based on creating different levels of the "visit":
1.1.3.1. Comprehensive spatial perception is preserved at least on the first level.
1.1.3.2. The artwork retains its integrity at least at level two.
1.1.3.3. Details related to the artwork (e.g., material use or technique) are visible at least at the third level.
1.1.4.   In color correction it will be necessary to preserve the color mood that was in the room, so it measuring the room's lighting with a spectrometer during shooting is recommended.

2.1.   Simulation of being physically present
2.1.1.   Considering monocular depth cues for the sense of space is recommended. For example: perspective lines, relative size and height, motion parallax.
2.1.2.   To maintain a sense of space at the beginning of wide shots (first level), it is worthwhile, if possible, leaving doorframes or other cues of the previous room in the frame at the beginning of the first wide shot of the next room.
2.1.3.   These three levels are based on a logic known from the psychology of human perception, according to which the brain is better able to orient itself in space if it is first primed with a wider view and then more detailed close-ups:

> to produce stimuli that fall within the accommodation ranges for perceptual continuity, *classical editing tends to follow the patterns of active perception.* Images in the physical world and classical cinema do not come upon the perceiver randomly; rather, they follow patterns based on some of the same probabilities. For instance, in both active perception and classical editing,

2   Abstract of Martin S. Banks, Emily A. Cooper, and Elise A. Piazza, "Camera Focal Length and the Perception of Pictures," *Ecological Psychology* 26, no. 1–2 (2014): 30–46, doi.org/10.1080/10407413.2014.877284.

perception of a new space likely begins with a wide, undetailed view fol-
lowed by closer and more discrete images of areas of interest. Perceptual
researchers Sanocki, Michelet, Sellers, and Reynolds have demonstrated
that viewers understand a space better if they are first "primed" with a wide
view. The details required to distinguish between similar objects, researchers
have shown, are generally acquired later through the slow, effortful process
of focused attention.[3]

3.1.   Compatibility with the user interface
3.1.1.   In the wide shot (first level) it is preferable to move slowly closer, not to the side, be-
         cause the points for moving to the next level of the user interface are not interactive
         with the video and do not move with the image. In case the interface does allow for
         interactively moving clickable transitions between levels, it is possible to consider
         more complicated movements, e.g., circling around the object.
3.1.2.   On the third level, the camera can move in relation to the work in such a way that the
         entire work is not visible, because this is the last level and the location of the user
         interface buttons is no longer necessary to consider.

Generally, it is optimal to film three levels:
  1. View of the space with the artwork
  2. View of the artwork itself
  3. Detail views of the artwork

Postproduction

In color correction, it is important to maintain more or less the same lighting and overall contrast
throughout the entire exhibition, to maintain the feeling of walking through it in one go (shooting
usually takes one day at a minimum; in boreal Estonia, this meant it became dark outside during
filming so we had to carefully plan the shooting day based on the placement of the windows).
Color correction focuses on evening out the differences between shots, creating as neutral an
image as possible, without adding shading to the artwork and keeping the white walls white
(regardless of the room's light color, because human brain keeps color continuity). The mov-
ing camera may create additional problems, for example many exhibitions have artworks or
spaces that create moiré distortion and this might need separate work (moiré and flicker should
be avoided as much as possible during shooting, but as exhibitions often have heritage CRT
screens or other elements that will still have flicker or chromatic aberration, postproduction
might need additional time to correct these issues).

   For sound, it is worth using one continuous background sound, not interrupting the sound
every time the viewer selects a new video or moves forward in the room. As we know from films
and computer games, the blending effect of the sound plays a very important role in the smooth-
ness of the image transitions. If a work of art is accompanied by a sound that can still be heard
while standing at a nearby work, special attention might be needed to stop it from blending with
the other artwork. When physically present in the room, a visitor can sense distances clearly
and acknowledge the source of sound automatically, but this is not the case in film. Continuous
background sound preserves a complete sense of space while allowing you to move from one
video to another.

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3   Todd Berliner, "The Illusion of Continuity: Active Perception and the Classical Editing System," *Journal of
      Film and Video* 63, no. 1 (2011): 44–63 (quotation on 50).

Avoiding Problems
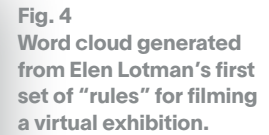
Special cases should be kept in mind to avoid headaches later. For example, video works are often on a loop, i.e., they start again after a certain length of time. Sometimes these loops can last hours. In this case, it is worth deciding early on whether the wide view of the room should be visible in the frame at the beginning of the video, or whether that is unimportant. (It is worth starting from the concept of the specific artwork: for example, does the video start when the visitor enters the room, or does the entire video loop regardless of viewers' presence?) In practical terms one must make sure that it is possible to control the video of the work on the day of the shoot (for example, a remote control may be required).

Interactive artworks also need special solutions, which are always worth considering from the user experience intended by the artist, which should be imitated as faithfully as possible.

Concluding Remarks

In writing this text I have revisited and shared more lists than I would usually ever do, and yet they are surely not comprehensive. They are fieldnotes from a practice-based approach and as such they are very detailed and can lack the bigger picture. But practice-based research stems from

tacit knowledge, and tacit knowledge only becomes explicit knowledge through various forms of externalizing—cognitive artifacts, as Donald A. Norman calls them—which sometimes take the form of a list, tutorial, or "how-to." As such, they are more informative than just the contents of a list. These lists speak of knowledge acquired through un-worded or pre-worded means. They can be treated as a text corpus for research and explored for insight. For example, a word cloud (whereby the bigger the word, the more frequent it is in the analyzed text, thus showing the text's dominant tropes and nodes) created from my first set "rules" shows the overarching themes (see fig. 4). This is already very evocative—we can see that the main concepts of a virtual exhibition are all there (camera, space, artist, work, viewer, material, interface).

A bird's-eye view of my more detailed "rules" list gives us another word cloud (see fig. 5). Central themes emerging from the more detailed rules are: space, room, wide, level, view, interface, artwork, perception, etc. These themes can be informative to a future conceptualization of a virtual exhibition, as both technological and formal solutions should take into account how the space is rendered and structured into different levels. These factors don't seem to concern artworks themselves (and thus might be missing from more traditional art exhibition documentation), but they are central for a virtual exhibition environment and its affordances (and how close these affordances are to real presence). The question of interface and the viewer's control over it, including how much freedom of choice in terms of content and kinesthetic impulse they have, are aspects that should also be taken in account.

Excluding the interactive part, all of these considerations are something that I deal with in my art practice as a cinematographer on a daily basis. It seems that in the end it turned out that this work was not so different from my more "artistic" works. Looking at the origins of the etymology of the English word "art," I find, interestingly, the centrality of a skill—early thirteenth century, "skill as a result of learning or practice," from Old French *art* (tenth century), from Latin *artem* (nominative *ars*) "work of art; practical skill; a business, craft," from Proto-Indo-European **ar(ə)-ti-* (source also of Sanskrit *rtih* "manner, mode"; Greek *artizein* "to prepare"), suffixed form of root **ar-* "to fit together."[4]

This begs a rhetorical question. Maybe, I ask myself in retrospect, by having been forced to not show myself as an artist, the true art of my cinematography had a chance to show itself? Maybe, stripped of all embellishments, what remains of any true art is skill? And if that is true, then ironically work like this could be—instead of a boring "just recording something someone else has done"—the pinnacle of a trained cinematographer's work? As such, I can only recommend this interdisciplinary practice to all cinematographers—and of course to all artists and curators—to enrich each other's professional understanding.

4   "art (n.)," in *Online Ethymology Dictionary*, https://www.etymonline.com/word/art.

SPOOKY ACTION AT A DISTANCE.
Tallinn Art Hall's Virtual Exhibitions and Engagement Platform

Corina L. Apostol

Towards the end of Jim Jarmusch's 2013 vampire film *Only Lovers Left Alive*, the undead protagonists, Adam and Eve, find themselves on the streets of old Tangiers at night lusting for purified blood. Their usual sustenance, without which they cannot survive, has been cut off during a mysterious epidemic involving blood poisoning. In their last tragic moments, they set their sights on a young couple passionately embracing, oblivious to their presence, while resting on the beautifully worn limestone walls of Morocco. In this womb-like space that glows with light, they contemplate Einstein's quantum entanglement theory. "It's not a theory, it has been proven," Adam explains. In short, he goes on, "when you separate an entwined particle, and remove both parts away from the other, even at opposite ends of the universe, if you alter or affect one, the other will be identically altered or affected. Spooky."[1]

If Adam and Eve are emissaries of the past, they are also prophets of the future. By helping us connect with them and offering us, through their eyes, access to a perspective of time that encompasses all time, Jarmusch invites us into a grander story.

I returned to this film, released at the height of the US opioid epidemic, to rethink the implications of developing and releasing Tallinn Art Hall's own digitally immortal platform for disseminating exhibitions and events to worldwide audiences during the coronavirus pandemic. Our platform was spearheaded by Tallin Art Hall's former director Taaniel Raudsepp, in collaboration with designer and programmer Sven Erik Raju, director and cinematographer Elen Lotman, video operator Ivar Taim, and video producer Madis Tüür. This team was also inspired by Jarmusch's cinematography, as I will later explain.

As a curator, my job is to work in collaboration with artists to create stories for our audiences that have a transformative effect on their lives. But how do we create communities in a digital exhibition, and how do we make sense of the relationship between the digital or virtual and IRL (in real life) under crisis conditions? Through whose eyes do we access a perspective that accurately represents an artist or artists' vision that has been digitized? While Jarmusch's vampire story shows eternal cycles of interconnectedness through the eyes of immortal lovers, we are navigating the equally connected and complex territories of art and the production of meaning through the eyes of a robot-camera directed by a living filmmaker. The changing contours of "the exhibition" after digitization are clearly defined by these human and other-than-human parameters of perception.

Art is also an act of communion. Through time, space, and emotions, we are connected. Art sheds light on this connection and complicates it. This connection was irrevocably altered with the deepening global crisis that

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1 *Only Lovers Left Alive*, directed by Jim Jarmusch (Sony Pictures Classics, 2013), 123 min.

further alienated us from each other, therefore also forcing us to reevaluate the ways in which art is communicated to audiences. In a situation where so much of our daily lives is flooded by *Zoom* platforms and online meeting rooms, how can we create forms of engagement while being physically separated?

The Tallinn Art Hall's virtual exhibition platform, which was launched in early 2020, did not begin as a result of the global pandemic. Its roots go back to a few years ago, when the Estonian Ministry of Culture declared that 2020 would be the year of digital culture in the country.[2] Estonia already had a "◥ digital twin," e-Estonia, which offers digital versions of the services that the Estonian state provides, such as digital ID cards, online voting, online tax board, and e-residency, as well as solutions developed by private tech and software companies. With all these options for visitors to play at building their own digital state, a cultural component was also envisioned.

Spooky premonition or razor-sharp intuition? Whichever the case, work on our platform began with concerns about making our exhibitions and programs more accessible. Our plans were in the works since Autumn 2019, as we started thinking about how to provide our differently-abled visitors and those living in other parts of the world the opportunity to experience our content from their homes. Appropriately, the first exhibition rendered through the platform, *Disarming Language: Disability, Communication, Rupture* (2018–19),[3] was curated by Christine Sun Kim in collaboration with Niels van Tomme. From the perspective of artists who are themselves differently abled, the show imagined new conceptual and experimental frameworks that use language and communication in innovative ways. Significantly, it included a sign-language tour, which supplemented sign-language in-person tours. This undeniably brought in more diverse and non-local audiences, who had not felt that that an art institution was accessible or even addressed their concerns at all before this.

The acceleration in the digitization of the arts picked up pace across the world in the first year of the pandemic in 2020, when people who were confined to their homes turned to online content while museums, cinemas, theaters, and concert venues remained closed. It was at that time that we realized that the potential for our project extended beyond making exhibitions more accessible.

As mentioned previously, the platform was inspired by the cinematography of Jim Jarmusch's films, which begin by showing an overall, wide view achieved through a slow-moving camera. By filming the exhibitions in a way that they give the impression of a unique experience, and by then overlaying this with an interactive system that can be easily accessed, the team at Tallinn Art Hall created a prototype that had both a minimal amount of user interface and showed all the details, rich textures, and colors of an exhibition.

This is a platform that speaks to the senses by giving you the impression of being able to reach out and touch the artworks on the screen. When conceptualizing the interface, it was essential to think about how the fine details of the artwork and the experience of the space of the exhibition could be best conveyed to the viewer, while also guaranteeing seamless immersion.

Since excellent films enhance human perception, films served as a vital source of inspiration for this ambition. The team's original goal was not to create another work of art but to create access to existing art, so that it is sharable, scalable, and repeatable in other institutions. The cinematographer, Elen Lotman, translated depth cues and her knowledge of human perception into the movements of the robotic camera. Without wanting to intervene in the works, the smooth camera movement inevitably created "digital twins" of the artworks. Shot from fixed positions, these high-resolution video walkthroughs present other versions of the exhibitions—spaces created by a moving camera, similar to a film.

2   Republic of Estonia, Ministry of Culture, "Theme Years," last updated November 1, 2022, https://www.kul.ee/en/ministry-news-and-contact/organisation/theme-years#item-1.

3   The exhibition can be accessed online via https://virtuaal.kunstihoone.ee/en/sona-mojutus/fuajee.

Navigation buttons are overlaid on top of the video allow the viewer to select the language (Russian, Estonian, English, or Estonian Sign Language) and move through the various sections of the exhibition. Since the nature of each of our exhibitions are very different from one another, the resulting interface had to balance multiple layers: between the navigation, wider shots of the room, views of an artwork or a series in its entirety, and closeup shots that show the texture and material, and the option to play embedded videos.

While it was launched at a time when communication around and experiences of art and culture began to change drastically, the platform presents digital experiences that will significantly alter the way we think of curating in the coming years. The filming of exhibitions has become increasingly common practice due to the pandemic and creates an environment that is devised to keep the viewers' attention. Digital moments in unison with artworks allow for a different kind of intimate experience as opposed to a 360-degree view, for example.

Similar to separated particles in Einstein's theorem, we can all of a sudden look at art, listen to sounds, and watch videos from opposite sides of the world. But how does this digital communion affect or alter us? When we all come together for an artist's talk, an educational class, or a curator's tour through a virtual exhibition that is then transmitted via *Zoom* or social media, we share a moment of discovery and pleasure, although we are each alone in our homes. A tingle of euphoria at this possibility of regained connection spreads through our isolated bodies. We become animated characters in the virtual exhibition platform experience, fully immersed in what we take in, not much different to intoxicated vampires roused from a state of melancholia.

When I began giving tours and holding artist talks through *Zoom* using the virtual exhibition platform of the Tallinn Art Hall, or by simply sharing it with others, I could sense

the complete engagement in the moment that comes from being absorbed in the digital exhibition. This in turn reinforced the connection I felt with audiences across space and time zones. Like watching a great movie over and over again, the platform upheld a sense of pleasure and wonder that also flourishes in mindful exhibition-engagement experiences. Moreover, the platform has grown beyond the function of sharing exhibitions or hosting talks: our team is organizing education activities through it and our programs are now available in English for schools. For example, in conjunction with artist Flo Kasearu's solo-exhibition *Cut Out of Life* (2020),[4] art therapy sessions have been offered for women that have experienced domestic violence in Estonia, a problem that has sadly only intensified during the pandemic.

Yet for all its powers of mimicry and creating actual possibilities of sharing and learning, I am constantly reminded of the robot operator making these connections possible. This leaves me wondering about the effects on us and within us resulting from observing this cocooned environment through mechanical eyes.

On the platform, time is frozen and looped, similar to how Jarmusch's protagonists are forever frozen in time and unchanging, locked in eternal cycles of interconnectedness. There is no installation, no deinstallation, no growth, no evolution of the artistic material. For example, an exhibition that I curated dealing with lived experiences of trauma and self-care, *Ede Raadik: The Best You Can Ever Be* (2020),[5] featured an installation of foamy material that expanded and deflated over the course of the exhibition, as well as a particular scent. These physical attributes, which were in flux within the physical exhibition, cannot be rendered through the platform. In the digital version we only access a fraction of the show in physical space.

To conclude, from the perspective of transcending space and advancing the possibility of allowing people to engage with contexts

4   The exhibition can be accessed online via https://kunstihoone.virtualexhibition.eu/en/
flo-kasearu-elust-valja-loigatud/fuajee.

5   The exhibition can be accessed online via https://kunstihoone.virtualexhibition.eu/en/
ede-raadik-parim-kes-sa-kunagi-oled/fuajee1

they cannot travel to, our virtual exhibition platform is a successful project, and one that remains open for further development and collaboration. The goal is to publish a guideline for filming virtual exhibitions,[6] as featured in this publication, and publish a code that is freely accessible, which could be used by any cultural institution worldwide that may be interested.

However, there is also the larger question that haunts us, of how the amalgamation of these digital experiences offered by institutions are affecting our perception of what art is and how we relate to it as audiences. The way in which we subject this perception to

the digital has ripple effects throughout the world. When we put these digital reflections of art out there, how do they reflect back? The pandemic has laid out in plain sight humankind's cascading damage to our ecosystems and pulled the last veil from the reality of the capitalist crisis with its deadly effects all over the world. While it is educational, enlightening, and entertaining to seamlessly immerse ourselves in initiatives that offer temporary portals and cultural experiences, it is in our forever damaged world that we ultimately have to come back to life.

THE SENSE OF PRESENCE IN A VIRTUALIZED SOCIETY

Elena Esposito

The Space of Exhibitions in Times of Virtuality

Virtuality is becoming increasingly normalized in our society.[1] Right now this is primarily happening through Meta's ⟍metaverse, an immersive virtual world in which users move in the form of avatars. The *metaverse* is regarded as an alternative digital world (or integrative in the sense of augmented reality) that is not real, but in which one does things that can have consequences in the real world: creating and destroying wealth with cryptocurrencies, performing surgery on living bodies, experimenting with novel forms of authenticity and ownership such as non-fungible tokens (NFTs), and much more.

Art production reacts in its own ways, using software programs and virtual reality equipment to experiment with computer-assisted animations, immersive spaces, human-machine interfaces, and artistic experience in non-real environments. For museums, virtualization can be particularly challenging. The requirement to move people's bodies to a specific place—the space of the exhibition—at specific times seems to become anachronistic and increasingly rare. Now that so many experiences, including the artistic, are disengaging from participants' physical context and can be accomplished by going online from any location, requiring physical presence in a given place seems a luxury and a cost (in time, money,

effort, and commitment) that must be justified. How do curatorial approaches respond to this? How does the meaning of exhibiting work of art in the museum space change when society offers more and more, and increasingly rich and flexible, digital spaces of experience? Why should people be willing to take on the burden of going to the physical place of the exhibition?

The Metaverse, Cyberspace, and the Experience of Fiction

To answer these questions, we must first clarify what the virtualization of experience is and in which ways it is innovative with respect to the media experiences already available in our societies. From a sociological perspective, virtuality—from video games to the recent emphasis on the *metaverse*—is a form of experience with not-real worlds that further elaborates the modern tradition of fiction, most specifically the development of the novel since it coalesced as a form in eighteenth-century England.[2] Fiction also constructs an avowedly non-existent alternative reality, which enables participants to observe the "real reality" from the outside—with the result that direct experience is contextualized.[3] Virtual reality has some very peculiar features that make it not a fictitious reality distinct from the real one, however, but an independent alternative world in which one can operate and realize concrete

1   See the Collaborative Research Center Virtual Environments at the University Bochum, https://www. sfb1567.ruhr-uni-bochum.de/.

2   See Lennard J. Davis, *Factual Fictions. The Origins of the English Novel* (New York: Columbia University Press, 1983).

3   See Elena Esposito, *Die Fiktion der wahrscheinlichen Realität* (Frankfurt am Main: Suhrkamp, 2007).

effects. How does this happen, and what are the consequences?

Recent virtual environments, including the Meta's *metaverse*, promise to constitute the most accomplished form of virtualization to date. And the difference between fiction and virtualization may be particularly useful in helping us understand what is in fact new about the *metaverse*. At first glance, the discourse on the *metaverse* reproduces, thirty years later, the discussion in the 1990s about so-called cyberspace, an alternative world to real reality, in which people can experience different identities and have otherwise inaccessible experiences.[4] At that time it was already observed that we had been living in cyberspace since at least the past two or three centuries, since the experience of fiction became widespread—and that arguably this first happened with novels, and then with cinema and television adding sounds and moving images,[5] as we participated in alternative worlds which were known not to exist but were nevertheless not a lie. The author of fiction narrates events that never happened, but cannot be called a liar. The reader or viewer, like the avatar in virtual reality, enters the world of fiction by assuming the perspective of the characters and participating in their experiences—because they are known not to be true. Engaging in the events of fiction, we weep, are happy, become scared, and, by observing the world from a different perspective, eventually learn to observe our own perspective from the outside. In sociology, this is called second-order observation: instead of observing the objects of the world we observe other observers and their perspective on their world.[6]

This *Realitätsverdoppelung* (reality doubling) as described by Niklas Luhmann[7] was a key element in the transition to modern society and is now so normalized that we no longer realize it. In fact, we have all been living for centuries in a "metaverse" that includes Sherlock Holmes and Harry Potter, Emma Bovary and Mickey Mouse, to name only some figures from Euro-American culture, and that affects the way we observe other observers and ourselves, and the way we experience the real world. Already in the seventeenth century, François de La Rochefoucauld observed that each of us knows what it is like to be in love before we meet our loved one—we experience it by reading novels.[8]

What does virtuality add to this experience? The fundamental element of *interactivity*. In fiction you cannot intervene: the reader or viewer cannot change the course of the story if they do not agree with it—they cannot decide not to let Prince Andrei die in *War and Peace* (1869), even if it makes them very sad. The point of fiction is that we know it is not true, but it is also not a lie, so it cannot be changed at will: it has been created by someone, the author, to whom the choices within it are attributed.[9] If we do not respect the author's omnipotence, our sense of participation in fiction empties: Moll Flanders is only a servant and a thief, and what's more she never existed—why should we care about her affairs? By participating in a world explicitly invented by the author, we can do what is never possible in real life: access the minds of the characters and see the world from their perspective.

We cannot enter the fictional world, but we do enter the virtual world. Interactivity is a component that fundamentally characterizes recent technological developments due to another agent that comes into play: algorithms that work autonomously.[10] In the virtual world,

4   See Michael Benedikt, *Cyberspace. First Steps* (Cambridge, MA: MIT Press, 1991); Sherry Turkle, *Life on the Screen. Identity in the Age of the Internet* (New York: Simon & Schuster, 1995).

5   See Niklas Luhmann, *The Reality of the Mass Media* (Stanford, CA: Stanford University Press, 2000). First published as *Die Realität der Massenmedien* (Opladen: Westdeutscher Verlag, 1995).

6   See Heinz von Foerster, *Observing Systems* (Seaside, CA: Intersystems Publications, 1981).

7   Niklas Luhmann, *A Systems Theory of Religion* (Stanford, CA: Stanford University Press, 2013), 56.

8   See François de La Rochefoucauld, "Réflexions ou sentences et maximes morales" (1665), in *Moralistes du XVIIe Siècle*, ed. Jean Lafond (Paris: Laffont, 1992), 134–93.

9   See Wayne C. Booth, *The Rhetoric of Fiction* (Chicago, IL: The University of Chicago Press, 1961).

10   See Elena Esposito *Artificial Communication* (Cambridge, MA: MIT Press, 2022).

one can act: in video games we run, shoot, hide, communicate with other characters, intervene in the story's course. The world we enter with the support of advanced algorithms is not a fictitious real world but a real virtual world, one in which what happens also depends on us as observers and our behavior.

Let us now return to my basic question: if this is the innovative feature of virtualization, what risks and opportunities does it offer for art curation in physical exhibition spaces? As we know, challenges can also be opportunities to innovate, and a dynamic and experimental world like the art world is particularly well suited to seize and exploit such opportunities. Here I briefly focus on two aspects of the virtual in the art world: the significance of the contextuality of experience in exhibition spaces, and the exploitation of interactivity.

No Sense of Place

Virtualization technologies seem to have taken to the extreme the "no sense of place" theorized by Joshua Meyrowitz in 1985 in reference to television, which had made it possible to directly experience distant places to the point that when you actually went to them, they already appeared familiar.[11] The experience offered by television made it possible to see a place and its dynamics with very high fidelity while remaining at home—and then to observe one's real world from an otherwise inaccessible distance. Today, in the virtual world, it literally makes no difference where the user is in the real world: provided we can access the metaverse, our perceptual experience takes place in the same space shared by all other users. We not only see it but move within it, inhabiting it with the other participants. How does this experience affect our relations with our immediate context?

A first consequence is that moving physically to a different place in the real world to have an experience, such as visiting an

exhibition, must be motivated in a new way. Many immersive, interesting, and surprising experiences can be made from home at a very high level of fidelity. Why then should we feel like going to a museum?

Faced with this challenge, the curators of art exhibitions have progressively modified their approach. Already in the twentieth century, the experience offered by exhibitions was less and less about contemplating a painting or work of art (which can also be reproduced with very high resolution) or seeing a sequence of works in chronological order (e.g., from Cimabue to Jackson Pollock) or organized according to abstract criteria such as thematic or stylistic affinity. Exhibitions came to offer a contextual experience, participation in the enclosed space of the "white cube" of the museum or gallery,"[12] disengaged from ties to the outside world. Visitors must be physically there to perceive the space and the moment with an otherwise unknown intensity and reflexivity. We are not asked to fix our attention on a single work of art but to participate in a broader experience generated by a contemporary exposure to different (often heterogeneous) works and by the works' mutual relationships in the exhibition space— something that cannot be posted on the web or reproduced in the *metaverse*. The experience is not about getting to see the *Mona Lisa* (ca. 1503–06) or another work of art, but perceiving the spatial arrangement of the room, the light at that time of day, the volumes, and the references and harmonies between all exhibited objects.

Within the Western art tradition, artists came to experiment with the contextuality of artistic experience in the 1970s through *space-bound* exhibitions: *site-specific* works like Robert Smithson's *Spiral Jetty* (1970) or Daniel Buren's installations integrating contemporary art into historic buildings. They linked art objects to a specific place inside or outside the museum; the objects could not be moved without losing their meaning.

11   Joshua Meyrowitz, *No Sense of Place. The Impact of Electronic Media on Social Behavio*r (New York: Oxford University Press, 1985).

12   Brian O'Doherty, *Inside the White Cube: The Ideology of the Gallery Space* (Santa Monica, CA: Lapis Press, 1986).

"To remove the work is to destroy it,"[13] said Richard Serra of his *Tilted Arc* (1981). Today the virtualization of experience seems to lead to a further step of contextualization. Some curators are experimenting with forms of *time-bound* exhibition whereby art (like theater) dictates the time of viewing, which cannot be changed without altering the meaning. Several curatorial experiments by Hans Ulrich Obrist, for example, have been conceived as temporal rather than spatial experiences,[14] the most advanced of which are held to be his *Marathons* (2006), twenty-four-hour combinations of conversation, performance, presentations, and experiments. The decontextualized experience offered by participation in virtual realities is apparently reflected here in its opposite: a rediscovery and replanning of contextual presence in the space of the exhibition.

Time-bound as in theater, however, is not *time-specific* in the sense of a reflective awareness of temporal context. One example of an authentic, innovative time-specific experience is Christian Marclay's video installation *The Clock* (2010),[15] consisting of a twenty-four-hour montage of thousands of images of clocks in movies or on television, combined in such a way that the time shown on the screen always coincides with the present time of the spectator (see fig. 1). In seeing onscreen images of distant places and moments synchronized with the present, Marclay says, "you're constantly reminded of what time it is," so that "*The Clock* has the ability to make us present in the moment."[16] Viewers who observe the perspective of others reproduced by the images on the screen are led to reflect on their own perspectives and current context, reversing the tendency to digitally neutralize a sense of place and reference to contextual experience.

In this and in similar experimentations, the detachment of virtual worlds from the concrete experience of the "real world" invokes as its opposite innovative forms of intensified contextual experience in the space and time of the museum or gallery. While virtual realities are not bound to any concrete time and space, art exhibitions require visitors to engage in a heightened awareness of their presence in a given space and time—making use of a

Fig. 1
Christian Marclay, *The Clock*, 2010. Detail. Single-channel video with sound, 24 hours.

13   Richard Serra, "Letter to Donald Thalacker, January 1, 1985," in *The Destruction of Tilted Arc: Documents*, ed. Clara Weyergraf-Serra and Martha Buskirk (Cambridge, MA: MIT Press, 1990), 38.

14   See Hans Ulrich Obrist, *Ways of Curating* (London: Allen Lane, 2014), 139–45.

15   See https://www.tate.org.uk/whats-on/tate-modern/exhibition/christian-marclay-clock.

16   https://www.tate.org.uk/art/lists/five-ways-christian-marclays-clock-does-more-just-tell-time

condition that digital society tends to make increasingly obsolete: reference to context in the real world.

Interactivity

But virtualization has a further unprecedented characteristic, going back to the origins of the idea of the virtual: *interactivity*. The notion of virtuality comes from optics, where an image is defined as virtual if the light rays passing through it are not the real light rays but their extensions, as is the case with images in a mirror. These images do not correspond to autonomous objects on the other side of the mirror but enable us, as observers looking at the mirror, to explore our own worlds from an otherwise inaccessible perspective: in the mirror we can see objects and even ourselves as an observer standing in front of us would see them. The virtual images depend on us and our movements, changing when we move and observe them from another point of view. They are therefore interactive but do not duplicate the world: they only correspond to objects that exist in the real world, which can be seen from different points of view. One cannot enter the mirror to look for objects corresponding to these virtual images. Nothing would be found.

In an experience with virtual reality produced by algorithms, however, interactivity shifts within virtual space: we enter the mirror, manipulate the objects, and act on the alternative world. Video games, for example, offer us the possibility of active intervention in the game world; their creators have developed a highly innovative "grammar of fun."[17] Contrary to the basic rule of fiction, players of video games also act in the virtual world and live a particularly immersive game experience—shooting, hiding, running away from enemies.

In third-person point-of-view games, we can also see the body of the characters we impersonate from a perspective above and behind the avatar. If we identify with and act through an avatar, we can observe our virtual self through the eyes of another. For the first time, the video game offers a space in which we see not only the world but also ourselves and our own behavior through the eyes of another. In the form of the avatar, according to Zach Waggoner, we experience a "virtual identity" that allows us to be "both self and not-self," "other and not other at the same time."[18]

Virtuality thus seems to make possible an unprecedented form of experience of ourselves and of our observational perspectives, offering opportunities for innovation. Commercial projects have rapidly emerged on the fringes of the art world to do this, such as *Admission to Be Yourself* (2022–) at Beautiful Gallery, Bologna,[19] which promises "an interactive, one-of-a-kind artistic experience" with an immersive journey that allows a visitor "to focus on yourself, on who you are at your core, apart from others" and "makes you the real protagonist of the work" in the physical space of an exhibition. As the possibilities of interactive virtual experience multiply, the real world reacts by staging concrete spaces that allow digitally accustomed users to test the forms of self-awareness they have experienced in the virtual world. Virtualization also leads to a new interest in unprecedented forms of self-observation.

In an article in the *New Yorker*, Anna Wiener describes the "Rise of 'Immersive' Art"[20] as a commercial phenomenon, exploiting interactivity to allow visitors to retreat into themselves and their comfort zones. This is certainly the case, but there are also genuinely artistic projects that take advantage of the experience of immersion for innovative

17   See Tom Bissell, *Extra Lives: Why Video Games Matter* (New York: Random House, 2010); Tom Bissell, "The Grammar of Fun: CliffyB and the World of the Video Game," *The New Yorker,* November 3, 2008, https://www.newyorker.com/magazine/2008/11/03/the-grammar-of-fun.

18   Zach Waggoner, *My Avatar, My Self: Identity in Video Role-Playing Games* (Jefferson, NC: McFarland, 2009), 42.

19   See https://beautifulgallery.it/mostra/bologna/.

20   Anna Wiener, "The Rise of 'Immersive' Art: Why are Tech-centric, Projection-based Exhibits Suddenly Everywhere?," *The New Yorker*, February 10, 2022, https://www.newyorker.com/news/letter-from-silicon-valley/the-rise-and-rise-of-immersive-art.

experiments in self-observation, which are anything but comfortable. Take for example *In Abwesenheit* (*In Absence*), presented by Alicja Kwade at the Berlinische Galerie in 2021 (see fig. 2).[21] The installation occupied an entire large room in the museum, and at its center was a ring of black steel, reaching almost to the ceiling, on which twenty-four loudspeakers transmitting the artist's heartbeat were mounted. Also present were twenty-four glass ampoules containing the chemical elements of the human body in pure form, 314,000 sheets of paper bearing the full print of the artist's sequenced DNA on the walls and collected in big bronze boxes, and several stelae made of overlapping smartphones shaped as a double helix. The overall effect was of an exploration of the physical presence of an absent person in a deeply immersive experience, timed by the rhythm of the heartbeat and staged through the various objects in the room, with the stacked smartphones as a gateway connecting the real space of the museum and the virtual space to which they gave access.

The expressive possibilities offered by virtualization to artistic communication go far beyond the production of virtual artworks and the use of digital programs. The normalization of virtuality gives artists and curators the possibility to juxtapose different modes of presence and absence, in place, in time, and with respect to oneself—and this requires physical presence in the space of the museum.

21   See https://berlinischegalerie.de/en/exhibition/alicja-kwade/.

REFIGURING *THE BROKEN TIMELINE*

Annet Dekker, Marialaura Ghidini, and Gaia Tedone

The Broken Timeline (TBT) presents historical exhibition projects that were curated online.[1] Inevitably partial and subjective, *TBT* burrows back in time to unearth a lineage of web-based curatorial projects too often unseen, neglected, or ignored by the mainstream artworlds and their discourses. For distant.gallery the three of us made a small selection of projects that highlight the intricate socio-technicalities of the web.[2] In the following email exchange, we reflect on the project and some of the issues that emerged from it. The conversation that develops circles around issues of ownership and authorship, networked cocurating, and the intricate socio-technicalities of the web, on which exhibition projects can both follow and subvert technical trends. The lack of historical memory for digital shows, which often have short lifespans, is compensated for by telling stories which present new ways of historical engagement and have the potential to reconfigure traditional models and methods for presenting and remembering such exhibitions. *The Broken Timeline @ distant.gallery* was part of the exhibition *Matter. Non-Matter. Anti-Matter* at ZKM|Center for Art and Media Karlsruhe (2022–23).
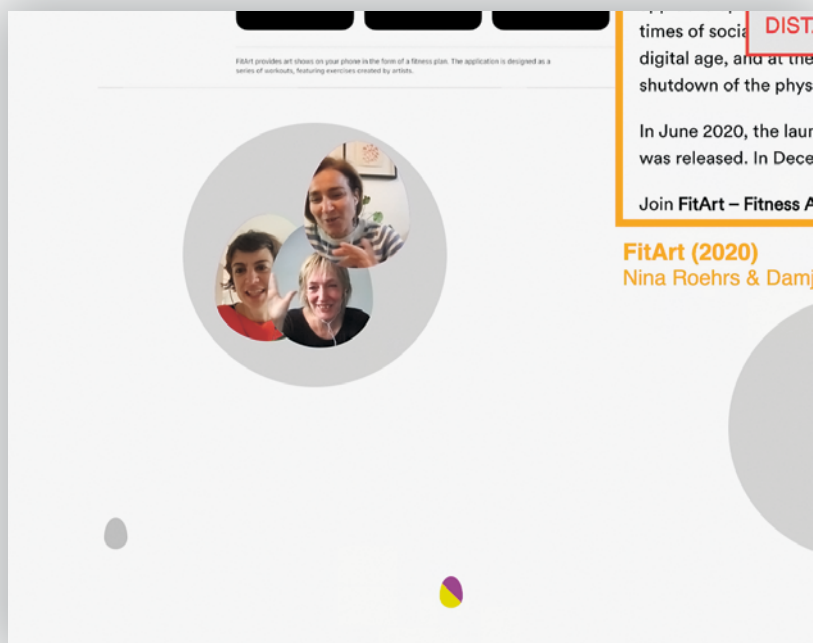
Fig. 1
The Broken Timeline @ distant.gallery. **Screenshot.**

1   *The Broken Timeline* is part of Annet Dekker, ed., *Curating Digital Art. From Presenting and Collecting Digital Art to Networked Co-curation* (Amsterdam: Valiz, 2021).

2   https://distant.gallery/the-broken-timeline.

Op 18. Aug. 2022 om 12:15 schreef Marialaura Ghidini:

I was going through some of my pics and saw this one ... After all those online meetings and spreadsheet comments, I enjoyed seeing you both live amid *The Broken Timeline* highlights. It was refreshing to bump into the curators and artists involved in the projects: Martine Neddam, Sebastian Schmieg ... All those faces and voices, moving around egg-shaped, while Constant Dullaart performed in between the presentations. It felt alive and the exhibitions felt so current, not fixed in time like in the archive (see fig. 1).

Il giorno 22 ago. 2022, alle ore 09:25, Annet Dekker ha scritto:

:D yes indeed, the real-time experience makes distant.gallery work really well—it's the possibility of a chance encounter, the fact that you may or may not "run into" someone! I think the fragments that we recovered from *TBT* work in a similar way to leftovers that you can interact with to try and figure out what they were. In a sense they become living entities instead of merely fixed elements or records of a bygone time.
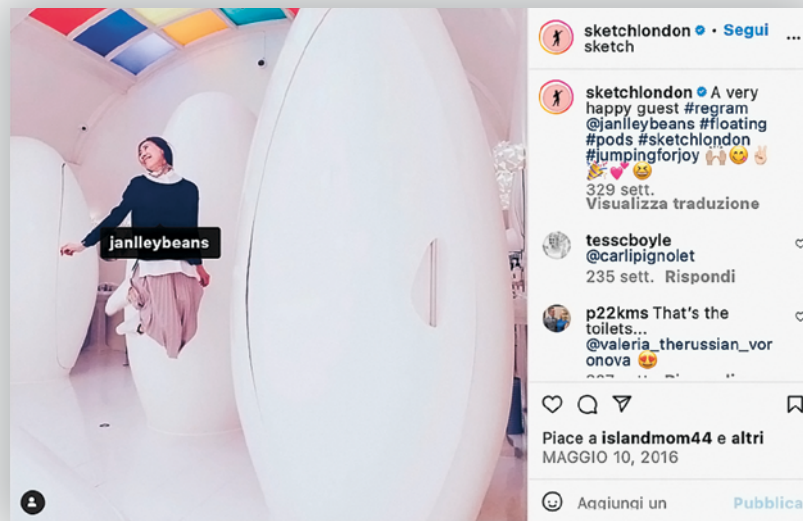
Fig. 2
@sketchlondon,
Instagram. Screenshot.

Op 5. Sep. 2022 om 17:24 schreef Gaia Tedone:

Yes, the egg shape ... after all this time being confined in square rooms and grids with tired faces there was something refreshing, almost liberating, about those encounters. There was also a certain clumsiness that we all shared: Who is speaking and where? Is it my time to say something? Can they hear me? I wonder if the future of the gallery in physical space is egg-shaped too. Like the toilets at the restaurant Sketch in London, just off Piccadilly Circus (see figs. 2 and 3).

I returned to distant.gallery for Jonas Lund's exhibition a few weeks later and found myself alone in the ↘ virtual space, with only the artist-egg moving around. This was a completely different experience: it felt as if I was entering his studio. I could sneak around, semi-unannounced—it was a feeling I have never experienced before on the web.

On Sep. 7, 2022, at 12:12, Annet Dekker wrote:

I recognise your experience—it's interesting how an online space can change depending on who's around. The space can act as a boundary to communication and socializing, and notions of time and the temporal existence of an exhibition become important. The web reflects a notion of time that is different from our invented clock/Cartesian time, which is why it is referred to as detemporality, internet time, or computational time. Yet I remember the discussion we had

about the opening of *The Broken Timeline* in distant.gallery, and how Constant was clear that
he wanted to open at a time that would reach as many people as possible around the globe. In
a way it was an attempt to connect internet time to clock time, to mimic the opening hours of
physical galleries, but now including people from "distant" places. The strict integration of clock
time into internet time, an almost unnatural endeavor, created a strange friction but also made me
think differently about time, our audience, etc.
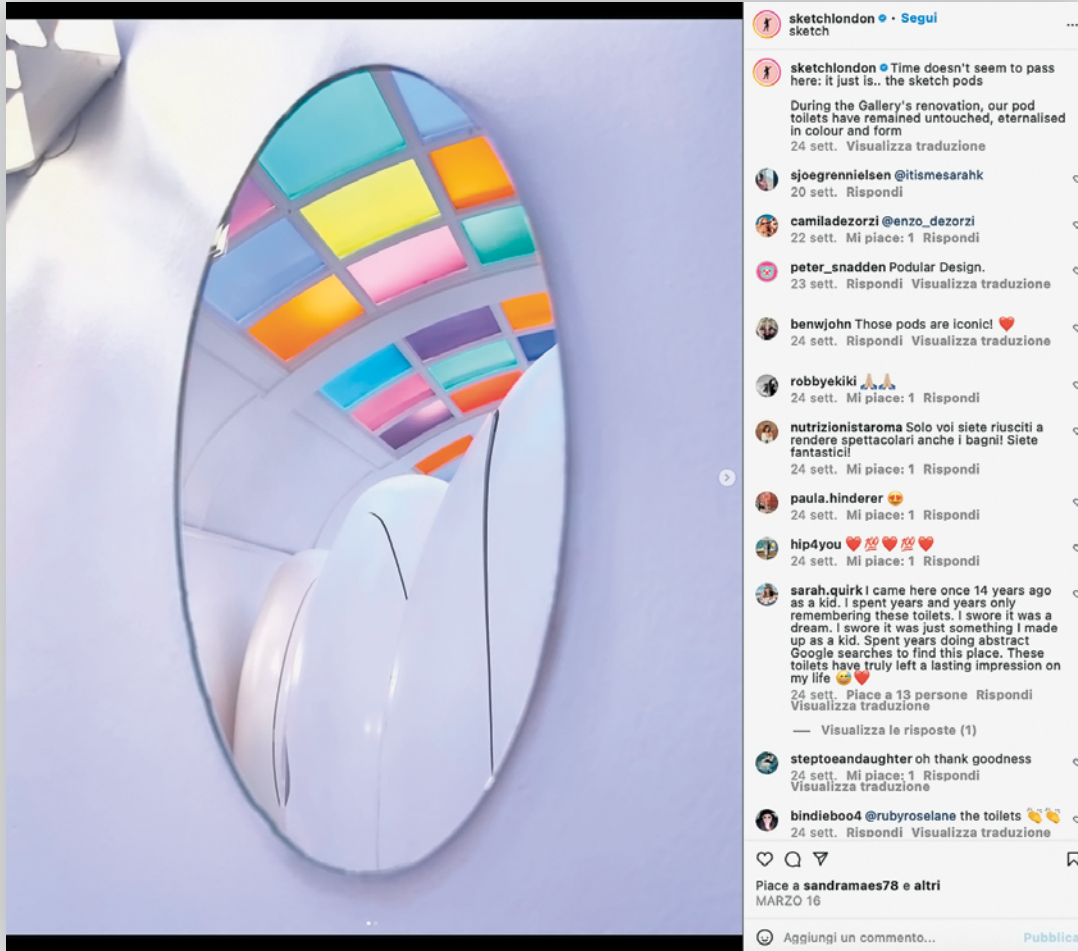
Fig. 3
@sketchlondon,
@janlleybeans,
Instagram. **Screenshot.**

In many of the projects that are part of our timeline, and those beyond it, the emphasis is on the
spatial experience, and less focused on subverting our time experience. What has your experi-
ence been? How is internet time used in online exhibitions beyond the trope of 24/7 accessibility?

Il giorno 19 set. 2022, alle ore 10:43, Marialaura Ghidini ha scritto:
In the late 2000s/early 2010s there were different attempts at tackling time beyond 24/7 acces-
sibility. I remember various time-based projects, including the online work of Charles Broskoski,
films.supercentral.org (2008). As part of a daily schedule, eight well-known films were screened,
such as *Pulp Fiction* (1994) and *The Terminator* (1984), regardless of whether anyone was visiting
the website. But you only saw a black screen with the film's subtitles. The project addressed the
notion of immediacy in web publishing by asking for the intellectual engagement of the viewer.
While this was more an art project, some of the exhibition strategies that I find interesting are
PDFs with expiry dates, for instance *XYM* (2010), curated by Yngve Holen, Ilja Karilampi, and
Marlie Mul, or the unannounced broadcasts in pop-up windows from *Field Broadcast* (2010–17),
curated by Rebecca Birch and Rob Smith. If the former invited the viewer to take responsibility

for their own viewing needs (like: hurry up, there are only five more days to download this PDF!), the latter created an unexpectedly intimate space with the locus of an artist's performance—a bit like the feeling of Gaia when moving through Jonas Lund's exhibition. I really enjoy it when my browsing habits are disrupted by sudden occurrences.

To be honest, ten years ago I found 24/7 access to exhibitions quite refreshing because it was a new form of distributing art and creating exhibitions. You could browse artworks and exhibitions when, where, and for as long as you liked. So immediacy and availability had a plus. However, those years were different from today, there was still a degree of separation between online and offline routines, and being online felt like escaping from "daily life."

The web was a radical form of distribution, expanding conventions and hierarchies. I recall Kenneth Goldsmith's talk about UbuWeb (2005) in which he stated "we are in a unique position—I'd call it a privileged position—to be able to give our work away, ensuring that it exists. … And with the advent and subsequent growth of the web, we have our perfect distribution mechanism."[3] While most of my work and network would not exist without the web, I often want to escape that distribution mechanism, and I long for different forms of shared experience.

Op 19. Sep. 2022 om 17:15 schreef Gaia Tedone:
I recognise the desire to escape from 24/7 accessibility and to find other forms of shared experience. On the other hand, I wonder if being able to choose and set boundaries, which is also a luxury, is not the same for everyone. Between internet time and clock time lie an awful lot of cables and invisible (yet very material) technical infrastructures that determine connection speeds and how content circulates, and hence our browsing habits. I recall a project by Cuban artist Yonlay Cabrera *!Descargas de todo un poco* (2014–17) that played with the limitations of connectivity he was experiencing in Cuba in early 2013, when he was allotted approximately 100 megabytes of downloads per month, with a connection speed of 0.06 kB per second shared by everyone in the same computer room. This restriction meant he had to be extremely selective when it came to internet usage, which became a record of his information consumption strategies. Filtering and curating can become a necessity and a time-sensitive matter. What choices would you make if you could only access the internet for a few minutes every day? Things have changed in Cuba—the internet is mostly accessed through mobile phones and connectivity is more stable—but glitches and time-lapses are still common when organising online events in different time zones.

In general, I'm interested in projects that creatively exploit the constraints of specific technical formats. For instance, *Desktop Is* (1997–98), curated by Alexei Shulgin, which explored the performative potential of the desktop as a liminal space between human and machine communication, and between private and public spheres. Or the more recent *Screen Walks* (2020), conceived by the digital curators of Fotomuseum Winterthur (Marco De Mutiis) and the Photographers' Gallery in London (Jon Uriarte). They use screen sharing as a mode of entry into an artistic and creative practice, enabling an artist or researcher to open the black box of their computer, thereby blurring the boundaries between studio visit, networked performance, and online workshop. When translating the tactic of working with constraints to the context of online platforms and social media, such initiatives unravel the hidden algorithmic logics of such platforms. Moreover, the boundaries between artistic and curatorial practice and research are often hazy. This seems to have persisted since the early days of the web.

3   Kenneth Goldsmith, "If It Doesn't Exist on the Internet, It Doesn't Exist," University of Pennsylvania, September 27, 2005, https://writing.upenn.edu/epc/authors/goldsmith/if_it_doesnt_exist.html.

On Sep. 21, 2022, at 09:28, Annet Dekker wrote:
I agree, the boundaries between artistic and curatorial practices and research often seem to balance on a tightrope. For me they are always connected, and I think that connection is often stronger, or at least more visible, in online exhibitions than in physical space. *Kingdom of Piracy* (2001–03) is a good example of the merging of those fields, not only through the people involved—Yukiko Shikata, Armin Medosch, and Shu Lea Cheang—but also because they described the project in their curatorial concept as "an online, open work space to explore the free sharing of digital content—often condemned as piracy—as the net's ultimate art form."[4] The aim was to address the limitations of intellectual property rights online, to emphasise that copyright legislation was much less of a universal definition than its online interpretations. Unfortunately the project didn't last long before being banned from the country where it started, Taiwan, when both the initial leadership of the commissioning body (Acer Digital Art Center) changed and an anti-piracy initiative started in Taiwan. This caused the curatorial team many problems; while they managed to transfer the content to other servers, and the exhibition came to be seen as a floating kingdom with different docking stations, they lost their domain name. The online exhibition included fourteen artworks and three commissioned papers on intellectual property, covering themes ranging from biopiracy, censorship, and control of the internet to demos, games, and new interfaces for file-sharing. So here there was an obvious merging between research, art, and curation.

Fig. 4
eBay warning after Joana Moll posted her artwork auction. Screenshot.

4   Yukiko Shikata, Armin Medosch, and Shu Lea Cheang, "Curatorial Statement," *Kingdom of Piracy*, 2002,
     http://www.mauvaiscontact.info/kop/html/proposal.html.

More generally, I think that curating in the web already means that you need to research the space you're going to be using, to learn its specifics whether you code it yourself or are using an existing platform. This is why we decided to include a technical timeline as part of *The Broken Timeline*, which Constant extended as part of his performative intervention in distant.gallery by including sociopolitical events taking place around the time of the exhibitions. It is important to consider the connection between these layers. A good example of how boundaries are disappearing is your project #exstrange, which you can better explain than me 😄 (see fig. 4).

Il giorno 25 set. 2022, alle ore 20:27, Marialaura Ghidini ha scritto:
#exstrange was a mammoth project that I organised with artist Rebekah Modrak in 2017. We used eBay as a platform, which turned out to be full of surprises …

First of all, we had to find ways to deal with the protocols and language of the marketplace, the live auction as a format for the production and distribution of artworks, and all the guest curators. We wanted to reflect on the modes of exchange and type of circulation that happens on commercial platforms, and address how this impacts the way we understand transactions and objects and assign value to them—sale categories played an important role in the project. But as the production of artworks started and the auctions were posted online, we stumbled on different issues. For example, we had to confront the "nationalization" of the eBay platform, which has different categories and rules according to the country in which the user operates, or the unavailability of the platform in many countries: some artists had to have a proxy in another country to be able to sell on eBay. Joana Moll's *Google trackers in North Korea official webpage* (2017), curated by Bani Brusadin, was blocked by eBay because it was read as an embargoed product. Whichever national eBay platform the artist chose, the artwork was blocked because of sanctions on North Korea (see fig. 5).

Fig. 5
Ajit Bhadoriya, Chinar Shah, and Surabhi Vaya, *An Apology for Sale*, **2017. Screenshot.**

Througout the project we discovered how "real politics" affects the workings of an online plat-form. For example, the artwork *An Apology for Sale* (2017), a doormat with an Indian flag created by Ajit Bhadoriya, Chinar Shah, and Surabhi Vaya, had to be taken down because eBay considered it offensive to the Indian government (see fig. 6).

We worked with the nooks hidden away in the platform and fine-tuned #exstrange over the course of four months. The research happened during the curating, as we were digging into a black box and trying to collaborate with multiple actors, artists, curators, technicians, and algorithms. This made it a very extensive performance and time-intensive process. What are your experiences curating within online formats?

Op 26. Sep. 2022 om 16:24 schreef Gaia Tedone:
Online formats define the limits and constraints of curating on the web. They can be constructive, as they create a context to reflect upon. My curatorial intervention usually starts with a specific query which is then shaped by the recurring interactions with a given algorithm, platform, or database. All these agents contribute to various degrees to the process of curating, or to what I have been calling with Annet "networked co-curation,"[5] a collaborative and performative process which is less concerned with objects, and perhaps formats, and more concerned with forging relations and strategic alliances.

Il giorno 5 ott. 2022, alle ore 16:44, Annet Dekker ha scritto:
Processes and relations are indeed crucial in online curating, which makes it different from other formats. They also open up older, more conventional ideas, such as around the value of authenticity. Although authenticity has always been a contested concept, it's usually dismissed in a digital context where a copy is said to be interchangeable with the original. Our experiment in distant.gallery showed how authenticity is still relevant in the digital, albeit in a more expanded way. I remember when we discussed the exhibition *The Broken Timeline*, some of the online exhibitions that we wanted to embed and (re)present as part of the exhibition on distant.gallery didn't exist anymore and all we could find were traces of screenshots or fragments captured in the Wayback Machine, while other exhibitions had to be upgraded to fit the current standards of the platform (for instance, the move to the https:// protocol) and others required lots of additional contextual material.

We decided to use all these different types of materials as a sign of brokenness, but also to demonstrate how relations of functioning and meaning were formed through adding and juxtaposing fragments.[6] At the same time, if we consider the recent hype around blockchain technologies and NFTs specifically, it seems that this opening up of older concepts is closing down again. In those practices, authenticity is connected to its original object, redirecting the discourse to favour a more conventional approach. The sense of ambiguity and play that to me is inherent to the web is lost in the process. Although of course there are also notable exceptions of artists who play and subvert the blockchain mechanism.

What also interests me in discussions about the focus on processes instead of objects are the notions of authorship and ownership, which are fixed in the blockchain but which in many online exhibitions and curatorial practices are more and more blurred—in the sense that authorship and ownership are not necessarily connected to one person anymore and the

5   Annet Dekker and Gaia Tedone, "Networked Co-Curation: An Exploration of the Socio-Technical Specificities of Online Curation," *Arts* 8, no. 3 (2019): 86, https://www.mdpi.com/2076-0752/8/3/86.

6   This links to the notion of "authentic alliances," where seemingly different parts form a whole. See Annet Dekker, *Collecting and Conserving Net Art* (London: Routledge, 2018).

authority of the curator is also questioned. Examples of this are your experiments with eBay, or *The Recombinants* (2017) by Madja Edelstein Gomez, where the system is triggered by each new user to generate a new exhibition and hence affects the authorial role of the curator. Or TAGallery, in which different curators and users collaborate on del.icio.us. Do you feel that this shift or change in authorial roles has challenged established museum values or advanced alternative ways of understanding art stewardship, curatorial authority, and public access more generally?

On Oct. 10, 2022, at 16:41, Gaia Tedone wrote:
Museums have been struggling for a while with the creative exuberance of networked culture and the hybridisation of the roles of curator and user, as well as the curatorial agency of technology. The Covid-19 pandemic and the recent hype around NFTs and blockchain metaverses added more layers of complexity to a deep-rooted crisis, that of the museum and networked culture, which is more generally a crisis of cultural value with regard to the role of the web and social media platforms. The majority of museums tend to avoid asking how these platforms and hybrid digital spaces contribute to shaping what is meant by art, creativity, and culture today.

Museums such as Moca.Virtual.Museum (founded in 1993) and Whitney Artport (founded in 2001) are committed to presenting net art and have acquired web-based works for their collections, but most museums largely operate according to a modernist canon and an art-historical logic of curating. Firstly, the logic of the white cube cannot be translated online, in spite of the proliferation of online viewing rooms created overnight during the lockdowns. Secondly, a wide range of contemporary artistic and creative digital practices, for instance, meme-based practices, which are valuable digital traces of contemporary culture, take place beyond the purview of the museum. Some artists have set up their own "museums" to fill the institutional void. For instance, Félix Magal and Emilie Gervais's Museum of Internet (MoI), a *Facebook* page dedicated to collecting and archiving a daily stream of internet images from 2012 to 2019, and Systaime's SPAMM (SuPer Art Modern Museum), founded in 2011, is "a space open to digital creation, a decentralized alternative to the elitism of contemporary art."[7] At the other end of the spectrum, the word "museum" has been co-opted by marketing and is now associated with all sorts of Instagrammable pop-up stores, such as the Museum of Ice Cream.

All of this points to the same question: how can museums retain social relevance and engage with various forms of cultural production which are not technically art? As the NFT hype has clearly shown, these distinctions tend to collapse online: art and non-art happily sit alongside each other. If museums and curators want to remain relevant in post-digital cultures, they should find the language or means to articulate where the difference lies and why it matters, if it still does.

Op 12. Okt. 2022 om 11:35 schreef Marialaura Ghidini:
For a long time researchers grappled with the changing role of the curator, in terms of authorship but also in the definition of curatorial work. In 2006, Christiane Paul stated that curators became "filter feeders"[8] when confronting and responding to the interactive, modular, variable, and distributive properties of the web medium. A few years later Sarah Cook and Beryl Graham proposed the metaphor of the curator as a "node," a mediating figure who operates across

7   http://spamm.fr/about/.

8   Christiane Paul, "Flexible Contexts, Democratic Filtering and Computer-Aided Curating," in *Curating Immateriality: The Work of the Curator in the Age of Network Systems*, DATA Browser 03, ed. Josia Krysa (Autonomedia: 2006), 85–105, http://www.data-browser.net/db03.html.

several areas of expertise and fields.[9] For others, like Trebor Scholz, the curator turns into "cultural context provider" producing "contexts into which others input their content."[10]

These interpretations suggest that the changing role of the curator is not just a consequence of the medium adopted, but, as Gaia suggests in referring to a wide range of contemporary digital artistic and creative practices, the result of adopting, integrating, and tweaking different formats of production that require curators to undertake different functions. When interviewing curators, I found they defined their work by borrowing terms from other fields: Robert Sakrowski of CuratingYouTube.net (since 2007) compared it to a record label; Reinhard Storz of Beam Me Up (2009–10) talked about multidisciplinary publishing; and Frederique Pisuisse described the work of Cosmos Carl (2014–21) as being "more about publishing than about exhibition making."[11] Here the idea of authorship falls apart because curating within these other domains means an active collaboration between various actors who all have an equal presence in the project.

Il giorno 2 feb. 2023, alle ore 19:40, Annet Dekker ha scritto:
At ZKM, with the opening of *Matter. Non-Matter. Anti-Matter*, and particularly the *VIEW* platform, there's a renewed interest in not only making new online exhibitions in various formats—such as using game-engines to navigate photogrammetric documentation of a physical exhibition in *Spatial Affairs: Worlding* (2021–23) or 3D captures and audio field recordings in *Tirana Time Capsule #2* (2021)—but also in re-interpreting older offline exhibitions in online environments. The platform brings together exhibitions of institutions across Europe, and the re-interpretations work well: forgotten exhibitions are revived and gain new meaning within their updated context. The characteristics we focused on when creating *The Broken Timeline*, such as links to other websites, databases, or browser dependencies, appear less relevant here. Yet when trying to figure out how to represent a selection of older exhibitions in distant. gallery, those dependencies became productive impediments for us. We were intrigued by all the fragments we could find on the web and on people's hard drives. We wanted to see whether these slivers would still make enough sense to understand what was once there. So we were less focused on creating a conventional reconstruction of these online exhibitions.

For me, the fragments we collected and rearranged provided space. Figuratively it opened a space to (re)imagine what was there when it all worked, and literally it was similar to how we tend to move around the web, i.e., via hyperlinks. Perhaps this is a form of social archaeology?
In some ways, developing something on the web is also about the question of how users find the exhibition and where they interact with it, for instance, on their work desktop or at home on the couch or in bed while browsing the web? These questions seem less pertinent in the re-interpretations of *Les Immatériaux* (1985) and *Iconoclash* (2002), which are presented as autonomous archival experiences full of information from the past. Being in those contained spaces, I felt like a virtual tourist stepping into a time capsule. Clearly *The Broken Timeline* is extremely limited in that sense, but in some ways it does provide the strange navigation and perhaps the surprise you can experience online, when you move between pieces of information that seem unconnected and yet you link them and create stories. This type of open storytelling through fragments is what attracted me to *The Broken Timeline*.

9   Beryl Graham and Sarah Cook, *Rethinking Curating: Art after New Media* (Cambridge, MA: MIT Press, 2010).

10   Trebor Scholz, "Curating New Media Art," April 11, 2006, https://mailman.thing.net/pipermail/id-c/2006-April/001439.html.

11   Marialaura Ghidini and Frederique Pisuisse, "Reclaiming the platform space as an art form with Cosmos Carl," *Curating.online,* October 8, 2021, https://www.curating.online/interview/cosmos-carl/.

Op 3. Feb. 2023 om 11:35 schreef Marialaura Ghidini:
The view of many curators included in *The Broken Timeline* is indeed radically different to how curating online or digital curation has often been discussed in the mainstream. They may stress the opportunity to create peer-led audiences, to enhance and democratize the way art is accessed, and to be entrepreneurial and independent, but their exhibitions are also about the experimentation, collaboration, unpredictability, and community efforts that evoke and mirror the open spirit of the web.

Op 3. Feb. 2023 om 12:04 schreef Gaia Tedone:
The online restaging of seminal offline exhibitions is a strategy that could potentially open the virtual space to practical uses in the context of curatorial study programmes or in the re-writing of exhibition histories and practices. Yet as you both mention that's a completely different process from commissioning an online show, or approaching the exhibition as a networked ecosystem, which is what other projects on the *Beyond Matter VIEW Platform* do. I wonder whether the different premises and temporalities of the variety of digital projects being produced today can really coexist under an overarching umbrella. But the proposition that the digital trace or rendition of an exhibition can be fabricated retroactively is compelling. It is quite different from the kind of virtual tourism performed by *The Broken Timeline*, which has more to do with exploring the remnants of computational matter and revealing the inherent brokenness and fragility of code.

5.
VISIBLE REVISION.
Hybrid Experiences in the Museum

A CASE STUDY FOR VERSATILITY AND RESILIENCE. Toolkit Notes based on the "HyMEx 2021" Symposium

Borbála Kálmán

A General Framing

This case study revolving around the two-day symposium "HyMEx – Hybrid Museum Experience 2021" aims to bring forward the special components and less visible goings-on that enabled an inspiring, quite unique, and custom-made—yet structurally repeatable—event. Delivered as an entirely live program at Ludwig Museum – Museum of Contemporary Art on May 6–7, 2021, "HyMEx 2021" was ⬦archived through a microsite that technically remains under the auspice of the Ludwig Museum's website.[1] All the presentations thus remain accessible within their original conceptual frame, including the detailed program, the call for papers, and the extra features and information about the exhibition *Spatial Affairs* that accompanied the symposium.[2] To share its larger context—including the debates that took place during the event—a written digital publication on the proceedings was made downloadable free of charge in December 2021; available through the abovementioned microsite, it will also be integrated into the research platform of the Beyond Matter project. *HyMEx – Hybrid Museum Experience Symposium 2021: Proceedings*[3] contained a detailed editorial cowritten by Lívia Nolasco-Rózsás, curator at the Hertz-Lab of ZKM | Center for Art and Media Karlsruhe and head of the Beyond Matter project, and myself, curator at Ludwig Museum and project manager of the symposium. We both worked on elaborating the concept and deciding who to invite, creating a tighter partnership between the two institutions within the Beyond Matter project; the organizational part remained mostly within Ludwig Museum's frame.

   Our editorial for *Proceedings* aimed to give a strong conceptual sense of the origins of the symposium and serve as a guide to what shaped its content and carved out its sections. It also provided a surface to reflect on the multilayered approach that the two-day event allowed: it was always intended to be cross-disciplinary, and in practice "HyMEx 2021" surpassed that goal by encompassing "significant knowledge from diverse fields and engaging discussions fostered by connecting areas otherwise rarely linked."[4] Through its wide spectrum of experience-based approaches to the museum, and within the overall aim of Beyond Matter to take cultural heritage

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1   The microsite is available at: http://hymex2021.ludwigmuseum.hu/ and at: https://hymex.beyondmatter.eu/.

2   For more information regarding the exhibition *Spatial Affairs* see this chapter in the present publication

3   See Lívia Nolasco-Rózsás and Borbála Kálmán, eds., *HyMEx – Hybrid Museum Experience Symposium 2021: Proceedings* (Budapest: Ludwig Museum, 2021).

4   Nolasco-Rózsás and Kálmán, "Editorial," in *HyMEx 2021: Proceedings*, 9–26, (quotation on 17).
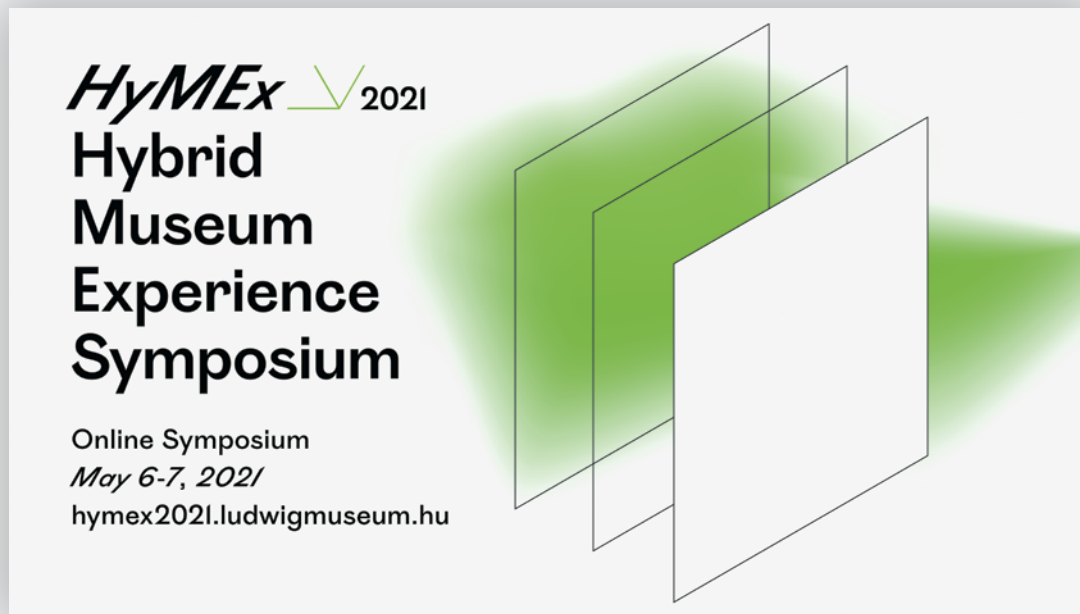
and culture in development to the verge of virtual reality, it "sought for interpretations of the hybrid museum experience that emphasize contemporary art production and its mediation in light of spatial and societal aspects, to elucidate the possibility of deterritorializing the museum space and/or understand ways to construct participative solutions through which the museum may be an active mediator."[5]

The symposium's seven panels are reflected in the structure of the publication (although its fifth and sixth panels were merged into one), emphasizing the connections made between generally disconnected fields. We explained: "The decision to eschew a purely technology-based program emanated from a desire to address issues related to technology in less obvious ways by approaching the hybrid experience transversally, via new 'intersections' […] that might be only developing and becoming palpable presently."[6] The seven panel topics were: knowledge production under the virtual condition, the economy of museum experiences, crises and the hybrid museum, participatory involvement, deterritorialization and the hybrid museum, cognitive processes around the hybrid formula, and the interface and its dissolution.

Backstage at "HyMEx 2021"

The idea of "HyMEx 2021" first materialized on the application form for the Beyond Matter project in 2018, within a classic physical symposium frame. The idea was to create an event within the Media Art Preservation Symposium (MAPS) series, initiated at the Ludwig Museum by conservator Béla Tamás Kónya in 2015. It was already quite clear that the Beyond Matter edition would be unusually specific, and advance new approaches on the topic through knowledge production. By the end of 2019, the focus on hybrid museum experience was already crystallizing, and it was essentially confirmed when the first Covid-19 lockdowns were announced in spring 2020. So its program did not arise from the changes the pandemic wrought, but was naturally impregnated with the pandemic's presence, as perspectives on the roles of museums and their virtual condition had become relevant more than ever. We finalized the list of invitees in autumn 2020, and

5   Nolasco-Rózsás and Kálmán, "Editorial," 11.
6   Nolasco-Rózsás and Kálmán, "Editorial," 14. For the final panel titles please see the publication.

the symposium took place a year after the first lockdowns in Europe. Its presentations did indeed provide a fresh and intriguing response to challenges that were being experienced ubiquitously, while also keeping an eye on the essential aspects of what hybridity can signify outside that context. As the hybrid museum experience became a focus increasingly pertinent to a wider museum world, the symposium was able to suggest possible answers while generating new debates around wider and non-local audiences.

Structure Matters

The virtual platform eventually created to host "HyMEx 2021" at the beginning of May 2021 represents a paradigmatic shift in the operational process of Ludwig Museum, and offers a carefully considered, well-researched online symposium toolkit which might serve other discursive events in the contemporary art world. The number of online symposia and conferences has multiplied following spring 2020, but when the pragmatics of "HyMEx 2021" needed to be pinned down in the summer and autumn months of the same year, technical solutions for a relaxed

virtual event that also provided participants with a comprehensive symposium experience were still in work-in-progress phase for many service providers, from online platform hosts to conference organizing teams. The method that the organizers were looking for needed to stand by itself and become a long-term contribution for the Beyond Matter project, and beyond.

As a physical event "HyMEx 2021" would have had been organized in Budapest, the venue being Ludwig Museum, with about 120 attendees. The previous MAPS editions, usually each two days long, were not accessible online during the events themselves, but were all archived to be uploaded later, presentation by presentation, onto the Ludwig Museum's MAPS microsite.[7] Thus we needed to make a speedy and radical shift in the symposium's structure to fit the already existing framework of Beyond Matter, as we were contracted to do.

The most important part of the shift was to replace the original physical form with a hybrid or a fully online version. More precisely: a fully online version was evidently needed—the question was whether to include a physical dimension or not. In September 2020 there was still hope that in May 2021 the pandemic would be easier to handle and allow participants/viewers from at least the geographically proximate countries to gather in Hungary and meet in person. Also, the opening of the exhibition *Spatial Affairs*,[8] curated by Giulia Bini and Lívia Nolasco-Rózsás and closely related to "HyMEx 2021", was scheduled to coincide with the symposium, involving all its participants. In January 2021 we opted for a fully online event, without any speakers or participants physically present, some important aspects that were taken in consideration from the start gained their true sense, i.e., the fact to have several strategic plans in parallel so we could switch between them at the right moments.

Platform Matters

The optimal vision was for a custom-made, user-friendly, visually unique online venue able to handle the symposium live, allow different levels of live interaction between invited participants through various features (speaker-speaker, and speaker-participant), be professionally backed up and with minimal image or sound delays (due to speakers' considerable distance) and technical glitches, with a platform with on-demand access. As the project was part of a budget set initially for a physical symposium, calculated on the basis of previous editions and submitted in 2018 as a Creative Europe application, the finances became tight when the whole technical context changed.

The solution came after months of thorough research and technical inquiry in the form of a hybrid structure, using a live-streamed online meeting place paired with physical studio-based recording and a professional technical team handling the invisible side of the online symposium (CreativePro Agency). We felt that an independent platform that could be customized for the event would be of utmost value. The result was high-quality: after registration, a participant would easily land up through a link on a secure, custom-made platform that streamed the symposium's live program, allowing real-time chat with other registered participants including, among other extra features, through break-out rooms ("Conversation Halls") grouped alongside topics throughout the two days. The on-demand platform remained accessible for an extra month as the archiving was processed for the microsite. The right technical partner gave the whole event a strong backbone, as the most important aspect for all registered participants, after the content, was the enjoyability of the symposium—and as organizers we sought an enjoyable visual experience too. We wanted to create an online venue and an on-demand platform providing a unique shared experience that would in turn produce a sense of community and

7   The editions between 2015–2020 are accessible through one microsite and its archives: http://maps2020.ludwigmuseum.hu/.

8   See this chapter of the present publication.

strong bonds for the content. "HyMEx 2021" had a graphically distinctive design while fitting in the Beyond Matter visual world and aligned with *Spatial Affairs*; it also had a custom-composed soundtrack not only for spot animations (for the call for papers, the platform launch, and so on) but also for animated bumpers and other relevant visuals during the symposium. "HyMEx 2021" singular visual and sound identity highlighted its singular approach.

Statistically speaking, the shift from physical to online enabled wider outreach in terms of topics, disciplines, speakers' locations, and attendee numbers. We could expand globally: almost 950 registrants were counted from fifty-two countries. Sixty further registrants accessed the platform following the event during the month in which it was possible to register and access the raw recordings and the platform's extra features. Registration was free of charge but necessary; we aimed to reach a high number of professional communities and individuals with few opportunities to access such academic gatherings due to costs (registration, traveling, accommodation, etc.).

A Matter of Speakers

Twenty-four speakers took part in the symposium with a presentation.[9] The selection process had three dimensions. Some speakers were directly involved with the Beyond Matter project, and their research topic fit the symposium's center of interest; others were professionals who we found relevant for the symposium's foci and multidisciplinarity; and four speakers came from our call for papers from within the Central and Eastern European region (CFP), as befit the Ludwig Museum's mission.[10] The CFP was open to East-Central European and South-East European countries and the Baltic States, making up twenty countries all together, and sought to connect young researchers to the international discourse through a sort of short-cut for those who otherwise would seldom have the opportunity for such exchange. The CFP process also helped the symposium gather some preliminary attention from the close region and spread the news at an early stage.

Overall, the shift from physical presence to online enabled to us to invite speakers we would not have been able to invite otherwise and to reach an audience at the global level. At almost 1000, the number of registrations during the two days reflected intense interest, while the average time registrants spent watching the stream suggested a real curiosity about the program.

Transmogrifying Museum

Stepping out of the well-experienced physical symposium format was an apt and timely move for the Ludwig Museum. After the previous editions of MAPS, live accessibility needed to be widened to allow participants from great distances to join discussions relevant for the museum field globally. Secondly, the unique constellation of perspectives that such an event creates through its crossdisciplinarity calls for real-time connection, even if the proceedings are to be archived and released as a publication—converging channels of live discussion can move the conversation forward. This aspect seems obvious when a symposium happens physically, and "HyMEx 2021" was a way to think through its many nuances when trying to recreate it online.

9   The speakers who participated with a presentation: Tania Aedo Arankowsky, Bruce Altshuler, Robert B. Lisek, Philippe Bettinelli, Daniel Birnbaum, Tegan Bristow, Bruno Brulon Soares, Lily Díaz-Kommonen,, Jonathan Dotse, Boris Groys (keynote speaker), Fonyódi Krisztián, Varvara Guljajeva, Kálmán Borbála, Sarah Kenderdine, Seong Eun Kim, Felix Koberstein, Kónya Béla Tamás, Joasia Krysa, Corina L. Apostol, Lívia Nolasco-Rózsás, Christiane Paul (keynote speaker), Ruttkay Zsófia, Varga Krisztina, and Ben Vickers.

10   From the four chosen applicants, only two could take part in the symposium.
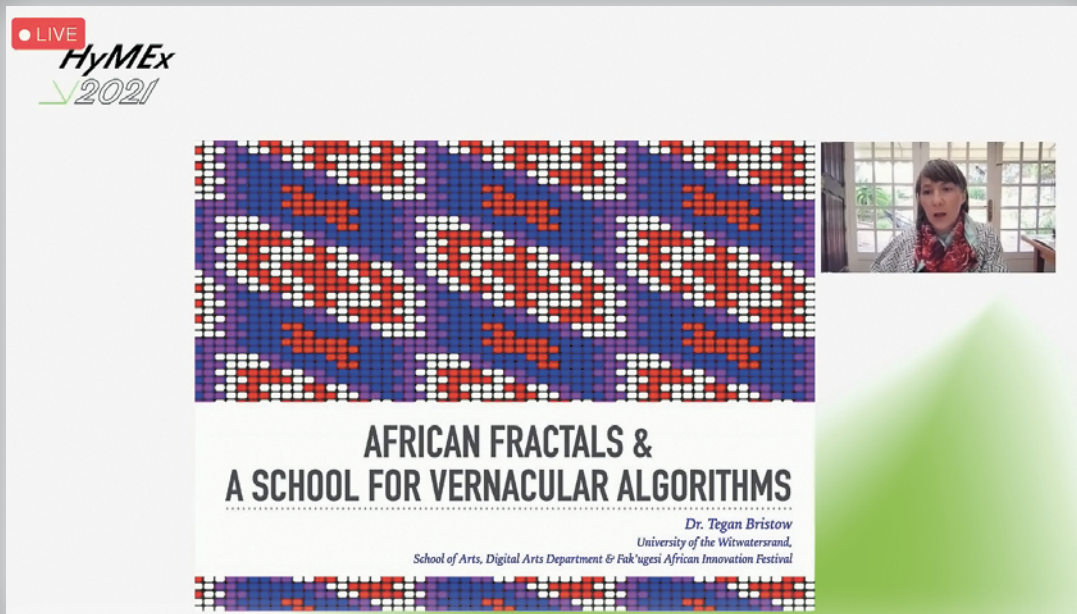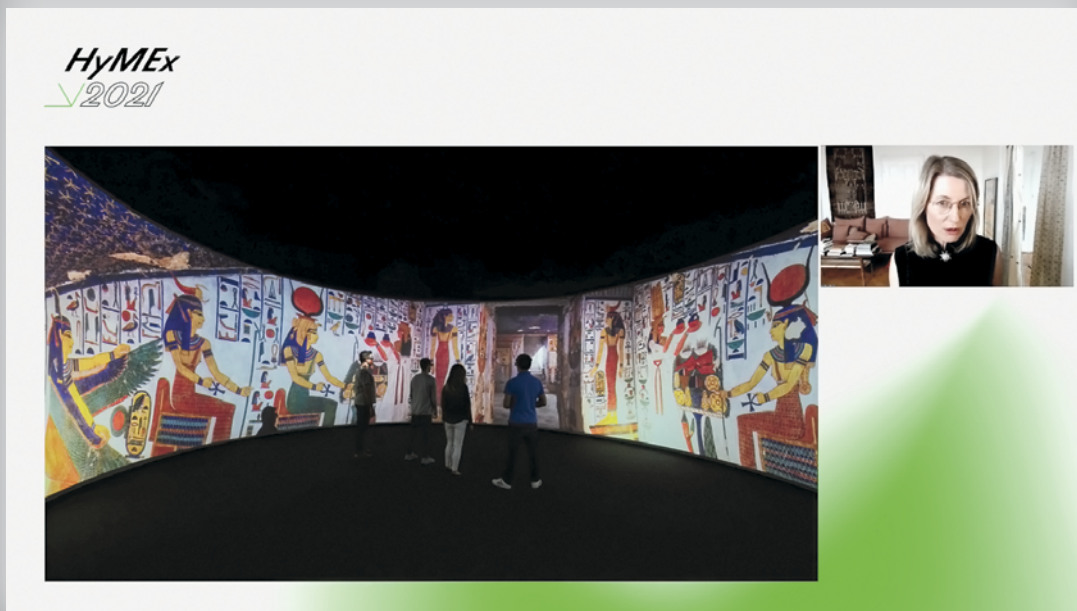
Fig. 6
Daniel Birnbaum's
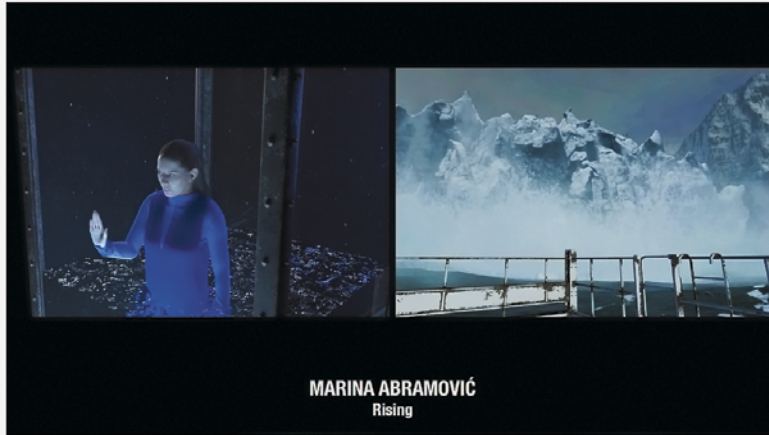presentation "Exploring
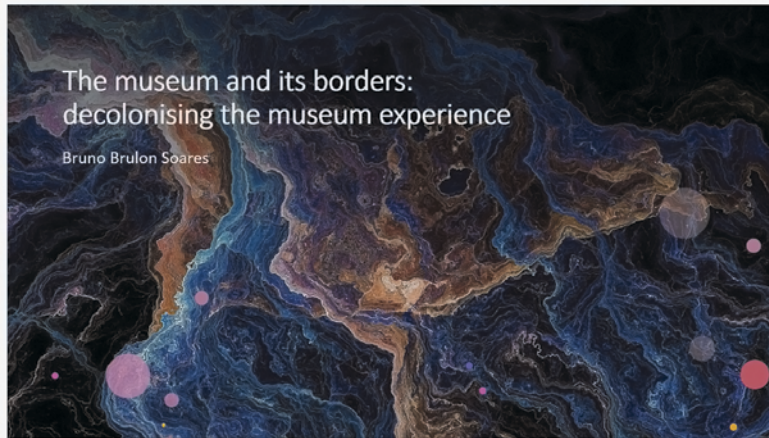the Virtual" (Panel 1).
Screenshot.

Fig. 7
Bruno Brulon Soares'
presentation "The
Museum and its Borders:
Decolonising the
Museum Experience"
(Panel 3). Screenshot.

Keeping in mind the main mission and vision of the Beyond Matter project, we aimed to create an event that could retain its interest as an entity, upgraded into an archival interface, so that it would be a valuable part of the whole project beyond the two days of its happening.

To fully understand the impact of the "HyMEx 2021" symposium within Ludwig Museum's program, it is important to know that the exhibition *Spatial Affairs* opened parallel to the event at Ludwig Museum.[11] Together, the symposium and exhibition constituted a strong commitment to exploring spatial relations through theory and artistic practice. As explained in its press release:

> *Spatial Affairs* aims to investigate the relation and interdependence of physical and digital presence via Modern, Conceptual and Contemporary works of art and manifestos. Confrontation with the achievements of science and technology and their social impact through the notion of space unites pre- and post-computational artistic approaches featured in the exhibition. Independent from their medium, they point out the entanglement of the palpably real and intangibly digital.[12]

Moreover, *Spatial Affairs. Worlding – A tér világlása* was (and remains) the online extension of the physical Spatial Affairs exhibition and a crucial aspect of it, designed by The Rodina: a multi-user environment in which "figures representing works of net.art and browser-based digital art move around the virtual space mingling with visitors represented by avatars."[13]

The exhibition proposed new ways of understanding the apparently binary relationship between actual and virtual, including how multiplied notions of spaces could be understood through new approaches, and the symposium elaborated on the same ideas through the perspective of museum experience. For Ludwig Museum, the shift that accompanied the unfolding of "HyMEx 2021" was an interesting way to apply the theory and to reflect on the ideas advanced by the exhibition and "HyMEx 2021" about hybrid museum experience. As we wrote in our editorial:

> the museum transmogrifies into a hybrid entity integrating a geographical location with various digital platforms. Instead of a single building, an affluence of exhibition spaces must be taken into consideration while imagining the museum as an extended but also porous system of multiple dimensions. In these circumstances, the museum can be better understood as a system triggered by cognitive processes and based on experiences than a space bounded to a specific location.[14]

The symposium's panel "Cognitive Processes Around the Hybrid Formula" advanced the idea that "the museum can be approached as an affluence of networked spaces as well as a cognitive space in which visitor and curator are not the only actors; as machinic intelligence rises, non-human algorithmic actors play an increasingly important role in the museum's hybrid ecosystem."[15] Within this conceptual framework, the Ludwig Museum, through my own presentation, raised the idea of a resilient method which could be described as an option of working in curatorial clouds based on knowledge-sharing and uniting members' capacities through swarm intelligence. Understanding the cloud as a hybrid and resilient formula also reflected my thinking

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11   Although the exhibition had to spend its first few weeks under complete lockdown, it was available through a virtual tour from the first days. The virtual tour is still available through the Ludwig Museum's website: http://spatialaffairs.ludwigmuseum.hu/.

12   Press release of the exhibition, April 21, 2021, https://www.ludwigmuseum.hu/en/news/spatial-affairs-worlding.

13   Press release of the exhibition. The digital twin is available through: https://spatialaffairs.beyondmatter.eu/en.

14   Nolasco-Rózsás and Kálmán, "Editorial," 10.

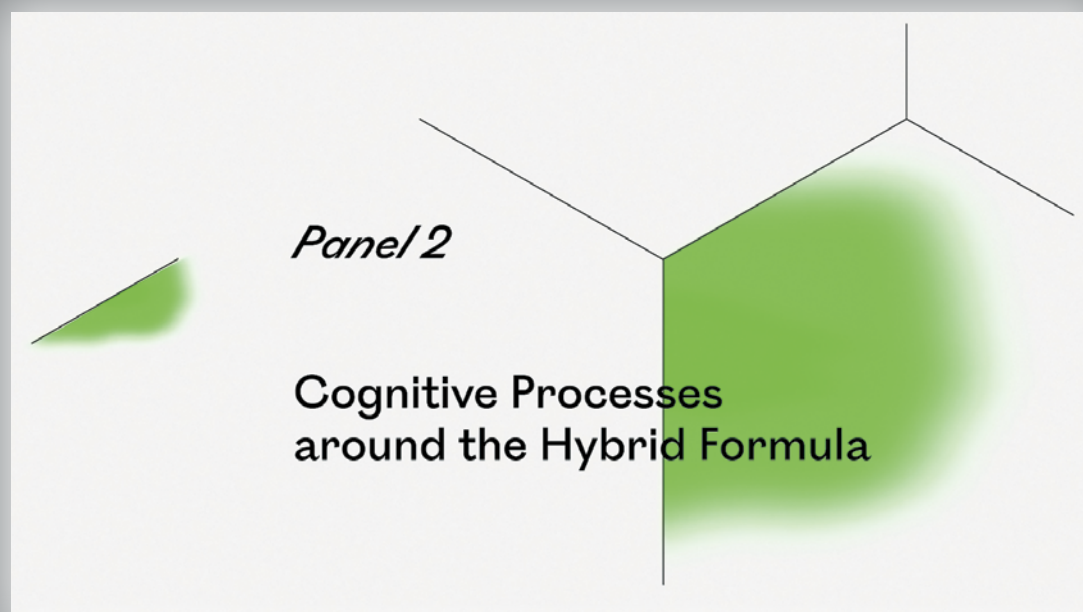15   Nolasco-Rózsás and Kálmán, "Editorial," 19.

Fig. 8
Animated visual for
"Panel 2: Cognitive
Processes Around
the Hybrid Formula."
Screenshot.
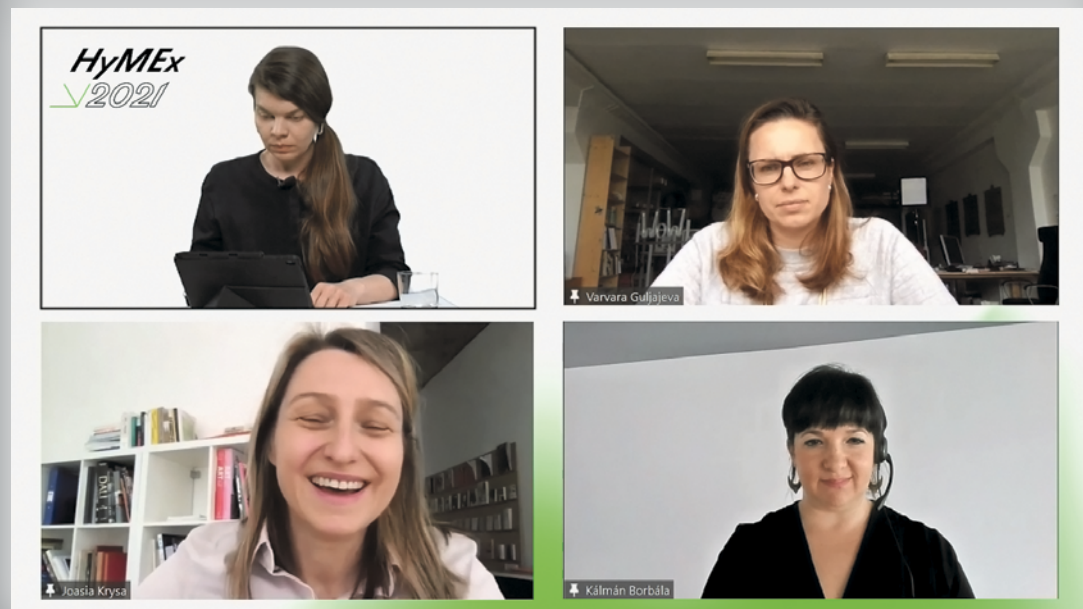
Fig. 9
"Panel 2: Cognitive
Processes Around the
Hybrid Formula."
Host: Lívia Nolasco-
Rózsás; speakers:
Varvara Guljajeva,
Joasia Krysa, Borbála
Kálmán. Screenshot.

about how the detachment of exhibitions from their physical venues prompted the sudden direct online accessibility of exhibitions in many institutions that would not have considered making their content so freely available had there been no lockdowns. This new reality could lead to shortcuts in the remodeling of institutional roles within the contemporary art world. In this context, "the online exhibition may carry a different conceptual weight: not only is it a digitized extension of its physical version, but it needs to sustain an inclusivity to endure a transnational gaze [...], it requires a cognizant expansion of the surrounding cultural practices and the research phase."[16] Creating a more accurate and responsible relation to hybridity was one of the engagements suggested by Ludwig Museum in the symposium's context.

Conclusion

As I put it in my presentation, "In today's virtual condition museums are everywhere, experiencing themselves as new forms of existence and conceptual entities."[17] The process of organizing the symposium, the arrival of the pandemic, and conversation trajectories that "HyMEx 2021"generated all challenged the Ludwig Museum to reassess its position in the system of spaces it was enveloped by and dealt with, as it integrated its online sidenotes into its core entity, created its own hybrid reality, and put into practice the theoretical ideas it proposed through the symposium and exhibition.[18] By stepping out of its comfort zones, it established a better-channeled, deeper connection to the wider museum field in a much more intense and quality-based form and reached out to distant participants while not letting go of the close presence of its physical visitors. What needs to follow is the systematic elaboration of a new methodology to make these revisions visible.

HyMEx– Hybrid Museum Experience 2021

Keynote speakers:
Christiane Paul, Boris Groys
Speakers:
Tania Aedo Arankowsky, Bruce Altshuler, Robert B. Lisek, Philippe Bettinelli, Daniel Birnbaum, Tegan Bristow, Bruno Brulon Soares, Lily Díaz-Kommonen, Jonathan Dotse, Krisztián Fonyódi, Varvara Guljajeva, Borbála Kálmán, Sarah Kenderdine, Seong Eun Kim, Felix Koberstein, Béla Tamás Kónya, Joasia Krysa, Corina L. Apostol, Lívia Nolasco-Rózsás, Zsófia Ruttkay, Krisztina Varga, Ben Vickers

16   Borbála Kálmán, "The Curator-Cloud: A Resilient Apparatus for the Long-Term," in *HyMEx 2021: Proceedings*, 96–97.

17   Kálmán, "The Curator-Cloud," 24.

18   "These museums offer hybrid experiences as they dispose themselves over an abundance of spaces that vary in access and compatibility, organizing them into one system poses a challenge to museums accustomed to focusing on one type of space." Nolasco-Rózsás and Kálmán, "Editorial," 16.

ANATOMY OF THE BEYOND MATTER MA FELLOWSHIP PROGRAM

Lily Díaz-Kommonen and Cvijeta Miljak

The MA fellowship program of the Beyond Matter project was envisioned as a continuation of a decades-long art and design research education initiative carried out through the ↘Systems of Representation research group,[1] which combines arts, humanities, and technology in diverse cultural heritage projects. The approach of the program, presented to the director of the Media Lab Helsinki back in 1998, offers reciprocal advantages to both cultural heritage and educational institutions. Design practice is oriented toward imagining achievable alternative futures, and working with talented design students enriches museums with an inflow of fresh perspectives. Younger ways of thinking can stimulate engagement with heritage in novel ways that complement traditional curatorial work, while students can find motivation in experimenting with exciting materials of high cultural value to gain deeper understanding and knowledge about heritage, design, and new media. Museums' interdisciplinary commitment also provides an environment for a much-needed scientific and humanistic grounding.

The MA fellowship program ran from September 2020 to July 2021 as part of the Beyond Matter project and was coordinated at Aalto University together with several initiatives of the partner institutions. The main objective of the collaboration was to provide a setting where accomplished art and design students would engage in independent lines of research within major European museums and art institutions, contributing creatively to the Beyond Matter outputs. The Centre Pompidou in Paris, the Ludwig Museum – Museum of Contemporary Art Budapest, Tirana Art Lab, and ZKM | Center for Art and Media Karlsruhe offered fellowship placements within their curatorial and research teams, where students were able to learn about archival research, curatorial practices, and design and media, developing their skills in 3D modeling, user interface (UI), user experience (UX) and visual communication design. They worked on the virtual reconstruction of two momentous historical exhibitions, *Les Immatériaux* (1985) at Centre Pompidou and *Iconoclash* (2002) at ZKM, as well as on the interactive installation

1 See Lily Díaz-Kommonen, "Interactive Diorama: A Virtual Reality (VR) Reconstruction of The Anatomy Lesson of Doctor Nicolaes Tulp by Rembrandt, 1632," *2017 IEEE International Symposium on Mixed and Augmented Reality*, Nantes (IEEE, 2017): 258–61, doi:10.1109/ISMAR-Adjunct.2017.85; Markku Reunanen, Lily Díaz-Kommonen, and Tommi Horttana, "A Holistic User-Centered Approach to Immersive Digital Cultural Heritage Installations: Case Vrouw Maria," *Journal on Computing and Cultural Heritage* 7, no. 4 (2015): 1–16, doi:10.1145/2637485; Lily Díaz-Kommonen, "Developing Design Education and Knowledge for Heritage," in *A New Affair: Design History and Digital Design Museum*, ed. Güzden Varinlioğlu and Gülen Çağdaş (Izmir: Yasar Universitesi, 2014), 11; Ferhat Sen, Lily Díaz-Kommonen, and Tommi Horttana, "A Novel Gesture-Based Interface for a VR Simulation: Re-Discovering Vrouw Maria," *2012 18th International Conference on Virtual Systems and Multimedia*, Milan (IEEE, 2012), 323–30, doi:10.1109/VSMM.2012.6365941; Lily Diaz-Kommonen, *Art, Fact, and Artifact Production. Design Research and Multidisciplinary Collaboration*, PhD diss. (Helsinki: Ilmari Design Publications, 2002), https://sysrep.aalto.fi/mulli2015/Thesis.html.

titled *The Immaterial Display*, on producing the exhibition *Spatial Affairs* (2021) and the hybrid "HyMEx – Hybrid Museum Experience 2021" symposium at the Ludwig Museum (May 2021),[2] on the *Tirana Floating Archive* (2021),[3] and on an artist-in-residency program with Tirana Art Lab.

MA Fellowship Arrangements

The MA fellowship program was developed as an educational and research initiative in the context of the Creative Europe co-funded project Beyond Matter by Lily Díaz-Kommonen, professor at Aalto University's Department of Art and Media (one of the co-authors of this text), and Hanna Karkku, planning officer responsible for international exchange programs, including Erasmus, at the university's School of Arts, Design and Architecture. Starting in August 2020, doctoral researcher Cvijeta Miljak (the text's other co-author), joined as coordinator of the MA fellowship program. Initially, the MA fellowship was proposed as a funded travel grant program comprising nine five-month positions at four European museums and art institutions, awarding three fellowships per year from 2020 through 2023.

Applications, Selections, and Placements

Applications were open to all MA students at Aalto University School of Arts, Design and Architecture and ended in March 2020. Twenty-eight MA students from all of its departments responded, writing a short letter including an expression of interest indicating how travel and participation in the project would benefit their studies. Fifteen students were shortlisted based on interests, skills, artistic merit, and relevance of the fellowship to their study paths. The museums made the final choice based on their perceived needs and preferences. Ultimately ten fellowships were offered: four at Centre Pompidou, three at ZKM | Center for Art and Media Karlsruhe, two at the Ludwig Museum – Museum of Contemporary Art, Budapest, and one at Tirana Art Lab.

Organization and Management

Organizing an experimental international collaboration between many institutions with different project goals and internal constraints brought along a few challenges to be solved, some which were not anticipated in the proposal and some that emerged due to the Covid-19 pandemic. We needed to follow specific national administrative and bureaucratic procedures as well as those of the Creative Europe framework, in both organizing and implementing the program. As a result, some aspects had to be significantly adjusted.[4] Making the necessary modifications to the original proposal within the same budget resulted in shortening the fellowships to three part-time months per student. Simultaneously, the duration of the whole MA fellowship program was condensed to a year by the managing partner.

   Then the Covid-19 lockdowns across Europe in the spring of 2020 significantly hampered the program by delaying activities at the partner institutions and made most travel abroad impossible. Only two fellows managed to travel to the museums' actual premises, while the rest had to take part remotely. This coincided with the technical partner's departure from the project. These

2   See "HyMEx – Hybrid Museum Experience 2021" symposium May 6–7, 2021, http://hymex2021.ludwig-museum.hu/.

3   See *Tirana Floating Archive*, https://www.tiranafloatingarchive.org/.

4   For example, MA students cannot be both full-time employees and engaged in their MA studies.

new circumstances required a flexible remodeling of the original fellowship arrangements. The placements at Centre Pompidou and at the Ludwig Museum were amended to overlap in order to allow the students to work together. One extra fellowship opportunity was offered at Centre Pompidou in April 2021, reflecting a reassessment of the student skillset requirements by the program organizers.[5] After travel was restored in spring of 2022, we offered those fellows who had participated remotely shorter complementary visits to the museums to get a glimpse of the planned experience, work behind the scenes, and meet in person the people they had collaborated with online. The trips were intended to reward their dedication and hard work under challenging pandemic-tainted circumstances.

Coordination and Guidance

Coordinating the program, much like many other emerging institutional settings, involved a variety of complex tasks aimed at facilitating collaborations with partner institutions while supporting crucial pedagogical aspects for the students. Coordination activities ranged from practical organization of the fellowships, making it easier to navigate institutional contexts, promoting social relationships, encouraging student agency, and providing personal support. These categories have been corroborated in previous educational research findings as providing additional assets for students.[6]

Promoting Social Relationships and Cross-institutional Communication

In *The Semantic Turn* (2006), communications scholar Klaus Krippendroff argued that design is a human activity based on language that occurs through dialogue.[7] As a social process,[8] communication is crucial for successful design. A large part of our efforts thus went into building social relationships that would support an open and safe atmosphere that welcomes discussion and critical feedback about ongoing practices. This was particularly important at a time of social distancing and uncertainty, when students, like most of us, worked scattered alone in our own homes, with collaboration happening exclusively via computer-mediated channels. Getting to know the students and providing possibilities for them to meet and exchange ideas as a group, sharing a range of perspectives and experiences, was regarded as vital both professionally and personally. The coordinator organized weekly or bi-monthly online one-to-one meetings with each student to check how they were doing, follow the progress of their work, and offer support; internal presentations of the final fellowship outcomes within the respective research teams on *Zoom* also served as a platform for feedback and reflection on achievements and collaborative practices within the team; and colleagues from the partner institutions and the students were invited to share and discuss the work in progress at two common virtual get-togethers. The first of these took place December 2020, gathering most of the partners and students online, while the second was held in June 2021 and brought all the students together in person at the end of the program.

5   The skillset added to the pool related to 3D graphics modeling.

6   See Sanna Honkimäki and Päivi Tynjälä, "Prerequisites for the Successful Group Mentoring of First-Year University Students: A Case Study," *Mentoring & Tutoring: Partnership in Learning* 26, no. 2 (2018): 148–64, doi:10.1080/13611267.2018.1471338(Betty Malen and Tara M. Brown, "What Matters to Mentees: Centering Their Voices," *Mentoring & Tutoring: Partnership in Learning* 28, no. 4 (2020): 480–97, doi:10.1080/13611267.2020.1793086.

7   See Klaus Krippendorff, *The Semantic Turn: A New Foundation for Design* (New York: Taylor & Francis, 2006).

8   See Katerina Alexiou and Theodore Zamenopoulos, "Design as a Social Process: A Complex Systems Perspective," Futures 40, no. 6 (2008): 586–95, doi:10.1016/j.futures.2007.11.001.

Educational Resources

One essential aspect of the fellowship coordination was to prepare and support the students in their tasks, incorporating the idea of student self-directedness. Self-directedness is a central concept of adult education widely adopted in Finland, and according to Sanna Vehviläinen it is often thought of as both a pedagogic *aim* for students to gain competence and a didactic *means* consisting of students doing independent work.[9] It shifts the teacher's responsibility for certain tasks related to the learning process, such as planning, timing, and evaluating the learning activities, to the student. For Aalto University, Cvijeta Miljak compiled an "Educational Exchange" section on the Beyond Matter website which featured a collection of useful resources encouraging the fellows to get acquainted with the project before starting their fellowships.[10] We also organized supporting participatory workshops and lectures for the fellows, including a three-day workshop with Professor António Araújo (Universidade Aberta, Portugal) on hand-drawing equirectangular perspectives, "Sketching 360° VR Panoramas"; a lecture by doctoral candidate Tania Chumaira (Aalto University) titled "Architectural mapping techniques"; and an "Information Architecture" workshop with Miljak. In addition, a series of participative co-design workshops were offered to develop the concept and implementation for the digital exhibition model of *Les Immatériaux*.
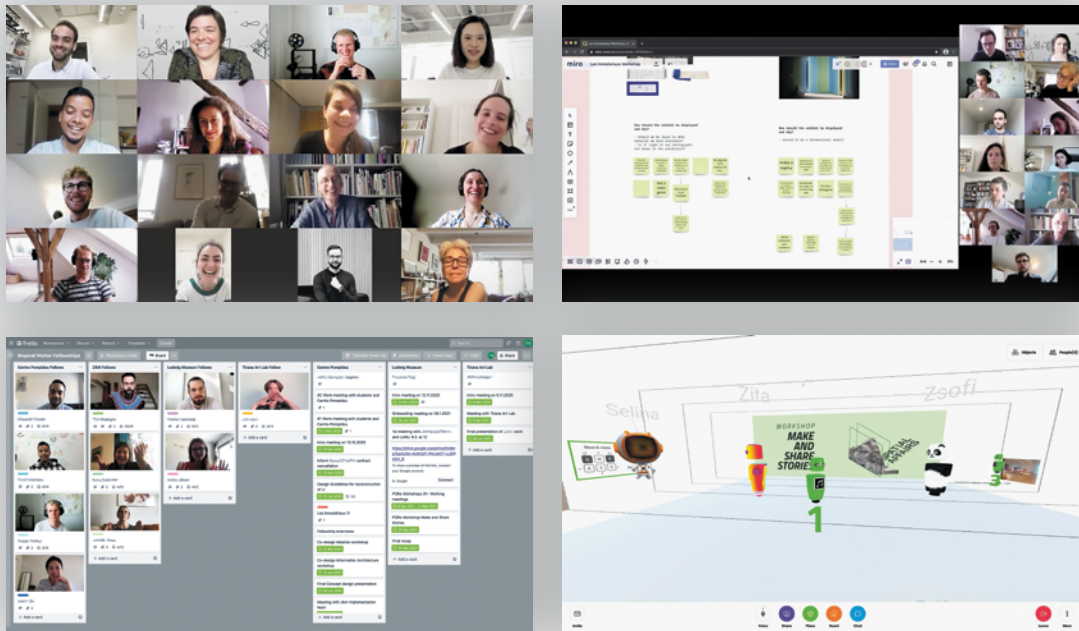
Figs. 1–4
Remote work and virtual tools for collaboration. 1) A collective get-together via *Zoom*, December 15, 2020. 2) A participatory co-design workshop with Centre Pompidou via *Zoom* and *Miro*, an online visual collaboration platform, March 31, 2021. 3) Preparations for the guided tour part of the PORe workshop with Ludwig Museum, Budapest in *Mozilla Hubs*, May 20 2020. 4) Organizing collaborations in *Trello*. Screenshots.

Collaborations

The collaboration with each partner was quite unique, shaped by the objectives of the overall project initiative as well as by their ideas on how to integrate the student teams into their own working processes. The research aspect of the students' tasks and activities were discussed and agreed upon in advance with Aalto University. Throughout the course of the fellowship, we

9   Sanna Vehviläinen, "Avoiding Providing Solutions: Orienting to the Ideal of Students' Self-Directedness in Counselling Interaction," Discourse Studies 5, no. 3 (2003): 389–414, doi:10.1177/14614456030053005.

10   See "Educational Exchange," https://beyond-heritage.aalto.fi/educational-exchange/.

Fig. 5
Anatomy of the Beyond Matter MA fellowship
program. The graphic shows student demographics,
the program's timeline relative to the Beyond
Matter project, practice-based research design
collaboration settings, and maps the student
contributions and design skill set per project.
Information design by Cvijeta Miljak.

— MA FELLOWSHIP
    TIMELINE —

Centre Pompidou   visits abroad

Tirana Art Lab
ZKM

Ludwig Museum

Oct 2020   2021   2022   2023 Aug

sudent
self-declared
profession

product
designer

architect

— STUDENT
DEMOGRAPHICS —

Aalto University   industrial designer

                              graphic designer   mother
Department   degree   tongue
of Design   graphic designer,   earned
                              new media artist   IT
                              visual artist   age
Department   CMN
of Architecture   visual artist,   BA   18–24
                              media designer   FI   gender

Department of   writer   25–29   KN   M
Art and Media   MA
                              fine artist,   EN   F
Systems of   art teacher   30–39
Representation   GE   —
research group
(coordination,   UX designer
advisory role)

— STUDENT CONTRIBUTIONS,
DESIGN SKILL SETS —

Les Immatériaux

Spatial Affairs

Tirana
Floating Archive

Iconoclash

Immaterial Display

— PRACTICE-BASED RESEARCH
DESIGN COLLABORATIONS —

engaged more deeply than originally planned with Centre Pompidou and the Ludwig Museum, working closely together on the concept design of the virtual reconstruction of *Les Immatériaux* and on a pilot PORe (performance-oriented research) workshop that took place online using social VR techniques.[11]
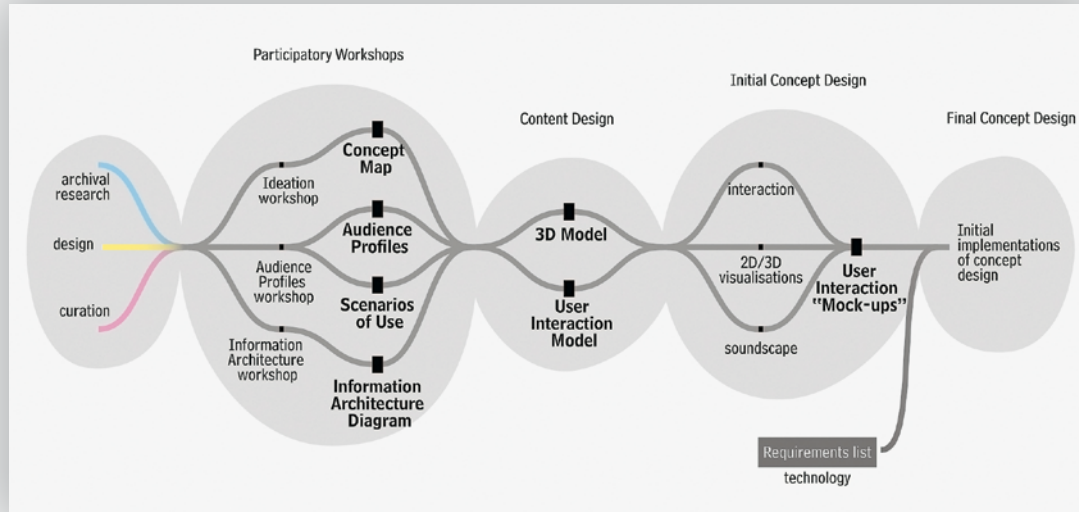
Fig. 6
The co-design process. The diagram shows the interdependencies of the process phases as well as the design outcomes of the interdisciplinary collaboration. Information design by Cvijeta Miljak.

Case study: *Les Immatériaux* and the Process Toward a Concept Design

In the context of the program, the collaboration with Centre Pompidou was exceptional. The partner was determined to rely on the work by the MA fellows to produce concrete results for the interactive virtual reconstruction of *Les Immatériaux.* Recognizing that an important aspect of any complex design project is that it "is itself designed and depends on creative and innovative thinking for its success,"[12] they asked for our support in guiding this collaborative design effort. We (the authors) committed to the team,[13] structuring the co-design process as "facilitators or enablers, helping to create the conditions and build the group's capacity to design the project themselves,"[14] as well as providing focused educational activities. The main aspects of the partnership were described in detail in a memorandum. The Centre Pompidou group had the key role in evaluating design proposals based on their curatorial vision and notion of historical accuracy, but the main decisions were made in dialogue with the students and Aalto faculty.

It is important to realize that in approaching a task from a design perspective there is no universal prescription that works in all situations. With this is mind, we briefly present our co-design strategy,[15] including the choice of human-centered, participatory design methods used

11   "Make and Share Stories – PORe Workshops Pilot," May 20, 2021, https://beyond-heritage.aalto.fi/
      pore-workshops-pilot/.

12   Jonas Löwgren and Erik Stolterman, *Thoughtful Interaction Design: A Design Perspective on Information
      Technology* (Cambridge, MA: MIT Press, 2007), 40.

13   The co-design team constituted three curators and two archival researchers from Centre Pompidou and
      four MA students and two researchers (the authors of this text) from Aalto University.

14   Theodore Zamenopoulos and Katerina Alexiou, *Co-Design as Collaborative Research*, Co-Design
      as Collaborative Research Foundation Series, ed. Keri Facer and Katherine Dunleavy (Bristol: Bristol
      University/AHRC Connected Communities Programme, 2018), 31.

15   Co-design is first and foremost a collaborative practice where participants pool their knowledge,
      skills, and resources to perform a design task. See Zamenopoulos and Alexiou, *Co-Design as
      Collaborative Research*.

and incorporating experiences from earlier projects successfully realized in a comparable context by the Systems of Representation research group.[16]

The collaboration started through a deep engagement with the archival materials and concepts of the historical exhibition, and by an introduction to the curatorial visions for virtual reconstruction. Following in the interaction design tradition, the co-design process was developed via a series of participatory workshops which created spaces where knowledge could be exchanged, common language and understandings established, and ideas generated. The workshops yielded important design objects/prototypes which were relied upon to proceed to the next steps in the concept design development. They also served as tangible documentation of the intellectual work done. For example, the "Ideation" workshop summarized the multiple discussions between the curators, researchers, and designers, identifying and structuring the main themes and concepts; the results were documented in a concept map. The "Audience Profiles" workshop mapped the target audiences, drawing out their needs from the virtual model, and uses scenario design methodology to describe potential situations of use; these results were gathered into audience profiles and scenario-of-use narratives, and employed to define key aspects of usability, accessibility, and functionality needed in the reconstruction. The "Information Architecture" workshop resulted in a series of information architecture diagrams and focused on organizing the system's components and contents, combining them with a projected user experience to support the user interface and navigation corresponding to the curatorial vision of Centre Pompidou's team. Following the collaborative work done in the workshops, a structurally built 3D model of the sixth floor of the Centre Pompidou building, with an exhibition floorplan and walls, was realized. This model was used in the process of designing the exhibition model, but also added a perspective to continued archival research. A user interaction model was then developed, providing a consistent design pattern of interdependence of content with user actions to ensure that users would stay oriented and understand how to navigate and discover information within the virtual model. The initial concept design encompassed interaction, visualization, and soundscape design, and was delivered in the form of user interface mock-ups focused on content and functionality.[17] The final concept design proposal, based on five representative exhibition sites of *Les Immatériaux,* gathered all the design objects described above. It was shared with ZKM|Karlsruhe implementation team to get a requirements list that would specify a range of technical components to be utilized in the execution of the project. With the approved of the final concept design proposal, our (the authors') extra commitment to the research design phase of the virtual reconstruction ended. However, the project proceeded with the Centre Pompidou team and two fellows who continued to the next phase of design implementation.

Collaboration Impact

Although altered and hindered by the pandemic, these joint efforts were fruitful and enjoyable. Successful teamwork made it possible to step toward concretely supporting the students' careers: two of the students were hired by Centre Pompidou and one student by ZKM to stay on the projects as professional designers after their fellowship periods ended. The intended hiring of a fourth student could not be carried out due to the partner's specific funding requirements.

16   These investigations into the topic of designing historical simulations can be seen as a continuum ranging from most accurately equivalent simulations to the most interpretative artistic renditions.

17   This was a high-fidelity prototype realized in Blender that incorporated all the CP changes, etc. It was later ported to Three.js.

The fellowship environment provided a fertile background for academic achievements too: one MA thesis was directly influenced by the work done in the program.[18] It also helped two of the students decide on the supervisor and advisor for their MA thesis.

When *The Immaterial Display* was shown in Finland in the spring of 2022, we organized two complementary hybrid panel discussions, "Matter, Non-Matter, Anti-Matter"[19] at Aalto University and "Co-Designing VR Experiences"[20] at Design Museum Helsinki. In addition, we received an invitation to participate in the New European Bauhaus Festival 2022 program "Digital Awareness. From education to social impact and human identity,"[21] organized by Espronceda Institute of Art & Culture in Barcelona as part of the ISEA 2022 extended program; we contributed with an exhibition titled *Heritage as a Source of Knowledge in Art and Design Education*[22] on the collaboration between Aalto University and Centre Pompidou.

Ethical Considerations

The collaborations instantiated in the Beyond Matter project were very complex and occurred at multiple levels among the university members, between the university and museums and art institutions, between museums and diverse production organizations, and finally between museums and audience communities. In such a project, we can assume that each party will have their own specific goals and aims and that following the principles endorsed by the research community in all stages of research will be a shared and a paramount concern for everyone involved.[23] Adopting a collaborative interdisciplinary way of working in the research setting, based on a generous collegial sharing of knowledge and a mix of creative contributions from different actors, requires serious consideration of how to integrate ethical aspects into the common project protocols. It is important to define the status and responsibilities of researchers and the fellowship students within the research teams, and those of other non-academic collaborators, as well as status, rights, and consent of the research subjects. To comply with the standards set for academic research as well as for art and design productions, it is equally critical that institutions take due account of the work and achievements of each contributor at all phases of a research production by giving their contribution the credit and weight it deserves in the final collaborative research outcomes.[24] This is necessary and expected in both academic publications and public dissemination of the project outcomes and processes.

To assess the processes involved in the fellowship program, we conducted a series of interviews with the students and documented some of the working interactions and discussions within research teams, the final student presentations, and the collaboration in co-design workshops. When collecting these research materials, which comprise accounts in text,

18   See Niklas Alenius, "Archival Transformations – Translating Simulated Archives into Digital 3D Media" (master's thesis, Aalto University, 2022), https://aaltodoc.aalto.fi/handle/123456789/114853.

19   See "Matter, Non-Matter, Anti-Matter. Past Exhibitions as Digital Experiences. Panel Discussion," Aalto University, March 17, 2022, https://vimeo.com/693727404.

20   See "Co-Designing VR Experiences. Hybrid Seminar," Design Museum Helsinki, May 19, 2022, https://vimeo.com/749464469.

21   See "New European Bauhaus," ESPRONCEDA Institute of Art & Culture, https://www.espronceda.net/new-european-bauhaus/.

22   See "Heritage as a Source of Knowledge in Art and Design Education," https://beyond-heritage.aalto.fi/heritage-as-a-source-of-knowledge-in-art-and-design-education/.

23   See "Responsible Conduct of Research (RCR)," Finnish National Board on Research Integrity TENK, updated April 12, 2022, https://tenk.fi/en/research-misconduct/responsible-conduct-research-rcr.

24   See Krista Varantola et al., eds., *Responsible Conduct of Research and Procedures for Handling Allegations of Misconduct in Finland*, Guidelines of the Finnish Advisory Board on Research Integrity 2012 (Helsinki: Finnish Advisory Board on Research Integrity, 2012), https://tenk.fi/sites/tenk.fi/files/HTK_ohje_2012.pdf.

photographic, video and audio formats, we obtained the informed consent of all participants and briefed them about the possible ways the materials might be used, knowing that data gathered in this way should only be shared according to the informed consent procedure developed at the beginning of the project.

Discussion

We have presented some of the important aspects of the educational pilot MA fellowship program where art and design students worked with museum professionals in various Beyond Matter practice-based research projects. Here we discuss some of the observations and findings we acquired as accomplices to these unfolding collaborations.

Hosting the fellowship was a new situation for the museums, and each institution had to work out its own method of accommodating the wider novel research affair, incorporating the international students into their projects and activities, in most cases remotely, and finding a good rhythm for cooperation. Within this complex setting, each partner had to deal with a specific set of practical, administrative, employment-related, and even language-related complications. What was deemed important in developing an enjoyable collaboration was to embrace the improvisation, to cultivate mutual trust, a flexible mindset, good intent, and an open heart. The collaborations were considered very successful, both by the students and by the museum professionals. The way the fellows were integrated into the partner projects was central to their overall experience. Feeling a part of the museum team from the very beginning was important to them. They highlighted the efforts made to build and sustain the interpersonal relationships and reiterated their importance on multiple occasions. Moments of the fellowship that were especially appreciated included the extra efforts taken to introduce other museum staff and physical premises, for example by making little virtual tours through the museum, showing a museum artwork storage or spaces where the exhibition was just being built. Being able to go into the archival depths alongside invested museum professionals and thus build up an understanding of the underlying concepts, artworks, and artists was seen as a highlight of the fellowship.

The museum curators appreciated that alternative working methods in the fellowship allowed them to learn how things could be done in other ways. As our colleague from Ludwig Museum beautifully put it: the real magic of collaboration shows in small the experimental endeavors spurred from creating such a partnership, where you dare to go together on an unknown journey—you don't know how it will end, but you want to make that journey nevertheless. The tangible results of the students' design experimentations allowed curatorial concepts and decisions to follow directions they might not have otherwise taken. Some regarded the student work as a catalyst for their own processes to run smoother, creating a stronger bond between different parts of the institution's involvement with the Beyond Matter project. Additionally, one student's design work was used as a direct basis for a successful application to a local grant, funding the further implementation of the concept. Most thought the collaborations with the students and the results of their work went beyond the expectations they initially had for the MA fellowship program.

Coming with different initial interests, the students found the experience exciting and rewarding. They reported learning a lot, gaining new experiences and understanding even in unexpected areas. They valued the experimental nature of the work and doing things they had not done before. Students whose placements overlapped appreciated working together and found they complemented each other, making it possible to learn from their peers and improve their own skillsets. The program was seen as a beneficial environment where, as students receiving guidance and support, they could feel free to express their creativity and explore new ways of doing things, unlimited by the usual employment-like relationship where they would not have dared to

take certain chances nor to show professional insecurities. The students valued having a reliable home-based safety net,[25] focusing beyond educational and professional expectations on their personal well-being.

The feedback received about practices used to fortify inter-institutional and peer communication suggested that most participants were very keen to take part in these opportunities for social exchange, and the students found them particularly beneficial. Most of the students engaged in regular one-to-one meetings, and most of the final presentations of the student work were successfully delivered within the research teams. Besides the pedagogical aspect, we believe this kind of open exchange also provided an additional valuable layer of knowledge accumulation during the project that benefitted all the parties.

A common wish was that collaboration had taken place within a museum, as remote work was challenging and difficult for many. The necessity of working remotely provided a setting for investigating viable virtual collaborative strategies between the partners so that the planned work could still be accomplished. The virtuality of the collaboration also dictated an approach where more effort needed to be invested in social relationships so that a feeling of a community could be built and sustained. The students saw remote working as a biggest culprit for being any confusion or uncertainty about their roles or tasks.

Based on the first students' feedback about the kind of support they needed in navigating the complicated university administrative protocols, the coordinator compiled a collection of detailed instructions to help those coming after. Still, the students would have also appreciated more structured fellowship timetables in advance, so they could better plan the rest of their semester activities. A couple of students wished they had met with their team members immediately on starting their fellowships to clarify expectations and their roles within the project.

As participants in this program, as organizers, mentors, design advisors, and coordinator, we learned from several perspectives what it entails to run such an international interdisciplinary collaborative research project. Aware of its experimental pilot character, we were committed to keep improving any shortcomings on the fly. With the generous combined efforts of all participants, the Beyond Matter MA fellowship program produced significant results—both material and immaterial.

25   See Honkimäki and Tynjälä, "Prerequisites for the Successful Group Mentoring of First-Year University Students."

PERFORMANCE-ORIENTED RESEARCH METHODS FOR AUDIENCE STUDIES AND EXHIBITION EVALUATION

Lily Díaz-Kommonen and Cvijeta Miljak

A continuing trend of using emerging digital technologies in the museum context is changing the ways in which museums position themselves towards their audiences, allowing for more democratic exchange and giving visitors more opportunities to participate actively in the museum ⭨experience.[1] These strategies to open up museums to a wider range of audiences have the potential to gather new communities and to form discussion forums about topics of public interest.

In the context of participatory design, participation, according to Susanne Bødker et al., "is emphasised as a way by which people can influence digital technologies that will change their work practices or everyday life." People are not viewed as end-users but as "human beings with the full faculty of skillfulness, emotions, concerns, beliefs, and grounding values that make us human." They explain that participatory design is "a process of mutual learning between people and professional designers" who "commit to explore how future technologies might support the imagined futures" of participants, as well as "a set of emancipatory practices"[2] not just for individuals, but also for the groups and communities they are a part of.

Co-design can be seen as a design approach that incorporates participation as its basic premise. Using performance-oriented research (PORe) method for audience studies and exhibition evaluation, a methodology being developed by Professor Lily Díaz-Kommonen (one of the co-authors of this text) and evolving through the art and design research practices of the System of Representation research group at Aalto University School of Arts, Design and Architecture views co-design as practice aiming for knowledge development and research. In practicing co-design, participants connect their knowledge, skills, and resources to conceptually develop and create tangible or intangible artifacts and contexts. As Theodore Zamenopoulos and Katerina Alexiou write, "Co-design activity produces new knowledge as people develop and experiment with (new) ideas around a matter of concern and as they engage in negotiations around the development of these ideas."[3] Different definitions of design focusing on distinct

1   Tula Giannini and Jonathan P. Bowen, "Museums, Art, Identity, and the Digital Ecosystem: A Paradigm Shift," in *Museums and Digital Culture: New Perspectives and Research*, ed. Tula Giannini and Jonathan P. Bowen, Springer Series on Cultural Computing (Cham: Springer International Publishing, 2019), 63–90, doi:10.1007/978-3-319-97457-6_4.

2   Susanne Bødker et al., *Participatory Design* (San Rafael, CA: Morgan&Claypool Publishers, 2021), 10.

3   Theodore Zamenopoulos and Katerina Alexiou, *Co-Design as Collaborative Research*, Co-Design as Collaborative Research Foundation Series, ed. Keri Facer and Katherine Dunleavy (Bristol: Bristol University/AHRC Connected Communities Programme, 2018), 10.

characteristics, such as "conceiving, planning, and making,"[4] framing problems and solutions,[5] and sense making,[6] show the complexity and uniqueness of the practice. People connected by co-design processes usually come from different disciplines and work together in a variety of ways. The emphasis is on eliciting knowledge, learning about values and ideas from other participants, and stimulating collective creativity through mechanisms facilitating conversation, sensing, writing, making, and enactment.[7]

According to Zamenopoulos and Alexiou, the focus on collective creativity is best termed "co-creative design" which "typically involves hands-on activities and materials that focus on eliciting the creative and reflective capacity of people and facilitate the collaborative development of ideas and knowledge."[8]

Second-order Understanding in Audience and Community Studies

Audience and community studies are of great importance to design and research, since activities realized with groups of people enable the expression and gathering of meaningful discursive matter that nourishes co-design and co-creation processes.[9] The iterative processes enacted via co-design and co-creation afford possibilities for a second-order understanding about the different positions from which stakeholders comprehend their world, because of qualitative and meta-level differences between the designer's (and the researcher's) understanding of an artifact as it is being proposed and the understanding of the various interactors as it is being negotiated via co-design and co-creation. As Klaus Krippendorff has noted, "the meanings of interest to designers are *embodied individuals*, who, as members of communities, coordinate their understanding by interacting with one another."[10] Implicit here is the recognition of knowledge which materializes as part of life lived as an embodied being and how meaning is always *someone's meaning*.

Second-order understanding is essential to human-centered design. It is grounded on the fundamental recognition that *design is for others*. The PORe method aims to arrive at an understanding of the myriad perspectives that inform the meaning of artifacts' use. We use creative activities which, rather than reducing, hope to amplify the range of communicative experience, allowing for observation of different communicative modalities as they unfold.

The Immaterial Display in Finland and Data-Gathering Strategies

The touring exhibition *Matter. Non-Matter. Anti-Matter. Past Exhibitions as Digital Experiences* was presented in multiple venues in Finland, including Väre, the main building of the School of Arts, Design and Architecture at Aalto University (March to May 2022), and the Oodi Library (April 2022), which was co-designed with residents of the city as a "living and functional meeting

4   Richard Buchanan, "Design Research and the New Learning," *Design Issues* 17, no. 4 (2001): 3–24 (quotation on 9).

5   See Kees Dorst and Nigel Cross, "Creativity in the design process: co-evolution of problem-solution," *Design Studies* 22, no. 5 (2001): 425–37.

6   See Klaus Krippendorff, *The Semantic Turn: A New Foundation for Design* (New York: Taylor & Francis, 2006).

7   See Zamenopoulos and Alexiou, *Co-Design as Collaborative Research.*

8   Zamenopoulos and Alexiou, *Co-Design as Collaborative Research*, 19.

9   See John Dewey, *Art as Experience* (New York: Milton, Balch and Co., 1934).

10   Krippendorff, *The Semantic Turn*, 65–67 (quotation on 65; emphasis by the author).

place open to all,"[11] as reflected in its diversified audiences. At the Design Museum in Helsinki, the exhibition was part of Museum Week 2022 (May 2022), which gathered museum profession-als and visitors interested in design (see fig. 1).
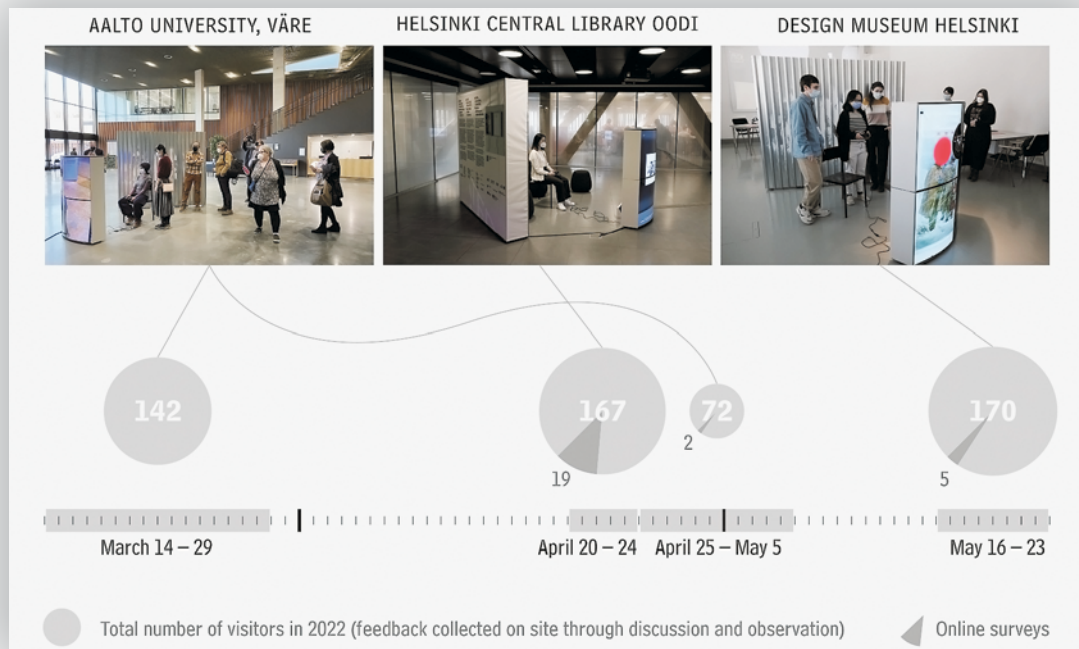

Fig. 1
The Immaterial Display in Finland: venues, numbers of visitors per venue, and type of feedback collected. Information design and photographs: Cvijeta Miljak.

Virtual Workspace and Digital Tools for Audience Support

Staging the exhibition in Helsinki required additional support. Six master students from Aalto University School of Arts, Design and Architecture were hired through an open call, followed by an interview, for the period from March to May 2022. The main tasks were setting up the installa-tion at the venues, supporting the audience with additional information about the exhibition, and helping visitors interact with the installation. The exhibition was open from six to nine hours per day depending on the venue, and the student work was organized in shifts so that one person was always available to support the audience. Students were also instructed to collect feedback about visitor experience. To organize the student work and facilitate collection of visitor experi-ence data, an online collaborative workspace was designed by Cvijeta Miljak (the other co-author of this text) on the visual collaboration platform Miro. This supported tasks such as com-munication among team members and scheduling shifts through custom-designed timetables, as well as enabling (if needed) new links and materials to be added to students' daily tasks.

A color-coded messaging system could be positioned directly onto the timetable items, facilitating simple communication between students and coordinator, a very flexible arrange-ment of working shifts, and the tracking of possible changes in a visual manner. Comments were also used to note feedback in each daily shift. We used yellow for feedback, green for instruc-tions and additional information for students, and red for comments about shift timings or ques-tions to the coordinator. A poll conducted among the students after the first week of implement-ing this system showed that it was found to be comfortable and useful, so it was used throughout the tour of *The Immaterial Display* in Finland.

11   "What Is Oodi?," Oodi Helsinki Central Library, accessed May 24, 2023, https://oodihelsinki.fi/en/what-is-oodi/.

Audience Feedback Data Pipeline

A more traditional approach was used to gather general feedback about visitors' experience of *The Immaterial Display*, focusing on accessibility and usability as well as initial impressions. As exhibition guides, the students were instructed to engage in open discussions with visitors who might be willing to share their opinions. Being design students, they recognized the value of feedback and took the task very seriously, noting comments from visitors and their own observations in the communication tool linked to their daily shift slots. This allowed for a straightforward overview of the amount of new feedback inputs daily, and a reminder if any were missed. One limitation of the Miro platform is that although it can export any other element from a board as jpg or pdf formats, it doesn't export comments. Due to a limited volume of feedback entries in our case study this was not an important drawback, and the textual entries were copied manually to a MS Word document. An online structured survey on a touchscreen tablet was made accessible to visitors in the exhibition spaces of the last three venues and collected twenty-seven feedback inputs. From the, a small dataset will be generated for textual (and possibly content) analysis and further research.
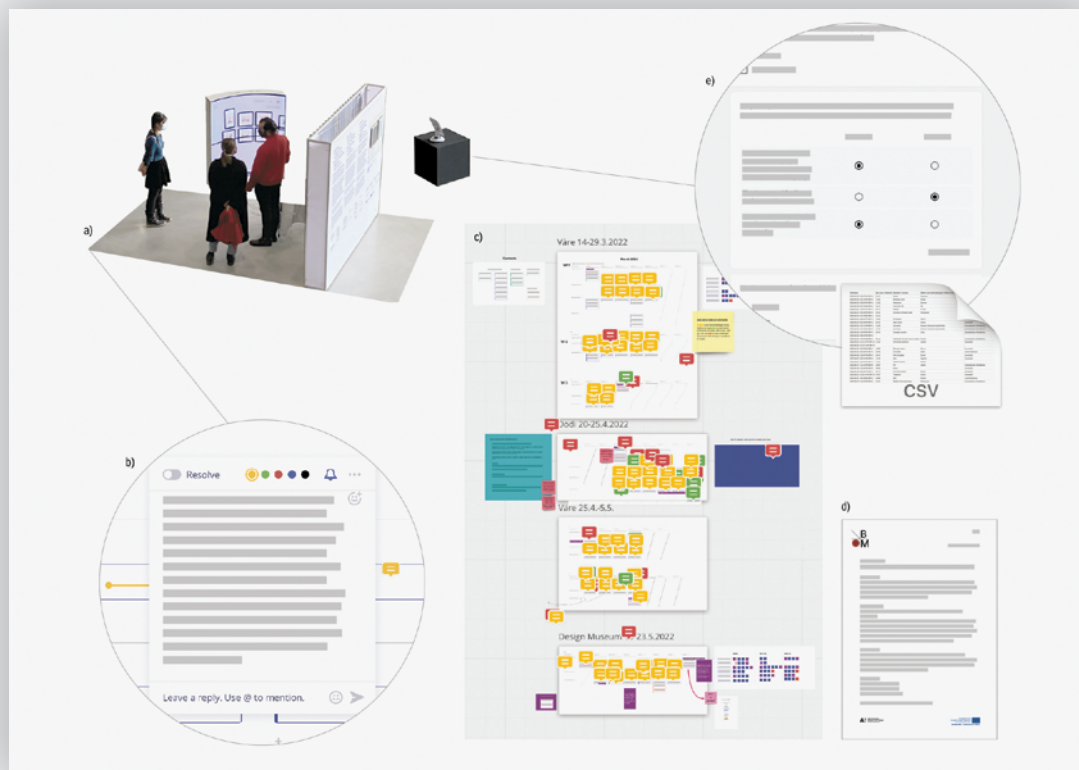

Fig. 2
The audience feedback data pipeline. a) Discussions with visitors about their experiences of the exhibition. b) Students marking audience feedback as comments at the end of their daily shift. c) Miro board workspace used for organizing audience support and feedback. d) Feedback entries copied to a MS Word document. e) The online exhibition survey (Google Forms) with .csv data export. Information design and photograph: Cvijeta Miljak.

Performance-Oriented Research for Audience Studies and Exhibition Evaluation

Our main line of investigation within the Beyond Matter project has been to develop a research framework based on the abovementioned performance-oriented research (PORe) methods for audience studies and exhibition evaluation. PORe promotes audience participation using autoethnography and duo ethnography. It also combines artistic (improvisation) and digital humanities-oriented (textual and content analysis) methodologies with (embodied) co-design and co-creation practices as scaffolds that enable the subjective interpretation and evaluation of exhibitions. These methods allow for exploratory research, creativity, and openness, while facilitating co-creation of new content by visitors and sharing valuable insights about exhibition experiences that might otherwise remain hidden.

PORe workshops were created as a series of participatory events accompanying two distinct exhibitions realized as part of Beyond Matter. We designed two PORe workshop models, tailored respectively to the *Spatial Affairs* exhibition at the Ludwig Museum and the touring interactive exhibition-installation *Matter. Non-Matter. Anti-Matter*, which was a collaborative effort of several partners involved in Beyond Matter and showcased two seminal past exhibitions *Les Immatériaux* (Centre Pompidou, 1985) and *Iconoclash* (ZKM|Center for Art and Media Karlsruhe, 2002). Our two case studies showcase our experimental investigations into questions of how, when, and why these exhibitions and cultural events touched visitors in meaningful ways.

The concept of *narrative cycles* is one we frequently apply in PORe. According to Díaz-Kommonen's hypothesis, these cycles are patterns with a material composition emerging from human language and affording discursive capabilities such as categorical and metaphorical thinking: "How is [something] unique?"; "When is [someone] part of the group?"; "What does [the group] stand for and why?" As acts of "languaging," narrative cycles are part of the glue uniting aspects of our existence into meaningful experiences. Often perceived as either internal or external, they emerge by necessity through our encounters with complex, often conflictive aspects of life. Narrative cycles operate as meta-descriptive devices and impart cohesion. Closely intertwined with the notion of existential coherence or the need to experience continuity, we can observe them in stories about origins, which bring the past into the present via questions such as "Where are you from?"

Through childhood, adolescence, and into adulthood, followed by maturity, old age, and death, narrative cycles comprise (and are structured by) landmark events that are part of a natural life cycle. They fuse lived experience into a unique physical body that also partakes in shaping personal identity. A narrative cycle is also a conceptual lens that allows us to contextualize and situate the individual within a shared community, time, and space. We are interested in learning about whether and how digital cultural heritage and media artifacts become intertwined in the lives of humans through narrative cycles. Do they support the forging of existential coherence or cohesion among communities?

The notion of existential coherence has been developed and researched by linguistic anthropologist Alessandro Duranti.[12] It is influenced by the work of psychologist Eric Eriksson, who proposed that the development of a person's identity involves an unconscious striving for continuity and entails actions, routine activities, and the recognition of a temporal dimension. The temporal dimension comprises a *past*, which conceivably includes so-called narratives of belonging, a *present* that is a natural extension of the past, and a *future* possibly checkered with uncertainty and paradox.

PORe Workshop: "Make and Share Stories"

When *Spatial Affairs* was on show at the Ludwig Museum, access to the physical premises was impossible due to Covid-19 lockdowns, so for most of the duration of the exhibition it was only accessible as an interactive online 360° photogrammetry model. This led to the design of the first pilot PORe workshop "Make and Share Stories"[13] as an online participatory experience in the Mozilla Hubs platform; participants could meet as avatars in an immersive virtual space.

In keeping with the PORe perspective, we sought to design an environment in which selected artworks from the exhibition, previously introduced to the group in a virtual guided tour, were

12   See Alessandro Duranti, "Narrating the Political Self in a Campaign for US Congress," in *Linguistic Anthropology: A Reader*, ed. Alessandra Duranti (Oxford: Willey-Blackwell, 2009), 245–271.

13   "Make and Share Stories – PORe Workshops Pilot," May 20, 2021, https://beyond-heritage.aalto.fi/pore-workshops-pilot/.

used as anchor points through which to launch narrative cycles, enabling participants to project their own experience onto the heritage and share insights from these encounters. Designed by Díaz-Kommonen, the main co-creative task carried out by participants was the collaborative creation of a story in space. Dialogue between participants was encouraged through the employment of autoethnography—connecting to personal experiences—followed by duoethnography—the collaborative juxtaposition of personal experiences. Particpants engaged with the task using a set of pre-designed 3D artboards.
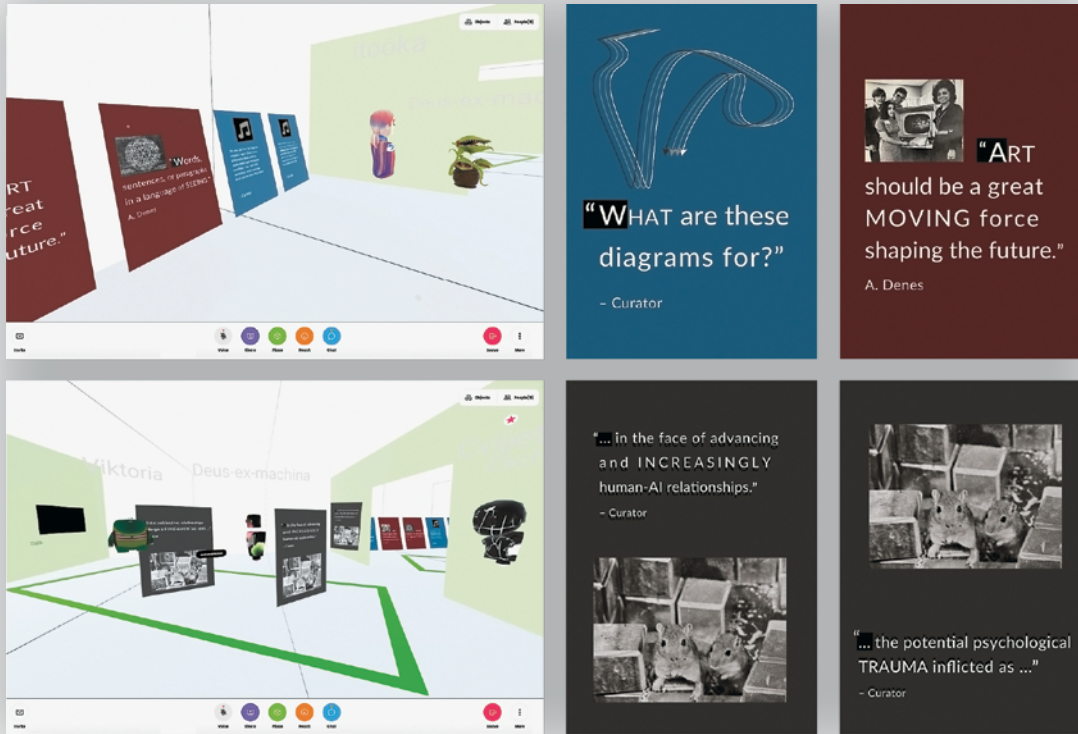
Figs. 3–8
The "Make and Share Stories" workshop. Top row: A set of 3D artboards augmenting the work *Dialectic Triangulation, A Visual Philosophy* by Agnes Denes (1970). Bottom row: A set of 3D artboards augmenting the work *Spiritual Reality* by Lou Cantor (2017). Artboard design and images: Lily Díaz-Kommonen.

Each artboard provided additional information, affording further contextualization of the works. For example, information and images gathered by Díaz-Kommonen from the catalog for a 1970 exhibition titled *Software*[14] was used to augment two artists' works: Agnes Denes' *Dialectical Triangulation: A Visual Philosophy* (1968–83) and Lou Cantor's *Spiritual Reality (It is all in your head)* (2019). Creative attributes such as clickable icons triggering audio of the curators' tour guide were used to extend the experiential capacity of the artboards. Participants could select from the artboards and place them in an order that made sense from their point of view, adding their own perceptions, feelings, and thoughts as texts or as pictures taken by a virtual camera tool available in Mozilla Hubs. The story was finalized by adding a title, which provided a frame through which it could be read. Observation, video recordings of the activities in the staged 3D environment, and discussions with participants served as qualitative inputs to reflect on the process and learn more about their experiences.[15]

14   See *Software – Information Technology: Its New Meaning for Art* (New York: Jewish Museum, 1970).

15   This case study is discussed in detail in the article Cvijeta Miljak and Lily Díaz-Kommonen, "Immersive Participatory Experiments in Sharing Knowledge for Cultural Heritage," *Acoustic Space Journal* 19, no. 4 (2022): n. p.

PORe Workshop: "Avatars and Poetry"

Designed by Miljak, "Avatars and Poetry" is a second workshop model conducted at three venues of the traveling exhibition *Matter. Non-Matter. Anti-Matter*: Aalto University, the Design Museum Helsinki, and Oodi Helsinki Central Library.

The workshop started with participants engaging hands-on with the interactive exhibition models on *The Immaterial Display*. The working material was taken from the catalogs of the two past exhibitions, *Les Immatériaux* and *Iconoclash*. While the content for *Les Immatériaux* comprised copies of pages containing pictures and text from two parts of the catalog, *Inventaire* and *Epreuves d'écriture*, the material on *Iconoclash* consisted of individual images and words from the exhibition catalog. A group of words depicting concepts related to presence and enchantment and deemed relevant to the PORe explorations were added. After spending some time with the interactive reconstructions, participants were invited to engage with the working materials in pairs. In dialogue with each other and their embodied actions, each pair negotiated remediations of these visual and verbal materials and collaboratively composed a collage mask and a poem. The creation process for the poem was inspired by the traditional Japanese collaborative genre of renga, whereby different poets alternately compose sections, producing a rhythmic dialogue. The mask collages were successively assembled into 3D avatar faces, and the poems were performed and recorded as avatar-performed live-animation video-poems. A live animation was created through bodily performance, utilizing interactive augmented reality effects called "lenses" prepared for the participants in the Lens Studio, accessible through the social media platform Snapchat. In the final part of the workshop, these multimodal exhibition commentaries—visual, verbal, and performative hybrids—were screened and shared with the group to elicit a discussion on the perspectives that emerged from engaging with the heritage, technology, and taking part in the artistic co-creative activities.

Figs. 9–12
The "Avatars and Poetry" workshop. a) Using material from the exhibitions: images from *Iconoclash* and *Les Immatériaux*. b) Participants create poems using words from the catalogs c) Participants perform and record poems using a mobile phone. d) Moments of reflection and interpretation.

Discussion and Future Developments

One of the main hurdles to the development of the PORe method relates to the improvisational aspects and the unstructured data which results from the sessions. To meet this challenge, we are beginning to use semantic tools for organizing and processing the data gathered. An example is our use of textual analysis through Quanteda, a subset software of the R-Studio programming environment. After the selected audio recordings from the workshops are converted to text, a corpus is created using this tool. Transforming the textual materials into a corpus organizes the documents into a unit without altering them. The corpus is further processed to create a document-feature matrix (dfm) whereby all elements are arranged into rows (the original texts) and columns (the features of the text). This allows us to extract meaning from the speech

data. For example, we can perform content analysis across multiple sessions where the most discussed terms are displayed in the context in which they occurred. Relationships between concepts used in the speech and the contexts in which they were spoken can be approximated using traditional visualization formats.[16]

This work has prompted deep reflection on how language colors human creativity and understandings of the world. It has also enabled us to note some differences between research and design thinking. Whereas the former is more concerned with axiology[17] and epistemology,[18] the latter focuses on the precise framing of a problem while considering ethical and human-centered aspects to achieve preferred situations.

16   See "A Beginner's Guide to Text Analysis with Quanteda," https://data.library.virginia.edu/a-beginners-guide-to-text-analysis-with-quanteda/, accessed April 26, 2023.

17   Axiology refers to "the study of the nature, types, and criteria of values and of value judgments especially in ethics," according to the *Merriam-Webster Dictionary*, https://www.merriam-webster.com/dictionary/axiology, accessed April 26, 2023. An example of axiology of relevance to PORe research is how diverse research paradigms influence the way data is collected. The approach to data collection within PORe is essentially pragmatic and interpretive.

18   See Hillary Collins, *Creative Research: The Theory and Practice of Research for the Creative Industries* (Lausanne: Ava Books, 2010), 91–93.

VISITOR EXPERIENCES IN A HYBRID SPACE.
A Mixed Method Study on the Use of Digital Media Technologies

Krischan Ditsch, Sebastian Klein, Simon Schneebiegl, and Felix Koberstein

The following text draws on the evaluation conducted in the framework of the exhibition Matter. Non-Matter. Anti-Matter at ZKM│Center for Art and Media Karlsruhe in collaboration with GIM│Gesellschaft für Innovative Marktforschung.

The advent of digital media as a means of knowledge mediation and generation in cultural education necessitates an expansion of the museum concept. In a hybrid museum, digital technologies extend the physical ↘ exhibition space into the digital realm, making it accessible to cultural education work taking place on multiple levels. In expanding or reconstituting the museum space, digital techniques create new avenues for mediating, presenting, and archiving artworks,

Fig. 1
A visitor filling out the survey in the exhibition *Matter. Non-Matter. Anti-Matter* at ZKM│Karlsruhe.

exhibits, and entire exhibition constellations. To integrate digital applications we need interactive devices, so-called human computer interfaces (HCI), which in turn need a certain level of competence in interacting with various end devices and technologies.

This understanding fed into the exhibition *Matter. Non-Matter. Anti-Matter*, on display at ZKM | Karlsruhe from December 2022 to April 2023 as part of the research project Beyond Matter. The exhibition was based on an art-historical examination of two past exhibitions, *Iconoclash* (2002, ZKM) and *Les Immatériaux* (1985, Centre Pompidou), which were brought back to life in digital space. As key parts of the exhibition, digital models of *Iconoclash* and *Les Immatériaux* were made accessible through a custom-built hardware interface, *The Immaterial Display*, consisting of a display module and a control module. Its large, curved display offered users an immersive experience, while screens on either side allowed onlookers to follow along. The control module was based on the Vitra Physix conference chair and equipped with motion sensors and a handheld controller. Its sensors give users control over the direction of their gaze and movements as they navigated the digital exhibition space. The handheld controller, like an air mouse with an added control pad, scroll wheel, and additional buttons, was used for interactive inputs such as opening menus and accessing information overlays. Like other spatial digital technologies such as augmented reality or virtual reality, this type of installation leverages the cognitive phenomena of immersion and embodiment to bridge the perceived gap between physical situatedness and the digital environment. Digital space becomes almost tangible, feeling like part of lived reality. In the museum context, this can be considered a form of hybrid museum experience.

Surveys investigating the use and usefulness of digital media technologies in the museum are scarce, especially in the German-speaking world,[1] so this text should provide novel insights into the field.

Evaluation Automatons and UX Go-Alongs

Visitor experiences in the hybrid museum were documented in an extensive evaluation process. To gain a holistic understanding of its reception, a research project combining quantitative and qualitative paradigms was set up with the market research institute GIM. The quantitative research consisted of a three-part standardized quantitative survey installed on-site "evaluation automatons"—openly accessible touchscreens for visitors to fill out surveys on their own. To avoid distorting visitors' impressions and experiences as much as possible, no human interviewers were involved. The three survey parts reflected the structure of the exhibition, as each focused on visitors' interactions with the digital exhibits in one of the exhibition areas. Initial insights from the surveys were used to develop the qualitative research, conducted as go-along interviews aimed at generating deeper insights into the user experience (UX). Subjects were recruited to visit the exhibition *Matter. Non-Matter. Anti-Matter* accompanied by briefed researchers, who used a qualitative interview guide to analyze UX and ask about underlying patterns, thoughts, and motivations. The combination of quantitative and qualitative results enabled us to draw conclusions suitable for statistical generalizations, but also understand underlying behaviors.

The results of this study are presented here, with the intention of documenting visitors' immediate experiences as well as exploring the potentials, limitations, and opportunities for further development of the hybrid museum.

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1   As one of the few qualitative surveys on the use of museum apps in German museums conducted before the Covid-19 pandemic, a 2017 study by the Institute for Museum Research bears mentioning: Anette Noschka-Roos and Lorenz Kampschulte, "Digitales Medium und analoge Ausstellung. Zur Analyse von Museums-Apps aus besucher:innenorientierter Perspektive," *Materialien aus dem Institut für Museumsforschung*, no. 74 (2020), https://www.smb.museum/fileadmin/website/Institute/Institut_fuer_Museumsforschung/ Publikationen/Materialien/mat74.pdf. The study includes and English summary on 38–39.

Evaluating the Hybrid Museum

Sample Structure

A total of 164 visitors filled out the first part of the quantitative survey, which focused on their experience with *The Immaterial Display*. In terms of sociodemographic markers, a broadly diverse sample was achieved (see fig. 2).

Age

14–25 years	35
26–39 years	27
40+ years	37

⌀ Avg. 37.1 years

Place of living

In Karlsruhe	28
In Baden-Württemberg	36
In Germany	25
In the EU	2
Outside the EU	5
No response	4

Gender

Female	46
Male	43
Other	11

Income

Less than €1,000	2
€1,000 up to €2,000	13
€2,000 up to € 3,000	21
€3,000 up to € 5,000	40
€5,000 up to € 7,000	24
€7,000 or more	5
No response	10

Base: Total, N=164, in %

Fig. 2
The sociodemographic composition of the sample.

The sample was also heterogeneous in terms of familiarity with exhibitions and art, as well as digital affinity. Of the respondents, 43% visit art exhibitions rarely (one or two times per year), 32% do so between three and two times per year, and 16% visited more than ten art exhibitions per year; 21% had dealt with art in some professional capacity. More than 40% stated that they have a strong or very strong interest in digital topics such as video games (51%), augmented reality (45%), and virtual reality (47%). The subsequent parts of the survey were filled out by 119 (part two) and 105 visitors (part three) respectively.

While the quantitative part of the evaluation used a random sample of museum visitors, the participants for the qualitative part were selected according to methodical criteria. For the six UX go-alongs, it was decided that half the participants should visit cultural institutions such as museums, art exhibitions, galleries, theaters, or operas once every 6 months or less, while the other half should state a higher rate of visiting cultural institutions. A balanced sample was sought in terms of sociodemographic criteria such as age and gender.
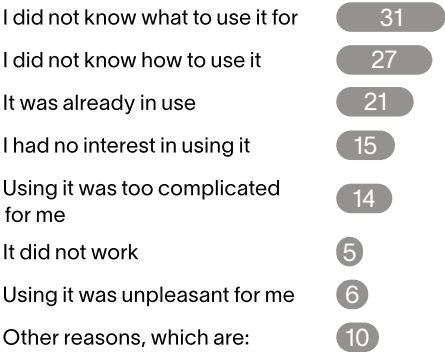
Results

The Immaterial Display was used by 45% of survey participants, of whom 37% viewed the digital exhibition *Iconoclash*, 9% viewed *Les Immatériaux*, and 54% moved through the digital space of both exhibitions. The time spent in the digital exhibitions varied between fewer than five minutes (35%), five to ten minutes (22%), and more than ten minutes (33%). Visitors who did not use *The Immaterial Display* gave a variety of reasons, most commonly a lack of clarity about its purpose (31%) or how to use it (27%). In some cases the display was already in use, preventing the respondent from interacting with it (20%). Only 14% of visitors stated a general lack of interest in using it. In the qualitative UX go-alongs, a majority of visitors actively approached *The Immaterial Display* (see fig. 3).

Did you use *The Immaterial Display*

No ⬤ 49   Yes ⬤ 51

Reasons for not using it

I did not know what to use it for ⬤ 31

I did not know how to use it ⬤ 27

It was already in use ⬤ 21

I had no interest in using it ⬤ 15

Using it was too complicated
for me ⬤ 14

It did not work ⬤ 5

Using it was unpleasant for me ⬤ 6

Other reasons, which are: ⬤ 10

Exhibition models viewed

Iconoclash ⬤ 37

Les Immatériaux ⬤ 15

Both ⬤ 48

Duration of use

< 5 min. ⬤ 33

5–10 min. ⬤ 29

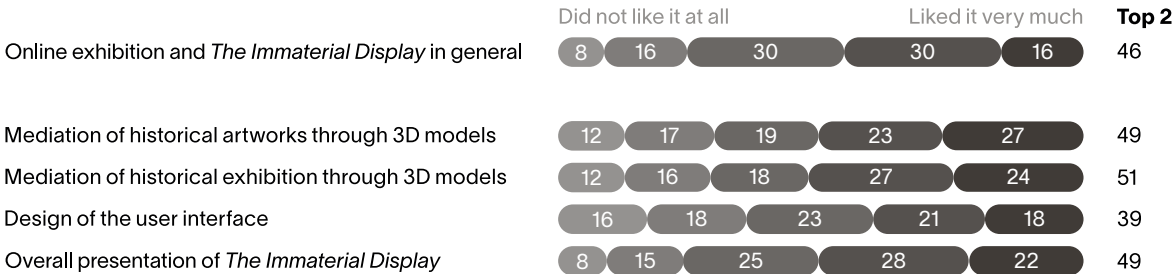>10 min. ⬤ 25

I don't know ⬤ 13

Base: Total, N=164, in %

The overall experience of interacting with the digital exhibitions via *The Immaterial Display* was rated as average with a slight positive tendency. Visitors were asked to rate their experience on a five-point Likert scale from "1: did not like it at all" to "5: liked it very much." While 46% of respondents who used *The Immaterial Display* stated that they enjoyed the overall experience (top two ratings[2]), 24% rated the experience negatively (bottom two ratings) and 30% gave a neutral rating.

In terms of visual appeal, the overall presentation of *The Immaterial Display* (top two: 49%), the 3D models of the exhibitions (top two: 49%), and the artworks (top two: 51%) were more convincing than the user interface design. Only 39% rated the user interface positively, while 34% stated that they did not like it or did not like it at all (see fig. 4).

How did you like the following aspects?

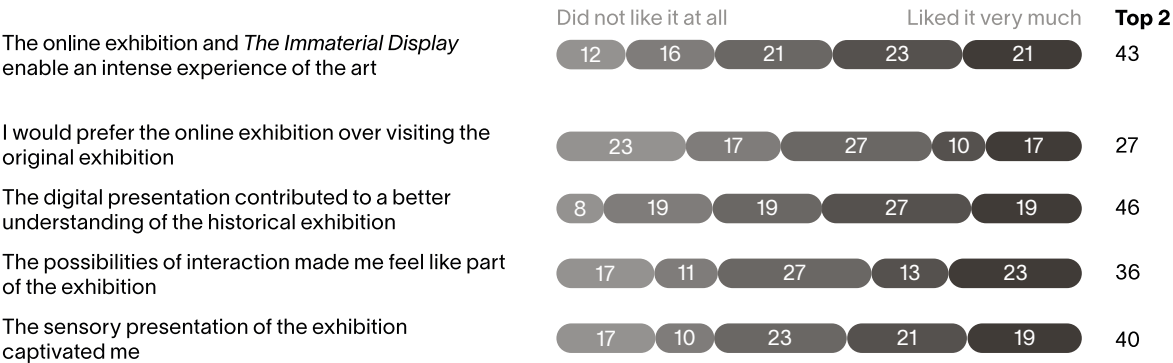|	Did not like it at all				Liked it very much	**Top 2**
Online exhibition and *The Immaterial Display* in general	8	16	30	30	16	46
Mediation of historical artworks through 3D models	12	17	19	23	27	49
Mediation of historical exhibition through 3D models	12	16	18	27	24	51
Design of the user interface	16	18	23	21	18	39
Overall presentation of *The Immaterial Display*	8	15	25	28	22	49

Base: Total, N=83, in %

Feedback was mixed on individual experiences with *The Immaterial Display* and the digitally presented exhibitions. All in all, they enabled an intense art experience (top two: 43%) and contributed to a better understanding of the historical exhibitions (top two: 46%). However, the digital exhibitions were typically not preferred over the original exhibitions (top two: 26%) and only partially managed to captivate visitors (top two: 40%) (see fig. 5).

One of the main causes for this may have been the controls, which were the most criticized aspect despite being generally perceived as a novel experience (top two: 41%) and the fact

2   The "top two" score is the percentage of respondents who selected either of the two positive options
     on the 5-point Likert scale. It is calculated by adding up the percentage of the respective scale points.
     Correspondingly, the bottom two scale points can be combined to reflect the sum of negative responses.

How did you like the following aspects?

	Did not like it at all				Liked it very much	**Top 2**

The online exhibition and *The Immaterial Display* enable an intense experience of the art
12 · 16 · 21 · 23 · 21 — 43

I would prefer the online exhibition over visiting the original exhibition
23 · 17 · 27 · 10 · 17 — 27

The digital presentation contributed to a better understanding of the historical exhibition
8 · 19 · 19 · 27 · 19 — 46

The possibilities of interaction made me feel like part of the exhibition
17 · 11 · 27 · 13 · 23 — 36

The sensory presentation of the exhibition captivated me
17 · 10 · 23 · 21 · 19 — 40

Base: Total, N=83, in %

Fig. 5
The Immaterial Display: detailed evaluation of the experience.

that 42% of users enjoyed watching other people's journeys through the digitally resurrected exhibitions. Only a minority perceived them as intuitive (top two: 39%) or easy to learn (top two: 36%), and there were issues with orientation in the digital space. Responding to the statement "Orientation in the online exhibitions was easy," 35% agreed or fully agreed while 31% somewhat or fully disagreed.

The qualitative UX go-alongs also confirmed that problems with the controls in particular were a barrier to stronger or more intense experience of the digital space. Certain control elements and explanations being too small or unobtrusive led to visitors failing to position the camera accordingly or move through the digital exhibition at all.
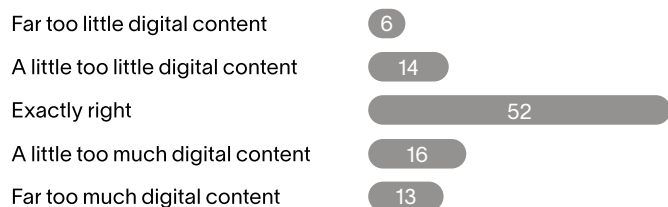
> I put my hand on the joystick and nothing happened. Is it broken? Then I moved on.

The lack of intuitive access often led to a trial-and-error approach to interacting with *The Immaterial Display*, which required so much attention that the reception of the exhibitions and artworks was overshadowed by dealing with the controls. This led to a limited immersion in the digital spaces of art mediation.

Beyond *The Immaterial Display*, the UX go-alongs showed that the structure of *Matter. Non-Matter. Anti-Matter* occasionally hindered its conceptual accessibility. On the one hand, visitors appreciated the freedom with which they could explore the exhibition and the resulting degree of individuality in their visit.

On the other hand, the exhibition structure was not always apparent, and it was not always clear which exhibits were available for further interaction. The online exhibition brochure was only used by 28% of respondents.

> If there were a pre-determined path, it would just be like floating along, this way you have the freedom to pick your own path, which makes the experience more personal.

How do you rate the proportion of digital content in this exhibition?

Fig. 6
Beyond Matter: rating
the amount of digital
content.

Far too little digital content	6
A little too little digital content	14
Exactly right	52
A little too much digital content	16
Far too much digital content	13

Base: Total, N=104, in %

Generally, the integration of digital and analog art was perceived positively. Visitors found it exciting, unusual, and rich in variety.

It's an awesome new experience.

However, we learned that a good balance between physical and digital content must be struck to create a harmonious and meaningful overall structure. Only 31% of respondents stated they would welcome the possibility of viewing parts of an exhibition online in advance, while 43% would not. In the qualitative UX go-alongs too, a majority rejected the concept of a purely online exhibition. In Beyond Matter, the proportion of digital to analog content seemed well-balanced: 52% rated it as just right, 19% rated the share of digital content as slightly or much too small, and 29% stated that it was slightly or strongly overrepresented (see fig. 6).

Summary

The evaluation provided fairly differentiated results. The integration of digital and analog content was found to be convincing, and the ratio of the two was mostly considered well-balanced. The various exhibits invited interaction, and the open structure of *Matter. Non-Matter. Anti-Matter* offered a great degree of flexibility, making for a varied and personal experience. While the exhibition's spatial openness was appreciated, its conceptual and artistic openness and certain language barriers created moments of disorientation. Its reception would have benefitted from clearer guidelines and additional information on the individual artworks. To this end, the online brochure could have featured more prominently, or its contents could be provided more directly, e.g., in the form of physical signage.

The Immaterial Display as a core element of *Matter. Non-Matter. Anti-Matter* and central interface between the physical and digital exhibition spaces was rated positively overall, and its presentation and mediation of the 3D models of the historical exhibitions and artworks were well-received. In the context of the exhibition, however, it was not always apparent how or why to use it, and the complex controls could hinder a broad generation and transfer of knowledge.

Is the Hybrid Museum a Failure?

Nothing could be further from the truth! The concept of the hybrid museum is appealing. Expanding physical spaces into the digital realm creates a special art experience, fosters curiosity, and invites visitors to explore and experiment, enabling an entirely new, often highly personal avenue in cultural education. Reconceptualizing the museum leads to a new form of art reception

by creating an immersive and participatory experience using interactive digital elements. Interplay between digital and analog dimensions is especially appreciated, so the hybrid museum requires a delicate balancing of the two. An excessive proportion of digital art poses a risk to hybridity, and a solely digital exhibition would be less appealing.

Particularly against the background of the museum's conceptually successful reimagining, the variated results of the evaluation might seem astonishing—but only at first glance. In terms of content and overall concept, the ideal conditions were somewhat hampered by the technical implementation. Two areas for further development can be identified for *Matter. Non-Matter. Anti-Matter*, and these could also be decisive for related future initiatives:

1) Freedom vs. orientation:
Both the quantitative and qualitative results suggest a certain ambivalence in this respect. The exhibition's openness invited visitors to actively experience digital technologies, generating an emancipatory momentum in individual journeys, and visitors generally appreciated this. The flipside however was a certain disorientation, at times manifesting in usage barriers—especially for *The Immaterial Display*. One approach to resolving this ambivalence would be to maintain spatial openness while establishing stronger conceptual guidelines that would provide orientation around concrete interaction with the physical interfaces of the expanded digital space and reduce usage barriers.

2) Technological complexity:
For *The Immaterial Display* and interaction with the digital exhibitions in particular, a more immersive experience of digital art was limited by the necessary complexity of the controls and diverse degrees of media competence among visitors. A lack of intuitiveness and learnability when it came to the controls meant that some visitors dealt primarily with the technology itself than with the digital exhibitions. This hindered access and the active experience inherent to idea of the hybrid museum. To further develop the new museum concept, the results of this study suggest moving the focus away from the technical interface and its usability to make room for active experience and broader access to knowledge. Technical implementation should provide an impetus for interaction without getting in the way of that interaction.

Matter. Non-Matter. Anti-Matter rethought and expanded existing museum concepts through the hybrid experience it created. Its combination of analog and digital content opened up new opportunities for knowledge transfer and cultural reception, such as revisiting past and future exhibitions. Acting as a kind of living laboratory within the practice-based research project Beyond Matter, the exhibition not only offered an update of established museum concepts, but also provided valuable impetus for future developments in the hybrid museum by way of this holistic examination of its reception.

Translated from the German by Dan Lawler.

WITHIN BEYOND

Esteban Gutiérrez-Jiménez

[T]he Immatériaux team [...] was more like a mind with seven heads elaborating the anamnesis of its themes: material, art, science and matter, body, space-time, and what "to exhibit" means. [...]

An indeterminate form, conceptually elusive, towards which only sentiment, when interrogated, spied upon (this is the anamnesis), purged, cleansed of interests fantastic and otherwise, can lead the way, by revealing which means will fail to translate it.

Jean-François Lyotard[1]

During the autumn of 2022, Beyond Matter's research team at ZKM | Center for Art and Media Karlsruhe was moving full steam ahead with the production of *Matter. Non-Matter. Anti-Matter. Past Exhibitions as Digital Experiences* (see fig. 1). The exhibition was one of the most significant outcomes of a four-year research project on the potential of digital technologies for the development of hybrid museum experiences. Presented on ZKM's atrium 1 and 2, the hybrid exhibition linked historical objects of art, digital artworks, immersive ⬂ virtual reality experiences, and digital models of past exhibitions.

Fig. 1
Mounting of the exhibition *Matter. Non-Matter. Anti-Matter*. ZKM | Karlsruhe, November 2022.

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1   Jean-François Lyotard, "On a Collaboration/D'un travail" (1986), in Les Immatériaux Research. Working Paper No. 6, ed. Andreas Broeckmann, 2021, http://les-immateriaux.net/wp-content/uploads/2020/12/LIR-WP6_Lyotard_On_a_Collaboration_1986_2020.pdf, 5.

For more than six weeks, I was invited to follow the production process, participate in team conversations, and see through the cracks of this high-level institution. I was able to interview all the participants and explore their individual approaches to digitality and creative research; to participate in technological device testing, always problematic and stressful; and to recognize the complex relations between institutions, projects, and individuals that define in great measure any project outcomes that make their way into the public sphere.[2]

That rare opportunity to witness the usually hermetic activity of exhibition production informs this text, which puts forward the possibility of the existence of multiple virtual exhibitions—or notions of what an exhibition is—within the apparent oneness of the exhibition in question. Similar to Jean-François Lyotard's characterization of "collaborative work"[3] during the curatorial investigation of *Les Immatériaux* in 1985, the practice-based research behind *Matter. Non-Matter. Anti-Matter* was a mind with several heads exploring the fast-approaching future of museums.

A Matter of Convergence

Even if the products of a project show a single vision, looking at it from the inside shows many different points of view. As a starting point, in 2018 ZKM posed a question that echoed in various ways within the art community: how can our field deal with computer-generated spaces for the purpose of art mediation and curation? The interinstitutional and multidisciplinary proposal for Beyond Matter became a hub for a dynamic process of knowledge production that involved people from different academic fields and institutions with diverse communication interests. As a community they also had to deal with the social and institutional problems caused by the pandemic, which made the project grow and change.

Among the partner institutions, the investigation process around the central inquiry generated a multiplicity of approaches to engaging with digital media, computer-generated spaces, or the internet: the Centre Pompidou in Paris was interested in creating a virtual exhibition based on an exhibition from almost forty years ago; the Ludwig Museum in Budapest had in mind a symposium that would engage with the thematic of the hybrid museum experience, and planned to organize an exhibition both physical and digital; the Tallinn Art Hall wanted to engage with the political implications of immersive digital technologies and to set up an exhibition around that issue; the Tirana Art Lab planned to organize residencies and work with artists, giving them an opportunity to explore virtual reality, and to document interventions in Tirana's public space over the past twenty years; and the Aalto University in Helsinki decided to develop a student exchange program and a series of workshops. This brief summing-up shows how manifold this project was, and the very different facets and layers from which its community came together in the creation of computer-generated spaces. ZKM collaborated on almost all the activities, researched the archive of its 2002 *Iconoclash* exhibition, led the development of the exhibition models and the hardware for displaying them in exhibition spaces (see fig. 2), set up the project's online platform, and published this edited volume on the project. Beyond Matter was envisioned an innovative and exploratory study on issues that would become increasingly important over the following ten years, but the Covid-19 crisis reshaped the cultural landscape and the project in ways not yet fully understood. As those cultural institutions which were put on

2   Video interviews were conducted by the author with the Beyond Matter team members Aurora Bertoli (November 8 and 24, 2022), Felix Koberstein (November 10 and 30, 2022), Moritz Konrad (November 7 and 28, 2022), Lívia Nolasco-Rózsás (November 30, 2022), and Marianne Schädler (November 4 and 23, 2022).

3   See the whole text of Lyotard's, "On a Collaboration/D'un travail" (1986), in *Les Immatériaux Research. Working Paper No. 6*, ed. Andreas Broeckmann, 2021, http://les-immateriaux.net/wp-content/uploads/2020/12/LIRWP6_Lyotard_On_a_Collaboration_1986_2020.pdf, 5–6.

hold for almost a year in 2020 reacted in different ways to the isolation politics around the world, it became clear that the ideas behind Beyond Matter needed to be implemented immediately in the art exhibition sphere. At the end of 2022, Lívia Nolasco-Rózsás, head of the project, told me about the past three years:

> Digital exhibition solutions are growing like mushrooms in the autumn forest. During the year 2020, there was an absolute cacophony of different technologies that were implemented within a few weeks or months around museums and exhibition venues that didn't have anything to do with digital technologies beforehand.
>
> The lockdown showed that the digitization of museums meets a need not only of the museums themselves but also a demand from their audiences. On the institutional side, the need to find new ways of mediation, distribution, and accessibility; and on the public side, the demand for relevant cultural and aesthetic experiences within contemporary digital culture. It revealed a gap in the online landscape that needed to be filled by cultural education and leisure activities, and that it was a mistake to separate museums from the larger social context and deny their relevance to social well-being.
>
> The convergence of human structures into digital infrastructure and an informational framework invites the cultural sphere to engage in critical participation in the process and to design non-corporative experiences for the digital age. All these viewpoints and possibilities manifest in *Matter. Non-Matter. Anti-Matter*, which connects past and future exhibitions, physical and virtual realities, and traditional and experimental museographic devices under one hybrid experience.[4]

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4   Lívia Nolasco-Rózsás, head of the Beyond Matter project, in a video interview with the author, November 30, 2022.
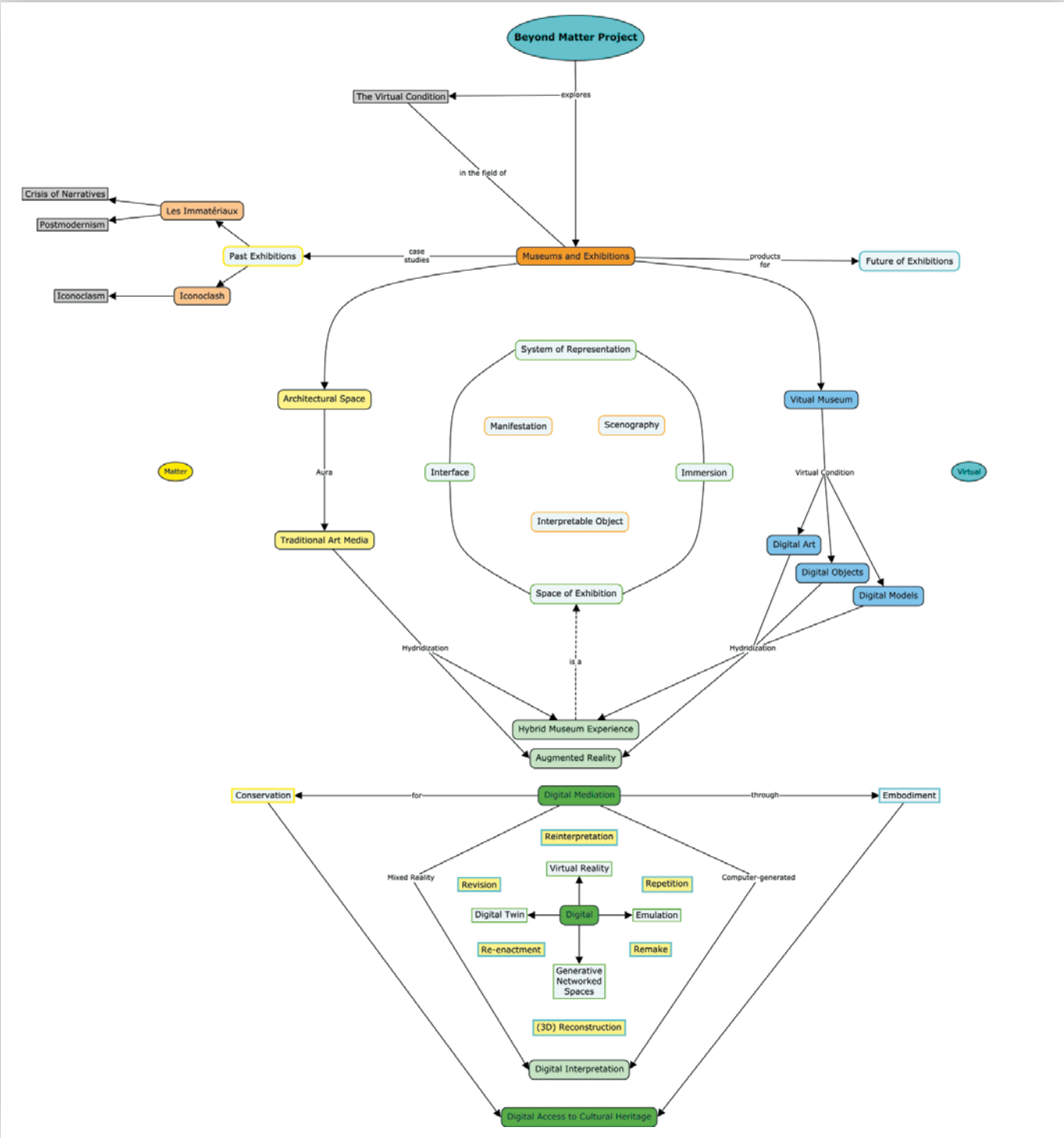
Fig. 3
The conceptual framing of the Beyond Matter project shown as a map.

Dynamic Roles in Growing Research

The Beyond Matter project team was an ever-growing net of researchers from around the world, intertwined through multiple moments of investigation and product development. During the winter of 2022, the team engaged with exhibition production for several months to set up a scenography linking historical cultural artifacts, digital artworks, avant-garde museographic perspectives, and digital models of landmark exhibitions from the past. Using an open conversation method, team members from diverse disciplines collaborated to continuously review the project's conceptual framing and outcomes (see fig. 3). They made several exhibitions, wrote critical and curatorial texts, added to a conceptual glossary, and shared the results of the project through academic channels and social media, among various other activities.

Figs. 4 and 5
Beyond Matter team during the mounting of the exhibition *Matter. Non-Matter. Anti-Matter*. ZKM | Karlsruhe, November 2022.

Even though every member of the group was responsible for a distinct aspect of the project, their open conversation evolved into an iterative design process until the final version of *Matter. Non-Matter. Anti-Matter* was ready to present to the public. This open discussion methodology was described by one member as an efficient way to continually return to the

project's fundamental ideas and the questions at their core. She found it gave her the opportunity to pose inquiries that, despite their apparent simplicity, contributed to forming a robust discussion among the group and developing effective methods for conveying difficult concepts.[5] (See figs. 4 and 5)

The text production tasks greatly benefited from this collaborative process, in which everybody was involved in generating content for the online booklets, the exhibition wall texts, and this book. Another collective endeavor that evolved was a project-specific glossary describing the philosophical, technological, and artistic concepts of Beyond Matter's practice-based research: on the one hand, the project undertakes empirical studies of cultural heritage by designing digital exhibition models; on the other hand, it generates embodied experiences by creating experimental human-computer interfaces to navigate these digital reinterpretations.

The base research tasks were also cooperative, and saw as many as eight interns supporting the Beyond Matter team. The group dug through numerous unlabeled boxes filled with documents from the original *Iconoclash* investigation in the early 2000s. These materials were used to reconstruct the components of that exhibition: its floorplan, its accompanying program, its map of artworks, artwork descriptions, and other details involved in a large-scale exhibition.[6] This is how they built up a structured database that informs the digital model of *Iconoclash as a Digital Experience,* a variation of the original exhibition concept in virtual space.

The production of *Matter. Non-Matter. Anti-Matter* was a place for likewise dialogue. One team member remembered how the group smoothly decided the gray shades for the walls, the milky plexiglass for the labels, and other visual identity elements.[7] During the production stage, several people from elsewhere in Europe came to visit ZKM and add to the discussion. Some of the participating artists came to work on the final details of the artworks and their display; researchers from the Centre Pompidou joined the production team and handled the placement of some delicate

Fig. 6
The Beyond Matter team visits the Bio Design Lab at the Karlsruhe Academy of Arts and Design (HfG) during the exhibition's preproduction. HfG Karlsruhe, November 2022.

5   See Marianne Schädler, team member of Beyond Matter, in a video interview with the author, November 23, 2022.

6   See Felix Koberstein, team member of Beyond Matter, in a video interview with the author, November 10, 2022.

7   See Marianne Schädler, video interview.

artifacts from their collection; and the ZMK production team had a lot to say about the technical infrastructure put in place for the exhibition's very technological staging. Students from the Bio Design Lab at the neighboring university, Karlsruhe University of Arts and Design (HfG), were also invited to join the discussion by articulating some developments in biomaterials (see fig. 6).

This open dynamic was one of the strengths of the Beyond Matter project, allowing for the organic growth of its productions and activities while encouraging a constant revision of their conceptual grounding and communications. Its materialization still posed a huge challenge because it had to interconnect the investigation findings with the institutions' goals, the experimental designs with certain technical limitations, and all the other internal and external forces that constantly reshape such a project.

Conclusion: The Dynamic Dimension of the Museum

Matter. Non-Matter. Anti-Matter. Past Exhibitions as Digital Experiences was a temporal system of historical objects, both material and digital, displayed in a hybrid scenography that included physical space, virtual space, and the in-between. It was also a temporal system of ideas that brought together the conceptual framework of the original *Les Immatériaux* and *Iconoclash* exhibitions with a multiplicity of fluid lines of thought around the digitization of the museum experience. In its Karlsruhe and Paris versions, the show thus invited its public to reimagine the role of the museum in our ever-changing mixed reality.[8]

The exhibition skewed the linearity of time by pulling past events into the present, and enhanced that experience by exploiting the potential of contemporary technologies—fulfilling a dynamic dimension of the museum experience impossible in past exhibitions but likely to be reinforced in future museography. That is, a performative exhibition space that changes in response to individuals' interests and interactions, an exhibition in which space and context play an important role in our embodied experience of its contents and discourse, as envisioned by Boris Groys and the rest of the *Iconoclash* curatorial team in the original proposal for that exhibition.[9]

In conclusion, the Beyond Matter project has generated a continuum between the past and the future of museums as the community expanded its heritage knowledge through present technologies. The *Matter. Non-Matter. Anti-Matter* exhibition articulated the growth of the ideas seeded at the beginnings of the investigation and then nurtured by the experiences, thinking, and perceptions of a diverse group of people against the backdrop of an evolving mixed reality and the acceleration effect of the pandemic in 2020.

Circling back to Lyotard's thoughts on collaboration, observing the Beyond Matter research team showed me the atemporal connections between human experiences that give material substance to digital reality. Their open conversation approach mirrored sentiments Lyotard expressed two decades ago:

> That secret emotion when one of us brought to a meeting (as one brings a dream to the analyst) some new idea, some principle of exploration, a way of arranging things, a sketch for one of the sites or the discovery of some pertinent object. It could be a detail or an overall idea, since no one was particularly responsible for the thing as a whole.[10]

8   See Roy Ascott, "Planetary Technoetics: Art, Technology and Consciousness," *Leonardo* 37, no. 2 (2004): 111–16.

9   See Lívia Nolasco-Rózsás and Boris Groys in "Nostalgia in Reenactments – Online Talk with Boris Groys." November 16, 2020. https://www.youtube.com/watch?v=Zj48pv_PFIw.

10 Lyotard, "On a Collaboration," 5.

GENERATIVISM.
The Impact of Generative Models on Aesthetics and the Human Experience

Mauro Martino

In the year 2008, upon my arrival at the Massachusetts Institute of Technology in Cambridge, a resonating theme was capturing minds: the six Vs of Big Data—volume, velocity, variety, veracity, value, and variability. The six Vs foreshadowed a novel epoch of worldly comprehension. As a visiting scholar at Carlo Ratti's renowned Senseable City Lab, I embarked on an intellectual journey to explore the subtle dance between the digital and physical dimensions—through which our quotidian experiences are immersed in data, brought forth by the intricate web of technological systems that envelop us. From vibrant urban arteries to the farthest rural reaches of our planet, an unrelenting stream of georeferenced data, born of sources such as mobile phones, sensors, and cameras, embroiders a rich and multifaceted fabric upon our reality. This elaborate tableau unveils a window into the imperceptible forces sculpting our lives and the world we inhabit. Over the course of fifteen years, guided by the prism of this digital layer, I have endeavored to discern patterns that underpin our existence by illuminating the complex relationships between human activity, technology, and the environment.

In this essay, I try to explore how one of the most disruptive technologies, artificial intelligence, can alter our cognitive abilities and the entire ⬊ experience of virtual reality, and perhaps even reality itself. Specifically, I address the revolution brought about by generative models, which engage with us naturally and create synthetic images of great allure; these models extend our intellectual capacities and transform our aesthetic taste, leading us towards mathematical beauty—a quantifiable aesthetic. Generativism is contextualized within innovations in the field of deep learning, beginning with Warren McCulloch and Walter Pitts' mathematical model of neural networks, progressing through the perceptron, backpropagation, and the neocognitron, and culminating in long short-term memory (LSTM), convolutional neural networks (CNN), deep Q-networks (DQN), generative adversarial networks (GAN), residual neural networks (ResNets), visual geometry group (VGG) networks, transformers, contrastive language-image pre-training (CLIP), and latent diffusion models (LDMs). The essay concludes with examples showing how artificial intelligence is changing the creation of digital content, particularly in memory exploration.

The Technological Transformation of Our Cognitive Architecture

It is not just our societies but our very brains that are being changed by our choice to reveal, record, and display data using sophisticated technology and interaction techniques. For instance, a growing body of evidence suggests that the use of GPS services and other

navigation technologies may have a profound impact on our cognitive abilities. By embracing these technologies to explore our environments, we may be unwittingly surrendering a part of ourselves: our innate ability to navigate, to create mental maps and spatial representations of the world around us. Studies have shown that the use of GPS systems can lead to a decrease in hippocampus activity, a region of the brain intimately involved in the formation and retention of spatial memories. We may be relinquishing a vital part of our cognitive architecture in outsourcing the task of spatial awareness to machines and algorithms.[1]

To consider how GPS and other data-related technologies can fundamentally alter our perceptions of the world and ourselves, I turn to the works of Don Ihde and Bruno Latour, whose empirical approaches have challenged classical assumptions about the nature of technology. Ihde's postphenomenology and Latour's actor-network theory jointly offer a perspective that focuses on the dynamic relationship between technology and its users, rather than on the inherent features of the technology itself.[2] Postphenomenology posits that technological artifacts always mediate human experience, and that the way we perceive and understand the world is inherently influenced by technology. In this view, technology is not a hindrance to but a fundamental and inescapable aspect of our humanity. It is impossible to separate technology from human circumstances and practices, and vice versa. The human condition cannot be understood without considering the role of technology in mediating our experiences. According to Ihde, technology not only changes but extends us, transforming our sensory experience and shaping the way we perceive and interact with the world.

In recent years, big data has merged with big computation, giving rise to a tsunami of increasingly sophisticated deep neural networks, culminating in modern large language models (LLMs). Artificial intelligence chatbots will have more disruptive effects on our lives than GPS technology; they will lead to significant changes in our minds, perceptions, and interactions. Prior to the advent of GPS navigation systems, people had to rely on paper maps, memory, and their sense of direction to navigate through space, requiring a level of skill in understanding and interpreting maps, as well as some geographic knowledge for orientation. An increasing reliance on AI systems to make decisions, solve problems, and perform tasks that once required human abilities could result in a progressive atrophy of certain cognitive skills. Consider decision-making. In the past, people had to rely on their own and their community's cognitive abilities to analyze and evaluate options and make informed decisions on various subjects, from career choices to financial decisions. Because AI systems can analyze vast amounts of data and provide optimal solutions for various problems, surpassing human capabilities in many cases, people increasingly rely on artificial intelligence to make decisions and solve problems, rather than develop and use their own cognitive abilities. We may become less adept at critically evaluating information and making independent decisions as a result. In other words, cognitive abilities related to critical thinking, analysis, and evaluation of information could atrophy due to our growing dependence on AI.

AI could also have important consequences in the social sphere. For example, its widespread use within simulated virtual reality environments could change the way we perceive and attribute meaning to our experiences and social relationships. We may find ourselves in a world where experiences are designed to satisfy our primal desires and needs, leading to increased alienation from reality and a fragmentation of our sense of community and belonging. AI could help create more detailed and realistic virtual environments that accurately mirror the real world or create imaginary worlds with internal coherence and impeccable logic. As non-player characters (NPCs) in virtual reality experiences become more believable, with

1   Louisa Dahmani and Véronique D. Bohbot, "Habitual use of GPS negatively impacts spatial memory during self-guided navigation," *Nature Scientific Report*, April 14, 2020.

2   Don Ihde, *Bodies in Technology* (Minneapolis, MN: University of Minnesota Press, 2001); Bruno Latour, "On Actor-Network Theory: A Few Clarifications," *Soziale Welt* 47, no. 4 (1996): 369–81.

behaviors, emotions, and dialogues mirroring human interactions, virtual reality experiences will become even more engaging and immersive. AI could allow virtual reality experiences to adapt to users' individual preferences and needs, offering personalized experiences that take into account each person's abilities, interests, and desires. In the near future, it is not unlikely that a staggering eight billion bespoke virtual worlds will coexist, ingeniously crafted by intelligent systems to cater to the individual desires of each Earth's inhabitants. In this enthralling symphony of virtual realities, every person will have the opportunity to engage with others while remaining fully immersed in their own uniquely tailored virtual world.

Virual reality experiences may be regarded as the simulacra, in the sense used by Jean Baudrillard,[3] capable of providing an immersive experience that may be more appealing than physical reality itself. Individuals might find themselves increasingly tempted to spend more time within virtual worlds, leading to a state of hyperreality where demarcations between reality and simulation become blurred. AI could be perceived as a further progression towards this hyperreality, as machines increasingly emulate human intellect and social relations. For instance, chatbots and virtual assistants can simulate human conversations, crafting an illusion of social interaction that could potentially supplant, at least in part, genuine human connections.

It may be useful to consider the advice of Jaron Lanier in his book *Ten Arguments for Deleting Your Social Media Accounts Right Now* (2018),[4] which offers a bold and provocative analysis of the social and psychological

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3   Jean Baudrillard, *Simulacres et Simulation* (Paris: Éditions Galilée, 1981).

4   Jaron Lanier, *Ten Arguments for Deleting Your Social Media Accounts Right Now* (New York: Henry Holt and Co., 2018).

effects of social networks—the same tips could be used for virtual reality. Lanier argues that our obsession with social media makes us unhappy, divides us, and weakens our ability to think and create. According to Lanier, the internet has given rise to a culture of images that conflicts with the reality of our surroundings. Instead of living life directly, we live through a lens of images and stories carefully selected by algorithms and designed to keep us engaged. This has disconnected us from our bodies, our senses, and our physical environment, including the natural world. That detachment has in turn led to a significant shift in our aesthetic sensibility. Beauty is no longer found in the world around us but is constructed and mediated by technology. The images we see online have become the primary source of our aesthetic experience and shape our perception of what is beautiful and desirable. Our sense of beauty has become increasingly narrow and uniform, and our ability to appreciate the richness and variety of the world has diminished.

The Algorithmic Co-Author

If we substitute "electric technology" with "artificial intelligence" in the following Marshall McLuhan quote, we might apply his ideas to an analysis of the impact of AI technology on society:

> The medium, or process, of our time—electric technology—is reshaping and restructuring patterns of social interdependence and every aspect of our personal life. It is forcing us to reconsider and reevaluate practically every thought, every action, and every institution formerly taken for granted.[5]

Generative models, the most advanced products of AI research to date, change the way information is presented and interpreted, revolutionizing human communication and interaction with technology. By introducing new dynamics to communication, such as large-scale content generation and personalization of information based on user preferences, these models can be seen as an extension of human cognitive abilities. Indeed, they enable the creation of content and ideas that might otherwise be difficult to produce. As explained above, this extension may also lead to loss of autonomy in critical thinking, as John M. Culkin suggests: "We shape our tools and thereafter our tools shape us."[6] The widespread use of generative models influences our perception of reality and human relationships, blurring boundaries between reality and fiction, between authenticity and artifice, and between human interaction and AI interaction. It may result in cultural shifts such as new art forms, languages, and ways of thinking.

Postmodernism offers an array of theoretical and conceptual tools to analyze and define one of the most utilized generative technologies at present: the transformation of text into an image. Baudrillard developed the notion of "simulacrum" to describe the escalating replacement of reality with images and symbols. According to Baudrillard, simulacra are copies without originals, constructing an illusion of reality that eventually supplants it. Simulation is the process through which simulacra become more real than reality itself: "The simulacrum is never that which conceals the truth—it is the truth which conceals that there is none. The simulacrum is true."[7] Images generated through text-to-picture technology can be perceived as simulacra, as they do not necessarily represent an existing reality but rather create a hyperreality based on the input text. Let us pose a few inquiries: What is the essence of an image crafted through text? Can such an image capture all meanings conveyed by the text, apprehending the unspoken, the unwritten? What truly belongs to the text, and what is autonomously

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5   Marshall McLuhan, *The Medium is the Massage: An Inventory of Effects* (New York: Bantam Books, 1967), 8.

6   John M. Culkin, "A Schoolman's Guide to Marshall McLuhan," *The Saturday Review*, March 18, 1967, 51–51, 70–72.

7   Baudrillard, *Simulacres et Simulation*.

inserted by the generative model? To what extent does the created image belong to the author of the text?

Through Roland Barthes, we can explore two further salient features of text-to-picture. First, through the *anchorage* concept Barthes introduced in the essay "Rhetoric of the Image,"[8] we scrutinize the process by which text (e.g., captions or titles) assists in fixing or anchoring the meaning of an image, guiding the observer's interpretation. In text-to-picture the anchorage process is, in a sense, reversed. Instead of using text to guide the interpretation of an existing image, the text is employed as a starting point to generate an image. The algorithm "anchors" the text to a specific image, but the outcome may not precisely align with the intention of the text's author. This may result in heightened ambiguity in the image's interpretation by the observer, rendering the anchorage less effective in securing its meaning. Furthermore, the same phrase may generate an infinite variation of images, amplifying the ambiguity. Second, Barthes' "death of the author" concept posits that the meaning of a work is not determined by the author's intention but rather by the reader's interpretation. In text-to-picture, the author of the original text may lose control over the generated image's meaning and interpretation, as the latter is created by an algorithm and individually interpreted by each observer. An author may have a precise idea of what they are attempting to communicate when they craft a text, but when the text is used as input for an image-generating algorithm, the result may not correspond. The generated image is influenced by the algorithm and the data on which it was trained. We can call the algorithm a co-author, since it utilizes the information contained in the text to generate an image but does so based on knowledge it acquired during its training phase. The original text's author shares responsibility for the creation of the image with the algorithm, potentially resulting in a loss of control and increased ambiguity in the meaning of the generated image.

Generativism

Generative models can make information more accessible to a broader audience, facilitating translation, synthesis, and presentation of content more effectively. This can help reduce linguistic and cultural barriers while also creating challenges in terms of equity and access to quality information. The growing prevalence of generative models raises concerns about privacy and the security of personal information, as the generation of false or misleading content can undermine trust in information sources and jeopardize individual privacy. We need to make changes in education and training to prepare people to interact effectively and responsibly with these new technologies. Such changes may include teaching skills necessary to distinguish between accurate and misleading information and developing critical thinking and a solid ethics in the use of generative models.

On one hand, we witness a democratization of high-level intellectual consultancy services, as they become accessible at no cost. On the other, we observe the development of autonomous virtual twins, a synthetic humanity capable of replacing the virtual presence of real individuals. The most intriguing aspect of this concerns the cultural and philosophical changes we are experiencing. We are transitioning from dataism, which emphasizes the importance of data and information in shaping our understanding of the world and driving progress, to generativism, where generative models and synthetic information take center stage and inundate our lives. This proliferation of synthetic aesthetics derived from computation and algorithms that emulate training data creates significant changes in image consumption, aesthetics, and the concepts of beauty, art, and taste.

An early signal of this shift emerged in 1933, with the publication of George Birkhoff's *Aesthetic Measure*,[9] proposing a quantitative measure of an artwork's aesthetic quality based on the balance of its elements. Birkhoff

8   Roland Barthes, "The Rhetoric of The Image," *Communications* 4 (1964): 40–51.

9   George David Birkhoff, *Aesthetic Measure* (Cambridge, MA: Harvard University Press, 1933).

believed that such a balance was determined by the ratio of order and complexity. In his formula, $M = O/C$, M represents the aesthetic measure, O the order, and C the complexity. Order refers to the degree of symmetry, repetition, and simplicity in an artwork, while complexity denotes its diversity, irregularity, and intricacy. According to Birkhoff, an aesthetically pleasing artwork exhibits a high degree of order and low complexity, while a piece with high complexity and low order is less appealing. His aesthetic theory rested on the idea of mathematical beauty, which he regarded as universal and objective: an artwork's aesthetic value could be determined through rigorous scientific analysis of its elements, rather than subjective interpretation or personal taste.

Another example of an increasingly quantitative aesthetic taste emerges *Aesthetica*, a book by Max Bense, a German cybernetician and philosopher, published in 1954.[10] Bense's generative aesthetic theory aimed to quantify and rationalize the production and evaluation of art. He too maintained that aesthetic experience could be measured and produced predictably, thus eliminating subjectivity and conferring upon art the transparency and clarity of science. His approach to information aesthetics examined the numerical value of the aesthetic object, with an emphasis on physical concepts such as entropy, process, and co-reality. Bense combined ideas from Birkhoff's theory, Norbert Wiener's cybernetic theory,[11] Claude Shannon's information theory,[12] and Charles Sanders Peirce's semiotic theory[13] to provide a framework for understanding the aesthetic properties of information. His exploration of information aesthetics (nowadays, we might call it quantitative

aesthetics) was particularly prescient. He believed that information aesthetics was becoming increasingly important in a world where we process vast amounts of data every day. Indeed, as we continue to rely more and more on technology to process and analyze information, our aesthetic sensibilities are being shaped in unexpected ways.

These two books significantly had influenced my thinking about art and science when I met Lev Manovich in Riga, Latvia, in 2014 at the *Data Drift* exhibition he curated with Rasa Smite and Raitis Smits.[14] We discussed how digital technology has revolutionized the way we create, share, and consume art and images, giving rise to a series of artistic and creative movements such as digital art, generative art, and AI art. Today, computational aesthetics can develop new tools and methods for generating and understanding digital artistic content, as well as simulating, enhancing, and augmenting human creativity and artistic expression. According to Manovich, digital art represents a turning point in art history, as algorithms are employed to create dynamic, interactive, and continually evolving artworks: "If painting was the art of the classical era and photography that of the modern age, data visualization is the medium of our time."[15]

This new aesthetics utilizing data visualization techniques and generative models creates new forms of artistic expression that emphasize the beauty and complexity of data and AI models themselves. In the following section I delve into the origins of this momentous paradigm shift, examining the evolution of artificial neural networks while pondering the course they are charting.

10   Max Bense, *Aesthetica,* vol. 1–2 (Stuttgart: Deutsche Verlags-Anstalt, 1954).

11   Norbert Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine* (Cambridge, MA: MIT Press, 1948).

12   Claude E. Shannon and Warren Weaver, *The Mathematical Theory of Communication* (Urbana, IL: University of Illinois Press, 1998).

13   Charles Hartshorne, Paul Weiss, and Arthur W. Burks, eds., *Collected Papers of Charles Sanders Peirce* (Cambridge, MA: Harvard University Press, 1931–1935).

14   See Lev Manovich, *Cultural Analytics* (Cambridge, MA: MIT Press, 2020), and Rasa Smite, Lev Manovich and Raitis Smits, *Data Drift. Archiving Media and Data Art in the 21st Century* (Riga: RIXC, LiepU MPLab, 2015).

15   Text on the exhibition *Data Drift* (2015), http://rixc.org/en/home____/0/293/

The Deep Learning Revolution and the Path to a New Virtual Reality

In the annals of artificial intelligence, the year 2012 marked a turning point. A venerable group of researchers led by Geoffrey Hinton achieved a feat that had eluded scientists for many years.[16] They devised the first deep neural network to triumph in the ImageNet Large Scale Visual Recognition Challenge, a contest aimed at advancing the frontiers of computer vision and image recognition. ImageNet encompassed millions of images spanning 1000 eclectic categories, ranging from quotidian manmade objects to flora and fauna. For years, even the most sophisticated systems had labored in vain to get below a 25% error rate. Hinton's team at the University of Toronto struck gold with their convolutional neural network, named AlexNet, which slashed the error rate to an astonishing 15.3% and laid the foundation for innumerable deep neural networks that would follow in its footsteps.[17]

For eight decades, artificial intelligence has pulsated with the fervor of its proponents, with deep learning propelled by a maelstrom of groundbreaking trends and discoveries. Let me point you to the most momentous milestones in this captivating chronicle. It commenced in 1943 when Warren McCulloch and Walter Pitts conceived the inaugural mathematical model of a neural network, drawing inspiration from Alan Turing's "On Computable Numbers, With an Application to the Entscheidungsproblem" (1937).[18] In 1958, Frank Rosenblatt implemented the *perceptron*, propelling the discipline into a new epoch of investigation.[19] In 1974, Paul Werbos unveiled the backpropagation algorithm, a crucial keystone underpinning subsequent ingenuity.[20] In 1979, Kunihiko Fukushima fashioned the Neocognitron,[21] and six years later David H. Ackley, Hinton, and Terrence J. Sejnowski gave birth to the learning algorithm for Boltzmann machines and the autoencoder, a sublime synthesis of notions and hypotheses.[22] The waning years of the twentieth century bore witness to the genesis of the LSTM network by Sepp Hochreiter and Jürgen Schmidhuber,[23] followed by Yann LeCun's trailblazing introduction of convolutional neural networks (CNNs) in 1998.[24] In 2013, the DQN algorithm materialized in the paper "Playing Atari with Deep Reinforcement Learning" by Volodymyr Mnih and his team, attaining state-of-the-art performance on Atari 2600 games using only raw pixel input.[25] In 2014, Ian J. Goodfellow, Yoshua Bengio, and their collaborators unveiled generative adversarial networks (GAN), an acclaimed technique for generating lifelike images and other data manifestations that encapsulated the artistic

16   Alex Krizhevsky, Ilya Sutskever, and Geoffrey E. Hinton, "ImageNet Classification with Deep Convolutional Neural Networks," *NIPS* (2012): 1097–105.

17   Terrence J. Sejnowski, *The Deep Learning Revolution* (Cambridge, MA: The MIT Press, 2018).

18   Warren S. McCulloch and Walter Pitts, "A Logical Calculus of Ideas Immanent in Nervous Activity," *The Bulletin of Mathematical Biophysics* 5 (1943): 115–33.

19   Frank Rosenblatt, "The Perceptron: A Probabilistic Model for Information Storage and Organization in the Brain" *Psychological Review* 65, no. 6 (1958): 386–408.

20   Paul Werbos, *Beyond Regression: New Tools for Prediction and Analysis in the Behavioral Sciences* (Cambridge, MA: Harvard University Press, 1974).

21   Kunihiko Fukushima, "Neural Network Model for a Mechanism of Pattern Recognition Unaffected by Shift in Position – Neocognitron," *Trans. IECE* (October 1979).

22   David H. Ackley, Geoffrey E. Hinton, and Terrence J. Sejnowski, "A Learning Algorithm for Boltzmann Machines," *Cognitive Science* 9 (1985): 147–69.

23   Sepp Hochreiter and Jürgen Schmidhuber, "Long Short-Term Memory," *Neural Computation* 9, no. 8 (1997): 1735–80.

24   Yann LeCun, Léon Bottou, Yoshua Bengio, and Patrick Haffner, "Gradient-Based Learning Applied to Document Recognition," *Proceedings of the IEEE* 86, no. 11 (1998): 2278–324.

25   Volodymyr Mnih, Koray Kavukcuoglu, David Silver, Alexander Graves, Ioannis Antonoglou, Daan Wierstra, and Martin Riedmiller, "Playing Atari with Deep Reinforcement Learning," *NIPS* (2013).

quintessence of AI.[26] The year 2015 sparkled with both the debut of ResNet by Kaiming He and his team,[27] and of VGG architecture by Karen Simonyan and Andrew Zisserman, which achieved state-of-the-art performance on the ImageNet dataset.[28] The year 2017 saw the publication of "Attention Is All You Need" by Ashish Vaswani and his team,[29] presenting the transformer architecture model, which achieved state-of-the-art performance on an array of natural-language processing tasks. In 2021, OpenAI showcased the most influential AI model, CLIP, a multimodal, zero-shot wonder that predicts the most pertinent textual descriptions for any given image.[30] The next year, Robin Rombach and his team conceived Latent Diffusion Models, surpassing other state of the art generative models in terms of sample quality and reconstruction accuracy.[31] As we reach 2023, OpenAI's Generative Pre-Trained Transformer 4 emerges as a groundbreaking autoregressive language model.[32] Possessing unparalleled capacities, *ChatGPT-4* may well signify the inaugural early stage of general AI, marking an indispensable milestone in our pursuit of devising machines capable of genuinely understanding and interacting with the world in a manner akin to our own.

This breathtaking progress can be attributed to several major innovations and trends that have transformed deep neural network (DNN) models. Among these are the emergence of transformer models, which have revolutionized the field of natural language processing (NLP) and have been used to create state-of-the-art language models such as *ChatGPT*. Autoencoders, initially used for data compression and reconstruction, have also been used to create high-fidelity image-generation models. The rise of generative models such as GANs and variational autoencoders (VAE) have opened up new possibilities for creating and manipulating data, and have expanded the scope of what is possible with DNNs. Finally, diffusion models capable of capturing the essence of diverse synthetic data with effortless elegance solve the drawbacks of GANs. Their superior handling of noise ensures a vibrant array of images, imbued with rich diversity and unparalleled quality. Plunging into the captivating realm of generative modeling, we are greeted by diffusion models as pioneers of an artistic revolution. Giving rise to a myriad of opportunities, they establish the groundwork for unrivaled digital content, including vivid digital twins and enchanting virtual reality experiences.

Overcoming "mode collapse," in contrast to the instability of GAN models, diffusion models adroitly capture the variegated essence of data distribution. This is crucial for conjuring rich, diverse virtual images that enthrall users, inviting them to explore undiscovered digital territories. Thanks to their stability during training, diffusion models ensure constant and superior-quality content. The digital vistas they generate are not only aesthetically intriguing and innovative but also can serve as accurate reflections of reality with a unique hyperrealism. Equipped with the capacity to estimate likelihoods, these models empower creators to effortlessly appraise and compare generative procedures. They can select the most fitting models, leading to the realization

26   Ian Goodfellow, Jean Pouget-Abadie, Mehdi Mirza, Bing Xu, David Warde-Farley, Sherjil Ozair, Aaron Courville, and Yoshua Bengio, "Generative Adversarial Networks," *NIPS* (2014).

27   Kaiming He, Xiangyu Zhang, Shaoqing Ren, and Jian Sun, "Deep Residual Learning for Image Recognition," *CVPR* (2016).

28   Karen Simonyan and Andrew Zisserman, "Very Deep Convolutional Networks for Large-Scale Image Recognition," *International Conference on Learning Representations*, September 4, 2014.

29   Ashish Vaswani, Noam Shazeer, Niki Parmar, Jakob Uszkoreit, Llion Jones, Aidan N Gomez, Łukasz Kaiser, and Illia Polosukhin, "Attention Is All You Need," *NIPS* (2017).

30   Alec Radford, Jong Wook Kim, Chris Hallacy, Aditya Ramesh, Gabriel Goh, Sandhini Agarwal, Girish Sastry, Amanda Askell, Pamela Mishkin, Jack Clark, Gretchen Krueger, Ilya Sutskever, "Learning Transferable Visual Models From Natural Language Supervision," *Open AI*, January 5, 2021.

31   Robin Rombach, Andreas Blattmann, Dominik Lorenz, Patrick Esser, and Björn Ommer, "High-Resolution Image Synthesis with Latent Diffusion Models," *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition* (2022).

32   OpenAI, "GPT-4 Technical Report," March 15, 2023, https://arxiv.org/abs/2303.08774.

of the intended digital content. Furthermore, the adaptable generation features of diffusion models allow for the tailoring of content to accommodate specific preferences and needs. This adaptability proves priceless when crafting customized digital twins and virtual reality experiences that resonate with the unique requirements of users and industries. Lastly, the interpretability inherent in diffusion models bestows creators with a profound understanding of the generative process, enabling them to fine-tune models, detect potential biases, and ensure that the produced content remains loyal to its objective.

In the near future, we will behold increasingly potent diffusion models, observe the progressive disappearance of biases, and, above all, experience the ever-growing ease of adapting models to our worldviews. Transfer learning and fine tuning will become increasingly simple, enabling us to impart desired knowledge to generative models. These models may serve as assistants that aid us in comprehending the world, transforming it, or even enhancing our recollections of it. Synthetic images predicated upon our memories could instigate reflections on past experiences, allowing us as individuals to scrutinize our lived past from novel vantage points. Exploring and comparing our memories may culminate in a deeper understanding of ourselves, while sharing these images could facilitate social connections, empowering others to grasp and empathize with our memories and experiences. Generative AI assumes a novel social dimension as shared images evolve into a collective and collaborative experience. By generating images based on historical events, myths, legends, and cultural traditions, we will find ourselves confronted more clearly with the construction and negotiation of our collective memory and cultural identity.

ADAPTATIONS.
Curatorial Agency in Virtual Spaces
Kai-Uwe Hemken

Museums around the world are going all-in on digitization: bright, animated ⬎ digital exhibits are displayed on their websites and in darkened showrooms, consoles with digital offerings enable new ways of accessing collections, digitized artworks can be explored using virtual reality goggles, and historical exhibitions are reconstructed in virtual space. Apart from these academic and pedagogical uses of virtual reality technologies, however, curatorial practice remains largely unaffected. As contemporary as such various digital offerings may seem within the museum context, they are ultimately guided by conventional publication, film, and analog exhibition practices as well as established collection processes (inventorization). Digitization is a strictly supplementary means of optimizing or augmenting existing formats, such as the inventory, the exhibition, or museum pedagogy. This leaves little room for the virtual as a format in its own right and pushes aside the vast potential of VR technology to open new paths in curatorial process—for instance, creating a purely virtual exhibition curated entirely by virtual means, fully utilizing the genuine possibilities of VR without remaining anchored in age-old conventions. Virtual space could provide an unmatched opportunity to meet the demand for progressive curatorial practice.

Explicating such a utopia of virtual curation requires an examination of previous forays into combinations of VR technology and curatorial scenography. Art historians at the University of Kassel have focused their research on the theory and practice of curation for several years, in line with the curatorial focus of the city itself, home to documenta.[1] The repertoire of research undertaken here has come to include a broad range of activities—archival work, conferences, publications, scenographies, and reconstructions—with special attention to reconstructions of renowned historical art exhibitions, such as the first documenta (1955) (see fig. 1). The stated goal of the reconstructions is to gain access to the exhibitions' curatorial scenographies and thus how their presentation was conceptualized. Reconstructions of exhibition displays and the way they work were previously available in written, descriptive form on the one hand, and in screen- or depiction-based form on the other. In some cases, imaginary exhibition tours were written out based on interpretations of floorplans, sketches, documentary photographs, and press reviews. Approximations of past exhibition scenographies had also been attempted in the form of computer animations using the tools of the computer-games industry.

Scientific, display-independent VR reconstructions enable a direct experience of the aesthetic impressions generated by an exhibition. Their technology is still under development, but has already come under academic scrutiny through analyses of concepts, press reviews, exhibition catalogs, and eye-witness reports. Completed VR reconstructions then lead to further critical investigations in relation to an exhibition's written documentation. Such projects assume that exhibitions must be considered autonomous curatorial and artistic media of expression.

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1   Further information about this research is available on the following website: https://www.profhemken.com.

In addition to the instrumental use of VR technology in curatorial research, other dimensions might emerge based on its potential for progressive curation. Together with Bernd Fröhlich of Bauhaus University Weimar, I am currently preparing a project on immersive curation with the aim of setting up a virtual exhibition. A virtual experimental laboratory is being created for a team of curators from the fields of science, communication, design, scenography, and art, who will implement the exhibition within the possibilities and conditions of VR technology and in consideration of the demands of progressive curation. There is no intention to introduce any specific training procedures, as might be the case in a flight simulator or to simulate work processes for construction sites; instead, the goal is to explore the technical possibilities with a view to optimized, complex visualization of content and propositions. It is important for us to account for both the perceptual disposition of those involved (their perception of the digital), as well as the actions and experiences that become possible in virtual space; the curatorial team must perform their curation within the digitalized space using telepresence.[2] Our aims emphasize the process of curation rather than the product, namely the curatorial scenography and exhibition.

The Laboratory

Immersive curation here is geared towards creating a virtual environment that starts out undetermined, with as little reference to physical reality as possible. This involves the formal aesthetics that determine spatiality (such as building types and functions, and including lighting, sound, objects, images, and texts) but also the more abstract signs that would identify a space as part of an institution (a museum, fair, gallery, etc.). Thus the curatorial team can focus exclusively on the process of curation and on their own interests, as informed by their professional backgrounds. For the most part, preconceived notions around self-image, exhibition

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2   See David Zeltzer, "Autonomy, Interaction, and Presence," *Presence: Teleoperators and Virtual Environments* 1, no. 1 (1992): 127–32; Gary Bente and Ingolf Otto, "Virtuelle Realität und parasoziale Interaktion," *Medienpsychologie* 8, no. 3 (1996): 217–42; Gary Bente, Nicole C. Krämer, and Anita Petersen, "Virtuelle Realität als Gegenstand und Methode in der Psychologie," in *Internet und Psychologie: Neue Medien in der Psychologie*, ed. Bernad Batinic, vol. 5, *Virtuelle Realitäten*, ed. Gary Bente, Nicole C. Krämer, and Anita Petersen (Göttingen: Hogrefe, 2002), 1–32.

context, traditions, and discourse-oriented content associated with institutions can be avoided. The minimalist basic disposition is meant to enable the heterogeneous curatorial team to start their conceptional and sceno-graphic work from zero. The VR curation space resembles a laboratory in which not a simulation of an analog exhibition, but a purely virtual exhibition as its own format is created.[3] The VR curation laboratory is not supposed to transform "a material laboratory into a digital space." Instead it acts as an epistemic framework for the "creation of an entirely new laboratory space with new and different conditions"[4] enabling "entirely new approaches to knowledge and experimental cultures."[5] The team is given a maximum of curatorial and scenographic freedom to experiment so that they can make intuitive, rational, or affective decisions about the use of digital exhibits from a wide spectrum of multi-modal formats based on their immediate virtual experience. We thus embrace Sylvia Kokot's idea of laboratories as "spaces for processes of negotiation, in which ultimately not only individual researchers […] or research institutions have agency, but also objects, materials, and samples themselves become agents within an epistemological framework."[6]

Progressive Curation

Curating in virtual space is no simple endeavor. Making creative decisions in virtual space is physiologically, socially, and conceptually challenging if academic standards and institutional

structures are to be called into question. The curatorial team is not subject to that hierarchy of responsibilities that institutional museum custody and curation tend to consider so decisive, in which ideas from other professions involved, whether artmaking, museum pedagogy, scenography, or design, are only brought to bear after the curators have set out their parameters. Here, everyone is brought in at the same time to begin the curatorial process as equals. Curation in virtual space makes this radical approach possible, as demanded by many protagonists of the broader curatorial discourse. In the following, I provide a short outline of progressive curation within the geographical confines of Europe as a foundation for exploring the opportunities of curation in virtual space.

Existing examinations of curatorial theory and practice here can be divided into two fields. On the one hand, discourse revolving around the "curatorial turn" since the 1990s has put forward an ideal construct of the curatorial, which points to the most current mode of modern curation in a process of continuous innovation. On the other hand, real instances of practice demonstrate forms of curation that have proven successful in making exemplary historical and contemporary projects, such as *This Is Tomorrow* (Whitechapel Art Gallery, 1956), *Dylaby* (Steedelijk Museum, 1962), *When Attitudes Become Form* (Kunsthalle Bern, 1968), documenta [5] (Kassel, 1972), *Les Immatériaux* (Centre Pompidou, 1985), documenta 11 (2002), and documenta 15 (2022). Positions of progressive curation as ideal constructs can emerge alongside conventional

3   See Hans-Jörg Rheinberger, "Labor," in *Künstlerische Forschung. Ein Handbuch*, ed. Jens Badura et al. (Zurich: Diaphanes, 2015), 311–14; Michael Bodekaer, "This virtual lab will revolutionize science class," *TED Ideas Worth Spreading*, TEDxCERN, October 2015, https://www.ted.com/talks/michael_bodekaer_this_ virtual_lab_will_revolutionize_science_class; Christine Hanke and Sabine Höhler, "Epistemischer Raum. Labor und Wissensgeografie," in *Raum. Ein interdisziplinäres Handbuch*, ed. Stephan Günzel (Stuttgart: Metzler, 2010), 309–21; Henning Schmidgen and Rand B. Evans, "The virtual laboratory: a new on-line resource for the history of psychology," *History of Psychology* 6, no. 2 (2003): 208–13.

4   Sylvia Kokot, "Virtuelle Laboratorien," in *Handbuch Virtualität*, ed. Dawid Kasprowicz and Stefan Rieger (Wiesbaden: Springer VS, 2018), 571–88 (quotations on 575).

5   Kokot, "Virtuelle Laboratorien," 575. See also Sabina Jeschke, Leif Kobbelt, and Alicia Dröge, "Einführung in den Band," in *Exploring Virtuality. Virtualität im interdisziplinären Diskurs*, ed. Sabina Jeschke, Leif Kobbelt, and Alicia Dröge (Wiesbaden: Springer VS, 2014), 7–18.

6   Kokot, "Virtuelle Laboratorien," 572. See also Karin Knorr Cetina, *Die Fabrikation von Erkenntnis: Zur Anthropologie der Naturwissenschaft* (Frankfurt am Main: Suhrkamp, 2002); Elke Bippus, "Kann man im Ausstellungsraum forschen? Oder: Die Ausstellung zwischen Labor und Verhandlungsraum von Wissen," in *Wissenschaft im Museum – Ausstellung im Leben*, ed. Anke Te Heesen and Margarethe Vöhringer (Berlin: Kadmos, 2014), 196–215.

and commercial approaches if they take a critical perspective towards society (economy, politics, culture) in general and towards their own institutions (museums, galleries) and professional function in particular. This poses further challenges to twenty-first-century curators: in addition to art-historical questions, new political, societal, and philosophical discourses are reflected as well. Numerous studies show that there is a great deal of academic interest in curatorial methods and orientations within an increasingly complex global art scene. The discourse is led by practitioners and researchers, presenting (self-)critical accounts of previous exhibition work concerning individual fields of action, self-image, and societal context.

In the early 2000s in Germany, scholars presented various critical interpretations of the curatorial field, describing curators as agents of a new subjectivism[7], as "young,"[8] as "presidial figures" in the age of neoliberalism, as "über-curators,"[9] or as exercising "curatorial absolutism."[10] Clearly, aside from eye-level cooperation with artists, curators must take into account the interests of the audience as a guiding dimension if an exhibition is to be truly insightful and critical of the art market's structures and hegemonies. Among the work of numerous critical curators, I argue that the

following are the most progressive approaches—helping us rise to challenges such as pushing back against capitalism:

- Exhibitions as spheres of knowledge and enlightenment[11]
- Exhibitions as risky provocations ("radical curation"[12])
- Cooperation between artmaking and curation in the face of hegemonic forces[13]
- Declaration of curatorial authorship in the exhibition[14]
- Audiences as curatorial entities[15]
- Curatorial practice as activism[16]

Fundamentally, there is a move towards modifying the conventional art-historical approach to curation to replace the discipline's canon of methods and content with an overarching curatorial approach oriented around discursive topics, audience participation, and disciplinary diversity.[17]

These critical discourses, which can be called new museology or new practices of exhibition, have not led to the intended destabilization of the curatorial instance and revolution of the described "baroque-representative" curation scene, but have instead through the use of their own vocabulary, structures

7   See Marius Babius, *Kunst in der Arena der Politik: Subjektproduktion, Kunstpraxis, Transkulturalität* (Cologne: Walther König, 2008).

8   See Christoph Tannert and Ute Tischler, "Vorwort," in *"Men in Black": Handbuch der kuratorischen Praxis*, ed. Christoph Tannert (Frankfurt am Main, 2004), 9–11 (quotation on 9).

9   See Patricia Bickers, "Auch der Kurator steigt auf," in *"Men in Black,"* ed. Tannert, 57–60 (quotation on 57).

10 See Hans Dieter Huber, "Künstler als Kuratoren – Kuratoren als Künstler?," in *Kunst des Ausstellens: Beiträge, Statements, Diskussionen*, ed. Hans Dieter Huber, Hubert Locher, and Karin Schulte (Ostfildern-Ruit: Hatje Cantz, 2002) 225–28 (quotation on 226).

11 See Kathrin Rhomberg, "What Is Waiting Out There," in *was draußen wartet / what is waiting out there*, ed. Kathrin Romberg, exh. cat. 6th Berlin Biennale for Contemporary Art (Cologne: DuMont, 2010), 11–13; Terry Smith, *Thinking Contemporary Curating* (New York: Independent Curators International, 2012).

12 See Thomas Wulffen, "Radikales Kuratieren in hegemonialen Systemen," in *Kunstreport '03/'04* (Berlin: Deutscher Künstlerbund, 2004), 35–37.

13 See Simon Sheik, "Constitution Effects: The Techniques of the Curator," in *Curating Subjects*, ed. Paul O'Neill (London: Open Editions, 2011), 174–85.

14 See Irit Rogoff, *Transcoding – Cross Cultural Contemporary Arts* (Cologne: Walther König, 2011).

15 See Rhomberg, "What Is Waiting Out There"; Susanne Gesser et al., eds., *Das partizipative Museum* (Bielefeld: transcript, 2012); Beatrice von Bismarck, "Curating Curators," *Texte zur Kunst* 86 (June 2012): 43–62; Beatrice von Bismarck, *The Curatorial Condition* (London: Sternberg Press, 2022).

16 See Maura Reilly, *Curatorial Activism: Towards an Ethics of Curating* (London: Thames & Hudson, 2018).

17 Critical positions towards science-based curation have been taken by artists such as Joseph Kosuth, Hans Haacke, Fred Wilson, Mischa Kuball, and Andrea Fraser, whose work aims, among other things, to push back against the curator.

of argumentation, and public appreciation of self-criticism created a new format, which could be described as "enlightened curation." Critical curation is largely met with skepticism regarding its plausibility; it is seen as the product of a mostly intellectual or expert discourse[18] with little influence in the face of omnipotent and omnipresent capitalism—even as co-opted as a figurehead by capitalism.[19] This is because all progressive approaches to date have been taken within projects whose content, funding, and public presentation are determined by political and economic entities, and are therefore part of the system they aim to criticize.[20] Because the fundamental problem of progressive or critical curation's embeddedness in societal structures and processes remains,[21] we must realize that any real or imagined alternative actions can and must fail due to real-world power imbalances.

Beyond this sobering realization on a global societal level, the fundamental criteria for progressive curation, in terms of both process and product, can be summarized as follows:

1. Maximum audience participation
2. Exhibition as source of enlightenment and information (knowledge generation)
3. Equality among the professions involved
4. Diversity of interests of professions involved beyond canonical demands
5. Maximum transparency of curatorial authorship and statements

Curatorial conditions in virtual space offer a seed of hope that supposedly failed utopias might yet be within reach. For thanks to the consciously shed limitations of formal disposition (space, light, sound, etc.) and the negation of institutional belonging, virtual space creates a setting in which the interests of all parties can be met to the fullest extent. Our intention is to take the vast heterogeneity of these interests into account. In regular intervals throughout the project, the audience is invited to act as a corrective force as they try out the various results of the VR curation team's work, evaluate them, and contribute to alternative suggestions with the help of IT experts.

Despite our euphoria, we must acknowledge the physiological and social obstacles that need to be overcome. Compared to conventional curation, curatorial acts, social interactions, and interacting with digital works as exhibits in virtual space take a lot of getting used to. For instance, spatial perception in the digital sphere has no limits that would require participants' adaptation.[22] Media-aesthetic research approaches virtual reality on the basis of video games and gameplay, leading to great distance between the "real bodies of the users" and the "symbolic bodies within virtual reality" (avatars).[23] In contrast, our VR laboratory lends itself to a certain realism, allowing individual agents to be digitally and factually present in a variety of ways. Media-aesthetic investigations focus on the "creative possibilities, materials, and forms of mediation" of the medium.[24]

18   See Georg Schöllhammer et al., "Constitution for Temporary Display," in *Manifesta 8*, ed. Nav Haq et al., exh. cat. (Milano: Silvana Editoriale, 2010), 211–99.

19   See Schöllhammer et al., "Constitution for Temporary Display"; Claire Bishop, "Antagonism and Relational Aesthetics," *October* 110 (2004): 51–79.

20   See Anthony Gardener and Charles Green, *Biennials, Triennials and Documenta: The Exhibitions that Created Contemporary Art* (Hoboken, NJ: Wiley, 2016); Ulf Wuggenig, Christian Tarnai, and Cornelia Kastelan, "Das Kunstfeld: Akteure, Institutionen und Zentrum-Peripherie-Struktur," in *Das Kunstfeld. Eine Studie über Akteure und Instituionen der zeitgenössischen Kunst*, ed. Heike Munder and Ulf Wuggenig (Geneva: JPR|Editions, 2012), 87–110; Oliver Marchart, "Das kuratorische Subjekt, die Figur des Kurators zwischen Individualität und Kollektivität," *Texte zur Kunst* 86 (June 2012): 29–42.

21   See Schöllhammer et al., "Constitution for Temporary Display"; Bishop, "Antagonism and Relational Aesthetics."

22   See Bente, Krämer, and Petersen, "Virtuelle Realität als Gegenstand und Methode in der Psychologie."

23   See Holger Braun and Regina Friess, "Empirische Zugänge zur Virtual Reality," in *Handbuch Virtualität*, ed. Kasprowicz and Rieger, 609–28.

24   See Braun and Friess, "Empirische Zugänge zur Virtual Reality"; Ralf Schnell, *Medienästhetik: Zu Geschichte und Theorie audiovisueller Wahrnehmungsformen* (Stuttgart: Metzler, 2000); Regina Friess, *Narrative versus spielerische Rezeption? Eine Fallstudie zum interaktiven Film* (Wiesbaden: Springer VS, 2011).

In a 2009 text, Cornelius Weidner and Rolf Kruse presented the results of a perceptual psychology study on experiences possible while visiting a VR environment with great enthusiasm: "First demonstrations show that such visits hold the possibility of intensive experiences. Through interactive simulation, the system offers new ways of experiencing spaces such as destroyed architectures of the past or fantastical or visionary structures. Boundless flexibility, independent of space and time, creates fantastic possibilities of experience."[25] In a virtual psychophysics study discussed by Rebekka S. Renner et al in 2014, however, significant deviations of perception in virtual space were observed:

> In the least complex virtual environment, in which the target object was presented at eye level before a white background, therefore eliminating any image-based depth stimuli, the adjustments of size deviated the most from the correct value. The distance to the screen was overestimated, while distances beyond the screen were under-estimated. Nevertheless, the size adjustment was better than adjustments made independent of distance and solely based on viewing angle.[26]

For the members of the curatorial team at our VR laboratory, another source of irritation is their own digital presence and interaction. To summarize, verbal and non-verbal acts, gestures, facial expressions, atmosphere, language, and acoustics exist in different forms within virtual space; participants have to practice them.[27] Experiencing one's own telepresence and that of others is a funda-mental requirement to guaranteeing maximum virtual-real suggestion.[28] The decisive factors for telepresence here are the vividness and interactivity of the VR laboratory, achieved through sensory breadth and depth.[29]

Using the technological means avail-able today, the curators' encounter in virtual space could be understood as an extension of "parasocial interaction,"[30] a phrase coined to denote the fictional relationship between viewers and performers in the context of tele-vision. Thinking of the collective experience in the VR laboratory as parasocial interaction might help mitigate irritations arising from the analog and digital presence of curatorial team members. VR technology offers a high level of realism regarding the personal presence of in-dividual team members; this kind of realism is not limited to illusory effects, but also includes sensory stimulation.[31]

25   Cornelius Weidner and Rolf Kruse, "Die Begehung virtueller Realitäten," in *Virtuelle Welten als Basistechnologie für Kunst und Kultur*, ed. Manfred Bogen, Roland Kuck, and Jens Schröter (Bielefeld: Transcript, 2009), 113–17 (quotation on 117).

26   Rebekka S. Renner et al., "Virtuelle Psychophysik. Psychologische Untersuchungen zur räumlichen Wahrnehmung in virtuellen Umgebungen," in *Exploring Virtuality*, ed. Jeschke, Kobbelt, and Dröge, 241–60 (quotation on 255).

27   See Anita Petersen and Gary Bente, "Situative und technologische Determinanten des Erlebens virtueller Realität,*" Zeitschrift für Medienpsychologie* 13, no. 3 (2001): 138–45; Deborah Foster and John F. Meech, "Social Dimensions of Virtual Reality," in *Simulated and Virtual Realities: Elements of Perception*, ed. Karen Carr and Rupert England (London: Taylor&Francis, 1995), 209–21; Bente, Krämer, and Petersen, "Virtuelle Realität als Gegenstand und Methode in der Psychologie."

28   See Zeltzer, "Autonomy, Interaction, and Presence"; Jonathan Steuer, "Defining Virtual Reality: Dimensions Determining Telepresence," *Journal of Communication* 42, no. 4 (1992): 73–93; Bente, Krämer, and Petersen, "Virtuelle Realität als Gegenstand und Methode in der Psychologie."

29   See Steuer, "Defining Virtual Reality."

30   See Donald Horton, R. Richard Wohl, "Mass Communication and Para-Social Interaction: Observations on Intimacy at a Distance," *Psychiatry* 19, no. 3 (1956): 215–29; Klemens Hippel, "Parasoziale Interaktion. Bericht und Bibliographie," *montage AV* 1, no. 1 (1992): 135–50; Bente and Otto, "Virtuelle Realität und parasoziale Interaktion"; Bente, Krämer, and Petersen, "Virtuelle Realität als Gegenstand und Methode in der Psychologie."

31   See Chris Christou and Andrew Parker, "Visual Realism and Virtual Reality: A Psychological Perspective," in *Simulated and Virtual Realities: Elements of Perception*, ed. Karen Carr and Rupert England (London: Taylor&Francis, 1995), 55–80.

The adaptations we must make also encompass the central aspect of VR curation: immersion. Being transported into a virtual exhibition space requires physiological and conceptional adaptation to the abovementioned changes in perception of space, sound, communication, and so on. The so-called realism of the maximally multisensory VR exhibition centers on the *physiological* dimension of VR curation, contributing an extensive immersion effect which ultimately departs from analog reality and develops its own scenographic forms of expression.

The conceptional medial dimension of immersiveness in curation can be traced back to the history of optical media such as the camera obscura and the panorama, which mainly prioritized entertainment value. In Germany, an immersive effect can also be observed in the *Kunst- und Kulturkammern* (art and culture cabinets) and in nineteenth-century museums such as the Glyptothek in Munich and the Neues Museum Berlin. Up until the 1990s, only a few exhibition projects in Europe can be said to have viewed immersiveness as a curatorial parameter; these include the 1920 International Dada-Fair in Berlin, the 1938 International Surrealist Exhibition in Paris, *This Is Tomorrow* in London 1956, and the 1985 exhibition *Les Immatériaux* in Paris. Last but not least, for the new media art of the 1990s the immersion and participation of the viewer were two equally important goals.

Translated from the German by Dan Lawler.

Conclusion

We may conclude that visiting virtual exhibitions places us under specific and solitary conditions: immersion, encountering multimodal exhibits, changed perception within virtual space, and telepresence. After curators make certain initial adaptations to these, the possibilities and implications of virtual scenographies and exhibitions can be fully taken on. In the VR laboratory, the unusual aspects of curation are continuously explored and evaluated. The various challenges of curation in virtual space should be addressed because it holds the potential for unprecedented progressive curation: through special consideration for diverse curatorial teams, maximum audience participation during exhibitions, transparency of authorship and knowledge transfer, and enabling the archiving of (and later or simultaneous access to) individual changes made by curators and audience members. Curation in virtual space is not a process towards an ultimately static product, but one that makes the dynamics of the curatorial process visible within the virtual exhibition.

ENHANCING CO-CREATION. Hybrid Museum Experiences through AI-based Cognitive User Interfaces

Yannick Hofmann and Cecilia Preiß

The intelligent.museum project,[1] conducting ↘practice-based research and developing artistic prototypes for the museum of the future since 2020 at ZKM|Center for Art and Media Karlsruhe and the Deutsches Museum Nuremberg, offers several examples of the use of artificial intelligence techniques to interact with museum visitors. When seamlessly integrated into exhibition spaces, they can offer visitors a more conversational and immersive museum experience that can carry over into virtual space. A speculative perspective on the hybrid museum experience of the future is thus emerging.[2] Recent developments in generative AI suggest that interactive experiences could soon be dialogically co-written by users in real time, transforming them from consumers into prosumers. Museums are likely to become even more responsive to visitors and

able to adapt according to their needs and wishes. This texts discusses opportunities, risks, and implications of these prospects.

Dynamic Spaces for Dialogue and Exchange in Museums

The so-called participatory turn has sparked a revolution in the museum world, pushing cultural institutions to be more than just static display systems for objects—to become dynamic spaces for interaction, learning, and community-building.[3] The five core functions of museums, namely collecting, preserving, researching, exhibiting, and communicating, have been re-evaluated in light of a new emphasis on openness, inclusivity, and collaboration.[4] The aim is to encourage critical

1   intelligent.museum is a collaborative project conducted by ZKM|Karlsruhe and the Deutsches Museum Nuremberg. Funded by the Digital Culture Programme of the Kulturstiftung des Bundes (German Federal Cultural Foundation). Funded by the Beauftragte der Bundesregierung für Kultur und Medien (Federal Government Commissioner for Culture and the Media).

2   The hybrid museum has been addressed by the "HyMEx – Hybrid Museum Experience 2021" symposium, among others, see Lívia Nolasco-Rózsás and Borbálá Kálmán, eds., *HyMEx – Hybrid Museum Experience Symposium 2021: Proceedings* (Budapest: Ludwig Museum, 2021), https://hymex.beyond-matter.eu/.

3   See Lluis Bonet and Emmanuel Négrier, "The participative turn in cultural policy: Paradigms, models, contexts," *Poetics*, no. 66 (2018): 64–73.

4   The International Council of Museums (ICOM) has led an international discourse on the future of museums, which has prompted a redefinition of the museum concept. The new definition focuses on increasing accessibility and inclusion, intensifying participation and collaboration with local communities, and promoting diversity, fairness, and equity, see https://icom.museum/en/resources/standards-guidelines/museum-definition/.

reflection and engage visitors in more meaningful ways. This reflects an ongoing debate around museums as catalysts for change and agents of social transformation. Inspired by the "third place" theory of US urban sociologist Ray Oldenburg,[5] museums are embracing greater audience engagement and participation, creating inclusive, welcoming environments for social interaction and collaboration. This shift toward a more participatory model represents a departure from the traditional top-down approach to cultural programming and has already left a significant mark on the museum landscape.

The participatory turn has prioritized a collaborative approach involving audiences in the creation, interpretation, and evaluation of cultural content. The concept of co-creation in the museum context gained momentum in the late 1990s and early 2000s, while the term itself seems to have been popularized in the museum field in the mid-2000s. Since then, co-creation has become an increasingly common term in museum practice and literature. Visionary museum professionals like US curator Nina Simon and Austrian museum theorist Nora Sternfeld have championed this approach, calling for museums to be participatory, collaborative, and community-driven. For Simon, the goal is to create engaging and interactive experiences,[6] while Sternfeld sees the museum as a space for political engagement and critical reflection, encouraging visitors to challenge dominant narratives and

5   See Ray Oldenburg, *The Great Good Place: Cafés, Coffee Shops, Community Centers, Beauty Parlors, General Stores, Bars, Hangouts, and How They Get You Through the Day* (New York: Paragon House, 1989).

6   See Nina Simon, *The Participatory Museum* (Santa Cruz, CA: Museum 2.0, 2010).

power structures.[7] Peter Weibel envisions the museum as an assembly, a hub for collective reflection and dialogue that is characterized by fluidity, openness, and accessibility.[8] In this vision, visitors are active participants in the production and dissemination of knowledge, and the museum functions as a catalyst for social and political change.

The cultural climate created by the participatory turn has allowed museums to experiment with digital technologies, creating innovative and interactive exhibitions that challenge traditional notions of the museum as a static and elitist institution. By fostering spaces for dialogue and exchange, both on-site and in their digital dependencies, museums are becoming more than just repositories of artifacts, but dynamic and inclusive spaces that promote social interaction, community-building, and the exchange of ideas. Now we are witnessing an evolution of the original possibilities of the participatory turn and the associated desideratum of involving a wider audience in interactive exhibition scenarios. Not least, the rapid developments in generative AI technologies have resulted in innovative mediation strategies and new modes of visitor participation.

The Museum as an AI Technology Sandbox

In scientific research "living labs" have been widely adopted, where public institutions such as museums are treated as platforms for translating theoretical research into practical applications. Practice-based research and development projects such as Beyond Matter and intelligent.museum use the exhibition space as a focal point for proposing new technical and artistic prototypes and providing space for associated discourses. The exhibition space becomes an experimental field in which technologies are tried out and

tested, for example, for their intuitive handling. Visitors are introduced to the technologies and enabled to use them. It is in this context that the participatory turn has become a driving force behind the intelligent.museum project's experimentation with digital technologies.

intelligent.museum employs a range of cutting-edge techniques to foster visitor engagement and participation in exhibitions. These include the integration of AI and interactive technologies, the creation of an adaptable and flexible software framework to suit evolving requirements, and the incorporation of diverse viewpoints to generate inclusive and thought-provoking museum experiences. The intelligent.museum project posits the museum as an ideal technology sandbox for experimenting with new forms of visitor-museum interaction.

Explicit and Implicit Modes of Interaction with the Intelligent Museum of the Future

Museums can adapt to meet the needs of their visitors in many ways, and this text explores only a few possibilities. From explicit interactions between visitors and museums using voice commands and other input methods to implicit interactions through the analysis of visitor behavior, the museum experience is set to become more personalized. By leveraging state-of-the-art AI models, museums can facilitate more sophisticated and nuanced interactions. In discussing new forms of interaction between museum visitors and the museum of the future, both implicit and explicit interactions are being referred to.

Implicit user interactions are actions that users take that are not necessarily consciously intended to interact with the system. They are based on the user's behavior, context, or environment (e.g., the system may detect that the user has entered a room, turned on

7   See Nora Sternfeld, "Im post-repräsentativen Museum," in *Ausstellen und Vermitteln im Museum der Gegenwart*, ed. Carmen Mörsch, Angeli Sachs, and Thomas Sieber (Bielefeld: transcript, 2016).

8   Peter Weibel, "The Non-Local Museum," online lecture, Sakıp Sabancı Museums Technological Arts Preservation, January 22, 2021, https://zkm.de/en/media/video/prof-peter-weibel-the-non-local-museum.

a light, or opened a door, and infer that they are present). We argue that the museum of the future will gradually transform into an ambient intelligence environment, in which ubiquitous computing is practiced. By using sensors in the exhibition space and application programming interfaces (APIs), crawlers, or scrapers to collect data from internet sources, museums can gather data which can help them better understand and anticipate visitor behavior and create a more personalized exhibition experience.[9] The intelligent. museum project is also dedicated to explicit user interaction with museum visitors, meaning actions that are intentionally performed by the user, such as pressing a button. These are the focus of this text.

Cognitive User Interfaces for Explicit Human-Computer Interactions within Museums

Many new explicit interaction methods between the museum and its visitors are conceivable, such as directly interacting with interactive exhibits, speaking a command, or making a gesture. This requires appropriate interfaces that serve as a communication medium between visitors and exhibits. Alongside generative AI technologies, it is in this area that the greatest developmental steps have been made in recent years. As the museum gradually expands into the digital realm, it is becoming increasingly necessary for the interfaces with which visitors interact to be intuitively usable, immersive, and seamlessly integrated into the exhibition context. Cognitive user interfaces (CUIs) use natural language, gestures, or facial expressions to enable intuitive interactions between users and machines. CUIs leverage AI technologies like natural language processing (NLP) and

Fig. 2
An AI-assisted Museum Label, **2020–21. Installation view *BioMedia*, ZKM | Karlsruhe, 2022–23. Based on Spoken Language Identification and thus on NLP, the work is used to translate the label texts of artworks into the visitors' national language previously detected by NLP, breaking down barriers in the exhibition space.**

computer vision (CV) to create more natural modes of communication. Unlike traditional graphic user interfaces, CUIs aim to emulate human communication, making digital systems easier to use and more accessible to a wider range of people.[10] Within the vast landscape of AI technologies, CV and NLP are two subsets that offer various possibilities for personalized responses to visitors and customizing exhibits to their specific interests, prior knowledge, and needs. In recent years, advancements in AI techniques, such as deep learning and neural networks, have significantly improved the accuracy and efficiency of NLP and CV systems. These systems are now better able to understand and interpret human language and visual data, allowing for more natural and intuitive interactions between humans and machines.

9   In the intelligent.museum project we are currently working on an intelligent internet of things system with which we can detect and analyze behavioral patterns, movement patterns, and other implicit interactions by converting sensor data parameters into digital values. See e.g., Yannick Hofmann and Lívia Nolasco-Rózsás, "The Museum as a Cognitive System of Human and Non-Human Actors," *The Garage Journal: Studies in Art, Museums & Culture*, no. 3 (2021): 1–15; Yannick Hofmann, "Towards an Intelligent IoT System for the Data-Informed Museum of the Future," in *Proceedings ISEA 2023 Paris "Symbiosis," 28th International Symposium on Electronic Art* (forthcoming).

10 See Steve Young, "Cognitive user interfaces," *IEEE Signal Processing Magazine* 27, no. 3 (2010): 128–40.

CV entails the use of algorithms and methods to enable machines to comprehend and interpret visual information from the environment. This technology can be applied to create interactive exhibits that respond to human behavior, by sensing physical presence, gestures, facial expressions, and postures, and altering accordingly (see fig. 1). This function can be used in various ways, from a simple trigger (e.g., triggering the playback of an animation on a screen) to optimizing museum infrastructure (e.g., changing lighting or activating sound or moving images).

Similarly, NLP enables machines to understand, interpret, and generate human language. This technology can reduce communication barriers in the exhibition space by implementing features like spoken-language identification-enabled text labels, which adapt to visitors' spoken language in real-time,[11] and conversational user interfaces that simplify complex information on demand, making it more accessible to a wider audience (see fig. 2).

Outlook: Generative AI as a Driver for Co-Creation in the Museum

With the growing adoption of participatory practices in museums, co-creativity between visitors and museums is increasingly significant. Advancements in multimodal generative AI facilitate this, as visitors are now able to play a more active role in shaping content. Where the museum shifts into the realm of the digital and where extended reality (XR) applications contribute to its hybridization, generative AI tools offer immense potential for visitor participation and human-AI co-creation. Generative AI uses AI and machine-learning algorithms to enable machines to create new content from existing text, audio files, images,

or patterns. In generative AI, including, for example, text-generating tools such as *GPT-4* and *Chat GPT* or the image-generating AIs behind *Dall-E- 2*, *Midjourney*, and *Stable Diffusion*, computers use their training data to recognize underlying patterns associated with the input and produce coherent content from them. This is in contrast to discriminative AI, which classifies or categorizes existing data based on certain criteria. In the following, we venture into two future visions for the use of generative AI in the museum context and point to related possibilities, challenges, and implications.

Co-Creativity or the Exhibition as a "Room of Requirement"

With the help of generative AI technologies, visitors can interact co-creatively with exhibits. This is the condition for the artistic work to materialize again and again in new and different ways. Visitor interaction with an artistic interface necessarily precedes the artwork. In other words, the acquisition of knowledge by the visitor only works in dialogical exchange with the corresponding AI software implemented in the artistic project. The use of generative AI in artworks can be approached through two examples created in the intelligent.museum project: *Wishing Well* (2022),[12] developed by Yannick Hofmann and *FreeStyler* (2022) by Dan Wilcox (see figs. 3 and 4).

If multimodal models of generative AI are now combined with XR technologies that blend physical and digital worlds, it will become possible to shape media environments in XR applications as a co-creative artistic process between human and machine. An impression of this can already be obtained in the field of gaming, where the demo version of *Matrix Awakens* by Epic Games presents a

11   See Yannick Hofmann, "intelligent.museum," in *Künstliche Intelligenz und Museen. Ein Toolkit*, ed. Johannes Bernhardt et al. (London: Goldsmiths University, 2022), 13–14.

12   Detailed information about the interactive installation *Wishing Well* can be found here: Yannick Hofmann and Cecilia Preiß, "Say the Image, Don't Make It. Empowering Human-AI Co-creation through the Interactive Installation *Wishing Well*," in *Conference Proceedings "Cultures of Artificial Intelligence – New Perspectives for Museums"* (Bielefeld: transcript open access, forthcoming).

Fig. 3
Yannick Hofmann,
*Wishing Well***, 2022.**
Installation view the
intelligent.museum
***is around the corner*,**
ZKM│Karlsruhe, 2023.
Interactive installation,
text-image model,
microphone, beamer,
urinal, foot pedal.
Wishing Well **transforms**
ideas, wishes and
fantasies of the
exhibition visitors into
images with the help of
generative AI.

Fig. 4
Dan Wilcox, *FreeStyler***,**
2022. Installation
view the ***intelligent.***
museum is around the
***corner*, ZKM│Karlsruhe,**
2023. Interactive
installation, Arbitrary
Style Transfer, Webcam,
camera, buzzer, screen.
FreeStyler **offers visitors**
to get co-creative
together with the
machine. New content
is generated based on
learned patterns from
existing data. In this
case, the generated
content is a new image
that combines the
content of the input
image with the style of
the reference image.

hyper-realistic city scenario inhabited by AI-generated metahumans.[13] Generative AI can generate textual prompts from images, music, and text; by being able to produce code, generative AI technologies like *ChatGPT* or *GPT-4* can also create structures, architectures, and spaces. When complete functions are automatically coded and executed by AI technologies in immersive projection environments, spaces of possibility open up that are in no way inferior to the "Room of Requirement" in J. K. Rowling's *Harry Potter*. It no longer takes magic for wishes, dreams, and utopias to take shape in the blink of an eye. Rapid developments in generative AI underscore our thesis that we are on the verge of an age of co-creative design of media environments, the potentials of which are being explored, reflected upon, and pushed in the artistic environment by means of co-creative installations.

Semantic Search as a Tool of Knowledge Acquisition

What are the possibilities of semantic functions such as *ChatGPT* for the museum experience of the future? As outlined above, NLP techniques can be employed to facilitate AI-powered voice user interfaces and conversational user interfaces, such as chatbots, to impart deeper contextual knowledge about museum exhibits, thereby enhancing human-computer interactions in museums. The use of NLP techniques involves interpreting the visitor's requests through semantic analysis, which is an essential component of semantic search. This allows the AI system to understand the meaning behind the visitor's questions and search its knowledge base for relevant information related to the exhibits in question. The latent space in artificial neural networks is not a knowledge base in the traditional sense, but it can be considered as a representation of the knowledge learned through the neural network's exposure to the input data during training.

If input data is encoded into the latent space, the neural network can learn a compressed and more abstract representation of the data. Hence, by means of generative AI, visitors can access references and learn about the context of a work of art, artists' biographies, tools, materials, and the like on demand (e.g., by means of voice user interfaces). A dialogic knowledge acquisition in the hermeneutical sense becomes possible, which in the long run fulfills desiderata of the semantic web: on the n-dimensional pool of information, insights, contexts, and references are established. Thus models such as *ChatGPT* are able to determine meaning and generate information from it. In this way, visitors and their needs and profiles can be addressed in real time in the exhibition space, making the museum experience and knowledge dissemination more intuitive and low-threshold. The technical tools, setting, and content of the museum are not fixed, but adaptive and processual. By drawing on deeper knowledge networks previously absorbed by AI, the museum experience is enhanced by a crucial dimension. Strengthened as a technical entity and entering into a dialogic process with interacting visitors, the museum continues to evolve as a place to acquire knowledge; new interface technologies make it adaptable to each visitor. Information can be conveyed in different levels of depth and granularity, tailored to each respective visitor. The museum could thus be an enriching place of knowledge acquisition for a more diverse group of visitors.

Risks and Side Effects

Such developments in AI technologies in museums must be treated with caution beyond the current hype. It is important to consider the risks and side effects associated with their use and to actively address them. The museum must take itself seriously as an educational medium, providing technological background information and imparting media competence.

13   See the *MetaHuman Creator* by Unreal Engine, https://www.unrealengine.com/en-US/metahuman.

In a non-exhaustive list, we identify the following four problem areas where it becomes necessary to adopt a critical perspective and actively communicate it.

First, with generative AI it is always important to keep in mind that the results it produces can be factual but also speculative. Like a "stochastic parrot,"[14] AI technology plays back what has been blended from the data pool fed into it. It is not able to check its own results for factuality, so the results must be critically questioned upon the input of a prompt.

The same is true for historical biases that are reflected in the data fed into the system and consistently reproduced through generative AI technologies. Despite protection functions that categorize results as "not safe for work," problematic content passes through. It is not possible to generalize about which content must be censored. The challenge lies in developing technology that is culturally competent and accounts for a range of factors, including social, political, historical, and religious perspectives and sensitivities.

Another key problem concerns authorship. If AI is trained on specialist publications by certain authors, on pictorial works, music, etc., it can create reproductions that are not infrequently copies or even plagiarisms. There is an ongoing discussion about how intellectual property can be protected and what types of copyright apply to creativity and style in relation to the results of generative AI.[15]

Finally, adopting generative AI technologies means relinquishing control in the curation process. When artificial creativity is used, some of the decision-making authority is automatically delegated to the technology. In a scenario of cocuration between humans and machines, it is crucial to acknowledge this shift and to evaluate and analyze the outcomes accordingly.

It is important to point to the pitfalls of technology through art, to put a finger in the wound and to enable curators, artists, and visitors to deal with AI in a reflective way. Our agenda should include green culture, equity or diversity, and inclusion. Culture can and must address these issues with the help of innovative technologies, making art accessible in low-threshold, intuitive, and cross-societal ways while constantly examining itself. If this succeeds, art can have a sociopolitical influence beyond the hybrid museum space.

Conclusion

The participatory turn and associated efforts to transform the museum from a rigid place of distanced art observation into an interactive and fluid place of collaborative engagement has produced the developments we are currently observing. The objectives of the participatory turn can now be tackled on a fresh level through practice-based research and development of AI technologies within the exhibition space. This area can be considered as a living lab where projects such as intelligent.museum elicit feedback from specialists and users to enhance its artistic endeavors. In the process, the exhibition space becomes a field of experimentation in which user-centered research and development is carried out with visitors' direct involvement. The agile structure of projects such as intelligent.museum makes this possible, being characterized, for example, by the employment of in-house software developers.

Developments in AI technologies are particularly interesting and promising for the interactive involvement of museum visitors on two levels, as evident in the current work of the intelligent.museum project. From a macro perspective and in the context of so-called implicit interaction, the project aims for a data-informed museum of the future, where artworks, visitors, and museum staff are networked and can respond to each other in

14 See Emily M. Bender et al. "On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?," in *FAccT '21: 2021 ACM Conference on Fairness, Accountability, and Transparency* (New York: Association for Computing Machinery, 2021), 610–23.

15 In the context of this debate, Holly Herndon, Mat Dryhurst, and Jordan Meyer founded spawning.ai with the objective of promoting ethical practices in AI applications and providing artists and creators with a voice in determining how their creations are utilized and attributed. spawning.ai was established in response to concerns regarding consent in AI training data.

real-time. From a micro-perspective, incorporating AI-based cognitive user interfaces can achieve co-creativity and co-creation, as repeatedly emphasized as part of the participatory turn. Generative AI technologies can allow visitors to co-creatively generate exhibition environments on demand.

This gives rise to exciting prospects for a co-creative museum of the future based on the collective intelligence of humans and machines.[16] Hybrid collective intelligence systems represent a promising approach for advancing the capabilities of humans and machines, and for unlocking new possibilities for innovation and creativity.

However, those possibilities should not be encountered blindly without a critical reflection on risks and side effects. The integration of AI technologies in museum spaces raises questions about data security and ownership. Thorough evaluations should be carried out before introducing AI technologies into museum settings, prioritizing visitor well-being and data privacy over technological advancements. The museum also provides a structure and space through which these broad sociopolitical issues can be identified and tackled, with the aim of raising awareness among visitors.

16   In contrast to technology-centric and human-centric perspectives, the collective intelligence perspective promotes the exploration of how humans and machines can collaborate to act more intelligently than either could alone. See e.g., Marieke M. M. Peeters et al., "Hybrid collective intelligence in a human–AI society," *AI & Society* 36, no. 3 (2021): 217–38.

FROM THE NET CONDITION TO THE VIRTUAL CONDITION

Daria Mille

This text sheds light on curatorial practice within ZKM|Center for Art and Media Karlsruhe in the context of the change from the net condition to the ⬎ virtual condition in exhibition practice. After almost thirty-five years of institutional history and after Peter Weibel's twenty-four-year tenure as artistic director, some conclusions about the history of media art can be drawn.

The foundation of ZKM|Karlsruhe was deeply embedded in the social condition characterized by the proliferation of telecommunication technologies and the rise of the World Wide Web at the end of the 1980s. The digitization of various technologies affected not only the development of an information society, economic integration, and the logistics that contributed to globalization processes, but also the formation of new subjectivities and communalities, through increasing connectivity and round-the-clock personal availability. The change had social and even biological dimensions, as described by Marshall McLuhan in his visionary book *Understanding Media*, written in 1964 about the change from the mechanical to electronic age but still applicable at the end of the 1980s:

> It is this same provision of interacting places in the electric media that now compels us to react to the world as a whole. Above all, however, it is the speed of electric involvement that creates the integral whole of both private and public awareness. We live today in the Age of Information and of Communication because electric media instantly and constantly create a total field of interacting events in which all men participate. Now, the world of public interaction has the same inclusive scope of integral interplay that has hitherto characterized only our private nervous systems. That is because electricity is organic in character and confirms the organic social bond by its technological use in telegraph and telephone, radio, and other forms. The simultaneity of electric communication, also characteristic of our nervous system, makes each of us present and accessible to every other person in the world. To a large degree our co-presence everywhere at once in the electric age is a fact of passive, rather than active, experience.[1]

The involvement of the arts in these developments and the boost given to media art through new technologies are aspects of what is outlined in this publication as the virtual condition, referring primarily to the interdependence of physical and digital spaces and temporalities, specifically in terms of art exhibition.

Weibel belonged to a generation of artists and curators who witnessed these multifaceted changes, but he also anticipated new technological tendencies and transformations. In 1995 he was responsible for the edition of Ars Electronica festival titled *Mythos Information—Welcome to the Wired World*. At ZKM one of his first major shows as artistic director was *net_condition* (September 1999–February 2000), curated with Walter van der Cruijsen, Golo Föllmer, Johannes Goebel, Hans-Peter Schwarz, Benjamin Weil, and Jeffrey Shaw.

1   Marshall McLuhan, *Understanding Media: The Extensions of Man* (New York: McGraw-Hill, 1964), 248.

That exhibition deserves special attention today, particularly its discursive attempt to define a canon of exhibitions of media art history.[2] It became an emblematic event for ZKM | Karlsruhe, the foundation stone of its programming, as the first exhibition initiated by WeibelLaunched under the umbrella of the steirischer herbst festival in Graz in 1998, *net_condition* strove to analyze and articulate a new online world and what it means to be online:

> A new world is being constructed. The world is going online. *net_condition* with all its forms of expression wants to be understood as an attempt and an offer to articulate this new world, online presence, and participation within a museum space.[3] (see figs. 1 and 2)

Taking Niklas Luhmann's systems theory as a starting point, Weibel saw the exhibition not as a simple showcase for artistic developments produced in net.art but as a way to address the social conditions that enforce the net and the new conditions that the net itself imposes on art and society:

> Society is networking to differentiate itself as an information society. Certain social conditions therefore that require and promote the development of the network.

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2   This became a discussion topic at the workshop "Methodology of researching historical exhibitions," in the framework of the exhibition *Matter. Non-Matter. Anti-Matter* on March 17, 2023. For a summary of the workshop see p. 160 in this volume.

3   "Einführung in die Ausstellung *net_condition*," ZKM | Karlsruhe, accessed May 25, 2023, https://zkm.de/en/einfuhrung-in-die-ausstellung-netcondition.

The net, in turn, provides the possibilities and conditions with which the information society can develop. The title of the exhibition is to be understood in this sense: as a social as well as technical condition that is reflected by art.[4]

Thus the main goal was to examine the conditions that media, communication, and economies are subjected to by the electronic network. A crucial precondition of the exhibition concept was the interdependence of physical and virtual space: the network of virtual space controlling the sequence of events in real space and vice versa. The distributed network idea resulted in focal topics such as virtual reality, shared cyberspace, non-local communication, and multi-user visual and sound environments. These were manifestations of the *net_ condition* but so was the distribution of the

exhibition itself as a multilocal networked project, taking place simultaneously in Karlsruhe (ZKM, its final part), Graz (steirischer herbst), Tokyo (the NTT InterCommunication Center (ICC)), and Barcelona (MECAD Media Centre d'Art i Disseny).

Reflecting on how an exhibition's topic can be represented through its medium or medium specificity (in this case a distributed network of locations around the globe) was of particular importance:

The aim of the project was to make us aware of and visualize the way the media change and construct reality with the aid of a media project taking place primarily in the media space. The aim of holding an exhibition in the media space [...] is essentially to leave the traditional spaces and institutions of exhibitions. [...] Ideally, an exhibition focused on the social,
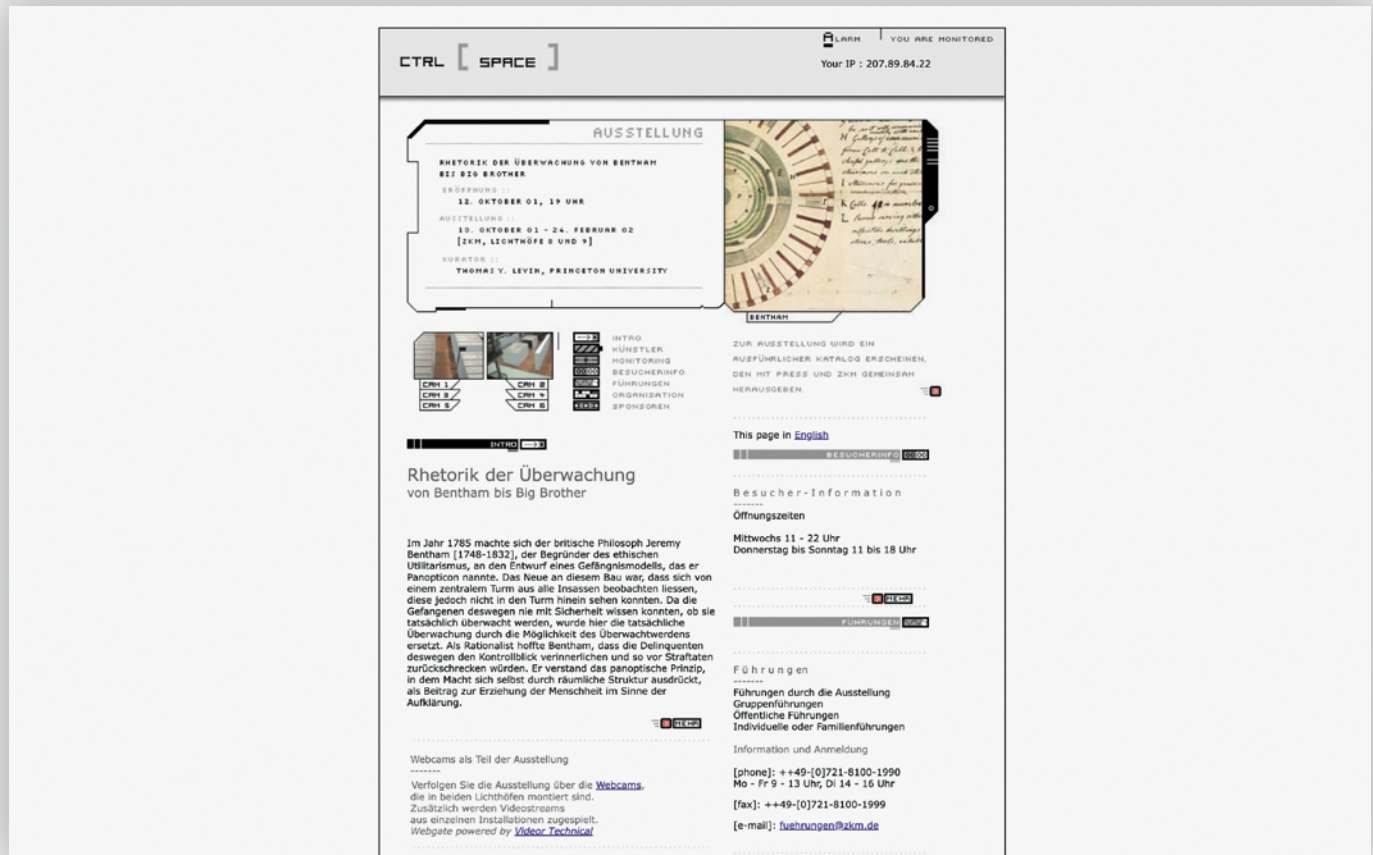
economic and political consequences of the new media can only take place within these very media.[5]

The title of the exhibition was programmatical not only because of the social processes described above, but also due to ZKM's institutional orientation. ZKM was not meant to become an ivory tower for presenting recent achievements in new media art, but a platform for artistic experiments and a forum for engaged citizens and visitors to reflect on burning social issues, namely technological and scientific developments and their impact on society. According to Weibel, as quoted above, probing possible forms of physical-virtual interdependence and prerequisites for the virtual condition were the exhibition's main focus, and these became research topics for ZKM. Since then the institution has consistently focused its program on research into various aspects of this virtual condition—not only

its utopic aspects. For instance, the exhibition *CTRL [Space]: Rhetorics of Surveillance from Bentham to Big Brother*, curated by Thomas Y. Levin in 2002, investigated the state of panoptic art, especially that dealing with dataveillance technologies and their shift from military to civil and domestic use. Webcam reordings of the exhibition were transmitted to an exhibition website that became part of the project (see fig. 3).

Purposive reflections on the digital revolution generated a series of exhibitions preoccupied with a new step in the development of connectivity through digital technology and globalization, which were changing the world exponentially. Some of these exhibitions, such as *Infosphere* and *Global Control and Censorship*, formed part of ZKM's 300-day event *GLOBALE: The New Art Experience in the Digital Age* in 2015. *Hybrid Layers* (2017–18), *BioMedia: The Age of Media with Life-like Behavior* (2022–23), and the research project

5   Peter Weibel and Timothy Druckery, eds., *net_condition: art and global media*, exh. cat steirischer herbst, Graz and ZKM | Karlsruhe (Cambridge, MA: MIT Press, 2001), 8.
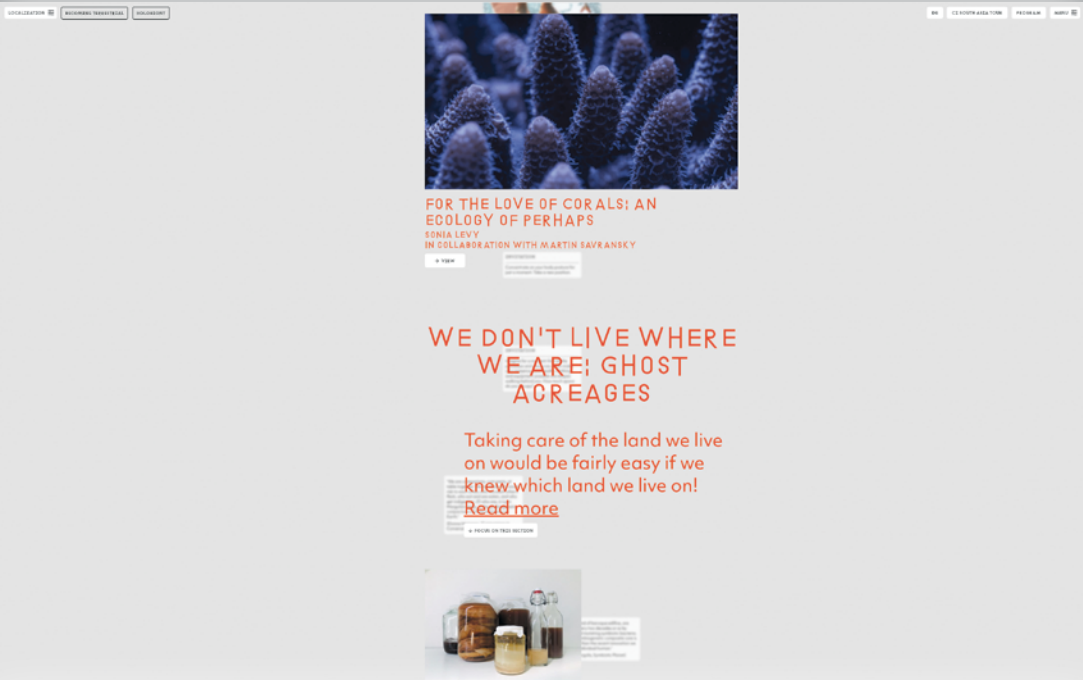
Fig. 6
Digital platform for the exhibition B*ioMedia:***
The Age of Media with
Life-like Behavior,
ZKM │ Karlsruhe, 2022–
23. Screenshot.

Beyond Matter can all be looked upon in this tradition of investigation.

Digital technologies such as the internet and portable devices have profoundly transformed modes of artwork production, distribution, and reception in recent decades. New tools, apparatuses, and digital technologies are being used to create works of art. Online platforms for artworks have proliferated, experimenting with methods for interacting and viewing art. Investigations into the virtual as an exhibition space took place quite early on at ZKM. Alongside exhibition websites, such as that for *CTRL [Space]*,[6] online exhibition platforms were developed independently from the physical space, as for example *ArtOnYourScreen – be part of it!* (2014).[7] Its mission was to exhibit artistic production and education in the online networked world and to enable interaction with artists whose medium is the internet.

The spread of Covid-19 and its shutdown of cultural institutions required an almost immediate reaction as institutions hoped to stay connected to the visitors. This boosted the numbers of online platforms and exhibition spaces, many of which were connected to physical exhibitions temporary closed due to the pandemic. Self-reflection on the medium was central to ZKM-related website exhibition projects. How could the content of an exhibition be reflected in its medium and the use of the web as a space? How to rethink an exhibition visit in virtual space and rebuild it, exploiting the potential of the web as a medium?

ZKM's online projects rejected the photogrammetric 3D representation of physical space and tried to create a space reactive to the goals and topics of each respective exhibition. The physical exhibition *Critical Zones: Observatories for Earthly Politics* (2020–22) reflected on the critical ecological mutations of the Earth caused by the man-made climate catastrophe. The pandemic made the scale of the crisis even more tangible. To grant

visitors access to the exhibition, especially during the uncertainty of the pandemic, the exhibition and its activation program were digitally reimagined, creating a digital and hybrid museum experience. Both exhibition and accompanying program were translated into a live-streamed festival, a digital exhibition platform,[8] and a community-based hybrid program, online and offline, in both digital and physical realms. These constituted not a copy but a reinterpretation of the physical exhibition space and its artworks, guided by certain questions: How to translate the idea of matter and multispecies interdependence and the artistic contributions to the physical exhibition into the digital? How to enable active co-presence and user involvement as a parallel to visitors being folded into the physical exhibition space? Website solutions were found in a collective brainstorming process among various ZKM departments with software development agency agenturfuerkrankemedien and graphic design studio operative.space. This moment of networked curation and cocreation was complemented by the fact that machinic intelligence cocurates the website: an algorithm reshuffles the website's contents, processing users' metadata based on their behavior (movement and actions) in real time (see figs. 4 and 5). Thus, relations between entities on the website, such as art viewers or museum interventions and instructions, establish an evolving ecology and recompose the site's surface. The infinite scroll was proposed as a navigation solution and translation of the experience of "being folded in." Due to the endless rotation of the artworks in the scroll, different for each cycle, no dead ends appear and no contents can be missed by the user. The rotation learns and is user-centered, revealing less prioritized content as first; the user navigates through evolving frames of the larger relationships within the exhibition. The website was conceived as an organism, with parts growing through an iterative development process. It

6   See http://ctrlspace.zkm.de/.

7   See http://aoys.zkm.de.

8   See https://critical-zones.zkm.de.
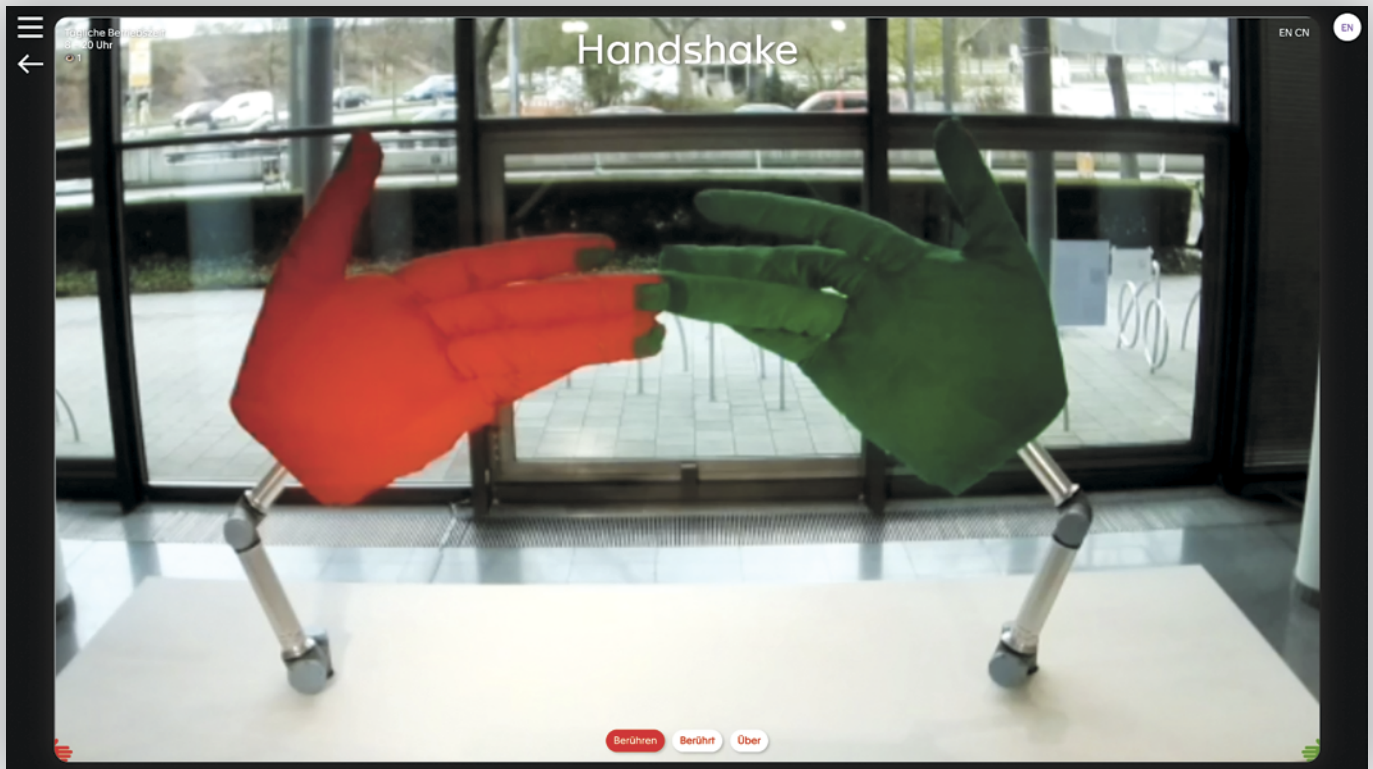
was featured in the *CRISIS SPECIAL* site of the Beyond Matter platform,[9] along with projects from partner institutions, all stemming from the need to keep audiences connected to art institutions in times of lockdown.

Over the course of the pandemic, digital interconnectedness and involvement in the digital grew immensely on a daily basis. Covid-19 also brought about certain changes in artistic production. Creating a hybrid experience was a core concern for the *BioMedia* (2022) digital platform (see fig. 6),[10] designed by The Rodina, a post-critical design studio which first collaborated with ZKM on the online exhibition *Spatial Affairs. Worlding* (2021–23). This was possible because speculations about the connectedness of physical and digital exhibition spaces were already inherent in the artistic interventions exhibited. For example, visitors to the digital space could control the robot created by the artists' collective AATB and located in the physical space (see fig. 7). A physical handshake between two robots was possible through the interaction of geographically distant visitors, creating moments of warmth and active co-presence. Today it unclear if the development of digital platforms will remain part of art institutions' exhibition and mediation programs, however, as physical art spaces have started to attract as many visitors as they did in pre-Covid-19 times.

But with the rapid hybridization of our daily life, we will most likely experience an increasing influence of the virtual condition on the arts—in aesthetics but also in production, distribution, reception, and mediation. The dynamic, processual, and spatial aspects of the virtual condition have already posed challenges to curators and technicians and will remain as a source of inspiration and curatorial invention for years to come. For institutions such as ZKM, this means a process of permanent reflection not only on the discourse of media art but on its preservation, presentation, and mediation.

9   See https://beyondmatter.eu/crisis.

10   See https://biomedia.zkm.de.

6.
VISIONARY RAMBLINGS. Residency Program in Karlsruhe, Tallinn, Tirana, and Online

INTRODUCTION.
Beyond Matter Residency Program

Felix Koberstein

How can virtual reality tools and digitization contribute to developing artistic practices that question materiality and offer possible ways to shift the discourse into other dimensions like experience, visualization, imagination, sensory perception, atmosphere, or spirituality? How can artistic practices using virtual reality contribute to current political and social discourses? What is the potential of virtual reality within the art field? And how can virtual reality serve as a media basis for overcoming physicality and temporality in order to create something new based on today's possibilities? What can VR stand for? Virtual Reality, Variable Relations, Vertical Radiation, Valid Readings, Vaporous Restoration, Visible Revision? Applicants are invited to consider not only the multivalent applications of the latest representational systems, but also how they can be expanded. The projects must be conceived as versatile as their fields of application are constituted. That is why the search is not for one answer, but for many solutions.

— extract from the open call announcement for the Beyond Matter residencies

On the basis of the thematic outline above, three partnering institutions—ZKM | Center for Art and Media Karlsruhe, Tallinn Art Hall, and Tirana Art Lab—invited applicants from the fields of art and theory to submit project proposals. Between 2020 and 2023, a total of fourteen residency fellowships were awarded to artists and researchers, each of whom had two months to develop their projects. The framework of the residency program enabled artists and researchers to delve into novel digital approaches to exhibition ↘revival, documentation, and dissemination, while encouraging them to explore the artistic and curatorial opportunities provided by virtual systems of representation. The overarching aim of the fellowship program was to identify the different potentials of virtual reality tools. With their local and professional networks of expertise, the participating partner institutions could assist the fellows in this task by offering practical solutions and equipment, such as workshops, seminar rooms, and exhibition opportunities, as well as professional support. Due to the varying degrees of difficulty posed by Covid-19 restrictions in Germany, Estonia, and Albania, applicants could alternatively submit a purely digital project.

The interviews and transcripts in this final chapter of the Beyond Matter publication report on the projects developed over the course of the residency program and explore their rich potential. They also highlight the obstacles encountered and adjustments made due to the pandemic. The contributions follow the chronological sequence of the residencies at the partnering institutions in Karlsruhe, Tallinn, and Tirana.

The Cypriot artist **Theodoulos Polyviou** was the first artist-in-residence at **ZKM | Karlsruhe**. Using a 3D model of the ZKM museum balcony as a starting point, he designed the digital exhibition space *Fantastic Confabulations*, which can be visited via computers and smart devices. The resulting exhibition, *Drifting, Browsing, Cruising*, likewise designed by Polyviou, was also shown as a site-specific VR installation on the physical museum balcony of ZKM.

With her project *Pandemonium*, British media artist **Ami Clarke** continued a series of works on data surveillance. With external developers, she worked on an online dashboard that visualizes the data crawled by a Twitterbot linked to it and acts as the entry point to the 3D environment behind it, a deserted cityscape populated by contaminated animals.

Call Signs is the title of the project by Berlin-based art and cultural critic **Jazmina Figueroa**, engaging with ego loss informed by abolitionist reckonings. Based on a spoken script, Figueroa created a sound environment that in turn served as the foundation and orientational tool for a chaotic flooded virtual exhibition on the abovementioned online platform *Fantastic Confabulations*.

Carolyn Kirschner is a London-based artist, designer, and architect who took up the 3D models of artworks in the digital model of the historical exhibition *Iconoclash*. By means of visual and auditory autonomous sensory meridian response (ASMR), a sedative sensation that has become popular through the internet, Kirschner restaged the exhibits by lending them a new materiality. Together with composer Kieran Brunt, she created the soundtracked video tour *Iconoclash: Slow Squeeze*.

The first fellow to work at **Tallinn Art Hall** was **Dennis Dizon**. Their research-performance *(e) spiritu-virtu* evokes a queer approach to (an ecological) crisis. Sharing stories and encounters through cursed images, texts, and videos, the work offers a humorous and self-reflexive attempt at a sacred recovery from colonial history, queer trauma, and ecological violence.

Laura Kuusk and **Camille Laurelli** used their residency to visit areas in Eastern Estonia associated with excavation, exhaustion, and/or abandonment, while expanding on the concept of digital composting: the recycling of digital waste matter. The focus of their joint project, which is titled *Laboratory of the Future*, lies in finding different ways of narration for future imaginings.

Helen Kaplinsky's unique tour *Unio Mystica* was the outcome of her residency. The story-telling event brought together mythologies and everyday stories of medieval women with contemporary mystical feminist narratives. Performance and virtual reality immersed the audience in confounding somatic practices and fantastical worlds that drew upon different experiences of embodying femininity, both in life and in death.

Zach Blas looked at aspects of religion that are uncannily mirrored in contemporary cultures of artificial intelligence. In an artist talk at Tallinn Art Hall, Blas focused on recent projects that explore AI and religion through emotional crying: the web-based work *576 Tears* (2022), commissioned by UP Projects for *This is Public Space*, and the immersive installation *Profundior (Lachryphagic Transmutation Deus-Motus-Data Network)* (2022), both of which were on view at the 12th Berlin Biennale for Contemporary Art.

In contrast to the fellows in Karlsruhe and Tallinn, the six artists-in-residency at **Tirana Art Lab** worked exclusively on-site and with reference to the urban and cultural history of Tirana. **Donika Çina's** research project built on her series of interventions in public space: attempts to preserve the façade of the house of Bia, a local woman who had repeatedly and untiringly cleaned and painted the façade for many years after the political changes of 1991. In recognition that the house may disintegrate or be destroyed for the sake of urban development and economic progress, its conservation through the repetition of Bia's method in a series of performances has been digitally documented as a virtual memory of the city.

Alexander Walmsley's *Tirana Time Capsules* are three virtual environments composed of 3D scans and audio field recordings that act as time capsules of three different neighborhoods in Tirana in 2021. With this work, Walmsley explores the ways in which high-quality digital scanning and modeling methods can update and reconstruct public space in the virtual sphere and, through subjective interventions, add and merge personal memories.

Since her arrival in Tirana in September 2021, **Hanna Hildebrand** has been fixated on grids. On one of her first days in the city she observed a lattice of steel bars emerging from a block of hardened concrete: an abstract, rational, empty structure coming out of what can be considered our most used material after water. Her installation *LWCE T1* explores the grid as a space between "the concrete," the imagined, the ideal, and the remembered.

Olson Lamaj's research investigates ongoing debates around space and art in public space in Tirana. During his residency he developed *Pixel and Blood*, a series of photographs and augmented reality interventions in Tirana's main square. Written statements and slogans lent new meaning to historical buildings. These semi-monuments contribute critically to debates relating to digital transformation, spectacle, consumption, and power structures in contemporary societies and art.

As Dust, as Rain, as a Line on the Map and a Crack in History is the title of the three-channel installation **HUNITI GOLDOX** developed during their residency at Tirana Art Lab. The work reflects on the state of the present while unveiling vulnerable landscapes and societies and their entangled relationships. With a strong focus on the Tirana River and the city's urban development projects, it poses questions about the lines of power affecting present capitalistic, social, and ecological structures in Tirana and beyond.

The most recent resident artist, **Valentina Peri**, used the residency to work on her ongoing project *Her Boyfriend Came Back From The War*. The starting point was the discovery of documents, including love letters, belonging to her Italian grandfather when he was stationed in Albania during World War II. With an interest in how narratives form, the project reactivates the archive and adds a new layer: Peri's experiences while retracing her grandfather's steps in Albania and recreating his memories through augmented reality.

VIRTUAL SPACES FOR TRANSFORMATIVE ENCOUNTERS AND VAST RECIPROCITY.
In Conversation with Jazmina Figueroa and Theodoulos Polyviou

Annette Urban

Jazmina Figueroa (b. 1989) is a Berlin-based writer. Her writing and research critically examine data or information extraction and ↘experiences with technology as immensely personal, non-scalable, and inherently socio-political. Currently, she thinks a lot about entropy in her recorded and arranged performances, written published prose works, and other artistic essayistic productions. From 2021 to 2022, Figueroa was a fellowship holder at Akademie Schloss Solitude. In 2021, she was invited to participate in the Beyond Matter research project at ZKM│Center for Art and Media Karlsruhe as an artist-in-residence.

Theodoulos Polyviou (b. 1989) is a Berlin-based artist whose practice, at its core, uses expanded media to consider the place of bodies within institutional physicality, and cultural and political narratives. His ongoing project *Transmundane Economies* deploys virtuality and associated digital technologies to study, reconstruct, and fill voids in Cypriot cultural heritage, deviating from a nationalist agenda to speculate instead on the relationship between queerness, repair and reinvention within the historical entanglements of the island. In 2014, Theodoulos graduated with a master's degree in visual communication from the Royal College of Art, London. He is the cofounder and former director of experimental project space Koraï, Cyprus. In 2020, he cocurated the 19th edition of Mediterranea Biennial: School of Waters, San Marino. He has presented his work in solo shows at Künstlerhaus Bethanien, Berlin, and ZKM│Karlsruhe, among others, and in various group shows, including the Cyprus Pavilion at 2021 Venice Architecture Biennale, Venice. In November 2023, Theodoulos Polyviou will exhibit the second chapter of *Transmundane Economies: Zypern Iconostasis* at the Bode Museum, Berlin.

Fantastic Confabulations is an online platform for virtual yet spatial exhibitions. It is a non-space that addresses institutional physicality and its contextual significance, with a particular focus on the decentralization of artistic activity away from one established physical site. The platform was developed in the context of the Beyond Matter residency program, inquiring into the virtual condition in the visual arts and raising questions about the relevance of art and architecture in a digital era.

Taking ZKM|Karlsruhe as a site of inquiry, Theodoulos Polyviou's and Eleni Diana Elia's VR site-specific installation *Drifting, Browsing, Cruising* (July 8–November 8, 2021) renegotiated the symbolic and material boundaries of ZKM, while inviting visitors to find new ways to compromise within those reconfigured spaces.

Jazmina Figueroa's *Call Signs* (2021) was the second exhibition hosted by *Fantastic Confabulations*. A virtual performance-lecture that is part machine-generated and part sensing, it is based on the subversive traditions of expanded media for information exchange and transference.

ANNETTE URBAN   Thank you for participating in this double interview, Theo and Jazmina, about Fantastic Confabulations, the virtual exhibition space set up in the context of your residency at ZKM|Karlsruhe. This virtual exhibition space was linked back to a concrete physical location, a room open to the atrium with a balustrade on the first floor of ZKM. In comparison with the virtual extensions of other museums, which are reminiscent of utopian architectural visions, this was a remarkable starting point. I am thinking, for example, of Manuel Rossner's cloud-like architectural add-on for the 2017 exhibition Unreal at the NRW Forum Düsseldorf. In contrast, what can you say about your idea for the virtual replica of the ZKM balcony?

JAZMINA FIGUEROA   In the initial stages of my contribution to the residency project, I proposed a model or function that thinks about VR away from virtual reality—to focalize more affective potentials of technology. This work was not intended as an alternative vision or virtual space but rather as a site for vast reciprocity (VR). To think of the medium in such terms suggests a non-linearity with the technology, subject to more subversive or chaotic takes on VR that think about perception not as resonating visually but rather sonically or with a sort of poetics. I took a lot of inspiration from Jackie Wang's treatise on Sigmund Freud's oceanic feeling, an elevated state or feeling of ego loss informed by an abolitionist reckoning with institutional structures—like breaking free of such oppressions. From this thinking, I wanted to use digital media, sound specifically, as an expansive model for intimacy, inquiry, and praxis. In my contribution, titled *Call Signs*, the virtual space initially looks like ZKM's atrium but as one virtually moves through it the space disorientates; with each step it is flooded with a liquid substance. As a result, the audience has to rely on sonic orientation.

THEODOULOS POLYVIOU   *Fantastic Confabulations* is an online platform that hosts and archives projects situated within virtual versions of institutions and sites of significance. It is a non-space that addresses institutional physicality and its architectural presence by moving away from established modes of artistic production within such spaces, so basically making virtual temporal interventions within an existing physical site. The project is generative and open—a research approach that develops virtual iterations of a chosen site. We wanted to invite people to work with the platform based on a framework of sustainability, to resituate methods of production and exhibition, and most importantly to initiate an inquiry into the chosen physical site.
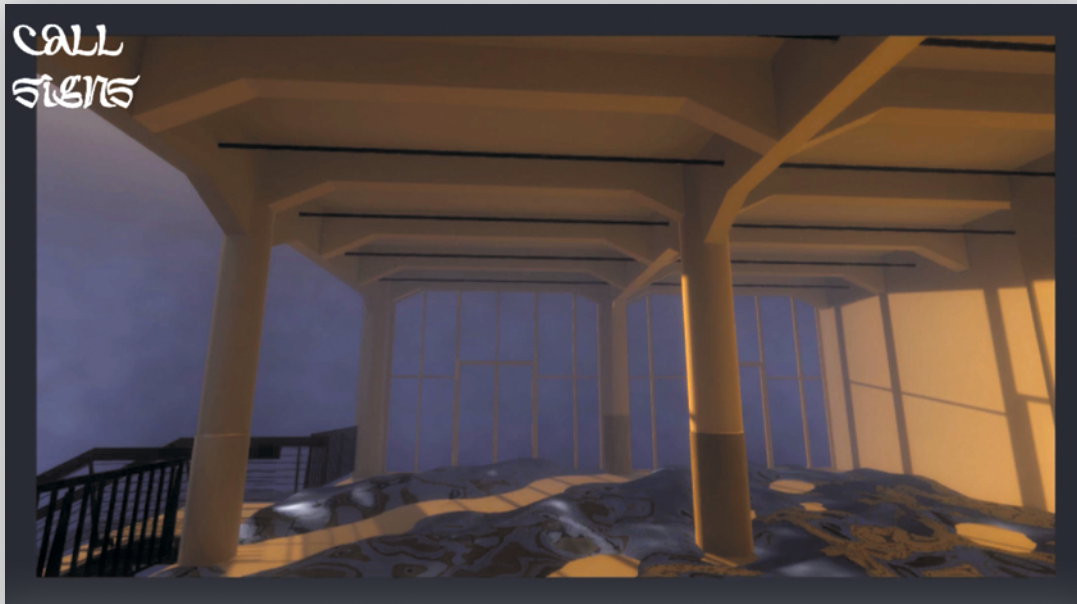
AU The site-specific approach is characteristic of your way of working, Theo. Besides the VR installation *Drifting, Browsing, Cruising* you made with Eleni Diana Elia for ZKM, the project Transmundane Economies, installed at Künstlerhaus Bethanien, refers directly to a monastery in Northern Cyprus. How did this connection between VR and site-specificity develop in your work?

TP *Transmundane Economies* is an ongoing project that deploys virtuality and associated digital technologies to study, reconstruct, and fill voids in Cypriot cultural heritage. It investigates the complex configurations formed between artifacts, new and immersive technologies, and the

physical site of the museum. The first chapter emerged from a year-long investigation, in collaboration with architect Dakis Panayiotou, into the ruins of the thirteenth-century Bellapais Abbey in northern Cyprus. *Transmundane Economies* proposes a reconciliation of the management of the site of inquiry and the institution hosting the exhibition, Künstlerhaus Bethanien. The monastery becomes an offer to discuss mechanisms of inclusion and exclusion, and to think about the potential of any place to transcend its own physicality and thus escape its embodied ideological charge and power. The monastery was virtually reconstructed and became the setting for a fully immersive site-specific VR installation meditating on the spiritual experience of contemporary queer bodies in institutionalized religious spaces and the social conventions these architectures engender and uphold.

This project gave me the opportunity to further develop my work with immersive technologies, after being introduced to VR in 2018 by David Kaskel, founder of Breaking Forth, a company specializing in VR as a platform for immersive storytelling. Since its advent, VR has promised spatiotemporal transposition. Its immersive nature makes it a medium that is intended to disappear. At the time I was interested in creating the opposite: a hyper-awareness in the viewer as to where they are and what they are doing. I thought the best way to achieve this was to work site-specifically. With the help of David and his team, we developed a code that allowed us to calibrate the virtual world experienced through the headset in accordance with the physical structure of a given gallery or museum.
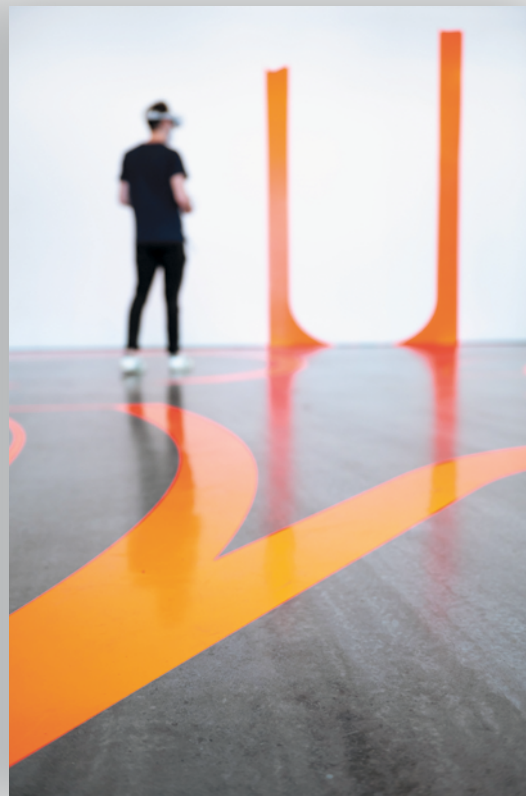

**Fig. 3
Theodoulos Polyviou,
Eleni Diana Elia, *Drifting,
Browsing, Cruising,*
2021. Installation view
ZKM | Karlsruhe, 2021.**

AU What inspired your thoughts on how this virtually doubled exhibition space at ZKM could be used? Neither of your contributions directly equip the virtually accessible space with additional objects as exhibits that claim their own work status. Were you playing with a paradoxical emptiness?

TP In my exhibition, visitors had access to headsets and were able to interact with online users viewing the exhibition, challenging notions of presence and embodiment. Others would experience the work not through VR headsets, but through the intimacy and voyeurism of watching visitors drift through the space. In addition to being site-specific, the work was therefore highly performative and scenographic. It placed particular focus on how immersive technologies can create more experiential and experimental processes of knowledge transfer in the museum environment. So the phenomenological emptiness can be attributed to contrasting traditional conceptions of museological semblance.

Fig. 4
Theodoulos Polyviou, Eleni Diana Elia, *Drifting, Browsing, Cruising*, 2021. Installation view ZKM | Karlsruhe, 2021.

Fig. 5
Theodoulos Polyviou, Eleni Diana Elia, *Drifting, Browsing, Cruising*, 2021. Installation view ZKM | Karlsruhe, 2021.

Something Jazmina and I frequently discussed was challenging concepts of borders, boundaries, and ergonomic factors relating to space. In the absence of materiality, new ways of mapping and occupying the space were proposed. As viewers were invited to find new means of compromising within the reconfigured spaces imposed by the installation, the symbolic and material boundaries of the museum were renegotiated. One had to think about the potential of space to transcend the people inhabiting it, as well about the metaphysical qualities of architecture.
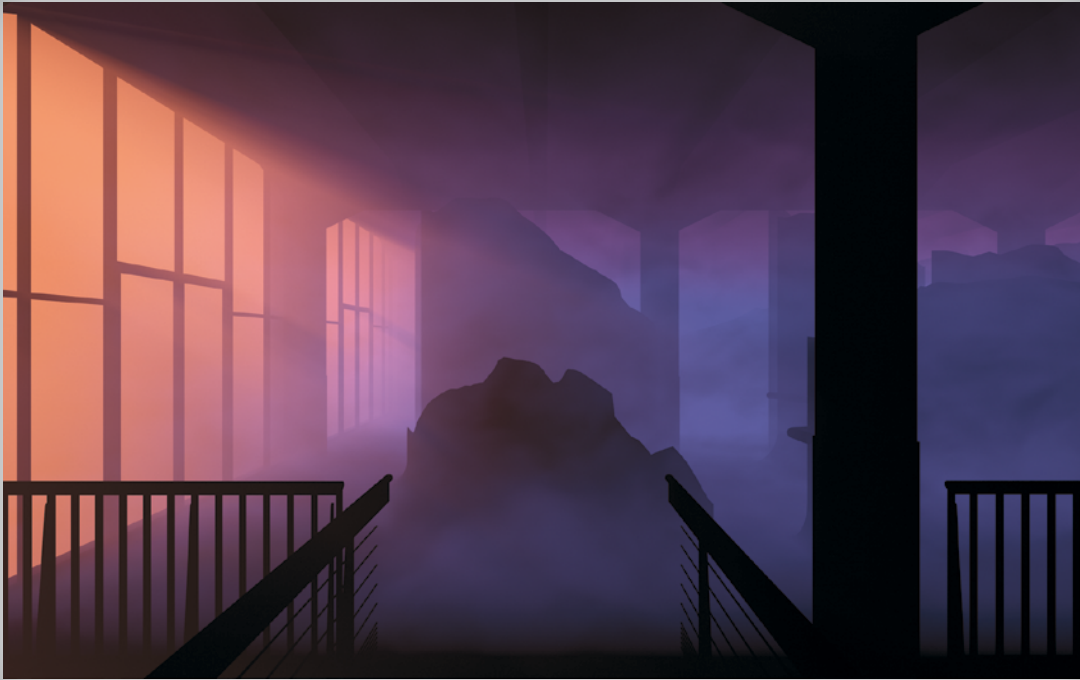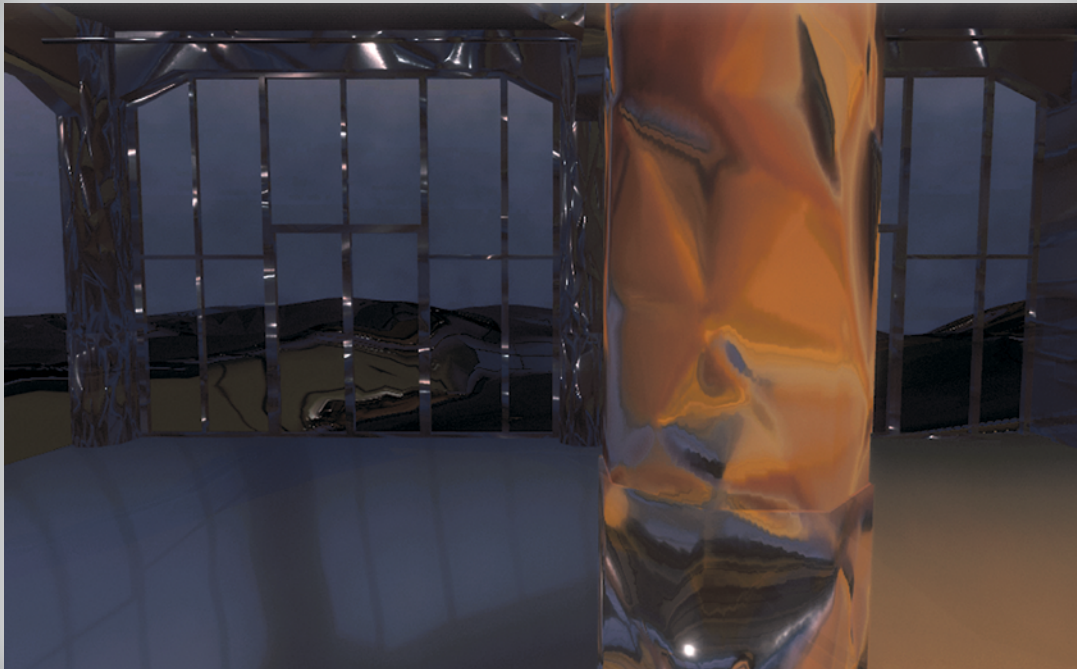
**Figs. 6 and 7
Theodoulos Polyviou,
Eleni Diana Elia, *Drifting,
Browsing, Cruising*,
2021. View of VR site
specific installation at
ZKM|Karlsruhe, 2021.
Screenshots.**
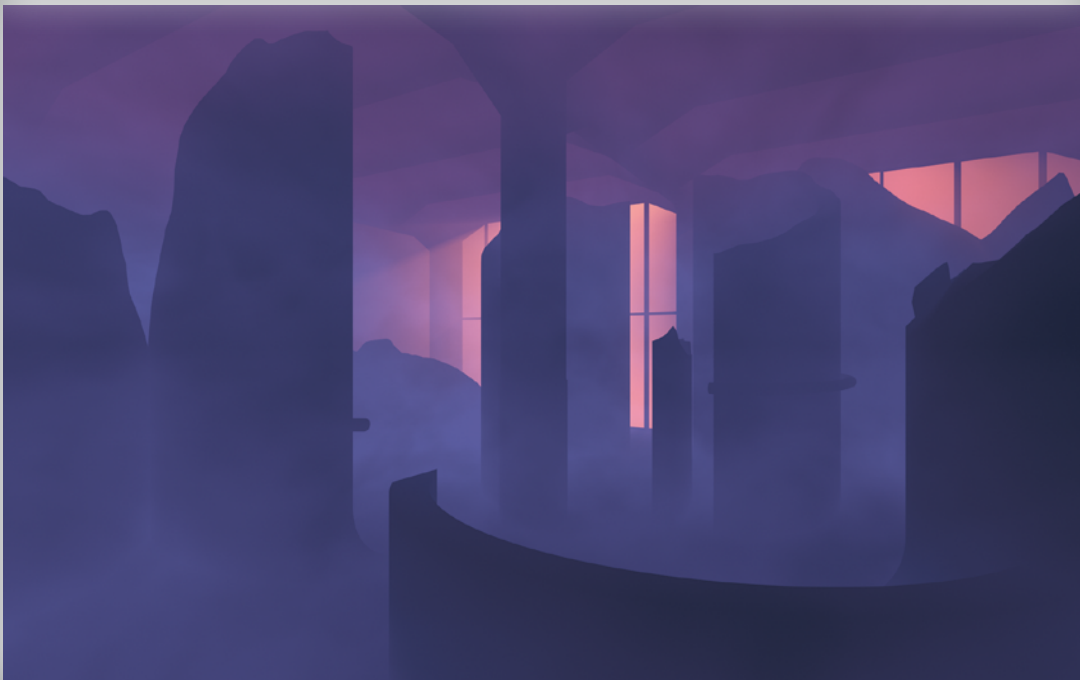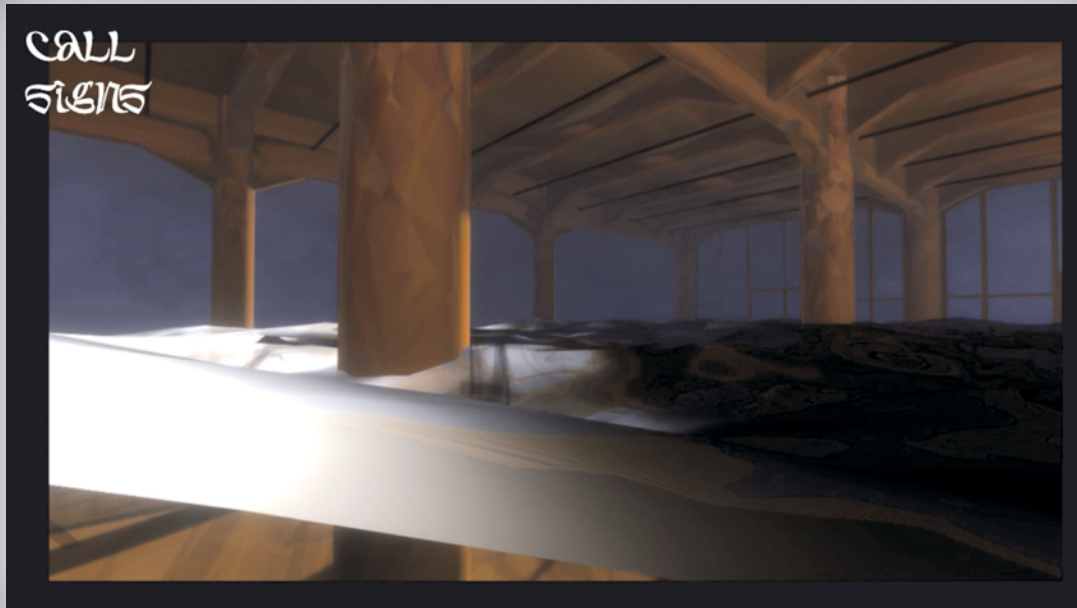
Figs. 8 and 9
Jazmina Figueroa,
Call Signs, 2021.
A flooded virtual
space that resembles
ZKM│Karlsruhe.
Screenshots.

AU Another common aspect of your contributions, Theo and Jazmina, is their recourse to the atmospheric, fluid, and formless. In *Drifting, Browsing, Cruising*, the pillars of the ZKM space seem to have multiplied into a confusing maze of column stumps and voids, dramatically illuminated by the flashing of otherwise functional ceiling spotlights. And in Jazmina's work *Call Signs*, the virtual replica of the room, again completely emptied, is literally flooded, taking on a catastrophic element. Are you explicitly embracing the immersive, overwhelming potential of VR?

There's an intimacy created when speaking words literally into the spectator or listener's ear— for me it creates a sort of deterritorialized inner mapping or orientating effect.

JF With regards to immersion, I like what Theo says about the intention to disappear. I try to think in terms of substances when it comes to developing research or practice about institutions or reiterations of them. It's less formal and less concrete, leaving room for experiential, zoomed-in, or expansive thought: one can choose between a state of being within, against, or alongside. So there's this awareness of VR, as both virtual reality and vast reciprocity, because we are always constrained by such parameters, but then there's an interaction and its affect that happens within the virtual site that recalls something else, more embodied. Theo and I talked a lot about queering and querying during our collaborations and how this comes to a head with concrete forms, or rather with the anchors of cultural heritage that we are working within.

I rely a lot on shared reciprocity in my work: what is familiar or unfamiliar when listening to a score and what happens to the gaze once you've entered the VR site. Reading the script was an attempt to do that with prose. It's interesting to think of VR effects as catastrophic these days, and for sure I was thinking about disorientation and chaos with the flooding effect. But the most important part of this work is the gesture of speaking into a space. There's an intimacy created when speaking words literally into the spectator or listener's ear—for me it creates a sort of deterritorialized inner mapping or orientating effect. Then there's a shift or sudden noise that breaks or restarts that experience. I like the roaming, coming upon, or traversing that happens in Theo's practice and in mine.

AU The idea of disorientation and its effects are crucial for both of you. Your contribution, Jazmina, includes reflections on fluidity, hyper/hydra media, wet matter, and the central motifs of water, spirals, and shells. In Drifting, Browsing, Cruising, the title refers to the Situationist theory of the dérive as a nonfunctional use of urban space following the release of suppressed passions, not unlike the forces of nature. Could you elaborate a bit on this multilayered field of reference?

TP   By immersing physical bodies in projected virtual trajectories, the exhibition proposed alternative ways of inhabiting and orientating. In landscape architecture the term "desire lines" is used to describe unauthorized paths, imprints on the ground that indicate activity that diverges from the preconstructed routes. In *Drifting, Browsing, Cruising*, the lines queer the space by disorganizing the expected navigational flow within the museum and disrupting the trajectory lines proposed by its site.

As Sara Ahmed writes in *Queer Phenomenology* (2006), orientation is not just a question of finding our way, but of how we come to feel at home and how that can necessitate some degree of disorientation. Getting lost still involves inhabiting space and following non-existent trajectories, until the state of being lost becomes a state of awareness. These processes of becoming necessitate ritual spaces. In his 2020 article for *Endeavour* journal, "Imaginal architectural devices and the ritual space of medieval necromancy," Andrea Franchetto explains how rituals serve to achieve psychological, material, social, or super-natural effects, turning the ritual space into an architectural device. This installation attempts to transform the ZKM balcony into an archi-tectural device through VR. It references mnemonic techniques dating back to the European Renaissance by involving esoteric "walking throughs" that make the site into a fictional syncretic sanctuary.

AU   Another work that you conceived for London, Theo, refers to a historical neighborhood and its cruising tradition. How does the theme of drifting and cruising seem particularly suitable for the virtual reinterpretation of a museum space at ZKM?

TP   The story of a city is one of constant change, where physical space becomes historical, and in becoming historical it becomes virtual. Queer spaces trace this trajectory in interesting and compelling ways. Using cruising processes as a strategy for marking space is a recurring method in my work. As mentioned above, lines queer the space by disorganizing the expected navigational flow within it and disrupting the trajectory lines proposed by its site. This was true for both my exhibition in London, *Molly House*, and for my installation at ZKM. They deal with the construction of memory and space through queer rituals like cruising as well as through religious rituals, and with the emergence of new social identities and new manifestations of queer spaces through digital collectivity. These new identities provide access to history, ancestry, and spirituality. By acknowledging the historical and social structures abstrusely inscribed in the production of these environments, my work expresses the possibility of geopolit-ical multiplicities.

AU   Your artistic practice, Jazmina, is primarily shaped by writing. Has this been modified by your contribution to Fantastic Confabulations? Does physically putting the user into a state of immersion and submersion stimulate fabulating?
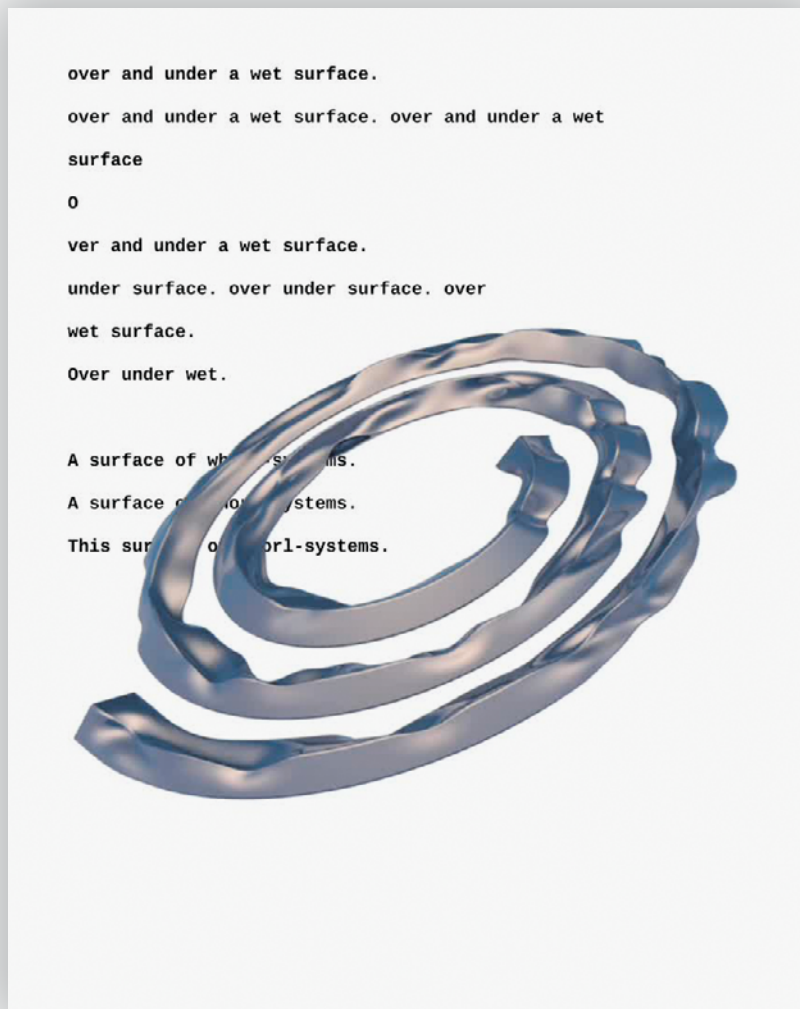
JF I work with language to store, render, or narrate chaotic situations, timing, and histories. I don't have any visual compass for the work I make. This was the first time I thought about my writing as a sonic experience to achieve something anecdotal, referential, emotive, and temporal. I wrote the script for the score, read it aloud, and arranged a sound work that incorporates melodic interventions, humming, distortion, noise, and sonic textures that build a sensorial space for the listener.

What I call the machine-generated and sensorial aspects of *Call Signs* refers to what the audience enacts from it. As the audience encounters the "virtual performance-lecture" sound textures appear based on one's orientation within the atrium and how they sense the setting. The machine generates a response based on rules I set with the spatial effects designer Andrew Madden—relating the "steps" of the user to the continuous flooding of the room. It's like a digitally implemented call and response, which is true for all VR. Meaning that the work unfolds differently in each encounter, and no one will have the same, or even a similar, experience. The piece relies on the audience's sentience and desire to go further by spending more time with it.
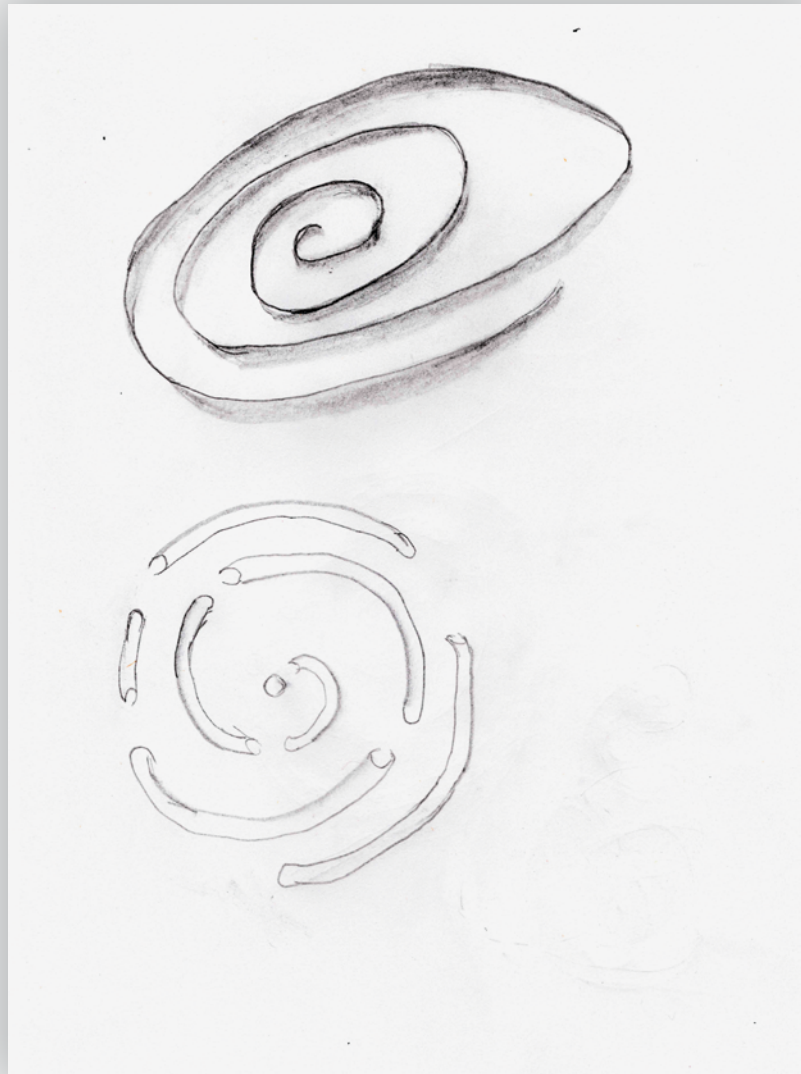
AU Jazmina, you also deal theoretically with screen-based spectatorship. In a recent article for MARCH journal, for example, you discussed the contactless drone-led studio visits of the initiative HIGH-RISE BERLIN, which wanted to keep art accessible under pandemic conditions. How do you classify Call Signs, which ultimately also situates the recipient in front of the desktop? Could you imagine an extension into physical space, such as in Theo's contribution?

JF The pandemic was a crucial moment for spectatorship and its expanded disembodied points of view, or what I termed "expanded spectatorship." I am interested in the canonical references for such technological implementations in the context of urban developments. How should technology be used socially for collecting data, organizing large sums of information, planning social organization formulations that inform algorithms, militarizing technological developments, and the self-actualization practices occurring across social-media networks? How do we move through and how are we seen by so-called digital architectures of perception? This is a main thread in the essay you mention.

With his SF tale *High Rise*, J.G. Ballard imagines how dystopian conse-
quences emerge from the architectures of perception embedded in tech-
nological solutions created in the name of utopian ideals for urban social
organization. *HIGH-RISE BERLIN*, by Schinkel Pavillon and Berlin's KW
Institute for Contemporary Art, adapts a drone's point of view over artists
working within their respective frames of reference and localities. For me,
architectures of perception also refer to perceiving space based on the
qualities that may trigger a memory or other senses (smell, touch, etc.). I'd
therefore like to make *Call Signs* into a live performance-lecture even-
tually, as it was originally intended to occur in front of an audience and
incorporate VR as another stage or point of view within the live staging.

AU Virtual spaces don't only enable embodiment and navigability, but also
provide us with virtual objects. What importance do you attach to these
specific forms of objecthood, Theo? Why did you develop an interest in
the 3D model of a spiral, Jazmina?

TP   Although virtual worlds juxtapose seemingly incompatible scenarios, I often correlate virtual objects to their physical counterparts. In *Drifting, Browsing, Cruising*, by examining the choreographies produced through the interaction between online users and the visitors in the museum, I hoped to investigate how perceptions of reality can be profoundly affected by what is unseen, thus defining the unseen as matter with agency.

Inversely, in *Post Impalpable Rites*, an exhibition curated by Carola Uehlken as part of the Open Window project at Künstlerhaus Bethanien, Dakis Panayiotou and I transformed a virtually constructed architectural structure into a physical environment. VR glasses were disabled from their technological functionality and instead equipped with horns, evoking pagan bull-mask rituals from Cyprus in antiquity. There were no access points to the installation; it was only visible from outside through a window, which served as a liminal membrane, an analog screen.

JF   In *Call Signs*, I used descriptions of shells to think through certain myth structures, material networks, and the spiral-like or sound chamber metaphors. I wanted to show how consequences or imaginaries correlate with chaos in or around the oceanic as a geopolitical and technological site. Through spoken language, sound textures, and prose, I used shells to represent a sort of oceanic dynamism. The body of work produced during this residency is based on present-day myth structures that uphold material infrastructures. I understand myth structures as data that informs technological production, quantified behavioral networks, and geomorphic structures—like shells. I came across Hans Meinhardt's book *The Algorithmic Beauty of Sea Shells* (1995) in the library at ZKM. Meinhardt thinks about shells as time machines, as each point or pigmentation marking on a shell, like DNA or rings on a tree, stores information about the time that mark was made.

In revisiting through VR technologies and experience-based productions the spiral-like objects created by oceanic topographies, I wanted to think away from Western canonical legacies of digital infrastructures and towards a more naturalistic impulse. Shells and spirals were also a way to think about the ocean's influence on defining global infrastructures for resource commodification and extraction. This was influenced by my own formative experiences, as a significant part of my childhood was spent in my father's hometown in Nicaragua, a country shaped by two coastlines and by major cultural and political influences and injustices from the histories of Atlantic colonization and Western-dominated geopolitics. I asked myself: what would lineage look like, as narrative, if we were to account for movement (in the form of migration or dwelling within or over the oceanic), world-making potentialities, and absence as displacement or abolition?

AU   From your point of view, Theo, what makes a VR experience special when it doesn't generate a separate world of its own, but is attuned to the existing environment? To what extent are the prominent pillars of the transit space at ZKM also the cornerstones of the VR experience? What is mapped out by the vinyl strips on the floor?

TP   These virtual spaces that I create in the form of non-spaces live invisibly in the physical premises of the hosting institutions. The pillars have no symbolic significance. Distinct architectural features of the balcony remind you during the VR experience that even though you are transcended, you are still very much present in the physical space. The vinyl strips indicate the architectural plan of the structures seen and experienced in the VR, but there's more to it than that: they suggest a ceremonial space that is ephemeral. The kind of space one would expect to find in domestic ritual, like magic or healing, and not associated with a standardized location.

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The lines serve to transform the exhibition space into an imaginal architectural device in the sense of Andrea Franchetto's work, and create interplay between mental projection and physical construction. They define the architecture as a physical form and as a void that shapes and contains space. They are arranged in a labyrinthine pattern. Meditating is derived from the Latin word *meditere,* which literally means "to find the center." Metaphorically and literally, walking through a labyrinth involves reconnecting with our deepest spirit. In the case of *Drifting, Browsing, Cruising*, there was no center to find.

AU   Recently there has been more experimentation with so-called social VR, and wide discussion about the ability of VR to generate empathy. What do you think of the future of this technology?

TP   Through the multiple headsets, the goal was not just to get lost but also to get entangled in queer togetherness, to cause and confront spatio-temporal disturbances and investigate the different ways in which politics and social structures that necessitate geographical specificity translate digitally. I would love to think of this in contrast to a rigid definition of "metaverse" as promoted and claimed by big tech. "Metaverse" doesn't really refer to any one type of technology but to how we interact with technology. And it could potentially stretch out in all sorts of unpredictable directions—much like the internet has done since the 1970s, when it was difficult to predict its development. As stated by Franco Berardi, the future is a cultural construction, a projection that changes as economic and political systems continue to develop.

I am not suggesting that we fully oppose technology. Digital technologies have the potential to integrate meditating bodies in ways that provide new spatial narratives and transcend binary divisions between online and offline, logged-in and logged-out, basic and premium. I like to think of the metaverse as a potential mystical space, like the desert.

A place of healing, rebirth, and spiritual cleansing. And this is the time to negotiate its different definitions.

JF   I think this also speaks to the psycho-social ethics of developing such technologies. A certain affect and media spectacle is presented to the masses through VR apparatuses in, for example, journalism. Unfortunately, it's impossible to hold technologies accountable for their psychological effects while they are still heavily influenced by Western knowledge systems of rational and capitalist production. Our experience with many technologies shows us that they are built to use quick conclusions, like a *deus ex machina*, to scale human behavior and connectivity into one single experience mixed with inherent surveillance, rather than being built as empathetic or nurturing spaces for reflection and understanding.

AU   Finally, I would like to ask what you think about the potential of virtual exhibition spaces such as Fantastic Confabulations for new curatorial practices, especially for artistic-curatorial co-productions.

TP and JF   They could generate new modes of spatial and narratological production in terms of researching and making virtual realms outside the traditional museum or gallery context. We also recognize the potential for such fantastic confabulations to investigate the use of art in architectural interventions, creating political disorganization and procuring modes of queering that disrupt homogeneous normativity.

Public art institutions are asked to be in continuous negotiation for works combining public engagement and art-market relevance. This has created a very narrow landscape populated by the production of physical or tangible objects that preserve soft power. For us, this is not consistent with the sociopolitical shifts occurring since 2020. In an era of new imaginaries, world-building, data-profiling, surveillance, and critical resistance, there are dynamic avenues for art institutions and museums to address their contexts and become more accessible or present.

PANDEMONIUM.
In Conversation with Ami Clarke

Felix Koberstein

Ami Clarke is an artist working within the emergent behaviors that come about through human engagement with technology. Their research is concerned with the complex protocols regarding surveillance capitalism as it meets disaster capitalism in everyday assemblages, such as the contract-tracing apps during the Covid-19 pandemic. They work from a xenofeminist and ↘post-human perspective that is interested in acknowledging and thinking through the complexities of the subject emerging in synthesis with their environment, from a critical intersectional position. There is an emphasis on grasping something of the complexity of the multi-temporalities and scales and the cross-species contaminations and alliances that are necessary to confront the environmental challenges ahead. They utilize various digital media, including data analytics and VR, often incorporating aspects of live programming to produce video, sound, or spoken-word performance.

The VR work *Pandemonium (do androids dream of?)* emerged from Clarke's residency at ZKM | Center for Art and Media Karlsruhe from June to July 2021. It includes a VR environment and live sound work with accompanying Twitter bot @trackntracer, deployed as a research assistant taking the temperature of public debate in England via sentiment and emotion analysis while rt'ing mentions of the NHS Covid-19 app, which had little to do with the UK's National Health Service (NHS), since November 2020.

Pandemonium nests like a bad-weather gift-shop snow-globe in the context of Clarke's body of work *The Underlying*, inviting participants to explore London's eerily decimated financial district, reclaimed by a virtual wilding, *way too lively by far*—pandemonium—where the kinds of animal spirits associated with markets get recalibrated to address the climate crisis.

An online dashboard provides an entry point for recalibrating concerns regarding the use of data; these are drawn from the Epidemic Preparedness Index by Metabiota, which takes a holistic approach in rating countries' or companies' preparedness for crisis, using criteria such as "trust in govt," and "govt comms" as well as "infrastructural development." It provides a stepping-off point to develop better practice that supports a rewilding of data to address user concerns regarding privacy, agency, and trust that crystallize around track-and-trace apps.

FELIX KOBERSTEIN   Ami, you are an artist whose multifaceted work focuses on the social behaviors emerging in the age of so-called platform capitalism. A digital economic order in which tech corporations such as Google, Apple, Facebook, and Amazon have become leading economic actors, and alongside Twitter, Instagram, and TikTok constitute what has become the mediasphere; they gain their power by keeping users engaged through data analysis and algorithms—forms of digital surveillance. As part of the Beyond Matter residency you developed a project called *Pandemonium*, a VR environment modeled on the old financial district in London, shown
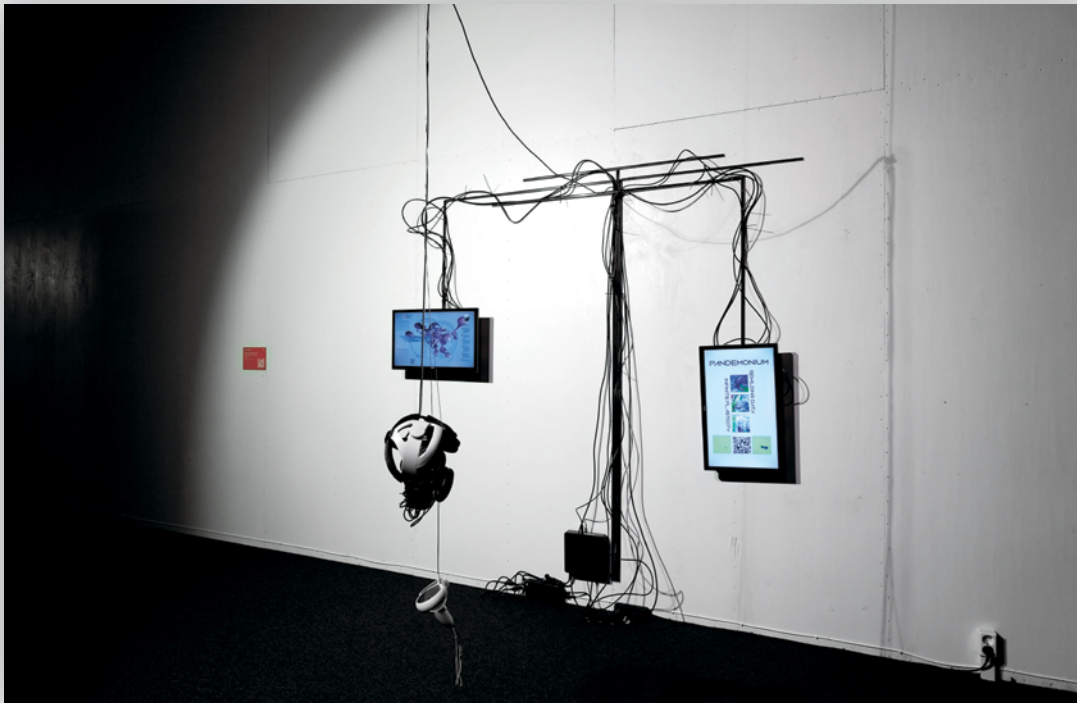
empty of humans like during the pandemic, but populated by some very lively critters. Could you elaborate on where you see the intersections and parallels between surveillance capitalism and risk management?

AMI CLARKE   The pandemic saw the 'return of the expert,' as news grounded in evidence became a vital necessity, as humans found themselves pitted against a killer virus sweeping through their midst. The mediasphere of social media had become a place where language was weaponized, with claims of "fake news" rendering the commons 'senseless' but not without *feeling*, as jouissance rippled through the networks. Come the pandemic, trust in the message was suddenly quite literally a matter of life and death, with a dire need to go beyond a medium beholden to a business model operating within an economy of attention driven by sensation and outrage.

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I'd come across sentiment and emotion analysis while working on *Breaking News – Flash Crash* (2014). Theoreticians Tero Karppi and Kate Crawford have drawn attention to *Dataminr* software, which "produces a sophisticated scoring of the relationships between words in play, to uncover grades of expressed 'emotions'—in order to 'predict the present' and thus transform social media signals into economic

information and value."[1] For many years my work has focused on the effects of the semiotic turn and equivalences found in the loss of the referent in both language and finance that Katherine Hayles describes in her book *Unthought: The Power of the Cognitive Nonconscious* (2017). A work I made in 2014 titled *Low Animal Spirits* deployed a high-frequency-trading algorithm trading in world news, while the Twitterbot @lowanimalspirit tweeted speculative headlines back into the twittersphere. In his book *Technic and Magic: The Reconstruction of Reality* (2018), Frederico Campagna wrote about the totalizing effect of language that is peculiar to this era, where "record-shattering investments in Big-Data systems and technology rest on the belief that there can't possibly be anything ontologically relevant that couldn't, at least potentially, be reduced (and reduced truthfully) to the serial units of the language of data." He made the case that "through substituting the terms 'information technology' with 'finance', we can understand the contemporary role played by financial capitalism, not merely as translator of the world into its own linguistic structure, but as the creator of a world that coincides exactly with such structure."[2]

The pandemic made visible all kinds of poor practice regarding the handling of biomedia/health data management and analysis, and the behavioral analysis that runs alongside it, which was necessary for the functioning of the Covid-19 app used in England by the NHS. This raised security and privacy concerns about the handling of data, with worries about mission creep made possible by the financial underpinnings of the app, and the expectations of those investing in its development, such as Palantir, Serco, Sitel, Deloitte, GS4, and so on.[3] It is no exaggeration to say that the NHS Covid-19 app in England was a very expensive disaster. Many urgent concerns to do with data crystallized regarding privacy, trust, and agency. In the void of guidance, education, or government know-how regarding safe data-handling practices, many grievances, imagined and real, flourished (and still do), in the highly volatile feed of the Twitterbot @trackntracer that I set up to retweet mentions of "track and trace" since November 2020.

FK One starting point for the Beyond Matter residency program was the question of how artists who use XR technology in their practice can make meaningful contributions to political and social discourses. Apart from the immersive connection with one's own body that virtual spaces make possible and the sensory experiences of the users linked to it, the status of virtual objects is particularly interesting. The relationship between virtuality and materiality plays a major role here. What role does it play for *Pandemonium*?

1   Tero Karppi and Kate Crawford. "Social Media, Financial Algorithms and the Hack Crash," *Theory, Culture & Society* 33 (2015): 73–92. See also Ami Clarke, "Language in a meme economy," *International Journal of Creative Media Research*, no. 5 (October 2020), https://www.creativemediaresearch.org/post/language-in-a-meme-economy.

2   Federico Campagna, *Technic and Magic: The Reconstruction of Reality* (London: Bloomsbury Publishing, 2018), 42.

3   Ami Clarke, "On Pandemonium," *Radar,* https://radar.lboro.ac.uk/contexts/on-pandemonium-a-new-work-by-ami-clarke/.

AC Anyone I spoke to who was not working in frontline activities had a very odd experience of time during lockdown where often they couldn't remember what day it was. Something to do with not being able to move around much, perhaps revealing to what extent memory is spatial, which makes me think of the mind palaces people use to remember things.

The shimmering in the VR work *Pandemonium* hints at this strange compression—as if time is condensed. My mother died suddenly weeks before the first lockdown and I had this intense feeling of time slowing down and distorting around me, almost as if looking through the bottom of a thick glass. Held numb in the stillness of grief while the entire planet learnt new protocols that in turn vastly restricted move-ment. Which then, even more strangely, combined with a growing awareness of just how lively the air around us had become, as ques-tions about whether the virus was airborne or lingered on surfaces for any length of time were debated daily. Later on, the frightening rate of mutation in the virus seemed entirely unnatural, but perhaps that speaks more about how distanced everyday life is from just how lively things really are. In the early mid-twentieth century, British surrealist artist and occultist Ithell Colquhoun proposed that the Earth was alive, which was radical for the time and place—now it's science. We have ways of seeing and sensing at increasingly small scales, as well as a hugely extended reach into space; technology adds extraordinary insights into the complexity of things.

Partly due to being a child of the 1970s and 1980s (although I also blame Netflix's reboot of that era), I kept thinking of body horror movies that

Fig. 3
Ami Clarke,
Pandemonium, 2021. VR
installation. Screenshot.

speak to permeable boundaries and slippery categories. The horror depicted often took disembodied flesh to a new level, with critters slithering out of taps that were alive in an extra sense, reminiscent of the "lamella," an often-evoked depiction of an alien force related to the death drive in Lacanian thought. Apt perhaps in terms of the virus's lack of any reason but to replicate at all costs.

For decades I've been fascinated by the difficulty of showing form evolving from one mass to another in cartoons and anime—the billowing clouds in the explosions in Katsuhiro Otomo's 1988 animation *Akira* as they swallow the screen, the elasticity of bodies in cartoons—and I really wanted to capture something of that in the plasticity of the gloop in this work. After a few false starts I found a great programmer, Luke Weston, and we worked very closely together on what seemed like an infinite series of tests, experimenting with what was possible in VR (at the stage of development that VR software was then at), and managed to conjure something quite close to what I wanted to see. The animals are the creations of Junnichi Suko, who very kindly let me play with them a while ago—they can be purchased on the Unreal Engine marketplace and I like that this means they populate other VR environments too. The overall liveliness of the scene is underpinned by the experimental sound work, which is spatially localized around the work, so you hear a different version every time. It's compiled from all the analog synth and digital sounds I've collected over the years, which segue into the synchronized dance routine with the deer.

I think everyone must be pretty traumatized by the pandemic and quite possibly still in recovery, and perhaps it will take a while to even realize

this. It was a strange experience making the VR environment during lockdown, and I'd not really had the distance to understand it properly when the artist and writer Emily Rosamond came over for a studio visit. We always have great conversations, but in this case our mutual interest in finance and probability had an unexpected layer to it, in that she had previously been a synchronized swimmer, lending an extremely serendipitous reading to the work! She picked up on the wrongness of the VR work immediately, the jankiness of it in contrast to how a corporate game-ready version might be. She described it as "leaning into the weirdness of the VR medium in a good way."

She mentioned Lacan's take on Freud's idea of the symptom, redefined as the "sinthome," which she described as when "artists produce something so particular, so unique, so strange, that it's like they are producing their own symptom." And that the work encapsulated for her "something that is precisely the right sort of shape to unlock a particular set of problems that are at once in the world: viral, ecological, political, pragmatic, temporal, financial, and of course subjective, all at once." Bringing together ideas "around virality, around the pandemic, around the too-muchness of the connectivity of datified life, about the too-abundancy of life, about the liveliness of the digital, there's multiple things going on." She told me: "you're producing a sinthome with the preciseness, the weirdness of the deer conglomerate, and the multiple-layered rhythms that come together in the scene" which "are generating a *sinthome*, that can hold all of that complexity somehow."

Serendipitously, her being a former synchronised swimmer herself meant she could not help but see the deer as "choreo-political in an André Lepecki sense—a choreo-politics" that asks "what does it mean to move politically?" She described the "apocalyptic imagery; a slight horror vibe" but also "a really gentle vibe to the whole thing" with a "celebratory angle" where "via their synchronization they are almost a logical extension of Siegfried Kracauer's girl clusters,[4] the Tiller Girls that were expressions of mathematics. There's a kind of genuine communal spirit and it makes me rethink what I always kind of desired out of synchronized swimming. The idea of being in sync." She said: " A post-species conglomerate digitality. The herd consciousness in the synchronized tweaks of the ears. As if they're all playing to the same program. It's really using the medium of synchronized movement. A techno species communism."

FK   Finally, I would like to ask a question about the beginning: in reference to Donna Haraway's concept of string figures, which she presents in her 2016 book *Staying with the Trouble*, residency applicants were asked what else VR could stand for. Ami, you responded with the variant "vital realism." What potentials for VR spaces were you addressing with this?

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4   See Siegfried Kracauer, *The Mass Ornament: Weimar Essays*, ed. and trans. Thomas Y. Levin (Cambridge, MA: Harvard University Press, 1995).

AC With a slightly different but not entirely dissimilar emphasis, the economist John Maynard Keynes' concept of "low animal spirits" captures a moment during the European Enlightenment when questions were being asked about the emergent properties that animate otherwise inert tissue matter. Everyone remembers the experiment where electrical nodes were attached to a pair of dismembered frogs' legs, making them jump and twitch, during an enquiry into what the elusive spirit was that made things come alive. The idea of animal spirits also became imbricated with the self-mythologizing of the financial markets, used to describe an "inexpressible" drive as the market's heroic "life source." But while Keynes' animal spirits drive the market through bullish opportunistic behaviors, the critters in *Pandemonium* that roam the deserted financial district speak of the zoonotic spillover—viral jumps between animal and human—that exemplifies the interdependencies revealed by the pandemic. They evade categorization by almost becoming their own species, living as kin with their humanoid siblings, pointing to a nature that is naturally queer and to a synchronized desire to do things differently—in a way that takes account of contingency to develop fluid data practices that are consensual and oscillate between being visible and invisible, as necessary.

And this, really, is the nub of the work. It circles around questions regarding how concepts of the individual relate to the community around them. This was my first question and it is epitomized in the issues of agency, privacy, and trust that crystallize in the app. A question, to a certain extent, between the bounded notion of the neoliberal individual and the communal agency of the deer, say. What is needed

is a shift in perspective able to comprehend the complex interdependencies that influence a syndemic, and how these converge in climate disaster. It tends to only be in crisis that the complexity of these multiple temporalities and scales can be briefly grasped.

Of course, the cartoon animation, the plasticity of the gloop, and the VR environment give me the opportunity to take the vitalist angle to an absurd degree, but instead of wishful thinking this could suggest grasping something of the "vital realism" of the circumstances we find ourselves entangled within, as we emerge in synthesis with the environment around us. In an era where advances in technology allow for increasingly sensitive degrees of sensing the world around us, making the world ever more complex. Other so-called advances in tech draw out existing biases and discriminations, through the absurd claim of tech neutrality. What these do in combination is allow us to address things with real insight into how inequalities are formed via an intersectional way of understanding, at a molecular level.

The alienation inherent in being a cyborg, as *a machine aware of being a machine* (as described by Paul B. Preciado), produces an understanding of the constructed nature of things, foregrounding how technologies such as synthetic hormones (BPA in *The Underlying*, for example) can lead to a *writing* technology of choice. All of this matters, deeply, if we are to mutate from what we currently know to forge a future engineered differently to the past, with the spark of imagination necessary to reboot the future, collectively and inventively, with care and deliberation.

ICONOCLASH: SLOW SQUEEZE.
In Conversation with Carolyn Kirschner

Cecilia Preiß

Carolyn Kirschner is an artist and researcher with a background in architecture. Her work explores the growing entanglements between humans, non-humans, emerging technologies, and planetary ecologies—using art and design as investigative tools to materialize fragments from alternate or expanded worlds. Carolyn is a lecturer in design at Goldsmiths, University of London, and holds a master of architecture from the Royal College of Art. As part of her residency in the Beyond Matter project, from May until June 2022, she dedicated herself to using the phenomenon of ASMR to enrich the digital museum ⬎experience in a multisensory way.

CAROLYN KIRSCHNER The project I am working on during my residency is called *Iconoclash: Slow Squeeze* and it's about new possibilities for autonomous sensory meridian response (ASMR) in the museum context. ASMR denotes a physical sensation: a warm, spine-tingling feeling which starts at the scalp and travels down the neck and arms. It's often described as similar to being gently touched, or like a mild electrical current running across the skin. The term ASMR was coined in an online medical forum in 2007, on a thread titled "Weird Sensation Feels Good," filled with posts of people trying to make sense of the feeling and its various triggers.

Since getting its name over a decade ago, ASMR has exploded into an internet sensation, with more than 13 million videos on YouTube alone. People chewing on pickles, shaving soap, and harnessing everyday household objects for their satisfying sound effects. Sliding, squeezing, bending, tapping, brushing, scraping, slicing, crunching. Slow repetitive movements. Seamless looping animations. Gentle whispering. A celebration of colors, materials, and textures. It's through these kinds of mechanisms—indirect visual and auditory triggers—that ASMR content creates a profound embodied experience in its recipients, who seek out the deep sense of relaxation and connection it offers.

Initially disregarded by academic researchers, the effects of ASMR are increasingly drawing the attention of psychologists and neurologists. Keen to better understand what triggers it and what exactly it does to the body, researchers have so far relied on extensive participant surveys and functional magnetic resonance imaging to study the activity of blood flow in the brain. At the moment, the leading theories suggest
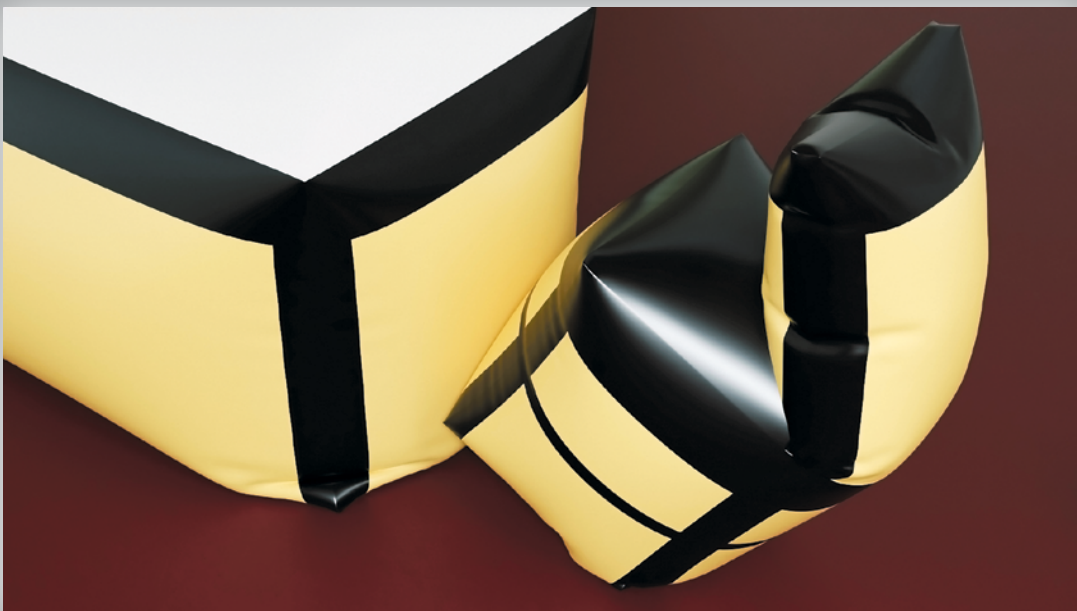
that ASMR triggers similar parts of the brain as when you're receiving close personal attention. It places the brain into a social state, like when primates groom one another, but through indirect digital means. Studies show that ASMR happens not only to the brain but to the body: reducing heart rates and stress levels while increasing skin conductivity—which creates a feeling of intimacy and closeness.

Certainly it is a medium that deserves attention in a time when connection, touch, and physical presence have been curtailed by a global pandemic and a growing shift of social interactions into online spaces.

CECILIA PREIß Where do you see potential use and opportunities for ASMR in art, design, and architecture? In what way should it get more attention, beyond being a weird internet phenomenon?

CK Because of its ability to trigger a deep sense of connection and an illusion of touch through the screen, I got thinking: what other possibilities are there for ASMR? In the context of a museum, for example, could it enable new forms of cultural production, mediation, and distribution? Could it allow for new kinds of embodied relationships with artworks and exhibitions? Can the body become an exhibition space? Or what about the possibilities for ASMR in the climate crisis? Could ASMR be harnessed to create experiences of and a sense of connection with distant ecologies, to instill an instinctive feeling of closeness to non-human worlds? These are the questions that initially set me off on this project and I'm looking forward to exploring them further.

CP How is your project located within Beyond Matter? Why did you decide to work with the exhibition *Iconoclash* and its digital revival as the basis for the project?

CK Beyond Matter is dedicated to exploring new possibilities for immersive technologies in the artworld. I would argue that ASMR is a kind of immersive technology, which is where I see an interesting connection. I was particularly drawn to one of Beyond Matter's ongoing research initiatives: *Matter. Non-Matter. Anti-Matter: Past Exhibitions as Digital Experiences*, dedicated to the digital revival of past landmark exhibitions—including the 2002 ZKM | Karlsruhe exhibition Iconoclash, for example, which is currently being reconstructed as a 3D virtual environment. I was curious about what role ASMR could play here, to contribute to that exhibition's revival and translation into new formats.

With this in mind, I've been experimenting with creating ASMR experiences of *Iconoclash* through animation and sound. At first, I mostly focused on the artworks originally included in the exhibition, testing ways in which they could each be digitally translated into alternative sensory triggers. But I soon realized that an exhibition is more than the sum of its parts. It's not simply a collection of solitary artworks. So I needed to think of *Iconoclash* as an ecology of sorts: made up of a messy interplay between the artworks, the spatial qualities of the gallery (lighting, stairways, ceiling ducts, etc.), and the sounds and bodies

of visitors (breathing, whispering, footsteps, etc.). A digital revival of the exhibition through ASMR needs to embrace the inseparability of these elements.

Working in this way has been a chance to probe the deeply ecological entanglements of exhibitions—the relationships between spaces, artifacts, screens, and bodies—and consider what new kinds of encounters can be created between them through ASMR. A shift towards this kind of digitization is also a chance to move beyond visual senses usually given primacy in physical exhibitions into a more deeply embodied realm—one that is more inclusive for neuro-diverse publics or those with sensory impairments, and can be transmitted across the globe.

Beyond the broader research initiatives of Beyond Matter, I have also been thinking about some interesting conceptual links between *Iconoclash* and ASMR. *Iconoclash* was an exhibition dedicated to destruction—of images and ideologies. ASMR, too, often relies on a kind of satisfying destruction to trigger its characteristic tingles, with endless online footage of objects being sliced, carved, melted, crumpled, and crushed. Perhaps ASMR offers a route to continue building on the questions raised by the exhibition back in 2002, and to re-appraise them in the digital age.

Fig. 3
Carolyn Kirschner,
Iconoclash: Slow
***Squeeze*, 2022.**
Rendering of John M.
Armleder's *RAL 3000*,
1987. Screenshot.

CP   How will you proceed concretely? How do you imbue the exhibition objects with sensory qualities? What role does sound play in the development of your work?

CK   The final outcome of my residency will be a long-form looping ASMR animation and soundscape. I have been working a lot with Blender, a 3D modeling and animation software, to create digital twins of *Iconoclash* artworks and spatial elements. This translation into digital form gives me the freedom to focus on and exaggerate their material qualities—their movements, textures, and colors—and distil them into visceral audio-visual experiences.
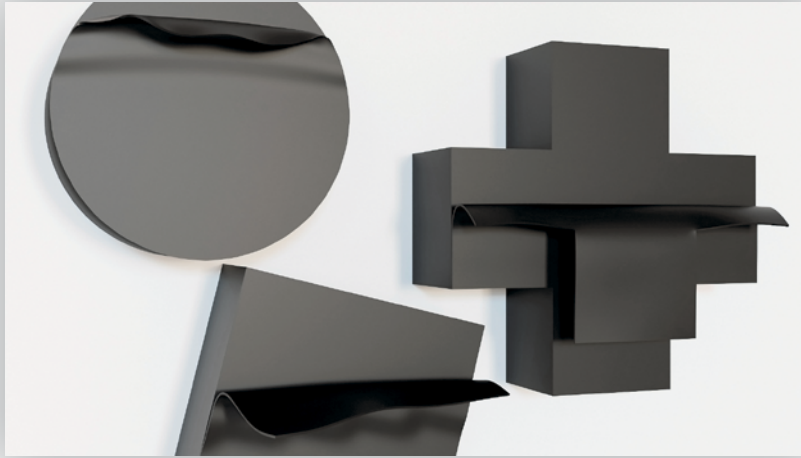
Digital translations of Kasimir Malevich's *Black Cross, Black Circle*, and *Black Square* paintings, for example, peel off the canvas in an endless loop, accompanied by sticky, smacking, peeling sounds, as the camera slowly pans through the space. These kinds of close-ups and magnified textures are used throughout the animation to instil a feeling of intimacy with the artifacts on the screen. Ultimately, the intention for the visuals is to trigger a bodily reaction—to mesmerize and slow down the viewer, latch onto their sensory receptors, and make their skin tingle.

Accompanying the slow-moving, looping ASMR animation is a binaural soundscape which has come out of a collaboration with the brilliant experimental musician Kieran Brunt. It's a really central component of the project. Afterall, ASMR is a multisensory phenomenon that relies on the interplay of sounds, sights, and touch. To create speculative artifact and material sounds, Kieran has been working with foley, a technique familiar to Hollywood filmmaking where everyday objects are used to create hyperreal sounds. In the same way that Blender was used to make amplified digital twins of artworks and the exhibition space, foley provided a chance to recreate their sounds in heightened versions.

Instinctively, we associate digital spaces with a loss of senses and sensory experiences. But I think the rise of phenomena like ASMR and other immersive technologies offer a compelling counter-argument.

The soundscape also plays a central role in amplifying feelings of intimacy and immersion. We have been working with binaural sound, where sound is split into two audio channels in order to mimic human ears' depth perception and simulate the experience of being in the same room as the sound source. The growing popularity of ASMR has given

rise to some incredibly surreal audio equipment; microphones have been embedded in prosthetic ears and heads, each competing to record sounds in a way that mimics the human body as closely as possible.

So that's the plan: for sounds and visuals to work closely together to create deeply visceral sensory experiences—and to explore questions of proximity, materiality, and ecological entanglement along the way.

CP   At a time when exhibitions and art reception are increasingly shifting into digital space, do you think the digital age is leading to a "desensualization" of art? Or is perhaps the opposite the case?

CK   Instinctively, we associate digital spaces with a loss of senses and sensory experiences. But I think the rise of phenomena like ASMR and other immersive technologies offer a compelling counter-argument. So rather than thinking about the shift towards digitization as a loss, I prefer to think of it as a chance to discover new kinds of sensations of and interactions with art. There was an article in the *New York Times* recently which described ASMR as the first time the internet has discovered "a new feeling"—and I don't think it will be the last.

(E)SPIRITU-VIRTU.
A Performance-Lecture

Dennis Dizon

Dennis Dizon is a research-based artist and writer based in Barcelona, Spain. Their practice interrogates intersections of technology and ecology, applying queer and decolonial practices to their poetics, urgencies, and speculative futures. They have contributed to *a model, a map, a fiction* at transmediale (Berlin, 2023), *Immerse!* at Tallinna Kunstihoone (Tallinn, 2023), *CAR-PARK* (Berlin, 2023), *Nation, Narration, Narcosis: Collecting Entanglements and Embodied Histories* at Hamburger Bahnhof, Museum für Gegenwart (Berlin, 2022), the workshop "Under the Rustle of Trees, We Listened to the Hum of Machines" at MaerzMusik (Berlin, 2022), the Weather Engines Symposium at Onassis Stegi (Athens, 2021), and *and yet the air was still stirring* at Circulo de Bellas Artes (Madrid, 2021). Dennis received an honorary mention from Arts at CERN's Collide International Residency Award in support of their research on climate sensitivity. They hold a master of research degree in advanced practices from Goldsmiths, University of London.

On October 29, 2020, as a Beyond Matter resident, Dennis shared their research with the public after spending two months tracking and visiting *hiis* (sacred sites) in Estonia.

This research-performance invoked the "(e)spiritu-virtu." Sharing stories and encounters through cursed images, texts, and videos, the presentation was an attempt at a sacred recovery from colonial history, queer trauma, and ecological violence. It concluded their two-month residency, which took place from September to October 2020 at Tallinn Art Hall.

**Excerpts from *(e)spiritu-virtu: a queer approach to (an ecological) crisis*
—a research-performance with Dennis Dizon**

PROLOGUE

I can't promise that this photo of me during an inaugural performance in quick drag will make any more sense [here] than it did then.

The evening was awash with rituals of the backpacker: singing and dancing to **90s Top 40**, guzzling **cheap beers**, **smoking** cigarettes in excess. And, as any daring traveler would, **longing for** an intimate... psychoactive high. You might be asking yourself:

Where *was* this? What was *that*? And Dennis, *why* a strapless top...?

As I sit here now ... **in front of wandering eyes** and **muted talking-heads**, in an attempt to share my research and residency output **on**

what "virtual reality" is or could be ... I *can't* promise any answers. I'll pull memories from the past and connect them with the present to deliver a future.

But listen, I can't promise that either.

What I can *attempt* to promise **is confusion.** An attempt to nudge reason, poke at logic, and dim the lights a bit; an *attempt* to crack our conditioned minds and labored bodies—quarantined in the binary of the actual and virtual—toward an ecological thinking that embraces complexity in language, image, and movement, melting brains among humans, oozing onto chairs and onto floors, seeping into soil and sea;

an *attempt* toward an embodiment of **the (e)spiritu-virtu** for an ecological singularity between humans, with the more-than-human: **the fruit flies** lounging on your bananas, **the disoriented cactus** in your lounge, **the flora** in your gut, **the concrete** ladybug, **the wiggling birch trees**, **the dog**, **the cat**, **the octopus teacher**.

QUEERNESS

I breathe queer air, sometimes choking on the dimensions of its complexity. I straddle nonlinear parallelisms between the other day and some other night in a *true*niverse between space and place, with narratives of feeling and thought while bathing in a cesspool of contradiction and control.

And as I observe it now, this photo of me in Fiji shows that first gasp of air, wearing a brown knee-length skirt and flip-flops, confused and barely out-of-the-closet, serving **charisma**, **uniqueness**, **nerve**, and **(questionable)** talent. This image reveals not a crisis in gender identity but rather the beginning of a gradual *denying of self*—as the late queer

thinker Jose Esteban Muñoz suggests—expressed with the body, trudging along the identities and counter-identities of the dominant masculine, heteronormative crisis.

ECOLOGICAL CRISIS

A world inhabited is a world in suffering. And *crisis*—miniscule, at-scale, or larger than—is a manifestation of that condition.

A crisis might be relative—***my* crisis** to ***your* crisis** to ***our* crisis**—but *crisis* is constant. And once in a while she demands a bit more attention, sending not-so-subtle reminders that she's actually *always already* there.

Sure, the ecological crisis is environmental—some "feeling" it more than others while many are already living and dying in destruction.

But the ecological crisis is also complacency in complexity ... a complacency that results in—among other things—the deterioration of global infrastructures through delusion, manipulation, neo-colonization, financialization, and extraction.

Estonia, 50% of which is covered in forest, has seen an 85% increase in logging between 2016 and 2018—part of an EU effort to ween off oil shale as fossil fuel for wood pellets as biofuel. In **the Philippines**, since the turn of the twenty-first century, the country has seen massive deforestation, which includes active illegal logging—parts of the Cordilleras in Northern Luzon nearly extinct, while the whole country, once 70% forest—now down to 20%—is expecting a complete and total loss by 2036.

Deforestation in Estonia has impacted and continues to threaten hundreds of sacred sites (or *hiis*, in the native language)—places not only for nature worship but virtual spaces for embracing divine uncertainty. For this residency, finding *hiis* throughout the country began—objectively—as fieldwork for a video project ... and admittedly, as an anthropocentric experience centered on *my* body.

RECLAIMING: *THE DISAPPEARING BODY*

A queer approach to (an ecological) crisis is to determine the proximities between colonial history, queer trauma, and ecological violence— and the disappearing body has been a utility for all three.

How can *the disappearing body* (or *bodies*) find and pick up their missing, broken parts and conjure a transformation along the way?

Attempting a decolonial wash ... in Estonia, I began exploring Indigenous spiritual practices and beliefs in precolonial Philippines—and much to my non-surprise, found out that most shamans, or *babaylans*, in many Indigenous communities were women, while a handful would have been

Fig. 2
Dennis Dizon, *(e)spiritu-virtu*, 2020. Stone hug (Anu and Mona) in Hirvli, Harju County, Estonia.

feminized men, transfeminine or gender non-conforming—with the feminine holding access to the divine.

The invocation of a *babaylan* could **begin with a psychological crisis**. And as an intermediary between the material and spiritual worlds, they would enter into a fit of temporary "insanity" and a loss of control over their body, withdrawing from others, migrating to the forest, some feeding on bark or climbing trees. The disappearance of the *babaylan in* and *with* nature was a state of spiritual abstraction in both mind and body—a vital in-between to supersede the human condition toward a transhuman existence.

"(E)SPRITU-VIRTU"

I'm no shaman by any means.
I have not become nor am I becoming.

The *(e)spiritu-virtu* is a perpetual *un*becoming. If "becoming is a process of desire,"[1] *un*becoming is a process of necessity. And if desire is the production of the real,[2] necessity is access by virtuality—access *not* for convenience but toward the dimensions of complexity.

There's no virtual reality—**only complex realities**—and the *(e)spiritu-virtu* is your medium. Identities bleed as means for singularity, and

1   Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, vol. 2, trans. Brian Massumi (Minneapolis, MI: University of Minnesota Press, 2005), 272. First published as *Mille Plateaux* (Paris: Les Éditions de Minuit, 1980).

2   See Gilles Deleuze and Félix Guattari, *Anti-Oedipus: Capitalism and Schizophrenia*, vol. 1, trans. Robert Hurlex, Mark Seem, and Helen R. Lane (Minneapolis: University of Minnesota Press, 2000). First published as *L'Anti-Oedipe* (Paris: Les Éditions de Minuit, 1972).

Correspondence

Water, water, everywhere, nor any drop to drink: climate change delusion

*Joshua Wolf, Department of Paediatrics, University of Melbourne and Integrated Mental Health Service, Royal Children's Hospital and **Robert Salo**, Integrated Mental Health Service, Royal Children's Hospital, Melbourne, Victoria, Australia:*

Clinicians caring for psychotic patients have long noted that delusional systems are determined by ideas and beliefs to which the individual has been exposed. We describe a patient with 'climate change delusion', a previously unreported phenomenon.

A 17-year-old man was referred to the inpatient psychiatric unit at Royal Children's Hospital Melbourne with an 8 month history of depressed mood, social withdrawal, school avoidance, social anxiety, amotivation, poor concentration, anhedonia, feelings of guilt and worthlessness, insomnia, suicidal ideation and self-harm. He also described hearing his own voice making derogatory and command statements, and had visions of apocalyptic events.

Admission was precipitated by acute deterioration in his condition consisting of increased emotional distress and suicidal behaviour. Prior to admission he was treated with fluoxetine (40 mg day^{-1}) and olanzapine (5 mg day^{-1}).

The patient had also developed the belief that, due to climate change, his own water consumption could lead within days to the deaths of 'millions of people' through exhaustion of water supplies. He quoted 'internet research' to substantiate this. The patient described that 'I feel guilty about it', had attempted to stop drinking and had been checking for leaking taps in his home to prevent the catastrophe. He was unable to acknowledge that the belief was unreasonable when challenged.

There was no history of substance abuse. Physical examination was normal except for psychomotor retardation and superficial forearm lacerations.

The final diagnosis was major depressive disorder with psychotic features. He was treated with oral fluoxetine (60 mg day^{-1}), clonazepam (1.5 mg day^{-1}) and olanzapine (10 mg day^{-1}). After several days his mood improved considerably and he denied persisting delusional beliefs. The experience of hearing his own voice persisted, but he no longer found it as distressing.

There have been numerous reports of incorporation of contemporary phenomena, such as the internet [1–3], into delusional systems, but a search of Medline and Psychlit did not identify reports of delusions related to global warming.

Climate change has rapidly become a dominant issue in Australian society. A 2007 poll found that 85% of Australians were 'very' or 'fairly' concerned about climate change, significantly more than the proportion concerned about terrorism [4].

This case provides another fascinating illustration of the cultural and environmental specificity of manifestations of psychosis.

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PHILIPPINE SHAMANISM AND SOUTHEAST ASIAN PARALLELS   147

midnight. You swallow this stone and you become irresistible to women.[72] A *mutya* is also believed to be possessed by a rat. It approaches the person who is destined to obtain it. The rat vomits the stone, the person should pick it up quickly and swallow it. At the same moment giants will come and struggle with him for the possession of the *mutya*. But the possessor will be stronger than all of them. This type of amulet is called *anting-anting yatot*, greatly desired by thieves. It will make one rich by stealing. Like the rat, he will know who is rich and where the money is hidden.[73]

3. *Shamanic Madness, Ecstasy and Possession*

Wherever shamanism appears, the shaman begins his career with some kind of psychological crisis which borders on madness. We have said something about this subject above.[74] Among the Filipinos, this phenomenon is copiously documented both for the shamans among the lowland as well as the highland peoples. We have mentioned how the early Bisayans were selected by the spirits to become shamans precisely by this experience;[75] Loarca reports the same occurrence among the early peoples of Bisayas, Luzon and Mindanao. More recently, John Garvan, writing about the Manobos of Mindanao says that a bailan-elect "is not recognized by his fellow tribesmen until he falls into the condition of what is known as *dunaan*, a state of mental and physical exaltation, whis is considered to be an unmistakable proof of the presence and operation of some supernatural power within him. This exaltation manifests itself by a violent trembling, accompanied by loud belching, copious sweating, foaming at the mouth, protruding of eyeballs, and in some cases that I have seen, apparent temporary loss of sight and unconsciousness. These symptoms are considered to be an infallible sign of divine influence, and the novice is accordingly recognized as a full-fledged priest ready to begin his ministrations under the protection of his spiritual friends. . . ."[76]

Garvan also reports on the Great Religious Movement of 1908-1910 among the Manobos, Mandayas, Mangguangans, and Dababaons of Mindanao. It was called the Tungud Movement because the formula "*tungud, tungud, tagaan*" was on the lips of believers. Tungud was started by one Meskinan, a Manobo of Libaganon River, who was taken ill by cholera. His relatives abandoned him. But on the third day he recovered and searched out his people. He assured them that his appearance was not due to an evil, but a beneficent, spirit who had

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[72] *Ibid.*, II, L-C, p. 542; cf. also *ibid.*, II, B, pp. 497, 498, 499, 500.
[73] Richard Arens, "The Use of Amulets and Talismans," *Leyte-Samar Studies,* Vol. V, Nos. 1-2 (1971), pp. 125, 131.
[74] Cf. *supra*, pp. 7-8.
[75] Cf. *supra*, p. 5.
[76] Garvan, *Manobos*, p. 200.

Figs. 5 a–c
Dennis Dizon, *the disappearing body*, 2020. Video stills of site-specific performance in Hirvli, Harju County, Estonia. Part of *Ritual as Protocol as Ritual*, 2023. Multimedia installation.

the *(e)spiritu-virtu* is your vessel. Neither a connection with nature nor relation to environment—**the *(e)spiritu-virtu*** is embeddedness in a sacred recovery.

To summon the *(e)spiritu-virtu* is to shift the positions of the human—to key them off-center and to challenge the concept of communication between *us* to invoke the incommunicable *we*. In shifting positions, the dimensions of communication—through discussion and dialogue, language, and translation, listening and hearing, noise and silence—*all* emerge in complex realities.

An active occupying of a multiplicity of positions is *the ritual*—to *deny self* between humans, *among* and *with* the more-than-human. A processual sacred recovery through divine uncertainty that positions the body in and among other bodies in complex realities; neither deconstruction nor reconstruction but a perpetual counter-construction of language, of image or of movement, inhabiting difference and asserting collaboration toward collective transformations through emergent communication.

DIGITAL; V/RITUAL

In crises, what *does* or has "ritual" become?

In 2008, having come across information online about an environmental crisis, a teenager in Australia stopped drinking water in **the belief that millions of people would have died because his share would have exhausted the global water supply**—a fit of psychosis that manifested *in* and *with* the body as extreme and violent behavior.

The crises had become reflexive—**distributions** and **circulations** of **(cursed) texts and images** colonizing the actual-virtual, facilitated by conditioned rituals of digital info-gluttony. And while embedded in disaster, **the teenager's body**—in its destruction and dissolution—suddenly became a site of inquiry.

In a compounded techno-ecological crisis, how can *disappearing bodies* inhabit oppressive conditions tactically as means to deny self?

In the late 90s teen classic *Buffy the Vampire Slayer (bold transition, but bear with me)*, Willow—Buffy's sidekick—gets catfished on the web by a demon. The episode—titled "I, Robot, You, Jane"—is teemed with early dotcom technologisms: **surveillance**, **facial recognition**, **social media**, and **digitization**, a process that just so happens to scan a demon-robot off the pages of a cursed book, trapping it into digital networked media.

And as the metaphorical demon-robot has in *Buffy*, **the deterioration of communication infrastructures** has and continues to manifest in the black box—decontextualizing and weaponizing information, accelerating distribution, manufacturing delusion, platforming oppression, implicating bodies and inciting violence online and offline.

Through emergent communication, how can we rethink sociality, occupy complexity, and reconfigure corrosive networks and linear technologies?

We have been conditioned to tap, type, swipe, comment, like/dislike, and consume the saturation of alternate realities on that smooth screen as soon as we wake and … throughout the day, normalizing communication that's quarantined in the binary of the actual-virtual.

And as artificial intelligence, telecommunications and virtual reality are modeled from the concept of a limited technological Self—positioned toward production, prediction, efficiency, and certainty—where the necessity lies **is in the *un*-becoming** of a conditioned and learned self toward (an)*other* self—the intangible, the more-than-human, the *(e)spiritu-virtu*—going *beyond* empathy and toward an embeddedness in the sacred recovery of the retreating, dissolving, and *disappearing body.*

EPILOGUE

If you were looking for answers, I'm afraid I don't have them.

I promised confusion and can only hope that I've exceeded that expectation.

Though here's a thought: in an ecological crisis, don't succumb to a virtual reality. Recognize, instead, that complex realities exist. We are living and continue to live through crises—while many have always already been. Crisis can be inclusive, so abandon positions of exclusion: there are marginalized within the marginalized, disenfranchised within the disenfranchised, disproportion in the disproportionate.

Don't attempt to overcome the firepit of fear; step into it, counter-constructing despair and denial for an imaginary that acknowledges colonial histories, queer trauma and ecological violence toward an ecological singularity that occupies the dimensions of communication and transcends human exceptionalism.

You don't have to be queer to approach an ecological crisis *queer*. At the intersections of the spiritual and the virtual is where inquiries to conditions and conditioning could begin and where resistance to oppression could emerge.

But don't listen to me.
I am *crisis* in disguise—always healing, never healed.
Instead, **invoke the *(e)spiritu-virtu***.
Walk the immeasurable **distance of an uncertain horizon**.
And embrace *the disappearing bodies* along the way.

That should be a good start.

DIGITAL COMPOSTING.
A Conversation between the Artists
Laura Kuusk and Camille Laurelli

Artist **Laura Kuusk** works mainly with photography, video, and installation. She lives and works in Tallinn. Her practice often engages with the recycling of found anthropological visual materials; recent works address identity construction and links between ecology and technology.

Camille Laurelli is a French artist based in Tallinn. He has curated exhibitions in Estonia, Sweden, France, and the Czech Republic. Laurelli is cofounder and artistic director of LVLup!, a video game museum. He is also a visiting lecturer in the Estonian Academy of Arts.

The public moment of Laura Kuusk and Camille Laurelli's residency took place in the studio of the Estonian Artists' Association on June 30, 2022. The event began with an open studio visit, followed by an artists' talk moderated by curator Corina L. Apostol, a screening of Donna Haraway's film *Story Telling for Earthly Survival* (2016), and a presentation of the duo's research under the title *Silent Sessions Soundscapes: Digital Compost* (see fig. 1).

During their joint residency, the artists developed the concept of "digital compost" to describe digital waste and the practice of recycling it as a way of exploring different understandings of narration when imagining the future (see figs. 2–4).

To compost is to convert matter back to its initial components so that it can be re-introduced into the cycle of matter and energy; Kuusk and Laurelli make digital waste re-usable or recycle it as new digital matter. Responsibility, responsiveness, ↘ interactivity, and interdependence are key concepts for this work. During their residency, the artists visited areas in Eastern Estonia associated with excavation, exhaustion, and/or abandonment, carrying out research for a future collaborative work entitled *Laboratory of the Future*, for which digital and analog materials will be combined and recycled into an immersive installation work (see figs. 5 and 6).

Fig. 1
Silent Sessions Soundscapes: Digital Compost, **performed by Laura Kuusk and Camille Laurelli at Tallinn Art Hall for the Beyond Matter Residency in 2021.**
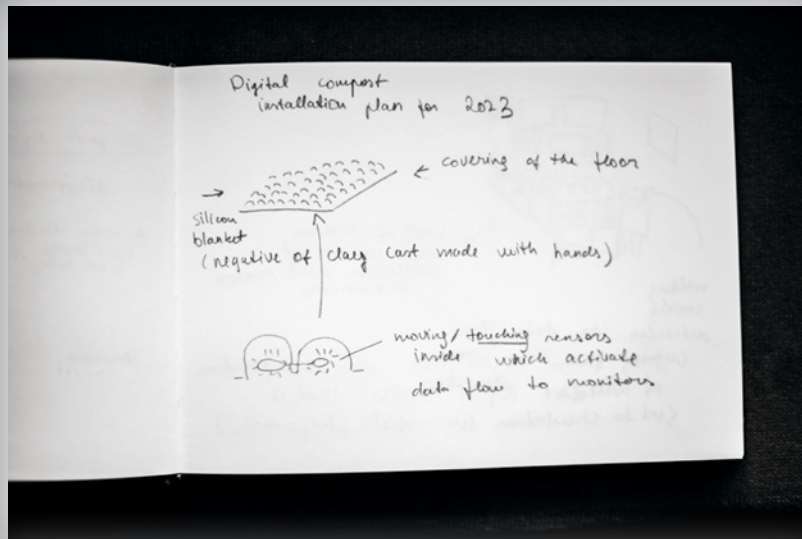
Figs. 2–4
Laura Kuusk and
Camille Laurelli,
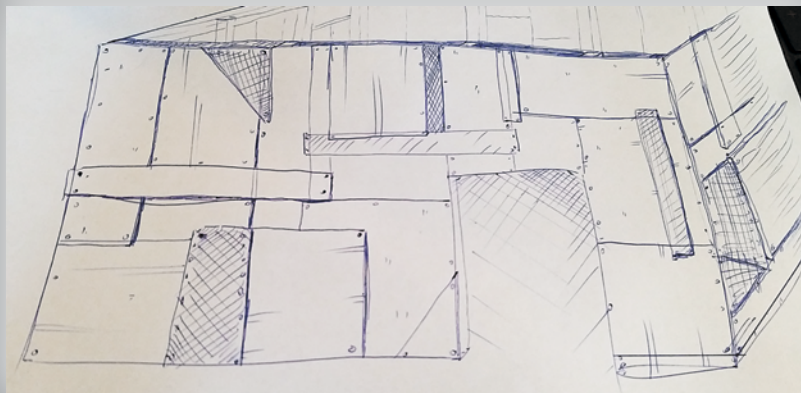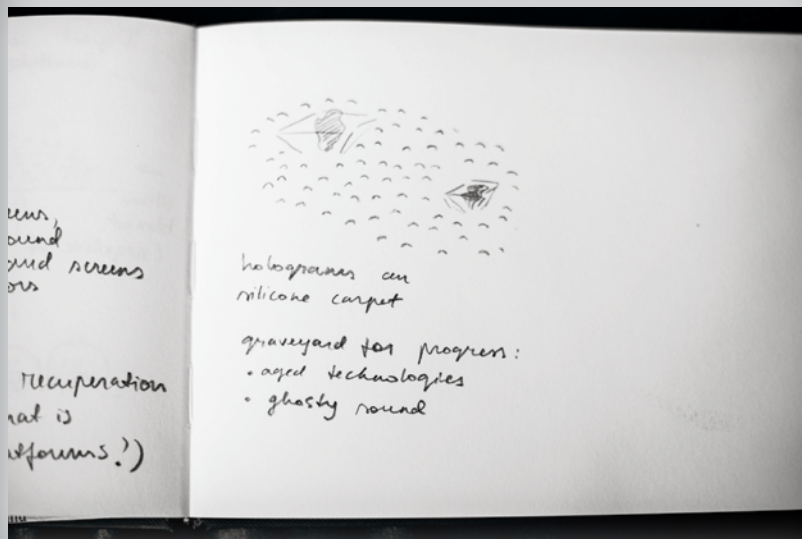*Sketches for digital
compost 1*, 2021.
Pencil on paper.

Fig. 5
Laura Kuusk and Camille Laurelli, *(composite vision),* 2023. Mixed media installation. Shoe design: Raili Keiv; image material from: NASA, James Webb telescope.

Fig. 6
Laura Kuusk and Camille Laurelli, *(composite vision),* 2023. Detail.

Digital Composting, Technological Enthusiasm, Virtual Reality, Downgraded Technology

LK: Our approaches to digital composting differ but time complement each other. The idea came when we were biking and thinking about the meaning of digital matter in the modern era.

We often question digital or technological enthusiasm in our work. I have used virtual reality in previous works to show its limitations, because it's still an image, like visual wallpaper—360-degree video gives the illusion that you're getting closer to objects, but you're not. Camille, on the contrary, has focused on the use of technologies that are defunct.

CL: I'm very interested in downgraded technology. I'm running the video game museum LVLup!, and I'm fascinated by outdated technology and nostalgia. Maybe it's because I haven't explored it as much as I did as a child or as an art student, or even in my artistic practice now.

The *Laboratory of the Future*, Digital Composting, Digital Consequences

CL: Our notion of digital composting began when we were imagining *Laboratory of the Future*, one of our ongoing projects. The idea was not to imagine the future in a decade or two, or as science fiction, but something in two hours. It is intended as a test laboratory for experiments that in the near future rather than in the distant future. It was Laura who coined the term "digital composting." This raised many questions relating to narrative: Is this narrative in the context of fiction? What kind of story could emerge? Should it be a narrative documentary, or should it be a fictional story?

Eventually we realized that everything we do has digital consequences at some point, and we cannot choose our digital environment. I mean,
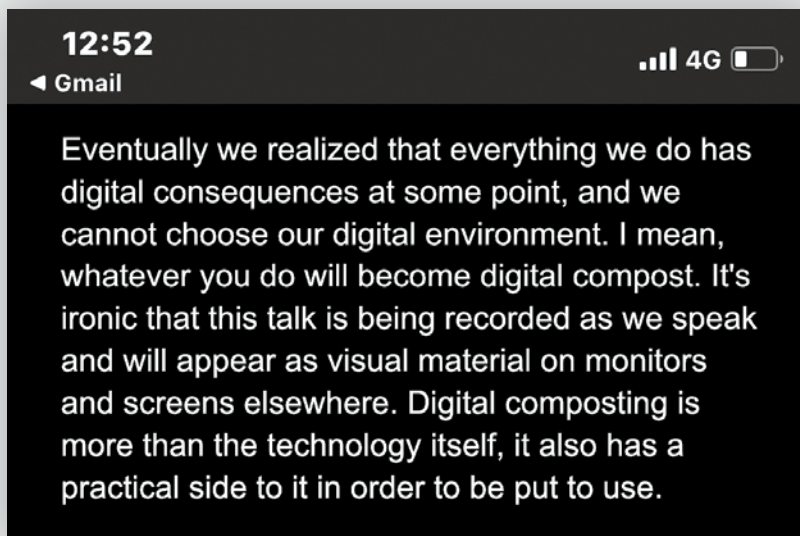

Fig. 7
Excerpt from an email from the artists, 2023. Screenshot.

whatever you do will become digital compost (see fig. 7). t's ironic that this talk is being recorded as we speak and will appear as visual material on screens elsewhere. Digital composting is more than the technology itself; putting it to use also has a practical side to it.

Being Stuck with Technology, Revisiting Old Technology, a Waste Management Pyramid

LK: I can add something to that. I have often found that my hard drives are full and my computer is full. So I really support Camille's point of view on revisiting old technology, as technology is advancing so fast that the human body cannot adapt to it quickly enough. It's good to take some time off and just look at what's already there, to revisit or reprocess it—to somehow compost it. The idea of digital composting is also based on a waste management pyramid. The first thing would be to avoid waste, so with digital waste this means, if possible, not producing new digital material. And if that's not possible, the next option would be to try to recycle or reuse existing digital material. If that's also not possible, maybe it's possible to store digital material so it can be used again later or find a way to generate new energy from it. The visual parallel of the waste management pyramid came to us as we were experimenting with different techniques and doing tests with holograms—the hologram also has a pyramid shape.

Reactivating, Reusing, Renaming, Revisiting

CL: I reuse a lot of my previous work, such as artworks I made as a student. I enjoy it, but it is also difficult because I try to remember as much as possible and archive what I have done since then. So I don't produce much but, as with time, it's still a lot to process. In many works, I only change the name or the date. I like the idea of reactivating the works, putting them in a different context, a different time. I think that artworks cannot become outdated, that they can be constantly reactivated. Sometimes I find something intuitive, like this idea of compost.

There are some materials present here in this talk that are not recent works, but ones that are like a legacy from earlier times. I'm really enjoying the dialogue between these works we've made in the last few weeks, in the last few days, and the works made at different times and in different contexts. The dialogue between these forms is important to me because it is related to practice. It's about what you're doing, including what you've done before and what you're going to do.

Trips to East Estonia

LK: We can also talk about the trips that we did to East Estonia. We thought that we could include both North-East and South-East Estonia, as the North-East is known for its industrial and excavation heritage, while the South-East is mainly known for its agricultural heritage. These areas are very different, but they also have similarities, such as declining populations, lots of space, and mosquitoes.

We made a trip to Aidu karjäär, near Kohtla-Nõmme. The area looks like a nice natural place, with blue lagoons and slopes covered with trees (see fig. 8). However, it is disturbing to know that it was designed by industrial diggers. They were just digging, and their tools were so big that the hole came to be deep as a five-story house. The reason the water is so blue is because of reflection and weather, but also because of sediment.

Fig. 8
Laura Kuusk and Camille Laurelli, field trip to Aidu ancient oil shale mining site, Estonia, 2021.

Exhaustion, an Exhausted Place

CL: One reason why we went into this area was that there is often a discussion about information and its relationship to our lived experience of the image and how we try to mine data from images. We discovered that there is a term for this: exhaustion. When you take things so far that they become empty. It started as an attempt to use digital compost as an idea and exhaust information; we went to this place because it is completely exhausted, like you can't take anything more out of it. You have machines that take thirty or forty tons in one mouthful. And you can't even turn them off for the night because it costs more to restart them than to leave them running. It's like working in a state of incapacity.

Image Exhaustion

LK: The idea of mining also applies to the image industry: image mining raises questions about image exhaustion, but also about putting materials back into circulation, and how to get life or energy back into places. How much does an image need to circulate? Can it ever be exhausted?

CL: For us these are concepts that constitute an extension of phenomena we already are dealing with, sometimes voluntarily, sometimes unconsciously—like post-internet, ecological approaches, recycling, and so on.

Digital Tools in Time

LK: When we returned to Tallinn and prepared for this event, we used a variety of tools. We put up the pictures that you can see on laptop or tablet computers, for example. We also took over the *Instagram* of Tallinn Art Hall and uploaded some more images there.

We wanted to frame the images digitally, as opposed to printing them. It turned out that we had two different digital frames, one of which no longer readable. We might have accepted this ten years ago, but now it was so intolerable that we had to change the equipment.

As an outcome of these processes we have started with the residency, we wanted to build an installation that acts as a shelter where different human and non-human organisms can come together to have a conversation with each other. We call it the *Laboratory of the Future* because it embodies the idea of experimentation and openness.

CL: An interesting similar phenomenon is when you watch old shows on TV that you remember from ten years ago, and you have some idea of what they were like on the screen. The image was clean. But when you watch them again today, it looks very strange. The colors don't match. There's a fine graininess in the texture. But in our minds, we remember them very clearly.

LK: There's also the other extreme, where humans can't see an image that's above 4k—meaning horizontal resolutions of around 4000

pixels—but it's still going up to 8k. There's no point in producing these huge files and not being able to see them with your own eyes. They're made for other organisms. On the other hand, our perceptions do evolve. And when new technology comes along, we get so used to it that these old images look like sludge.

Laboratory of the Future, Future Storytelling

LK: As an outcome of these processes we have started with the residency, we wanted to build an installation that acts as a shelter where different human and non-human organisms can come together to have a conversation with each other. We call it the Laboratory of the Future because it embodies the idea of experimentation and openness.

Donna Haraway inspires me. She is a very good storyteller and has very influential ideas about the future of storytelling, for example in her *Camille Stories: Children of Compost*, where she describes future generations as cyborgs between humans and monarch butterflies. They share genes and understand each other. They also have the abilities of both beings. The story goes through the seven generations of their evolution. I really like her style: it's like fiction about the future, but in a very documentary, scientific, and somewhat plausible way.

Haraway has been influenced by Ursula Le Guin, whose essay "The Carrier Bag Theory of Fiction," published in the 1980s, is about how we can restructure the future by telling different stories based on carrier bags and bags of mushrooms, which is an older and more authentic way of being. I believe that this kind of storytelling is the storytelling of the future, and that we can put it into practice.

UNIO MYSTICA.
Protocol of the Storytelling Event
Helen Kaplinsky

Helen Kaplinsky is an independent curator based in Helsinki, Finland. She is undertaking ↘practice-based research at the Exhibition Research Lab at Liverpool John Moores University (UK) on the cyberfeminist legacies of feminist storytelling. Recent exhibitions include *GENDERS: Shaping and Breaking the Binary* at Science Gallery London (2020) and *Alembic*, a collaboration between project space Res., Goldsmiths University, and the ICA (London, 2016–18).

Unio Mystica is a unique tour that took place in different locations across Tallinn in October 2021. The event concluded Kaplinsky's two-month research residency from August to October that year at Tallinn Art Hall. With a research background rooted in the intersection of gender and technology, Kaplinsky used the Beyond Matter residency to explore the relationship between virtual technological and mystical visions of women in the context of Tallinn, which is recognized as a UNESCO heritage site due to the unusual integrity of its medieval urban fabric. The event included a tour through the Old Town and St. Nicolas Church, a museum which contains the foremost collection of medieval art in Estonia.

The storytelling event merged mythologies, everyday stories of medieval women, and contemporary mystical feminist narratives. Through performance and virtual reality, the audience was immersed in confounding somatic practices and fantastical worlds entrenched in different experiences of embodying femininity, in both life and death. Through research into the experiences and representations of medieval women, Kaplinsky developed the notion of "medieval virtuality" and identified it in various aspects Christian spiritual life, from prophetic visions to the afterlife. Drawing parallels between mystical visions and contemporary forms of embodied learning rooted in historical somatic practices, she invited the audience into spiritual allegorical realms.

"Unio mystica" denotes the state of being at one with all, the union of the mystic's soul with God during a vision or other moment of religious ecstasy. In this amalgam of medieval mysticism and Lutheran orthodoxy, as promoted by "the father of German pietism," Johann Arndt (1555–1621), the aspiration was for one's soul to become absorbed in the transcendent. Many feminist artists today draw on proto-feminist figures from history, particularly female mystics from the pre- and early modern age. In light of ongoing efforts to build a virtual world or metaverse, and the promise it carries of a transcendental virtual universe, the fallacy within the notion that digital technologies are leading to an increase in virtual imagination is ever present. What are its implications for virtual imagery and feminist storytelling?

Symbols of Faith and Loyalty

Anu Mänd is senior researcher at the Institute of History, Archaeology, and Art History of Tallinn University, focused on gender, death, and animal symbolism in the late medieval and early modern Baltic region.

She opened the *Unio Mystica* event in front of a woman's gravestone in St. Catherine's Passage (see fig. 1), which is located on the remains of a monastery. It is the oldest surviving gravestone of a woman in all of Estonia. In the Middle Ages, only the rich and the powerful received gravestones and church burials. People from middle and lower classes were buried in churchyards without gravestones. That is how we know that this tombstone belonged to a woman from the upper class. The dogs on the gravestone symbolize faith and loyalty in Christian iconography. One dog or more at the feet of a woman was meant to symbolize her marital fidelity; thus we can deduce that this woman was seen as a loyal wife to her husband.

Memories and Traces of Women in the Middle Ages

Next on the itinerary was the Niguliste Museum, one of very few Northern European museums situated in a church building. It houses some of Estonia's treasures of medieval sacral art, including a fragment of Berndt Notke's fifteenth-century masterpiece *Danse Macabre*, which was painted in Lübeck, Germany, and is believed to have originally been some thirty meters wide. Its subject is an allegorical genre of the late Middle Ages; usually depicting the dead from all walks of life, or the personification of death, it served as a reminder of death's all-conquering and equalizing power.

While death unites all the figures in Notke's painting, from pope to peasant, then as now status and wealth played an important role in how one both lived and died. Wealthy women, especially wealthy widows, had more means to invest in their afterlives. In light of death and the fleeting nature of life, symbolized in the memento mori, women who could not make significant donations towards the end of their life, let alone afford gravestones of their own, had to seek other resources in order to be remembered by their communities. Confraternities fulfilled important social and spiritual roles for their members, mainly serving to aid in the salvation of their members' souls and the commemoration of their deaths. Thus people of fewer economic means could participate in mutual support, such as praying for one another's souls, in order to gain safe passage to the afterlife.

Mysticism and Contemporary Somatic Practices

In her artistic practice, **Dominika Trapp** addresses women's fates in traditional Hungarian peasant culture but also looks at women's contemporary experiences, including reflections on her own struggles with eating disorders and on feminism under rising nationalism in Hungary (see fig. 2). Her paintings embrace intuition and introspection as a guiding methodology. In her curatorial and collaborative projects, she generates situations of dialogue between socially or culturally distant groups.

Reading from a handwritten scroll, Trapp looked back on the past decade of her artistic practice against a backdrop of autobiographical ruminations: coming of age as a young woman in the Hungarian countryside, discomforts with contemporary feminism, and her commitment to somatic intelligence, influenced by mystic and philosopher Simone Weil, who, like some other female mystics, practiced abstinence from eating and thus became a key reference to Trapp in relation to eating disorders.

A recurring theme in Trapp's body of work, the claw clip is a functional hair accessory invented in the 1990s and currently experiencing a strong resurgence in popularity. It first appeared as

Fig. 3
The Vision of St. Emerentia, wing of The Holy Kinship Altarpiece, late 1500. Original location: Niguliste Museum. Brussels workshop. Reconstruction by artist Olesja Katšanovskaja-Münd, 2018. Oil on wood, fabric, 120 cm × 49 cm.

a motif in Trapp's paintings ten years ago and continues to weave itself into her artworks, one of them being *Eighth Grade Class Trip*, depicting a girl dressed according to 1990s fashion. In her series *Unio Plastica*, the claw clip clasps onto strands of organic matter. Borrowing the religious concept of "unio mystica," this series reflects on the union of organic and inorganic with two agonists: the hair clip as an invasive agent, and less conscious organic masses.

Embodying the Holy Kinship

In her creative practice, which spans fine art, museum pedagogy, and conservation, **Olesja Katšanovskaja-Münd** is interested in the aesthetics of hidden, undiscovered, and often invisible matters. This leads her to continuously connect with other interdisciplinary areas, often employing a feminist lens to analyze gendered dynamics in everyday rituals that govern women's sovereignty and bodies.

In front of *The Holy Kinship Altarpiece*, dating back to the fifteenth century, Katšanovskaja-Münd presented her reconstruction of the outer side of the altarpiece's deteriorated wing (see fig. 3), which bears a rare depiction of the vision of the grand-grandmother of Jesus, St. Emerentia, on Mount Carmel. In the image, a flourishing plant rooted in the womb of St. Emerentia bears her lineage—first her daughter St. Anne, then her granddaughter Mary, and finally, atop a flower, the baby Jesus. It symbolizes the fertile female lineage of Christ.

It took Katšanovskaja-Münd two years to reconstruct the painting. Upon its completion, she began to have visions of sprouting plants, and soon found out that she was pregnant. Her presentation on the tour was complemented by a somatic exercise and the audience was guided in bridging a connection between the trinity of visual stimuli, inner feelings, and bodily expression.

Tai Shani's practice encompasses performance, film, photography, and sculptural installations. She frequently incorporates experimental monologues by women into the fantastical worlds she creates. Inspired by disparate histories, her artworks manifest equally disturbing and divine images in viewers' minds.

To round off the storytelling event *Unio Mystica*, the VR screening of Shani's *Tragodía* (2019) circled back to the theme of death and mourning. *Tragodía* is a VR play structured around three generations of women in the artist's family and their non-human kin (see fig. 4).

The enormous heads of Shani's mother, aunt, and grandmother, reminiscent of the monolithic Maoi stone heads of Easter Island, hover weightlessly in outer space. The viewer embodies the avatar of a ghost child as they listen to stories from the other side of life and observe their own body.

Fig. 5
Screening of Tai Shani's VR play *Tragodía*, 2019, in the Niguliste Church and Museum (Tallinn) on October 26, 2021, as part of *Unio Mystica*, curated by Helen Kaplinsky. The event brought together her research for her Beyond Matter residency at Tallinn Art Hall.

Like many of Shani's works, *Tragodía* is autobiographical. It can be understood as a mystical vision of undefinable states of being that emerge during grief: both a sculptural installation and an immersive VR experience, it was created as a receptacle for the voices of Shani's family and as a girdle for the artist's fear of their own eventual passing. During the screening, some of audience members raised their hands and waved them. Seated in the church pews, they appeared to be raising their arms in praise of the Lord (see fig. 5).

TOWARDS COMPUTATIONAL BODY HORROR.
In Conversation with Zach Blas
Kristaps Ancāns and Corina L. Apostol

Zach Blas is an artist, filmmaker, writer, and professor whose practice spans moving image, performance, science fiction, and computational theory. His work engages philosophies and imaginaries related to artificial intelligence, biometric recognition, predictive policing, the internet, and digital technologies, often from a queer perspective. From September 2021, Zach Blas spent two months in residency at Tallinn Art Hall. During the period of the residency, Blas commenced research, started elements of production that are screen-based, delivered a performance-lecture, conducted workshops to test and share ideas with local communities in Tallinn and lead the online conversation with Tallinn Art Hall curator Corina L. Apostol, and artist, writer, and educator Kristaps Ancāns on which the following text is based on.

In his latest projects, *576 Tears* (2022) and *Profundior (Lachryphagic Transmutation Deus-Motus-Data Network)* (2022), Blas explores religious crying as a means of communicating with an artificial intelligence god. Both artworks present a new symbolism of tears in an age of AI, in which emotions are extracted by AI systems but also willfully given up.

This online discussion also concerns one of Blas' older key projects, the *Facial Weaponization Suite* (2012–14) (see fig. 1). Consisting of masks based on collectivities of faces, including faces of queers, the artwork demands informatic opacity against facial recognition systems. Blas uses a partly pedagogical approach to illuminate prejudices in biometric technology and suggest how to resist algorithmic governance. Many of Blas's works are preoccupied with ways to resist the web of capitalism, computational surveillance, and the corporate internet of Silicon Valley.

The conversation revolved around questions such as: What is behind our desire to create AI technologies, and why we are developing AI in human form? Do we want to replicate ourselves, or rather to be a creator or god? And what happens to bodies when they are mediated by different technologies, media apparatuses, and other generic forms?

Religious Figures, Religious Systems, Silicon Valley

KRISTAPS ANCĀNS   Corina and I have talked about how the political structure can change the idea of religion and replace religion. For example, how Vladimir Lenin became, in a way, the new Jesus of the Communists: in the Soviet Union religion was banned but religious structures were reshaped to fit Communism. My first question is: who or what do you think is the "new Jesus" in the emerging system?

Fig. 1
Zach Blas, *Facial Weaponization Suite*, 2012–14. Multimedia installation, plastic masks, HD video, 8:10 min, photo documentation. Installation view *Global Control and Censorship*, ZKM│Karlsruhe, 2015.
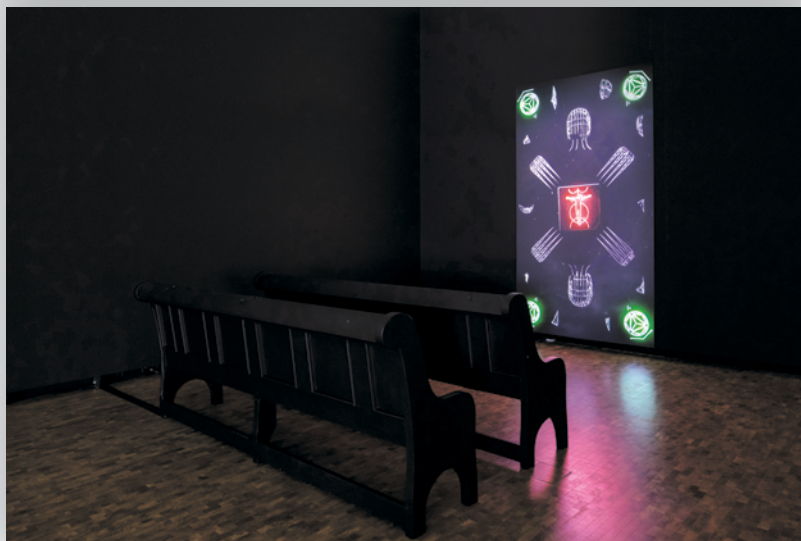

Fig. 2
Zach Blas, *IUDICIUM*, 2022. Multimedia installation. Installation view, MUNCH Triennale: *The Machine is Us, Munchmuseet*, Oslo, Norway, 2022.

ZACH BLAS   It might seem unexpected to consider religion and religious figures within the context of Silicon Valley and the tech industry, but it is indeed a site where various religious and spiritual beliefs coalesce—and have for some time. There is a large Christian population in Silicon Valley, but also the influence of Buddhism alongside New Age spiritual practices.

There are also "leader" figures in Silicon Valley who prognosticate their visions—visions of technology that are often teleological, promising a pathway to progress, and sometimes something even more directly religious or spiritual, like transcendence into digital data or immortality through consciousness fusing with computers. A comparison can be made to Jesus, but it's tenuous. There is a quite specific and unique formation of religious belief emanating from Silicon Valley. I'm interested in understanding the composition of this religious belief and how it undergirds the development, creation, deployment, and use of technologies made there.

Informatic Opacity, Surveillance and Capture, Privacy and Opacity

CORINA L. APOSTOL   I have known your work almost from the beginning, and every project you work on has key terms. One of the first terms you talked about in your *Facial Weaponization Suite* was "informatic opacity." I also know that you've made a distinction between surveillance and capture, and that it's very important to you. Now, years after that project, do you still consider opacity a productive form of protest or refusal to be captured?

ZB   *Facial Weaponization Suite* is outdated, for sure. I made that work before AI was integrated into biometrics. Biometrics is configured differently now. A newer paradigm of biometric calculation includes automation, data training, and generation. But opacity is not a matter that becomes outdated, and nor is it a question of trying to become opaque. We are all already opaque. It's an ontological and relational condition of existence, which I take from the Caribbean philosopher and poet Édouard Glissant. We are opaque, but forces in the world violate our opacity. Glissant would call these forces a kind of barbarism. Opacity shifts the political stakes of how we might imagine resisting or refusing biometric surveillance. How can tactics or techniques be developed that fight against the violations of opacity that biometric governance enacts?

Mask, Machine Vision and Learning, Computation

ZB   If opacity is a fundamental condition that constitutes us all, then following Glissant a core political goal is to create the conditions for opacity to flourish and shine in its fullest capacities. The protest masks in *Facial Weaponization Suite* (see fig. 3) were created as a tactic and technique for protecting and celebrating opacity. They are not just about individual hiding or subtraction but rather about refusing the biometric gaze that violates the opacity of the world. I was particularly interested in informatic opacity. Humans and computers see differently. One might be legible to a machine but completely obscure to a human, and vice versa. I wanted to make a work that fought for opacity on that informatic, computational front.

Privacy and Anti-Surveillance

ZB   I don't see privacy as the horizon of political transformation in an anti-surveillance project. This is not to say that privacy isn't important in certain contexts, but the larger vision here is anti-capitalist, anti-police, anti-corporate, etc. Anti-surveillance politics should sync with the aspirations of social justice movements, including feminism, anticolonial politics, queerness, and antiracism.

Roe v. Wade, Biometrics, Surveillance v. Privacy, Capture v. Opacity

CA   I have thought about this in the context of the overturning of Roe v. Wade in the US with, and how people who can get pregnant are now under scrutiny. Forms of surveillance are being reformed based on whether you have a uterus or not, so privacy and surveillance are already being used against us in ways that you wouldn't think would be legal.

ZB   I think this flags that there are many dynamics to what we call surveil-
lance, which we don't often even think of as surveillance, like certain
approaches to women's healthcare. Framing biometrics as a struggle
with opacity likewise productively expands our perception of the issue
of surveillance, to see it not only in some generic sense of powering
looking and watching but as the standardization of identity and identifi-
cation in and through data.

**Hacked Organisms, Generations, Decision Making, Cybernetic
Frameworks, Human Flesh, Embodiment, Being Non-Algorithmic**

KA   Historian Yuval Noah Harari has talked about the value of data and the
people who hold it. All living things can be hacked, and if the body can
be hacked, it can be communicated, it can be synthesized. How do
you see a generation growing up with these ideas? How do you see a

change when some algorithms can tell you what you like and don't like? I've always wondered if that leaves an imprint on our imagination. How does it relate to decision making?

ZB   The human body can certainly be hacked—we see this with transhumanism and biohacking movements today. And there is the older idea of humanity being in a cybernetic feedback loop with technology. Perhaps the more interesting question here is what conception of the human one begins with and how that conception influences or determines the possibilities and limitations of hacking the body. Mediation can also be viewed as a kind of body hacking. What I mean is that the mediation of a body through a technological device often hacks—reconfigures—that body to a degree. Again, biometrics is an example, one in which a tension emerges between ⬉embodiment and mediation. Media theorist N. Katherine Hayles described embodiment as non-algorithmic in her book *How We Became Posthuman* (1999), which suggests that the human body can never be fully mediated. Perhaps the lesson is that hacking can only be done within the confines of embodiment and materiality, the flesh. In the end, the idea of hacking human bodies beyond the flesh is more of a fantasy.

Subjectivity, Algorithms, Technological Devices, Corporate Interests

ZB   Your comment made me think about the production of subjectivity, how subjectivity relates to technological devices, platforms, corporate interests, and attention economies. Both Netflix and Amazon hack, impact, and shape human subjectivity. Humans are in a co-evolutionary relationship with technology—technogenesis—after all. I'd rather not be in a technogenetic spiral with these companies, but it's not as simple as opting out.

Generations, Deep and Hyper Attention, a Digital Media Era, a Print-Dominant Era, Neuroscience

ZB   Staying with Hayles a bit longer, the subjectivity question is a historical one too, so the technogenetic production of humans and their subjectivity looks different in different historical eras. For instance, Hayles related argument on deep and hyper attention. From a neuroscientific point of view, those born in a print-dominant era have a different wiring of neural pathways in their brain than those born in a digital-media-dominant era. Those born in a print-dominant era are thus more inclined towards deep attention (reading a book and doing nothing else for several hours), while those born in a digital era have hyper attention (reading an article, texting, watching a video, and sending an email all at the same time). Hayles is not making a moral judgment about deep and hyper forms of attention. Rather, she draws our attention to the ways in which media can mark and form us. But again, it's not completely deterministic; it's a co-evolutionary, non-teleological relationship. There is always the possibility for action, intervention, and change.

Anxiety, Fear, Digital Dictatorship, Education, Body Horror

KA   As a final question, I would like to draw attention to the anxiety around and fear of digital dictatorship in society. Would you like to elaborate on that?

ZB   Fear and anxiety are mobilized in so many differing modes and capacities, depending on class, race, gender, religion, nation, and many other factors. Sure, some people out there fear a digital dictatorship, but plenty of other people want—desire—that. Some people love and worship Elon Musk, while others hate him. I suppose levels of fear and anxiety are also determined by to how informed or educated one is concerning the composition of power in tech today. I think it's quite reasonable to feel fear and anxiety today, but I'm very interested in those who feel the opposite, those who feel something more like joy. I've been working through these dynamics by creating a new kind of genre, what I call computational body horror, to attend to the various horrors our digital bodies are subjected to, biometric and all.

RECOVERING BIA.
In Conversation with Donika Çina
Adela Demetja and Jiří Gruber (Tirana Art Lab)

Based in Tirana, Albania, **Donika Çina** is an artist and cultural activator working both regionally and internationally. Her artistic practice encompasses video art, video installation, and short movies. In her artistic practice she fuses her background in visual arts with her interest in how the personal situates itself and deals with society and its collective notions, norms, and standards. The complexities of her native Albania serve as a strong source of inspiration. The overlapping of and contradictions between different layers of history and individual perspectives are recurring themes in her artistic practice.

She graduated from the Faculty of Visual Art (multimedia), at the Academy of Arts in Tirana and continued to study photography and video in higher arts institutions of Romania and Germany. Her works have been exhibited widely, most recently in *Missing Stories* at the Salon of the Museum of Contemporary Art Belgrade, *Déjeuner avec Marubi* at Belvedere 21 in Vienna, and *Albania is not Cuba* in Havana, Cuba.

TIRANA ART LAB The project you developed during the residency at Tirana Art Lab deals conceptually with the maintenance and renewability of the city's memory. It is based on the story of Bia, a woman who, almost anxiously, took care of the exterior and immediate surroundings of her house in Tirana for many years. Why were you initially interested in Bia's actions? And what do they represent for you and the collective memory of the city?

DONIKA ÇINA When I first started working on *Recovering Bia*, also referred to as *The Bia Project*, I was contemplating public space in Tirana. I was especially attentive to the relationship that people reestablished with public space after the fall of the regime in 1991, a regime that hat subjected them to forced collectivism. I was intrigued by how the new perception of ownership of these territories. The image of Bia taking care of her vicinity flashed before my eyes—it was a memory, the one my inspiration was referring to. Bia had passed away some years ago, yet the image of her was so powerful to me. Later I confronted other people with my memories of her to discover that she was as vivid in others' memories as in mine. She was a known character in the city. Everyone who had to pass through Myslym Shyri Street knew her. She was remembered because she was doing something out of the ordinary, relentlessly. An obstinate defiance of the public order, but not one of those orders that would strike the nerve of the public. This hit my curiosity.

TAL Can such a personal, subtle act of defiance have a character other than symbolic?

DÇ   If we are to understand each of our personal acts, which are different
from mass reactions, to have a simply symbolic character then there
is absolutely no hope for humanity. Today we acknowledge what the
neoliberal system did and is still doing to the physiognomy of the cities
and the lives of the people. We have critical knowledge to confirm our
beliefs and other people share our anti-consumerist standpoints, so we
don't sound insane. In the 1990s, in Albania, at the height of when Bia
was living and carrying out her routine, the ideological approach was
different. She was alone and acting out of instinct. That's why I see her
refusal to make a profit from her house (see fig. 1), her constant cleaning
of her vicinity, and keeping her façade bright white as a personal act
of protest toward the ongoing changes in the city. Her personal act of
protest was more than a simple symbolic act; it was a lifestyle. But I'm
also aware that we are talking about two Bias. Bia the woman of Myslym
Shyri Street and my performance Bia, who is ↘reenacting this woman's
gesture. Is reenactment in contemporary art a symbolic act? That is
another question.

In *Recovering Bia*, the role of extended reality is
a remedy towards the preservation of the public
space rather than a replacement for it.

TAL   The project *Recovering Bia* has thus far advanced within the medium of
extended reality, while posing questions about technological potential-
ity and fragility. How do you perceive the role of extended reality tools
in efforts to preserve values or knowledge? What are the limitations and
potentials of "virtual memory"?

DÇ In *Recovering Bia*, the role of extended reality is a remedy towards the preservation of the public space rather than a replacement for it. This is evident within the project, since while constructing the VR experience of the space I posed an official request to the Municipality of Tirana to physically transform it into a public art installation and performance. In parallel, technology and extended reality are used to preserve the physical matter. But this is also due to the nature of the project. It is situated between reality and art; between past, present, and future. It deals with history and a person from the past whose house is her relic in the present. The way this relic is preserved or not determines knowledge and values for the future. In these terms, technology helps a lot. The project also has its archive of objects, pictures, and performance texts, so very soon it will find its place as virtual memory on a website alongside its physical presence in exhibitions.

Fig. 2
Donica Çina, *Recovering Bia (second phase)*, 2020–21. Installation, video, digital print: 220 × 160 cm, A4 prints, objects, VR glasses. Installation view Tirana Art Lab, 2022.

TAL Isn't the restoration of inaccessible digital data, as well as the consistent effort to preserve Bia's action, in a certain sense, a Sisyphean mission? Where does the significance of doing so lie for you?

DÇ I would not call the efforts to access digital data and preserve memory a Sisyphean task, simply because they don't replicate the same action and of course they don't give the same result. Maybe Bia's action had a Sisyphean character, but not the project. Each action opens a path to another question. The first live broadcast of the performance in an art gallery during the exhibition opening questioned notions of public or white cube art. The loss of the video footage due to technical malfunctions and the need for a clean room technology to recover the lost data raised questions about technology's fragility. A clean room is a work area in which temperature and humidity are controlled in order to protect sensitive equipment from contamination, which is essential for performing basic recovery procedures. Any physically damaged hard disk must be recovered in a clean room to preserve the initial state of the media.

The official request posed to the Municipality of Tirana to preserve and transform Bia's premises into a contemporary public monument shed light on the Municipality's bureaucracy and indifference to artists and public space. All these questions are raised by the survival of the past, but together they construct another narrative that is slowly built in the present. The conjunction of all these different pieces constitutes *The Bia Project*. I cannot talk about the future, but it lives in the present.

TAL   Can you talk more about your proposal that the Municipality of Tirana turn the house of Bia into a public monument, and how the project has evolved over these past months?

DÇ   When I filled out the application for proposals at the Municipality, I knew I would likely receive a negative answer, if at all. This is because of previous experiences that I as an artist and my colleagues have had with the Municipality. This is not the first request for support or proposal for an art project that has been completely ignored by them. Also, the Municipality's politics for art in public space is very different. Supporting a project that directly points out a refusal to adhere to the narrative of progress that the Municipality has unceasingly propagandized would have been surprising or too emancipatory. But I wanted the request to be registered in their system to open a conversation or acknowledge the differences. The 3D preservation of the space in digital memory came to rescue the project from that refusal.

For years I believed that Bia's house was in danger of being wiped out by developers, but to my surprise it has lately been squatted by an ambulant vendor who sells umbrellas and cheap sunglasses on the stairs of the building in the daytime and stores them indoors at night. Last time I painted the façade in lime wash, we agreed that I would do it in the afternoon after he had left so we could both do our defiant work undisturbed.

TAL   The term "future archeology" has emerged in connection with your work and interests. Can you relate to it in connection with The Bia Project?

DÇ   *The Bia Project* started as a reenactment performance of the action of Bia, the woman. Coming back to the question of the symbolic character of reenactment in art, for me, more than a symbolic act reenactment is symbolic archaeology. It represents the return or survival of the past to generate meanings and values for both the present and future. Every act of painting by Bia as well as by me has its physical footprint, which is documented in the archive of the project. Every act adds a thin layer of white paint to the white walls and pavement. Layers of the past and layers of the present stand equally on the surface. The historical character, the layers of paint and meaning, the archive, and the preservation of the building as a time capsule—these are all prominent elements of archeology.

TAL   Your works take the form of projects that you keep on working on, editing, and developing further and exhibiting in different forms over time. Some of them have taken the shape of alternative archives. Why does your practice need this approach?

Fig. 3
Donica Çina, *Recovering Bia (second phase)*, 2020–21. Archival material.

Fig. 4
Donica Çina, *Recovering Bia (second phase)*, 2020–21. Exploring XR. Installation view Tirana Art Lab, 2022.

DÇ   My practice is more like a lifestyle. I live simultaneously with *The Bia Project* and with *The Family Tree*, *The Surface Project*, and others. I don't know when I'm going to see them as being complete. It is an ongoing process of research, adding pieces, sometimes editing parts of the past, and translation into other languages. It's a layering process. But jumping from one project to another is also a refreshing process for me. Because it gives me the possibility to detach for a moment while I work on other things and return to see what I've done with a fresh eye. But I have to be honest: it started from precariousness. In the impossibility to cover production costs for one project I started to work on other ideas; my mind is of course more prolific than my wallet. Then it became an organic practice for me.

TAL   Bia's actions move between private and public, personal and societal. Some of your works likewise develop on the border between individual and collective history, memory, and narrative. Why is it especially important to keep creating such works in the Albanian context?

DÇ   I believe it is the Albanian context itself that generates such works in me or in other artists. Albania has been one of the most isolated social experiments on earth and we haven't come to terms with that past yet. I think art is the most effective way to do it.

TAL   Tirana has experienced a huge construction boom in recent years, and rather than care and renewability, in this case one can speak of growth and invasiveness. As if there was no more room left for something like cultural memory. How do you perceive the situation in the Albanian capital and the role art could have in this reality?

DÇ   Tirana has become unrecognizable through the tall towers and residential buildings that have popped up everywhere. The economy of this new reality is very doubtful. They were developed on top of informal buildings and penthouses built around 2000. So the problem lies further back in time. I addressed this topic in *The Surface Project* in 2014. Tirana and many cities in Albania have many formal and informal layers of building that are symptomatic of a long story of abuse by both citizens and governments. But of course, the responsibility lies with the most powerful, and the arrogance and arbitrariness of the government prevail for the moment. Its climax was the demolition of the National Theatre on the last day of quarantine during the pandemic, ignoring all protests and strong resistance from artists and civil society. The damage is not only in the loss of historical buildings and the memory of the city, but also in the establishment of a culture of state arrogance and exclusion of citizens. In this context, art can change people's perspectives and inspire them to find creative tools to restore dignity and self-empowerment.

TIRANA TIME CAPSULES.
In Conversation with
Alexander Walmsley

Adela Demetja and Jiří Gruber (Tirana ArtLab)

Alexander Walmsley is a British artist and developer based in Berlin. He is particularly interested in the relationship between the physical and virtual worlds, and how they are socially and technologically mediated. His work takes the form of interactive computer-generated environments, be they historic, speculative, or abstract, that make extensive use of digitized elements of the physical world. He comes from a background in archaeology and anthropology (University of Cambridge, University of Geneva). He is also currently a research associate at the Film University Konrad Wolf, Babelsberg.

The *Tirana Time Capsules* are a series of three virtual environments that act as time capsules for three different neighborhoods of Tirana in 2021. The chosen areas—21 Dhjetori, Kombinat, and an area of the Tirana Great Park—each embody different aspects of Tirana's urban development over the past 100 years. Particularly since the early 2000s, the areas have been characterized by the gradual disappearance of public space as the building sector has increasingly become controlled by private interests.

The *Tirana Time Capsules* were produced by Alex Walmsley in the period May–June 2021 as part of a residency undertaken at the Tirana Art Lab – Center for Contemporary Art in the framework of the Beyond Matter project.

TIRANA ART LAB   In your application for the residency at Tirana Art Lab, you envisioned your Tirana Time Capsules project to deal with how virtual documentation of spaces and objects can contribute to place-making rather than just record-keeping. Could you describe your working process and how you approached the project's implementation?

ALEXANDER WALMSLEY   One of the themes I was concerned with was the difference between record-keeping (or data storage) and preservation (or memory). Increasingly, digital media are not just sites in which to navigate ↘ archives, but also locations of active engagement with the past, and places where new memories can be formed. For me this is an important shift in the role they play in public life, a role that comes with new responsibilities and entanglement in new systems of value. In this work I was interested in creating virtual spaces that were themselves places, rather than interfaces through which we access data about other places.

I used methods of virtual documentation—photogrammetry and audio field recordings—to reconstruct and reconstitute places in the real

world. My aim was not to create virtual copies, but to create spaces of personal memory, i.e., to reconstruct my impression of place rather than the topological relations between things that exist in the "physical" world (see fig. 1 and 2).

TAL How beneficial is the dematerialization that goes hand in hand with virtual environment? And do you see any downsides to it?

AW   I am not sure that I see it as dematerialization so much as the transformation of media from one form into another. Photogrammetry scans have quite a distinct materiality, even if they are not tactile like physical media. It is clear, however, that the sensing and recording of the physical environment privileges certain kinds of materials and environments. Three-dimensional scanning works particularly well for solid, stable, non-transparent structures, and is less suited to structurally complex objects (e.g., clothing, fur, plants). Perhaps this is why it has been adopted so swiftly in archaeology and architecture. The use of this technique for "virtual preservation" ends up privileging the traditional subjects of heritage preservation (e.g., monuments and buildings) at the expense of other kinds of cultural artifact (e.g., certain kinds of cultural knowledge, music, dances). And although audio field recordings have their own biases, my use of them in the virtual environments was a way to account for this missing aspect of the 3D scans.

TAL   How do you decide which recorded material will be used in the final version? How objective can (and should) such records actually be?

AW   The materials I used for the time capsules are a result of my personal experience of the urban environment of Tirana and of my engagement with the recording techniques. I sought out objects to scan that could not be easily processed by the computer program. This produced the fractured nature of some of the objects in the virtual environments and perhaps goes some way towards breaking the relationship between the 3D scan and the reality it seeks to represent. There was also an element of curation in choosing the materials I used to create the environments. My selection was guided not by any objective judgement about what material was the most important historically (in any case, that is not my place to say), but rather what stood out to me as a guest in the city. Many objects or sounds caught my attention because they were so different to what I experience in my hometown. In other cases, it was because I associated the material with a narrative I had heard from someone. In still others, the object or sound was pervasive in the urban environment and difficult to avoid. At no point was I trying to create an objective record. For me, the goal of objectivity is a responsibility that is at odds with the desire to tell a story.

TAL   You created time capsules for three neighborhoods in Tirana. How did you choose each neighborhood and why were they important for you and the local reality?

AW   Each of these neighborhoods has a particular relationship with Tirana's urban development over the past twenty years and tells a slightly different story about the city (see figs. 3–5). The neighborhood of 21 Dhjetori is sandwiched between two main road axes leading out of the city (Rruga e Kavajes and Rruga e Durres), both of which have seen big commercial developments. The area between the two roads is markedly different—quiet, low backstreets with villas that occupy prominent positions in the urban fabric.

In Kombinat there is a very interesting juxtaposition between crumbling industrial structures and reclaimed domestic spaces. I was interested by the fact that, during and following the transition to capitalism in the early 1990s, many people moved into these abandoned factory spaces and walled off bits as their living quarters. But here too, is the ever-present specter of urban renewal—this time in the form of government plans to redevelop the area as a hub for design and technology start-ups, called KombinArt.

The Lake Park is where much of Tirana and Albania's public heritage seems to manifest: there are monuments to fallen soldiers, statues of famous writers and politicians, public works of art, religious spaces, etc., all in a fairly restricted area. Even there, the sound of construction was never far away.
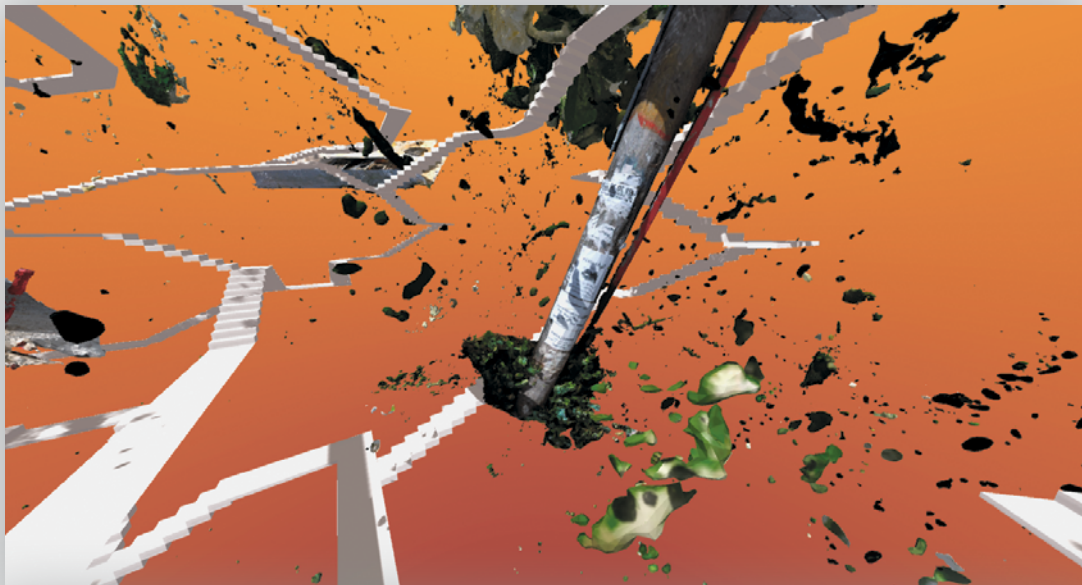
Fig. 3
Alexander Walmsley,
Tirana Time Capsules,
2021. VR installation.
View into the virtual
environment of ***Time***
Capsule 1 (21 Dhjetori),
2021. Screenshot.
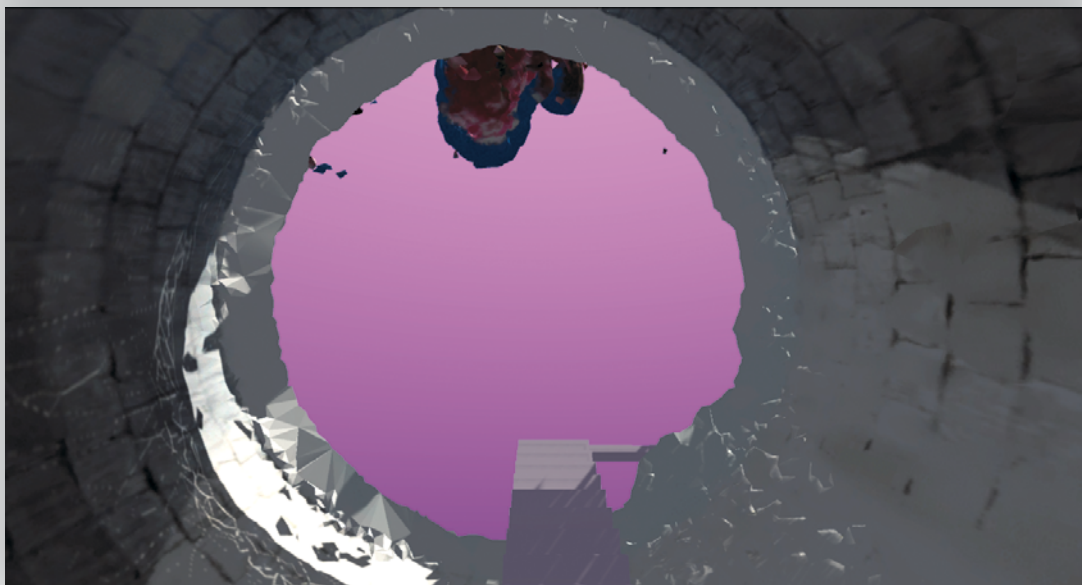
Fig. 4
Alexander Walmsley,
Tirana Time Capsules,
2021. VR installation.
View into the virtual
environment of ***Time***
Capsule 2 (Kombinat),
2021. Screenshot.
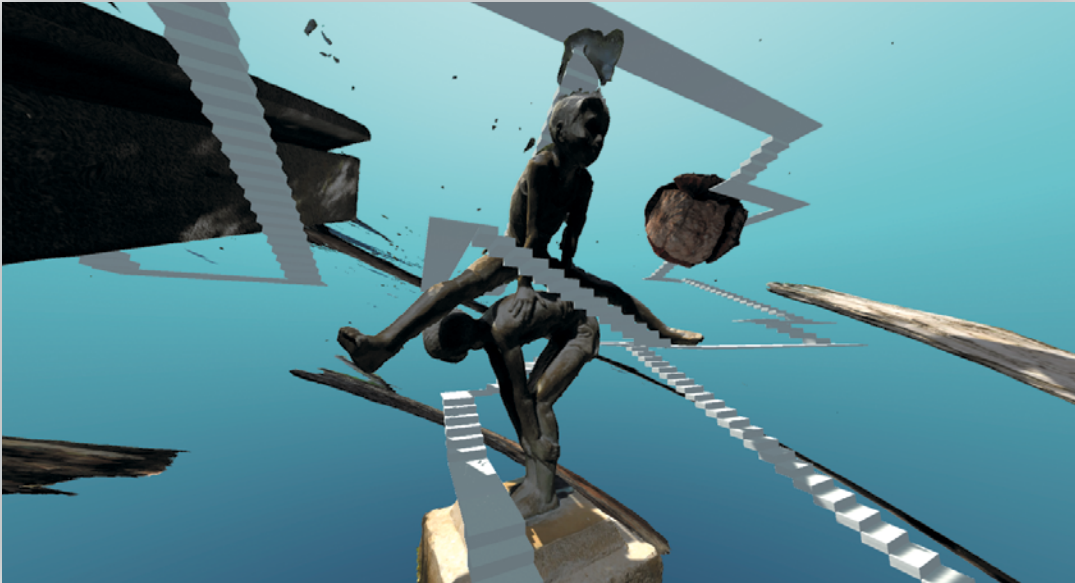
**Fig. 5
Alexander Walmsley,
Tirana Time Capsules,
2021. VR installation.
View into the virtual
environment of *Time
Capsule 3 (Teatri i
Gjelbërimit)*, 2021.
Screenshot.**

Although the narrative of urban development and the loss of heritage is not unique to Tirana, it seemed that tensions were particularly pronounced in the city, especially in the wake of the destruction of the National Theater in May 2020. The choice of these three areas was intended to portray on some level these tensions that are present throughout the city.

I am interested in finding ways of making art about the past that can open a space for speculation about the future, rather than reflecting on the weight of history

TAL An integral part of your work is the effort to capture, preserve, and possibly develop a certain situation in a specific period of time—but to what extent does your project reflect on the time conditionality of the medium itself?

AW The label "time capsule" was intended to be somewhat ironic given the ephemerality of digital media. Indeed, the idea that something can be preserved virtually seems oxymoronic given the speed at which digital media ages aesthetically and technologically. The act of virtual preservation seems destined to fail if the recorded data decays at a faster rate than the actual thing that has been recorded.

On another level, there is often a certain melancholy or nostalgia associated with the act of capturing something using photography, photogrammetry, or audio field recordings. Particularly in documentary photography there is a long tradition of dealing with this aspect of the

medium. Perhaps it is inherent in the very act of fossilizing moments in time. I am interested in finding ways of making art about the past that can open a space for speculation about the future, rather than reflecting on the weight of history (though the latter can certainly make way for the former).

TAL   You studied anthropology and archaeology. Could you briefly describe your path to visual art? What motivated you to connect these fields? What are the advantages of such an interdisciplinary approach?

AW   My academic background in anthropology and archaeology continues to inform my interests to a large extent. These subjects are broadly interested in the interplay between individuals and their cultural and environmental milieux. When I was studying, my interest was always geared towards the role of technology in producing new social and cultural formations through its transformation of human labor and material resources. And this is exactly what I am interested in as an artist. I feel that interdisciplinary approaches offer the kind of productive friction that all disciplines need in order to move forward. In return, the visual arts offer a broader set of methods for exploring these issues than a purely academic setting.

TAL   Another work that emerged during the residency, Another Facade, points to the absurdity of the visualizations surrounding construction sites. In Tirana, where the building industry is brutally taking over public space, these representations are clearly a form of escapism and manipulation. But can virtual reality, used meaningfully, offer visions of a better world?

AW   I would love for VR and perhaps the metaverse to become a place of experimentation with different social and political forms and meaningful engagement in public life. Seoul has just announced its intention to become the world's first "metaverse city," meaning that citizens will access state services from their homes via VR headsets as avatars in a 3D space. Whether this eases the burden of accessing those services or not I don't know, but it is the first example I have heard of a state investing in this infrastructure. There are plenty of examples of VR being used in therapy, education, medical training, etc.—these are still isolated cases but outline a broad range of promising applications to which it could be put. In art, it feels like we are only just beginning to explore its creative and emotional possibilities—the feeling of immersion one gets is still a relative novelty and must be somewhat analogous to when films began being shot in color: the illusion has taken another step in the direction of reality. Once we are past this initial stage of awe at the technology, hopefully there will be space to address its potential more fully.

LWCE T1. In Conversation with Hanna Hildebrand

Adela Demetja and Jiří Gruber (Tirana ArtLab)

Hanna Hildebrand is a multimedia artist of Italian and Swiss origin who completed her studies at the Academy of Fine Arts Städelschule in Frankfurt am Main in 2009 and has participated in exhibitions in Europe, Asia, and North America. Her research begins with conversations and observations of the surroundings which flow into narratives with a universal perspective developed through a practice extending through video, photography, drawing, sculpture, and lately also extended reality.

Upon her arrival in Tirana, Hildebrand was struck by the urban development of the city. During her residency from September to November 2021, she explored the grid as a space between "the concrete," the imagined, the ideal, and memory.

TIRANA ART LAB   In your application for the residency at Tirana Art Lab you described the Albanian capital as an ancient middle European center but also as a dynamic pole on the move towards a futuristic perspective. How did you experience the present in Tirana, especially in regards to its rapid urban growth?

HANNA HILDEBRAND   The quick development of Tirana is a topic I encountered immediately, being confronted with the numerous construction sites and high-rises (see fig. 1). While speaking with locals, I often experienced their skepticism and the belief that Tirana might become a sort of open architecture museum featuring architecture offices from other countries. They tried to explain the reasons for certain dynamics, such as the frequent presence of unfinished buildings and constructions that appear to be at a standstill. Doing research in museums and watching many documentaries from the Albanian Film Archive, I could dive into visions of how the city was in previous eras to grasp how quickly it has changed.

To me these rapid changes reveal an attitude based on emotions and instinct, and are signs of a dynamism that allows the construction of the new and the destruction of historical buildings to happen easily. There are ongoing discussions about which old constructions should be kept, especially those from the dark periods which awaken unpleasant memories, or how they should be transformed. I find these discussions very interesting, symptomatic of a global consciousness and an admission of the negativity of past habits and the struggle to find ways to deal with them. I wish to further experience the countryside, which in contrast to the capital seems to be standing still, as though time is not passing.

TAL   The work you produced during the residency is an investigation into virtuality, using storytelling and imagination to explore its speculations and limits. What possibilities and limits did you encounter when producing LWCE T1?

HH   *LWCE T1* is an ongoing project that first took shape during the residency weeks in Tirana. It delves into "the virtual" by stimulating people to recall past actions in relation to specific places, architecture, and objects, in order to perceive moments and sounds again, to let images float. While learning about local history and culture and collecting inputs, I initiated a series of conversations with many interesting people whom I met through a network of locals I was introduced to by the Tirana Art Lab team. For the public exhibition which concluded the residency, I presented an installation which, for me, is the foundation of the project. I collaborated specifically with Lori Lako, Olsi Hoxha, and Erida Bendo. The chance to visit the Albanian Film Archive, to view films, and create a work which includes fragments of films produced between 1958 and 1996, was of great value. I was limited by time. In the final exhibition I therefore presented a first, distilled sample of my intended realization, in the form of the multimedia installation *LWCE T1* (see fig. 2). I consider this as phase one of the project, which I am expanding and developing by elaborating on the material I collected in Tirana.

TAL   With *LWCE T1* you explore architecture as a symbol—specifically the potentiality of architectural sites to be, hubs where individual and collective memories and histories merge. Which places or structures in Tirana did you consider to have interesting symbolic potential?

HH   Architecture goes beyond its own concreteness as a container of stories and memories. The size of architectural objects, their presence in the visual landscape, and the fact that they do actually contain people and actions makes them irradiate philosophical and emotional significance, turning them into symbols of societal, economic, and political dynamics.

In Tirana I felt a deep fascination for landmarks that are widely considered as being important, such as the Pyramid of Tirana, which will be transformed into a new public space—I was fortunate to visit the construction site. I was also profoundly moved by frequently crossing the most central Skanderbeg Square (see fig. 3), which has been recently re-designed; I found it very suitable for philosophical ambulation, to view the many significant buildings which surround it and to feel an individual and a part of many at the same time. The square is unique due to its inclination and the light that sheds on it in the evenings, which has the stunning effect of transforming passersby into silhouettes, making them very present but also surreal. These two places are key when recounting the history of Tirana; they are not only what they are but also what they have been.

On one of the first days in Tirana I observed a lattice of steel rebar emerging from a block of hardened concrete on a construction site: an abstract, rational, empty structure. It struck me as so significant, considering concrete is one of the most used materials after water

But what has the most interesting symbolic potential to me is not a specific place but a specific state: the state of being in construction or unfinished, which reveals the grid inside. On one of the first days in Tirana I observed a lattice of steel rebar emerging from a block of

Fig. 3
Hanna Hildebrand, *LWCE T1*, 2022. AR object (roll) in Tirana Skanderbeg Square. Photograph via AR app, 2021.

hardened concrete on a construction site: an abstract, rational, empty structure. It struck me as so significant, considering concrete is one of the most used materials after water (see fig. 4). In the installation *LWCE T1*, I have thus been exploring the grid as a space between the concrete, the imagined, the ideal, and memory. The grid indicates structures of knowledge, and a search for order and rationality. I'm also interested in the grid as a structure because I don't see a stable hierarchy but a form of entropy, like wild mushrooms and flowers clinging to the grid. The idea of the grid informed the project *LWCE T1* and laid the foundations for a larger composition to be explored.

TAL An integral part of many of your projects is observing everyday reality and interacting with residents. How easy or difficult is it to get people to share their stories? Do you have a strategy for your approach?

Fig. 4
A lattice of steel rebar emerging from a block of hardened concrete, one of the most used materials after water. Insipiration for Hanna Hildebrand's artwork *LWCE T1*. Photograph from 2021.
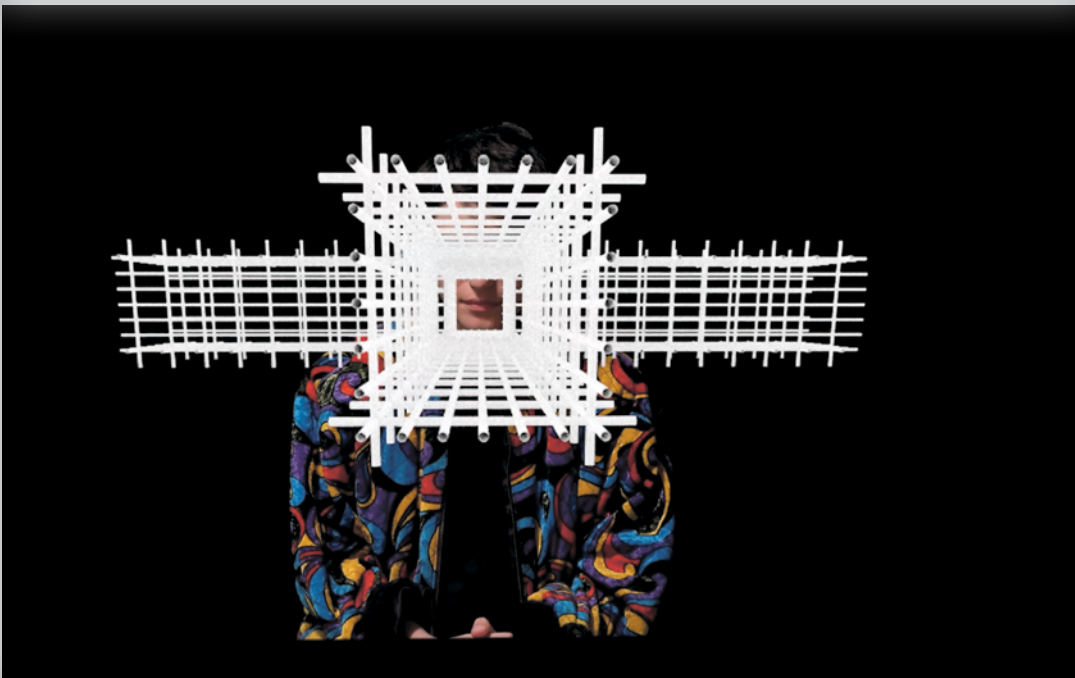
Fig. 5
Hanna Hildebrand, *LWCE T1* (Radioblog Tirana version), 2021. Video, sound, color, 1:40 min. Video still.

HH I think this is because of my nature: I am a listener, always curious, and I don't underestimate small details. I think everyone has incredible amazing stories; I love to hear them and mostly people love to tell them. I'm curious and I know that each point can be a starting point, each combination of words can connect with other facts and can be assumed to be prospective. I guess my strategy resides in a consciousness of how precious and unique each form of expression and communication is and as well how natural and easy it is to share. It is a mix of respect, devotion, mutual honesty, a very simple human solidarity, and empathic understanding. An important factor is the admission and sharing of my own obsessions and weaknesses, my vocation as preservationist, and my fear of a short memory and loss of information. It can be as difficult as it can be easy, and is unpredictable, like watching a starry sky, varied in conditions and with the excitement of possible shooting stars.

TAL All your projects seem to combine facts with imagination and rational thinking with intuition. Could you describe for us your practice of creation— where it starts, how it evolves, and how the different projects intersect?

HH I do not hide my nature; I have surpassed the desire to be someone else. It is me. I do not construct ethereal slick entities. It is me experimenting with what I have, the tools I have, the mind I have, and the language I have. Then there are techniques and a need for containers. Techniques are defining stories. Processes define where stories go. It can start anywhere. The works cannot be led until the end: I am no artisan pointing to a final product. They need to be somehow performative and with an experimental side. It mostly starts from the need to do something—I just have to do it. Sometimes I sniff the air and search, waiting for enlightenment, sometimes something comes along the way and intuition tell me that it's working, other times I just have to say let's take that curve, I'll do my artistic profession.

TAL *LWCE T1* stands for "looking with closed eyes," referring to the inner world and the faculty of imagination and storytelling. You define the human being as a virtual more than physical being. How can extended reality tools and their use in the arts contribute to refining the potentiality of the human as virtual being?

HH I would rather say that as a virtual being, the human can refine the potentiality of extended reality. By virtual being, I refer to a being that can imagine and live emotionally something which is not physically present, which can be anywhere, through the faculty of imagination. In terms of application in the arts, I find it most interesting to use the tools of extended reality to display and demonstrate concepts and ideas, to present ⬊models rather than creating a whole immersive illusionary landscape. Extended reality can provoke emotions in the receiver and through that it can be an interesting way for makers to express their intuitions (see fig. 5). I also find the application of XR effective in the conservation of heritage, because it offers a way to recreate a place for the senses and therefore preserve a four-dimensional experience.

PIXEL AND BLOOD.
In Conversation with Olson Lamaj
Adela Demetja and Jiří Gruber (Tirana ArtLab)

Olson Lamaj is an Albanian multimedia artist living and working in Tirana. His work investigates social and political issues related to contemporary life in Albania, as well as to more universal and timeless systems of meaning, beyond immediate conditions. As one of the cofounders of MIZA Gallery in Tirana, Lamaj's experience as an artist is linked to the establishment of artistic spaces and institutions in the city. His own projects emphasize the semiotic oversaturation and the mysterious, almost mystical qualities of objects and images related to political ideologies of various kinds. His artworks function as a collective mythography of the present, laying the groundwork for the projection and creation of new myths.

During his residency at Tirana Art Lab, from September to November 2021, Olson researched and investigated ongoing debates around space and art in public space in Tirana. He developed text-based interventions on public monuments in Tirana using extended reality tools. The ↘augmented reality application that was developed in the context of Lamaj's work can be downloaded from the App Store and via Google Play by searching for "Pixel and Blood."

TIRANA ART LAB   You studied in Italy, first painting in Florence and then photography in Milan. After receiving your diploma you returned to Tirana. What led you to come back? And how does the fact that you live and work in the "periphery" of Europe relate with the tendencies towards decentralization that can be observed in your works?

OLSON LAMAJ   I belong to a generation that went to Italy to study and to grow professionally during the 2000s. The Italian academy, while it was traditional, gave me the opportunity to see and learn more about what was happening outside Albania, and especially to learn more about myself. Even though I love Italy, after completing my studies I realized that life as a foreigner there required many sacrifices. Italy is a country where everything functions according to connections and recommendations; in the process of finding a job, in obtaining a residency permit, and so on. These obstacles make the art world feel even more inaccessible.

Upon returning to Albania and encountering the difficulties of adjusting, I began working on new artistic projects, and on contributing to the development of the local artistic scene. Living in the periphery has helped me to engage with certain themes related to the social and political situation in the region.

TAL   Some of your previous works deal with symbols, especially political symbols, and their manipulation on various levels. Could you discuss

your interest in symbols and their potentiality within the art discourse? Where do you usually find the symbols you use, and what are the sources of your research?

OL   With its history of wars and destruction, visual anarchy, and nationalistic propaganda, I did not need to look far to find various political symbols to work with in a Balkan country such as Albania. What has always left an impression on me is that when I present these popular symbols—like the two-headed eagle, or the star—in exhibitions outside Albania, audiences react to the works by adding to the meanings of the symbols, interpreting them in relation to the histories of their own respective countries.

TAL   You are one of two Albanian artists selected for a residency at Tirana Art Lab within the framework of *Beyond Matter*, and during the residency you worked with extended reality tools for the first time. How did your encounter with VR and XR develop during those two months?

Fig. 1
Olson Lamaj, *Pixel and Blood*, 2022. A look into the past. Installation view Tirana Art Lab, 2022.

OL   While I'm very familiar with photography and video, this was the first time I worked with VR. After I had gotten clear on the idea for the work I planned to create during the residency, I used online tutorials to try to understand the possibilities and the technologies I would need to use to realize the project. During my research, I came across the software *Unity* and got to know other artists who create virtual artworks.

TAL   You applied for the residency with the intention of researching public monuments around Tirana. What did you observe in that process and how does the alternative of creating a virtual monument influence the discourse? How great is the emancipatory potential of VR monuments in relation to public interventions, in your opinion?

OL   My investigation into the process of placing monuments in public spaces led me to look for images of monuments situated in public squares cities over the years. Looking at these images, I realized that

Skanderbeg Square is one of the central plazas in Tirana that has undergone the most change over time. I began thinking about how inhabitants intervene in that square in a physical sense, through protests or other usage, and the ways in which local government alters its architecture. I also became interested in the virtual participation in the square's formation that occurs through exchanging images online or by following the events that take place there on social media.

This brought me to the idea of using augmented reality as an appropriate way to reflect this phenomenon. The AR recognizes an image and by means of a phone app you can modify the reality that you see on the phone's screen.

TAL Your residency outcome was the creation of three text-based "monuments" titled *Pixel and Blood* and placed virtually on top of three significant buildings in the center of Tirana. How do these text interventions relate to and differ from the way such slogans have been previously present in the square?

OL *Pixel and Blood* presents new slogans above three of the main buildings surrounding Skanderbeg Square, which had political and propagandistic slogans installed on top of them during the Communist period. Using the AR application that I developed, you see the new slogans when you aim your phone at these buildings. I used slogans that speak of the transformation from the physical into the virtual.

TAL In your practice you engage critically with representations of power and with propaganda tools. In your opinion, how are the digital realm and new technologies being used as political instruments in Albania and beyond? Do they pose more threats or possibilities for their users, especially within the art world?

OL It's interesting, the fact that so many recent technological developments, from the invention of the internet to VR, have been created by militaries and governments influencing the masses. I think artists can have a critical attitude towards these kinds of technologies. This is evident from the projects created by other residency artists who didn't stop at simply demonstrating the possibilities of media, but also critically engaged with the ways these technologies are used by structures of power.

TAL For now *Pixel and Blood* can be experienced only within the given context of the exhibition, and therefore can be described as semi-public. What is your long-term strategy to make it more accessible to the larger public?

OL Ideally, the text-based components of *Pixel and Blood* will appear via location-based tracking on top of the original buildings in the square—but the current technology can't accomplish this. For the moment, I will exhibit the work by means of a phone app and photographs using image tracking, as I did in the concluding exhibition of the residency at

Fig. 2
Olson Lamaj, *Pixel and Blood*, 2022. Digital Print, AR slogan, plinth, phone. Installation view Tirana Art Lab, 2022.

Fig. 3
Olson Lamaj, *Pixel and Blood*, 2022. By pointing a phone at an image, a 3D slogan appears. Installation view Tirana Art Lab, 2022.
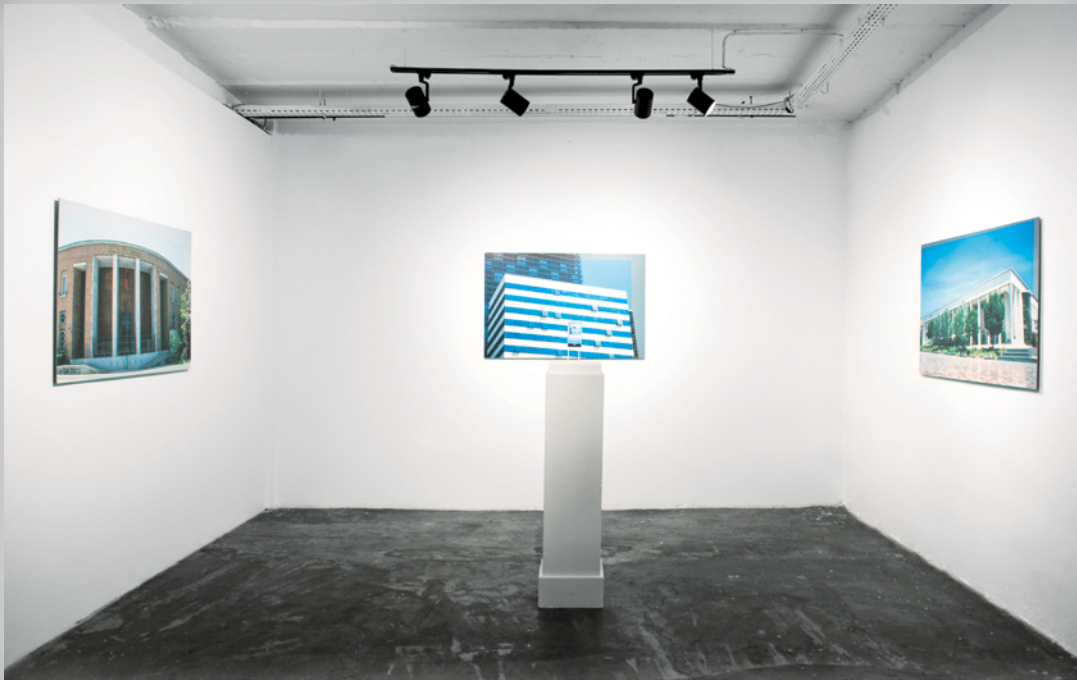
Fig. 4
Olson Lamaj, *Pixel and Blood*, 2022. Digital Print, AR slogan, plinth, phone. Three buildings around Skanderbeg Square. Installation view Tirana Art Lab, 2022.

Fig. 5
Olson Lamaj, *Pixel and Blood*, 2022. Digital Print, AR slogan, plinth, phone. Three buildings around Skanderbeg Square. Installation view, Tallinn Art Hall, Lasnamäe Pavilion, 2023.

Tirana Art Lab in summer 2022. The public could experience the
VR effect at the show, and if they went to Skanderbeg Square the same
effect could be experienced using the app on their personal phones.

Looking at current building trends, I imagine a chaotic city, one covered in concrete and very difficult to live in.

TAL Tirana's public space is disappearing literally before our eyes every
day. Thirty years ago Tirana was a capital of 250,000 inhabitants, but
today almost one million people live here, turning it into an extraordi-
narily hectic and pulsating metropolis. The massive urban and architec-
tural changes this growth has brought with it have not been in favor of
the city's inhabitants. How is the art scene in Tirana changing accord-
ingly? Can you imagine how this city will look in ten or twenty years?

OL We are living in an extremely unusual period that has transformed the
entire city into a construction site. The buildings being constructed
now have no relation to the increased population in Tirana, nor are they
being built in response to the current residents' need for housing. I think
that in the years to come we will encounter significant social problems
connected to the density of housing in urban areas, as well as ecologi-
cal problems brought about by the fact that these structures have been
built without any criteria that take their natural setting into account.

Looking at current building trends, I imagine a chaotic city, one covered
in concrete and very difficult to live in.

TAL What are you working on right now?

OL *Pixel and Blood* has been selected for *Immerse!*, an exhibition at Tallinn
Art Hall in February of 2023. This second display of the project will
enable it to be read and interpreted by a broader public, beyond the
Albanian context.

AS DUST, AS RAIN, AS A LINE ON THE MAP AND A CRACK IN HISTORY. In Conversation with HUNITI GOLDOX

Adela Demetja and Jiří Gruber (Tirana ArtLab)

HUNITI GOLDOX is an artist collective consisting of Areej Huniti and Eliza Goldox. They have been active since 2020 and reside between Germany and Jordan. Their practice is rooted in an interest in geopolitical realities, marginalized oral histories, and contextual research. It is shaped by an engagement with speculative futures and fictions that stems from the desire to create moments for collective ↘(re-)imagining, to collapse dominant narratives and fixed geographies. In their joint practice they incorporate writing and new media technologies, such as VR and video art, and embrace different formats, such as workshops, excursions, and interventions, through which to involve different voices and beings, be they human and non-human. Their work has been exhibited at Darat Al Funun, The MMAG Foundation, The Jordan National Gallery and Goethe Institute in Amman, SomoS Art House in Berlin, School of Waters / Biennale Mediterranea in San Marino, Sheffield Doc Fest, Transmediale Berlin, Dream City in Tunis, and D21 in Leipzig.

In April 2022, the artist collective spent their residency in Tirana Art Lab, where they expanded on their interest in geopolitical realities and exploring ways of communicating the interventions on waters that span temporal and spatial landscapes through new media tools. In Tirana, they came across many water bodies and digital renderings that are emblematic of the constant search for the novel and the new through fast-paced landscape modification.

By also sharing content from previous research projects and giving access to digital matter, the collective hopes to open up a space to think and unpack the lines of power that affect present ecological concerns such as intervention, extraction and dispossession. As part of their contextual research in Tirana they wish to have a dialogue with the guests on the topic.

TIRANA ART LAB Both of you have your ongoing individual artistic practices, but for three years now you have also been working collaboratively under the name HUNITI GOLDOX. At first glance, one might think that you come from very different and far-away contexts, Eliza Goldox being based in Leipzig and Areej Huniti in Amman. What are some of the shared elements that connect your practice and complement the collaboration?

HUNITI GOLDOX A lot of geographical imaginaries and boundaries are organized linearly, a sign of historical absurdity. For us, having shared values is essential for the collaboration to work. We both have interest in digital

culture, new media, geopolitics, and ecology. Coming from places with different water topographies has greatly informed our work. It made us dive into and discuss issues spanning from water scarcity and river burial in Amman to the postsocialist landscape around Leipzig, mined for brown coal during the Communist era and is now transformed into a massive water district with over fifty artificial lakes.

In our first collaboration, we were interested in experimenting with immersive virtual experiences to question and deconstruct histories and norms. So we took 360° footage of an abandoned theme park in Amman and reconstructed collective imaginaries of it in four chapters based on interviews. The aim was to get perspectives on different utopian configurations or possibilities, and the work was shown as a public intervention in downtown Amman. When it comes to understanding a place, it is necessary for us to organize walks and excursions to investigate the terrain and find ways to reflect on it artistically. Areej's background in digital cultures and documentary complements Eliza's background in design and art, widening our approach.

TAL You applied for the residency at Tirana Art Lab to research ecological realities, especially the diverse bodies of water around Tirana and marginalized oral histories. Can you talk about the ways in which water serves to you both as a material and a tool? What were some of the water-related issues you found and discovered in Tirana?
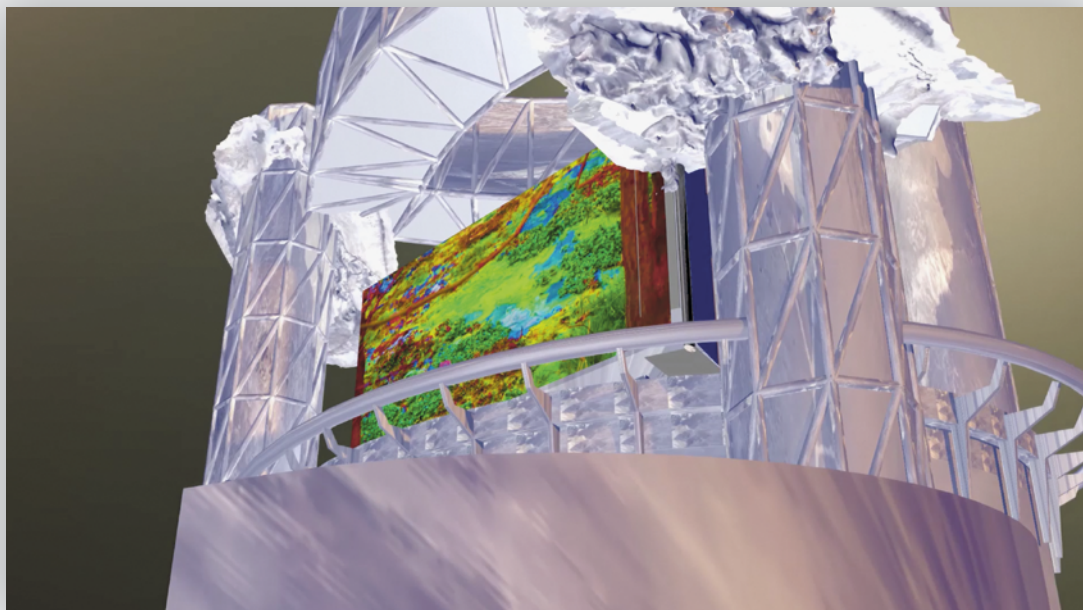
Fig. 1
HUNITI GOLDOX, *Tirana River Tower*, 2022. Digitally animated video.

HG Our intention was to find stories about present-day Tirana through visible and invisible water realities (see fig. 1). Listening to the present through accessing water bodies is a methodology we follow to place ourselves in the longer stories of water and to attend to what surfaces. As a medium, water creates a space for us to follow an unchoreographed thread while allowing room for facts and fiction to come to the foreground. It opens up conversations about personal, urban, mythological, and political realities.

In Tirana we came across a number of water-related issues; one is entangled with postcommunist economic policies and the social breakdowns that accompany them. The Tirana Riverside project proposes to turn the area where the Tirana and Lana Rivers join into a mixed-use development with a strong residential component as part of Tirana's 2030 urban regeneration masterplan. Proposed by Italian firm Stefano Boeri Architetti, the plan promises to enable "urbanism and nature to coexist." The masterplan shows an intention to create a smart self-sufficient city that offers housing, leisure, greenery, natural oases, office spaces, and soft mobility while embedding the health and safety requirements " necessary" for facing contemporary seismic and pandemic emergencies. By concentrating on construction in the city center, the government wishes to turn the city into a modern European metropolis.

Another issue we came across is pollution. A quick visit confirms the Lana River's polluted state, and the fact that it is devoid of human interaction. It is still clean at its source in the mountains east of Tirana, but the closer to the city it gets the more infiltrated by sewage water it is. No fish live in it due to the high pollution. During the 1990s, many buildings were constructed on the banks of the river illegally; they were torn down by mayor Edi Rama in the early 2000s. Now most of its banks have been planted with trees and grass. The Lana flows into the Tirana River, which has its source in the north of Mount Dajt, flows through a canyon called Shkalla Tujanit and across the Plain of Tirana, and then, from the city, heads towards the Adriatic Sea. At its mouth the river smells bad and spills out diverse pollutants; this place has become the worst offender for plastic waste passing into the sea in the Western Balkans and endangers an important sea-turtle breeding ground. As it crosses the central regions of Albania, the water gets mutated by agricultural activities, industrial leftovers, and untreated wastewater from urban areas. The concentration of macronutrients and microbial activity is increasing, and the deterioration of the chemical, physical,

and biological properties of the waters have been observed. The
dumped waters sometimes leech into groundwater, which is often the
main water source for local communities.

We also experienced water shortages in the city. Many areas have
water cuts for several hours a day, in contrast to the rich aquatic system
around the city created by drained, dammed, and linked rivers.

TAL Your newly produced three-channel video installation *As Dust, as
Rain, as a Line on the Map and a Crack in History* combines a range of
moving-image media: video recordings from Tirana, a VR-constructed
environment, and open-source digital material. How can you describe
the relations between these different moving-image approaches? How
is this combination useful for your concept?

HG Water bodies are very complex. We decided to have three videos to
visualize these diverse layers (see fig. 3). One that shows the water
flowing from Bovilla Reservoir through the mountains and into the
valley towards the city's sinks, tubs, and toilets before getting dumped
into the Tirana River. You see Mount Dajt next to the reservoir. Huge
amounts of stones get extracted from it for Tirana's construction
projects. In another digitally animated video, the river is imagined to be
thrusting upwards in the form of a tower mimicking the visual language
of the city's development projects. The river tower's walls and platforms
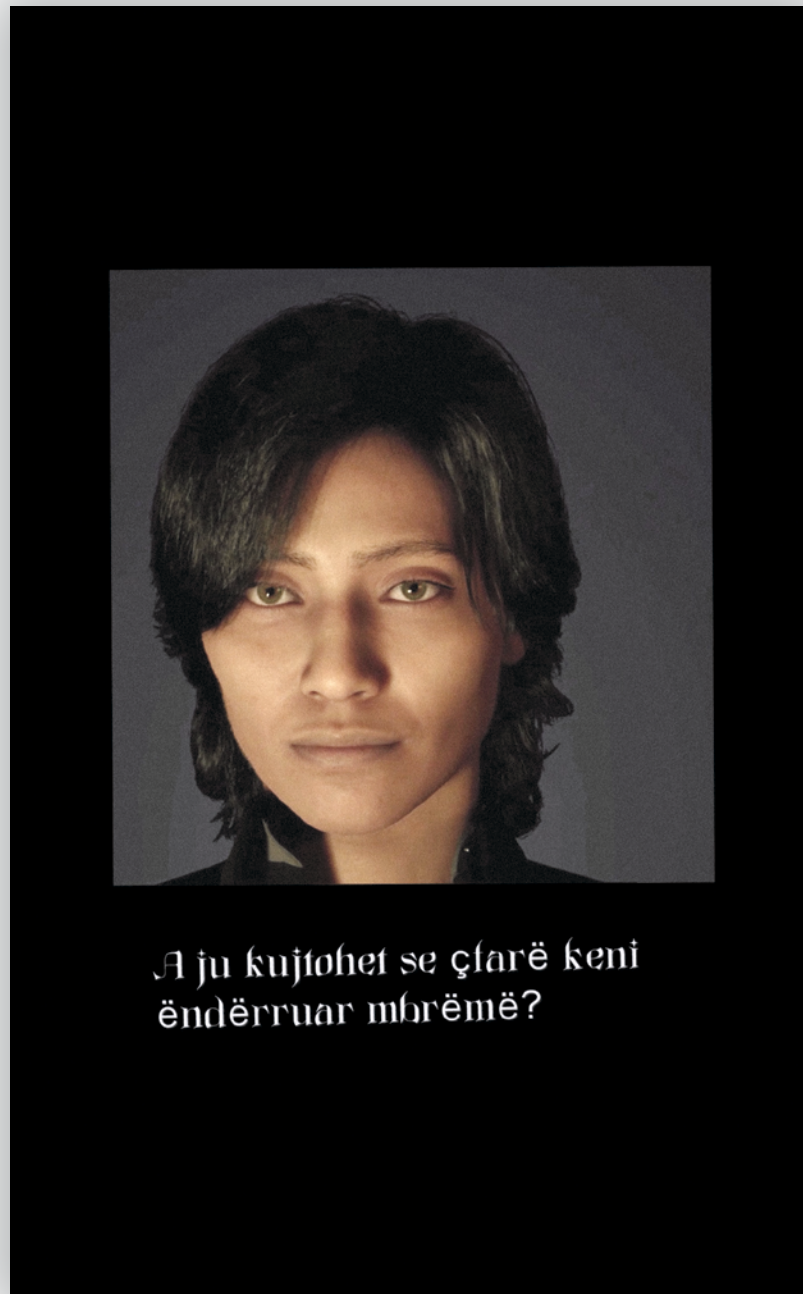
Fig. 4
HUNITI GOLDOX, *As Dust, as Rain, as a Line on the Map and a Crack in History*, 2022. Dispossessed spirits reproduced as avatars.

are made up of footage of the river's surfaces and matter. The third screen presents an avatar that appears to offer a conversation session with the viewer. For this, we wanted to include some of the myths of the inhabitants of the mountains, who are known to be guardians of people and nature (see fig. 4). As the degradation of stones continues, the dispossessed spirits get reproduced as avatars, referencing the dis-possession of many of those living on the mountain and around Tirana River, for example the Roma community.

TAL   I have the impression that your practice is directed toward speculation, providing space, and (re)imagination. How do you perceive the role of direct activism in artistic practice?

Fig. 5
The Tirana and Lana rivers are heavily affected by pollution.

Fig. 6
HUNITI GOLDOX, *As Dust, as Rain, as a Line on the Map and a Crack in History*, **2022. Installation views Tirana Art Lab, 2022.**

HG   Speculation generates spaces for engaging with reality differently. We try to find ways to create room for collective imagining about how we can have different expectations of the future, especially when being constantly confronted with dystopian forecasts. It invites one to take back agency while connecting our desires, feelings, and memories of what has been lost.

TAL   As one source of inspiration for your earlier project *Para Gardens*, you identified the work of biologist and eco-philosopher Andreas Weber. He states that love—the impulse to establish connections, to intermingle, to weave our existence poetically together with that of other beings—is a foundational principle of reality and that our disregard for it lies at the core of a global crisis. How did your experience in Tirana and its surroundings develop in relation to your theoretical starting points?

When all you see is a replication of the "real," it can be difficult to challenge one's habitual perceptions.

HG   Globalization involves processes of urbanization in which humans order their social function through the construction of built environments. Even when confined to urban spaces, humans impact nature through various forms of cultural intervention such as ecotourism. Imposing our collective will on external nature contributes to producing a romanticized and commodified representation of it, compounded by the media. Nature is often perceived as a detached, untouched world representing purity and spirituality. It feels like our encounter with nature, as with other beings, is staged and programmed. Expressions of need, emotion, and desire are oppressed by systems of functions and norms. Natural bodies such as lakes, rivers, and forests are often fetishized as external objects to be visited for healing and nurturing, while their actual conditions are ignored and destroyed. In Tirana we observed that people tend to visit Tirana Lake, an artificial lake in the center of the city, for recreational activities. Meanwhile lakes Paskuqanit or Farkës are not easily accessible by public transport and therefore are not places of significance in people's everyday lives. Moreover, the Lana and Tirana Rivers are quite polluted, and there is little activity around them (see fig. 5).

TAL   Where does the potential of VR-related tools and mediums lie for you as practitioners, and what are some of the traps that the medium can bring?

HG   We are wary of VR's military uses in which an experience is simulated while distancing the subject from their actions. We are interested in creating mediated spaces that fully immerse onlookers in their fluidity

while influencing perception. We merge real with digitally simulated elements to blur the lines between the two. So far, the experiences we have created invite the viewer to be elsewhere without the pressure of dominating or controlling that space.

One of the traps of VR is the confusion and nausea one can feel when experiencing it; it is important for users' entry into VR space and return from it to be thought through. Another is VR's role in reinforcing an objectifying stance towards the world, especially with the use of high-definition realistic visual representations which limit users' ability to make new associations and interpretations. When all you see is a replication of the "real," it can be difficult to challenge one's habitual perceptions. People's sense-making mechanism relies on finding and making associations with what is visible, to verify its believability. Being in a virtual space that incorporates a visual language of varying levels of realism therefore pushes one to visualize what is possible instead of relying on what is seen, known, and recognized. In other words, being in a contemplative position pushes us to intuit the meaning of a space.

HER BOYFRIEND CAME BACK FROM THE WAR AND THEY NEVER SPOKE ABOUT IT AGAIN.
In Conversation with Valentina Peri

Adela Demetja and Jiří Gruber (Tirana ArtLab)

Valentina Peri is an independent curator, artist, and author based in Paris. Her work examines the role of technology in contemporary culture, with a focus on love and intimacy in the digital age, media histories, and technologies in the Anthropocene. She has curated exhibitions, published writing, and given lectures on a broad range of topics in these areas. Her traveling exhibition *Data Dating* (2019–) about love in the age of the internet has been exhibited in Paris, Tel Aviv, London, Brussels, Geneva, and Brescia.

During her residency at Tirana Art Lab from May until June 2022, she explored how rhizomatic narratives in ⬂immersive virtual reality storytelling can be connected with the re-enactment of individual and collective memory. The augmented reality app developed within the framework of this project can be downloaded by searching for *HBCBFTW* in the Apple Store or on Google Play. Please see more information on the project website hbcbftw.com.

TIRANA ART LAB   You applied to the residency at Tirana Art Lab with the intention to work with archival materials your grandfather left behind, and to take your own physical journey following his footsteps. What led you to such a decision, and how important was it for the project?

VALENTINA PERI   I started putting together the archive that resulted in my installation *Her Boyfriend Came Back From The War. And They Never Spoke About it Again* in 2019, without a clear idea of how I would use the material. I was driven by a personal and perhaps spiritual curiosity, a longing to fill in the many gaps and shed light on the unspoken chapter of family history that had always fed my imagination. Reflecting on the medium of extended reality prompted me to formalize the project. Its structure made it possible to enhance the family archive, but also to put it in conversation with the history of art by referring to the artwork of Olia Lialina, media history, and war. War was in fact the background to the development of the Internet, which began with the invention of hypertext, and war led to more recent technological developments such as VR and XR.

From the beginning of my research it was clear to me that I wanted to retrace the places documented in my grandfather's archive and
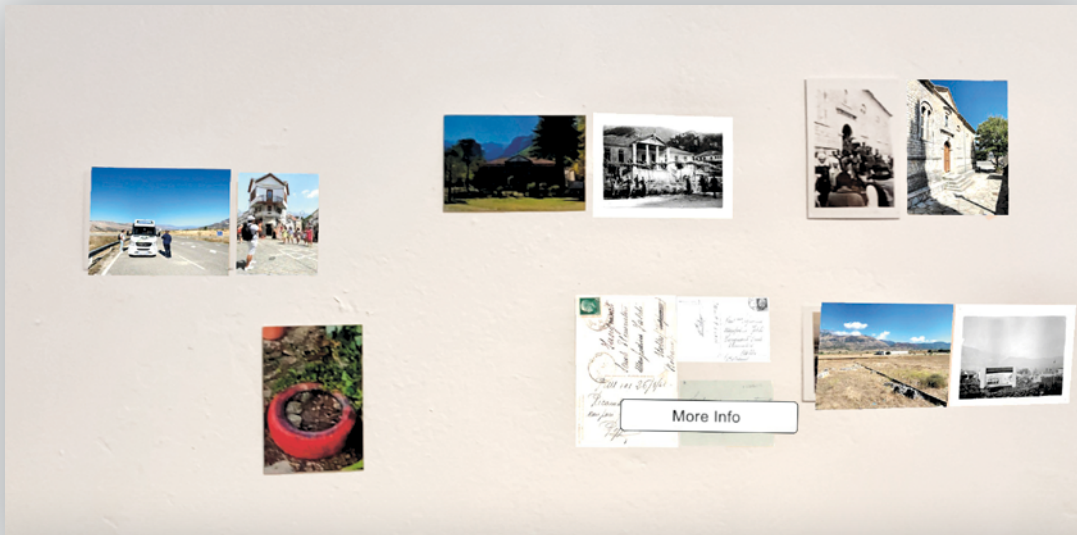
Fig. 1
Valentina Peri,
HBCBFTW, 2022.
Augmented postcards
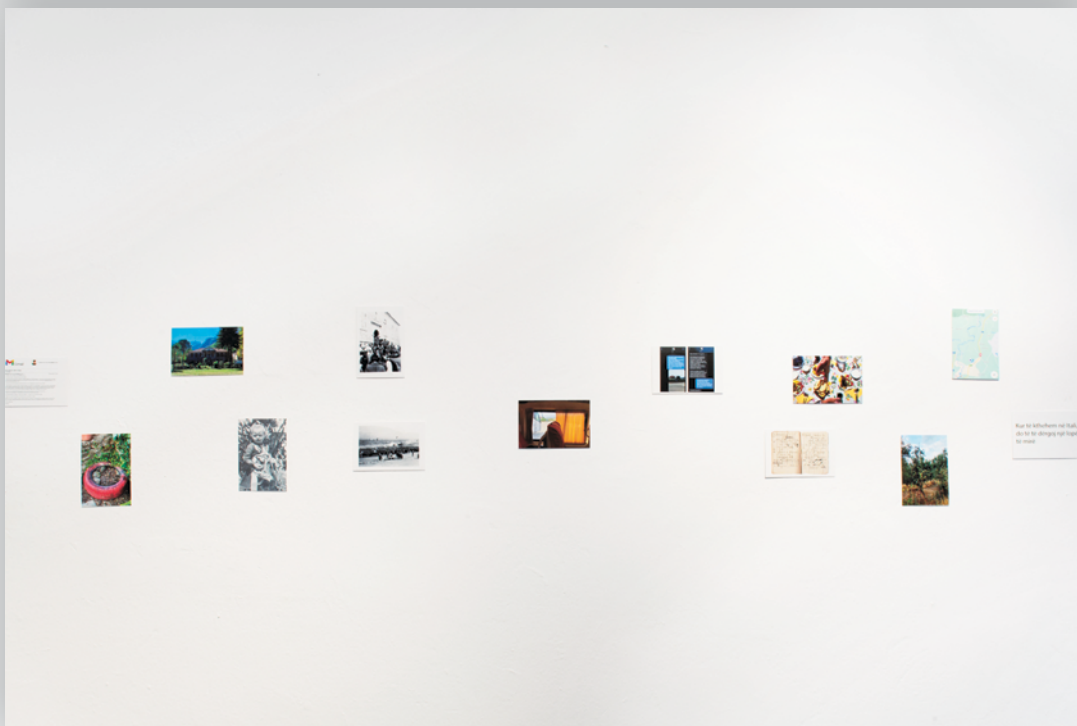activated via an AR app.
Installation view Tirana
Art Lab, 2022.

Fig. 2
Valentina Peri,
HBCBFTW, 2022.
Augmented Postcards,
Map, Video.
Installation view Tirana
Art Lab, 2022.

"reactivate" them with my presence in Albania eighty years later. I have a background in cultural anthropology, where fieldwork is a crucial part of research. My presence in these places prompted a series of situations that contributed to a new narrative that is subjective and personal, and full of very singular events and synchronicities that became part of the stories.

TAL As you touch on sensitive and intimate content of your grandparents' relationship within the framework of the story, you reopen problematic and taboo periods in the history of Italy and Albania, namely the Italian occupation of Albania from 1939 to 1943. What kind of response did you get from locals in both countries?

**Fig. 3
Valentina Peri,
HBCBFTW, 2022.
Postcards and map.
Installation view Tirana
Art Lab, 2022.**

VP Doing my first bibliographical research, I immediately realized that the subject of Italian soldiers in Albania—and in the Balkans in general—after the 1943 armistice during World War II had received little attention in either historiography or literature.[1] When I started talking about reopening that chapter of personal and national history, I received a positive response from my family, who were willing to answer my questions. But I was often surprised about how little they knew about this chapter of history and that they had no answers to give.

When I arrived in Albania, the picture was totally different. Many people I met there had a story to tell about their own grandparents who had taken in Italian stragglers after the capitulation, hid them, or helped them escape. I speak of "capitulation" while referring to conversations I had in Albania because this is the term that is used, whereas the more politically correct "armistice" is preferred in Italy. For the first time, I had more or less agitated discussions about the Italian colonial and Fascist past as an Italian in a former colony—Albania. I discovered stereotypes and generalizations about Italian soldiers and Italians that I had been unaware of,

1   One of the most extensive studies is by researchers E. Aga Rossi and M.T. Giusti's 2011 book *Una guerra a parte. I militari italiani nei Balcani. 1940–1945*, which opens with the above reflection. Italy's colonial period generally fills only a few pages in school textbooks, and often focuses on the geographical area of Africa, devoting only a few paragraphs to the occupations in Greece and the Balkans.

Fig. 4a

**Figs. 4a, 4b
Valentina Peri,
HBCBFTW, 2022.
Archival material:
Official military
postcard from 1941,
front and back, with
love correpondence
between the aritst's
grandparents.**

**Fig. 5
Valentina Peri,
HBCBFTW, 2022.
Archival material:
Photo taken by the
artist's grandfather at
the orthodox church of
Jorgucat in southern
Albania, a locality
that is inhabited by a
Greek minority.**

as well as assumptions about my position and the reasons for my research. Far from discouraging me, these elements made me realize that the terrain was rich with material to understand and deconstruct.

When showing the work to the public, the element that prevailed in most visitors' reading was the human side of the love story between my grandparents, the richness of my grandfather's photographic archive, the "magic" moments of my research on his footsteps, the reinterpretation of regime cinema in light of personal memory, and historical references unknown to many, such as the first tourist guide to Albania. The work was presented in the Alberodonte Cultural Center in Bescia, Italy, in the fall of 2022 and I was very curious to observe how it was perceived on the other side of the Adriatic.

TAL Your position in the project is multilayered: as a storyteller, a provider of remembrance, an active participant, and a narrative dramaturge. How do you navigate between these roles?

VP In many circumstances during the research I let myself be led by intuition, which always resulted in interesting leads. Listening, following an invisible trail, and picking up the product. In the text "Clues: Roots of an Evidential Paradigm," Carlo Ginzburg makes an interesting suggestion: that the idea of narration may have originated in a hunting society, relating to the experience of deciphering tracks. He links this "venatic model" with Mesopotamian divination texts as "both presuppose the minute investigation of even trifling matters, to discover the traces of events that could not be directly experienced by the observer."[2] I think my method can be likened to that of the hunters Ginzburg mentions. In my case, the prey is nothing more than an additional fragment that resonates with prior knowledge and opens the way for the next discovery, makes the invisible visible, and reveals a coherent series of events.

The fact that I was often accompanied by Albanian friends-collaborators who acted as an interface between me and the people to be met and the places to be visited, and the delay given by instant translation, helped me to assume a certain distance from the events as they happened. This gave me a margin to absorb often emotionally overwhelming moments and react in an "effective" way. It allowed me to be a sort of witness experiencing the unfolding of a story, as if in the third person, an experience similar to participant observation, a classic research method in anthropology. My choosing to record videos with my phone or take photos of moments that turned out to be decisive was driven by the intuition and give spontaneity to the work.

In the actual moment of writing the texts, the narration also included choosing the photos that would make the work iconic and the audiovisual material that would bring the postcards to life through augmented

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2   Carlo Ginzburg, "Clues: Roots of an Evidential Paradigm," in *Clues, Myths, and the Historical Method*, trans. John and Anne C. Tedeschi (Baltimore, MD: Johns Hopkins University Press, 1989), 96–125, 200–14 (quotation on 103). First published in Italian in 1986.

reality. The selection process was by no means simple. What memory did I want to create of this story about memory? Which narration did I want to highlight and how? To whom was I addressing this project? To myself? My family? The audience in Tirana? My grandparents? Today I think I was talking to everyone at the same time in the construction of the storytelling. This is also what contributes to the plurality of voices and points of view that I think are expressed in the work.

TAL   You usually work as a curator, producer, and writer. How do extended reality tools contribute to shifting and blurring the boundaries between contemporary artistic practice and curatorial practice?

VP   Considered from a semiotic point of view, an exhibition is a text. Curators select artworks and order them, adding a new perspective and a subjectivity to the narratives gathered. When audiences visit the exhibition, they experience in real time a sort of fiction orchestrated in space and time by the curator, a communicative environment. Curating is a metanarrative because it tells a story about a story.

Extended reality enhances totally new curatorial approaches and exhibition formats: thanks to the narrative potential inherent in the medium it can enable a shift between curatorial practice and practice. XR tools are characterized by interactive and spatial narratives which the audience can navigate. They allow the perspective of a story to shift from third- to first-person narrative. For users and the audience, presence is redefined in a more personal way than other digital media.

Due to investment by the cinema and game industries, VR has developed interesting new ways of telling stories in totally immersive environments. Storytelling in AR is more challenging, as the real physical environment is less easy to control than the digital. The development of haptic and wearable technologies will open up incredible possibilities for both artists and curators.

TAL   *Her Boyfriend Came Back From The War. And They Never Spoke About it Again* consists of several media, including an AR app. Can you explain how this extension contributes to the narrative? In what way can the technology shape it?

VP   AR has the potential to multiply content-related, temporal, and geographical connections in a given environment. This multi-perspectivity is one of the key aspects of AR storytelling. Visitors are attracted or triggered by a given fixed image on the postcards hanging on the wall, and they can disclose the hidden content through the AR app I developed with transmatter.art. This interactivity adds a layer of meaning to the bare images and reveals additional audiovisual content I associated with them: fragments of my journey in movie excerpts, songs, and so on that let viewers progress in their own understanding of the story. With each layer, visitors are free to go on with other postcards or leave, depending on their interest, time, understanding, and curiosity in relation to the work.
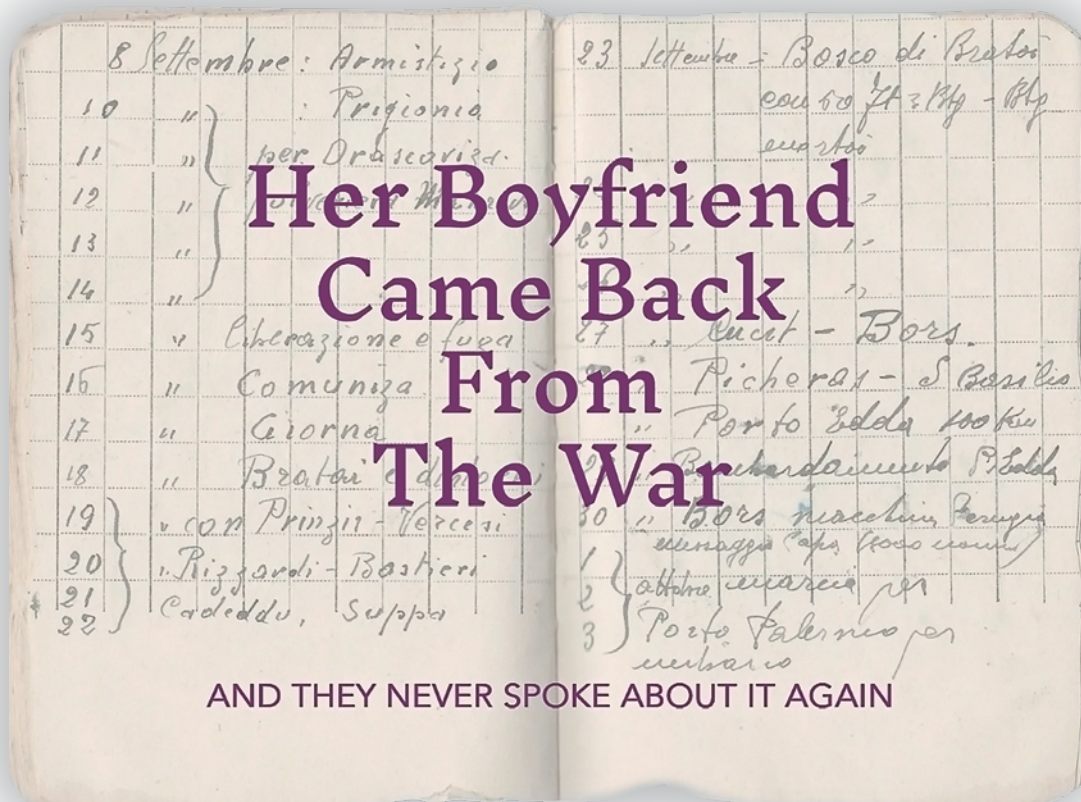

Fig. 7
Valentina Peri,
HBCBFTW, 2022.

What I find very interesting in interactive storytelling is that the audience can control the narrative and become co-author. They can delve into a topic superficially or intensively, but either way, AR can make history and storytelling feel more personal. Interactivity is key, as it allows visitors to experience the content in a self-determined way.

Visitors also have the possibility of taking away with them a poster displaying the whole series of postcards with the corresponding texts. All the fragments of the story are collected on a different medium to be used at a different time and in a different space, but they can all be activated via the AR app. This is one of the great merits and flexibility of the app: once the AR marker is defined, it will work on any medium, format, or size. All the postcards refer to the website I developed as a repository of additional content related to the stories, where people can easily download the app.

APPENDIX

2019

April

Conference

Creative Europe Innovation Day
Beyond Matter Project Presentation
Berlin

2020

March

Online Lecture

*Revival of Clashes in Representation
and Materiality*
Aalto University
Espoo

July

Online Conference

The Museum of the Future Is no
Longer a Museum
Emulation: Beyond Matter
ZKM | Karlsruhe

September

Online Seminar

The New Possibilities of the
Digital Archive Era
Virtual as a Condition
Lee Ungno Museum
Daejeon

December

Online Curatorial Talk

Open Lectures at the Post-Graduate
Program in Curating
Towards the Virtual Condition
Zurich University of the Arts

2021

January

Online Symposium

Rethinking Our Futures
Molior
Montreal

October

Online Panel Discussion

Art & Performance in the Age of AI
Goethe Institute Budapest

November

Guest Lecture

*On Digital Curatorial Practices:
Example Beyond Matter*
ITM Institución Universitaria
Medellín

2022

March
Online Symposium

Refigured Museums.
Interdisciplinary Perspectives for
Spatial Research in Museums
Input from the Practice: Beyond Matter
HU Berlin, TU Berlin

May
Symposium

MAI-Tagung (Museums and the Internet)
*Neue Wege kulturelles Erbe
zugänglich zu machen*
LVR-Landesmuseum
Bonn

Hybrid Seminar

Co-designing VR Experiences
Presentation of The Immaterial Display
Design Museum Helsinki

June
Festival

The New European Bauhaus Festival
Beyond Matter Project Presentation
European Commission
Brussels

July
Virtual Event

Metalogues
Beyond Matter Project Presentation
Goethe Institute Thessaloniki

Panel Discussion

*Strategies of Narration in the
Virtual Reality*
Manifesta 14
Pristina

August
Conference

ICOM General Conference
An Immaterial Display
Prague

Festival

MUTEK
*Beyond Matter. Producing, Curating,
and Mediating Art in Virtual Spaces*
Montreal

September
Online Panel Discussion

Museums Without Walls
*Virtual Galleries, Actual Institutions,
Future Materials*
Queen's University
Kingston

Conference

Future Materials Conference
Digital (im)materials
Moholy-Nagy University of Art and
Design
Budapest

October
Online Conference

Splintered Realities
Beyond Matter Project Presentation
RIXC Art Science Festival
Riga

December
Online Talk

CICANT PhD Research Talks at
Early Visual Media Lab
Beyond Matter Project Presentation
Lusófana University
Lisbon

Symposium

Helsinki Biennial 2023 Opening
Symposium
*Dimensioning: On the Processual
Augmentation of Space*
Helsinki Art Museum

2023

March
Hybrid Symposium

Transformation in Digital Art
Beyond Matter Project Presentation
LIMA
Amsterdam / online

May
Symposium

DEMO-
Augmented Reality in Beyond Matter
WAVA AR
Frankfurt

June
Hybrid Conference

Virtual Worlds
*"What never was but might
yet have been": Thoughts on the
Virtual Condition*
Ruhr-University Bochum
Bochum / online

July
Festival

Moviment
*Beyond Matter Book Preview and
Series of Artist Talks*
Centre Georges Pompidou
Paris

Hybrid Conference

Arts and Humanities in Digital
Transition
Beyond Matter Project Presentation
Nova University of Lisbon

GLOSSARY OF TERMS

↘ Affordance

The term "affordance" was introduced by James J. Gibson, most influentially in *The Ecological Approach to Visual Perception* (1979), to denote the kinds of behavior an environment allows to a living system. Gibson derived affordance from the concepts of valence, invitation, and demand, but with a crucial difference: the affordance of something doesn't change as the need of the observer changes—it is a constant that is always there to be perceived. The user of an environment must learn which behavior is affordable in different circumstances. Gibson's definition is based on interactionist view of perception, in a departure from Gestalt psychology; affordances are essentially actions based on the information available in the environment.

The term was later used in the context of human-computer interaction (see Norman, 1988) to indicate clear and definite signals to the user about what they should do with a computer or inside a system. It became a key element in interaction design, since interactive components must appear to the user in such a way that gives sufficient indications about their purpose and use.

In the Beyond Matter project, the concept of affordance comes into play in relation to *The Immaterial Display* and the adaptation of the virtual exhibitions on the *VIEW* platform to various types of hardware. The exhibition models of *Iconoclash* (ZKM|Karlsruhe, 2002) and *Les Immatériaux* (Centre Pompidou, 1985) were created for multiple platforms and devices— the custom-made hardware of *The Immaterial Display*, but also desktop and mobile use—and so the interaction design had to adapt to the different affordances of each.

↘ Agency

Agency, as the capability of cognition, decision-making, and action, is both an object of philosophical debates related to free will and a political term that has gained significance in the context of civil rights and minority and identity politics—particularly in terms of empowering unheard and marginalized voices in societal processes.

The question of whether computational agency emerged with artificial intelligence has been asked repeatedly in recent decades. Since the intelligence of intelligent algorithms is inductive, they bear the ability to operate independently from human actors, yet they aren't comparable with the general intelligence of the human mind. In artificial intelligence research, intelligent agents are defined as autonomous actors in environments they can perceive, and which may be capable of approving their abilities by learning. In general, agency needs matter to manifest. Thus, if the virtual is perceived as a substitute, an immaterial proxy for the material that contains the power to act without the agency of matter (see Friedberg, 2006), the artificial or machinic would not allow for agency. Yet Bruno Latour's notion of modernity (see Latour, 1991) suggests that non-human entities' agency stems from their participation in chains of actions.

In Beyond Matter, the term agency plays a significant role in projects where human and non-human actors embark on cognitive processes together. In the virtual exhibition *Spatial Affairs. Worlding—A tér világlása* (2021–23), the actions of avatars representing visitors and artworks bring up the question of agency, while in *Iconoclash as a Digital Experience* the site's sole visitor is guided by a recommender algorithm, meaning that agency is shared between human and algorithmic agents.

↘ Archive

The term "archive" can be used to refer to an institution where writings, documents, files, and other testimonies are collected, arranged, preserved, and restored. Collections within an archive are also referred to as archives. For governmental and other social institutions, archives are administrative systems that constitute a "functional memory" (see Assmann, 1999) through the subjective selection of

information. Archives can also fulfill the role of "storage memory" (see Assmann, 1999), for keeping evidence of past societies that are no longer deemed directly relevant for the present.

At least since the archival turn in cultural studies at the end of the twentieth century, and following publications by Jacques Derrida, Michel Foucault, and others, a growing theoretical-critical interest in the archive can be observed. Foucault declared the fundamental function of the archive as "the law of what can be said" (Foucault, 1973, 186).

Since the 2000s, the possibilities and problems of the archival have been supplemented by the possibilities and problems associated with digitization. Questions around the interconnectedness of archives and power remain central in the digital age. Whether the internet can be considered a "huge decentralized archive" (Assmann, 2009, 137) or the end of the archive is currently the subject of heated debate in cultural and media studies. In response, media theorist Siegfried Zielinski (2020) has developed the counter-concept of the anarchive, based on chaotic principles of order and opposing the idea of structuredness with unstructuredness as a method of archival work and indexing.

Digitized analog historical sources and genuinely digital objects can offer simplified access to ever-increasing numbers of archival items, but are subject to similar dangers as their physical predecessors in that they can only be used for limited periods of time. At the same time, the digitization of many archival collections is creating a need to develop new digital forms of data visualization and personalized search options. The digital models developed in the Beyond Matter project of the past exhibitions *Iconoclash* (ZKM | Karlsruhe, 2002) and *Les Immatériaux* (Centre Pompidou, 1985) can be understood as responding to this need.

↘ Augmented reality

Augmented reality is a multisensory experience where environmental and digital stimuli converge. This kind of mixed reality produces a correlation between sensual objects and informational data to enhance human perception. Producing augmented reality requires technological devices able to generate sensory signals—for sight, hearing, smell, taste,

or touch, or a combination of these—without obscuring the environmental reality.

The term was introduced in the early 1990s to denote the capabilities of a display headset that allowed employees manufacturing aircraft to access real-time information during assembly work. Thomas Caudell and David Mizell of Boeing Computer Services described such headsets as augmenting the visual fields of their users with necessary information for performing tasks (see Caudell, Mizell, 1992), therefore as generating an augmented reality.

The Beyond Matter project combines a multiplicity of digital and non-digital appliances to generate multilayered informational exhibition spaces. Artworks, digital models, online information, and digital art coincide in the same space, augmenting the reality and experience of the exhibition. Augmented reality becomes a museological strategy and a technological instrument of communication. The installation *AR Statue Dangling from a Crane* (2021), an AR reconstruction of a sculpture performance by Vitaly Komar and Alexander Melamid for the exhibition *Iconoclash* (ZKM | Karlsruhe, 2002) is a good example of this. The project's artists in residence also experimented with the technology, and the results were exhibited in *Immerse!* (Tallinn Art Hall, 2023) and *Matter. Non-Matter. Anti-Matter* (Tirana Art Lab, 2022). AR apps were published for the *Tirana Floating Archive* (2020–21), to locate digital content in public spaces of Tirana, and for the *Spatial Affairs* (Ludwig Museum Budapest, 2021) exhibition catalog.

↘ Aura

In the arts and humanities, the term "aura" is typically employed to describe a quality inherent to a work of art. This definition can derives from the writings of German philosopher Walter Benjamin, who discussed it in several texts throughout the 1930s, most notably in "The Artwork in the Age of Mechanical Reproduction" (1936). Benjamin used the term to distinguish between auratic forms of art that have a unique spatiotemporal presence, such as painting or sculpture, and anauratic media that can be experienced from anywhere at any time, such as film or photography. For Benjamin, the aura manifests itself affectively by placing

the viewer in a state of awe, which results from the experience of "the unique phenomenon of a distance, however close it may be" (Benjamin, 1936/86, 222). Even though the viewer may be physically close to the object, they sense a quality to it which they cannot grasp.

Digital reproduction has revived the use of the term, now appropriated to distinguish between analog and digital modes of reproduction. Since digital media open up new possibilities to engage with works of art and cultural heritage and to immerse ourselves in their historical contexts, researchers and practitioners argue that digital technologies can reproduce the aura, resulting in its migration or proliferation (see Lowe, 2011; Kenderdine, Yip, 2018; Bolter et al., 2006).

In the Beyond Matter project, the digitization of originally physical artworks for the exhibition models of *Iconoclash* (ZKM | Karlsruhe, 2002) and *Les Immatériaux* (Centre Pompidou, 1985) and the photogrammetric recording or digital twin of the exhibition *Spatial Affairs* (Ludwig Museum Budapest, 2021) broached the question of whether the aura can be migrated digitally.

↘ Autoethnography

Autoethnography is a form of qualitative research that takes personal histories and narratives as a starting point for data gathering. Involving reflexively writing the self into and through an ethnographic text, autoethnography is a method developed in anthropological fieldwork. Participant observation is part of the mindset the anthropologist brings to the task: in seeking to understand a social phenomenon, they aim to become a part of the group under study. The autoethnographer can interview others to acquire narratives and stories in specially organized activities such as workshops. To elicit further interaction and exchange, they can use artifacts such as photographs or drawings generated through those activities. Norman Denzin has proposed the concepts of epiphany, facticity, and revelation as forming the foundations of the method (see Denzin, 2014). Epiphanies are subjective and objective markers that indicate turning points. Facticity is a detailed description of how an event might have been lived. Moments of revelation in a life might come in the form of a major or minor

event or a relived illuminative experience.

Motivating factors for choosing autoethnography include the possibility of contributing alternative data which might diverge from dominant discourses and articulating insider knowledge to create more authentic representations of the culture or group under study.

Within the Beyond Matter project audience-studies workshops were developed that made use of performance-oriented methodologies (PORe). These encouraged embodied audience interaction with exhibited materials, for example by using *Snap Chat* filters to create personalized avatars that elicit performances or making collages using paper cutouts from exhibition catalogs for T-shirts and other memorabilia. Asking workshop participants to express thoughts and memories in a relaxed manner using autoethnographic approaches opened avenues for candid discussion about exhibition contents from unique, I-oriented, living perspectives.

↘ Born-digital

Born-digital content is created, managed, stored, and circulated digitally as opposed to content that has become digital through a digitization process (which can be called digitized content). Born-digital content includes emails, spreadsheets, content produced on social media platforms, and born-digital art, such as digital photography and virtual reality artworks.

Since the mid-2000s, how to care for born-digital content has become a key issue in cultural heritage preservation research and practice(see Ryan, Sampson, 2018). Born-digital objects pose new challenges to conservation, such as software, hardware, and media obsolescence, as well as bit rot (see Erway, 2010).

In Beyond Matter, born-digital objects were a focal point for conservation and philosophical and sociopolitical questioning. The project also oversaw the production of born-digital art, including virtual reality artworks within the exhibition *Matter. Non-Matter. Anti-Matter. Past Exhibitions as Digital Experiences* (ZKM | Karlsruhe, 2022–23), as well as the entire exhibition *Spatial Affairs. Worlding—A tér világlása* (2021–23), a virtual environment consisting exclusively of born-digital "crawling artworks" and avatars

of human visitors. Furthermore, the software developed over the course of Beyond Matter provides a technological solution for the digital recreation of past and present physical exhibitions that allows for the inclusion of both born-digital and digitized content. The strictest definition of born-digital refers to materials with no analog equivalent, but the hybrid ontology of the 3D models of *Iconoclash* (ZKM | Karlsruhe, 2002) and *Les Immatériaux* (Centre Pompidou, 1985) challenges its efficacy, especially where conservation is concerned.

↘ Cultural heritage

Cultural heritage may be tangible (e.g., artifacts) or intangible (e.g., oral traditions, knowledge, and practices). Its main realm is arguably the museum. As the International Council of Museums put it on its website in 2022, a museum "researches, collects, conserves, interprets and exhibits tangible and intangible heritage." ZKM | Karlsruhe, for instance, collects, preserves, investigates, and communicates strategies for the use and transmission of cultural heritage (see Serexhe, 2013), mainly by means of new technologies. Digital tools may provide greater democratization because different forms of interaction provide new knowledge and constitute a greater stimulus for valuing and appreciating heritage (see Economou, 2015).

Investigations of technological applications for heritage are increasing. This emergent field is global, complex, hybrid, and relatively independent of space and time; as the UNESCO website states, digital heritage is "made up of computer-based materials of enduring value that should be kept for future generations."

Beyond Matter demonstrates the relevance and advantages of inscribing and applying new digital technologies to cultural heritage. The new solutions it offers in digital exhibition modeling and mediation serve the preservation of a form of heritage situated between the tangible and the intangible.

↘ Curatorial condition

The term "condition" here means the pre-conditioning and political circumstances in which the curatorial takes place. In the curatorial condition the old and the new merge, encompassing shifts of media (analog and digital), spaces (physical and virtual), actions, expressions, and duties. It alters the meanings, functions, status, and roles of everyone and everything. With the "curatorial turn," curation is no longer an activity but a field.

The project Beyond Matter, being international and collaborative, conceptual and theoretical as much as practical, and with an extensive program of activities spanning a multitude of formats and actors, reflects the multidimensionality of the curatorial condition and elaborates on the virtual condition as an integral part of it.

↘ Cybernetics

Cybernetics cannot be described as a scientific discipline; it is rather a shift in approach to disciplinarity and a movement that profoundly impacted thinking and creation in science, engineering, and the arts. It is a genuinely twentieth-century phenomenon, rooted mainly in distinct forms of systems theory. The interdisciplinary version of systems theory was advocated by US mathematician Norbert Wiener and gained importance throughout the Cold War. Its significance gradually decreased from the 1980s, although a revival can be observed in recent years due to the increased interest in artificial intelligence.

Published in 1948, Wiener's book *Cybernetics: Or Control and Communication in the Animal and the Machine* laid the theoretical foundations of the field, drawing on numerous sciences, including physics, mathematics, neurosciences, and biology. This approach made cybernetics an early contributor to the deconstruction of the distinction between mechanical and organic, a distinction which has had a decisive impact on technologies of the twenty-first century such as robotics and information technologies.

The methodologies and subject matter the Beyond Matter project engages with, even though the condition that it aims to elaborate on was named virtual, resonates with cybernetics in terms of its transdisciplinary approach (including the application of methods from museum and curatorial studies, sociology, design and media theory, and philosophy), its creation of a quasi-autopoietic system (the exhibition model *Iconoclash as a Digital*

Experience), and its attempt to dismantle the distinction between virtual and physical, thus between organic and mechanical (*Spatial Affairs. Worlding—A tér világlása* (2021–23)).

↘ Digital commons

Commons are resources that are not owned privately but used and maintained by a community. Such a well-rounded definition cannot be given for digital commons, since their technological bases are constantly in flux and radically expanding. Digital commons include informational resources created and shared voluntarily within communities of different sizes and interests. They emerged with the historical shift from an industrial economy, often summed up as Fordism, to a new type of networked economy (see Stalder, 2010). Digital commons stand for a third model of social production, neither state-regulated nor market-dependent despite influences from both directions and possible overlaps. The internet plays a paradigmatic role in efforts to collaborate differently on the common good and to oppose the ramifications of data capitalism. Digital artistic practices and net.art have developed together and contribute to the networked commons, just like open online resources of archival data.

The digital models of *Iconoclash* (ZKM | Karlsruhe, 2002) and *Les Immatériaux* (Centre Pompidou, 1985) were created with the aim of making these exhibitions, their curatorial and spatial concepts, and their content available online for the long run. Exhibitions are both tangible and intangible cultural heritage; the knowledge they entail should remain accessible to a widest audience possible and become

Conflict is at the heart of the commons, but it's more obviously at the heart of the political treatment needed in order to take care of the negative commons.

**Alexandre Monnin
(philosopher)**

part of our digital commons.

↘ Digital models

A digital model is a computer-generated representation of an object in three dimensions. To create digital models, a distinction is made between indirect and direct representation schemes, which are processed using appropriate software. Indirect representation schemes describe bodies on the basis of their surfaces. Objects modeled through surface representation are usually composed of so-called free-form surfaces that can be deformed at control points. In the direct representation scheme, objects are modeled using basic bodies such as spheres, cuboids, or cylinders. Operations are applied to these basic bodies, resulting in a formula that describes how they are connected to each other (see da Silva Caetano, 2018).

With the help of 3D software, the origins of which go back to the development of graphical user interfaces in the second half of the twentieth century, in the mid-1990s it suddenly became possible to virtually reproduce multidimensional spaces and objects. Used primarily in the video game and film industries at first, and later for architectural visualization, the technology spread due to rapid advancements favoring accessibility (see Freyermuth, 2015).

In cultural production and theory, digital modeling techniques brought entirely new modes of representation. For museums too they offer new possibilities, especially for the presentation and preservation of cultural heritage. Here, the term "model," understood differently depending on the discipline, takes on a fixed meaning that can best be described as a reproduction as opposed to a facsimile or exhibition copy. For the exhibition models of the past exhibitions *Iconoclash* (ZKM | Karlsruhe, 2002) and *Les Immatériaux* (Centre Pompidou, 1985), 3D models of architectural elements and artworks were created to revive their scenographies.

Mediocracy. It can be a super high-tech, intense computation with advanced rendering, endless resolution, all these kinds of things. In some way mind-blowing but not really, as it always stays within what we call the probable.

**Jara Rocha and Femke Snelting
(initiators of the collaborative research
Possible Bodies)**

↘ Digital objects

Digital objects are manifold and can manifest as a bug, a virus, a hardware component, a piece of code, a bunch of binary numbers, or a set

of data. They are "objects that take shape on a screen or hide in the back end of a computer program, composed of data and metadata regulated by structures or schemas" (Hui, 2016, 1).

Aside from the fact that they are composed of data, they may be works of art contextualized in an exhibition and thus made interpretable to their human observers. Bruno Latour described the curatorial aim of the exhibition *Iconoclash* (ZKM|Karlsruhe, 2002) as inviting visitors to become "friends of interpretable objects" (Latour, 2002, 17), a phrase he borrowed from Migel Tamen (2001). The exhibition included various digital and analog objects, some of which were works of art. Of course, that wasn't the first instance when an exhibition emphasized the objecthood of artworks, and recently an object-oriented approach has re-appeared in ontology and in aesthetics. This has resulted in a "weird formalism" that implies that the beholder and artwork fuse into a third object (see Harman, 2020), regardless of the artwork's medium.

The Beyond Matter project features born-digital artworks, but also digital models of analog artworks. State-of-the-art technology enables high-fidelity three-dimensional reproductions that resemble the originals. As a result of such technological advancements, some theorists are discussing the migration of the artwork's aura into digital materiality (see Lowe et.al, 2020), enabling a fusion between the beholder and the digital equivalent of an originally physical artwork into a "higher object."

> I never refer to a digital artwork as an "asset" but prefer to use the words "artwork" or "complex digital object." It's important to acknowledge the historicity of digital artworks. We should avoid collections consisting of assets or entities for the sake of keeping pace with technological progress, and instead focus on their original, historical environments.
>
> **Morgane Stricot
> (media conservator)**

⬊ Digital twins

A digital twin can be understood as the digital representation of a physical object, device, or space with a high degree of fidelity. The term was coined in engineering, where the digital twin plays an important role in managing the life cycle of a machine or object. It is used as a method of computer-aided design but also in status-monitoring after the object is finished. It exists for the same time as the physical object it represents, and its analog counterpart can be connected to it to supply real-time information flows, allowing engineers to observe its performance. When referring to exhibitions, the term has been appropriated to describe photorealistic 3D models of existing physical exhibitions as opposed to born-digital solutions utilizing the full range of possibilities in digital space. Here, digital twins are usually created using photogrammetric recording technology.

Especially in the context of travel restrictions and social distancing regulations in response to the Covid-19 pandemic, many art institutions made digital twins of their current exhibitions available online. An example within the Beyond Matter project was the digital twin of the *Spatial Affairs* (Ludwig Museum Budapest, 2021) exhibition, juxtaposed with the born-digital exhibition platform *Spatial Affairs. Worlding—A tér világlása* (2021–23).

⬊ Embodiment

Human-computer interfaces such as virtual reality systems can represent immersive virtual environments in which participants feel fully immersed and present. Virtual reality systems also make it possible to create a sense of embodiment within virtual bodies (see Slater, 2018). Users see a virtual body instead of their own, but may also feel that those virtual body parts are connected to their own bodies.

A 1998 study found that it is possible to create the illusion that a non-animate visible object is part of one's own body. This happens through multisensory correlations, such as visual tactile stimulation. Subjects were placed in front of a rubber hand that was aligned with their hidden real hand, and both hands were stimulated with brushes. Participants reported that to some degree they could not distinguish touch to their natural hand from touch to the rubber hand (see Botvinick, Cohen, 1998).

A similar illusion can be experienced in virtual reality, where visual-tactile stimuli can be applied simultaneously to a virtual representation

of the body and the natural body. This kind of experience is fundamental when it comes to the phenomenology of virtual and hybrid spaces. "Remote sensing," as artist Carolyn Kirschner calls it (2021), has been the research focus for several Beyond Matter residency projects. Kirschner herself developed the immersive video tour *Iconoclash: Slow Squeeze* (2022), in which, using digital models of artworks from the exhibition *Iconoclash* (ZKM|Karlsruhe, 2002) as a starting point, she tested mechanisms of autonomous sensory meridian response (ASMR) for presenting and mediating art.

◥ Emulation

The term emulation comes from computer technology, where it denotes a process of running programs on operating systems other than those for which they were originally written. In contrast to simulation, meaning system replicas that correspond to reality down to the smallest detail, emulation focuses on partial aspects (see Dourish, 2016).

Software emulators are particularly common in the video-game sector, used to make games playable on alternative platforms. Usually only the look and feel of games are emulated, however, since the software and hardware used are platform-dependent (see Wüthrich, 2007).

The digital exhibition model *Iconoclash as a Digital Experience*, developed in the context of Beyond Matter, can be understood as an emulation. It assembles digital models and archival material of the artworks and objects in a three-dimensional exhibition space; because different physical laws apply to this space than to reality, it must be distinguished from a pure exhibition simulation. Insofar as they depict systems, then, models are usually emulations, since they always represent a simplified image of reality or an image focused on certain aspects.

Already described in the late 1990s as a salvage program, the exhibition *Les Immatériaux* (Centre Pompidou, 1985) can be interpreted as an analog emulator itself. It translated various kinds of worlds or belief systems and realities into exhibited artifacts that could be understood as interfaces. If an exhibition is understood as an emulator, it can be used to enter into the concepts of old exhibitions. An

exhibition may serve as the hardware for running a previous show, and due to the different environment, this can become a genuinely contemporary experience (see Seijdel, 2000).

> **Emulation is a conscious translation, adaptation, and modulation of signals. It implies the mapping of commands from the logic of one system (for example, *Les Immatériaux*) onto those of the target system (for example, *Les émulateurs*). Often the two systems are from different eras of computation. Emulation is not only computational, and it is not a mere act of copying or imitating, but rather a reworking and interpreting of something.**
>
> **Geraldine Juárez
> (visual artist)**

◥ Experience

As pointed out by US artist Sam Lavigne with a supercut, Mark Zuckerberg uttered the word "experience" about sixty times in a promotional video announcing Facebook's name change to Meta in 2021. It is characteristic of rhetoric within the user experience (UX) industry to dissolve the actual device and thus the interface that mediates content into the formlessness of "experience" (see Lialina, 2021). User experience design (UXD or UED) is the process of enhancing user satisfaction by improving the usability, ease of use, and pleasure provided in the interaction between user and product (see Nielsen Norman Group, 1998).

"Museum experience" is a label for how exhibited content is perceived and engaged with in the exhibition space. When digital interfaces enter the museum and various areas of museum experience are technologized, and as digital art reshapes conceptions of what an exhibition can be, the museum transmogrifies into a hybrid entity integrating a geographical location with various digital platforms. Imagining the museum as an extended and porous system of multiple dimensions means considering an affluence of exhibition spaces instead of a single building. The museum becomes a system triggered by cognitive processes and based on experiences, rather than a space bound to a specific location (see Nolasco-Rózsás, Kálmán, 2021).

Matter. Non-Matter. Anti-Matter. Past Exhibitions as Digital Experiences (ZKM|

Karlsruhe, 2022–23) involved digital models of *Iconoclash* (ZKM | Karlsruhe, 2002) and *Les Immatériaux* (Centre Pompidou, 1985). Neither experience was tied to one specific interface, although within the exhibition space both could be accessed via *The Immaterial Display*, a device created with user interface (UI) and UX design methodologies. Digital applications inside the museum and on its online platforms were discussed throughout the "HyMEx – Hybrid Museum Experience 2021" symposium (Ludwig Museum Budapest, 2021).

↘ Generative networked spaces

The capacity to create generative networked spaces to display art and produce knowledge has developed hand in hand with computation's ability to visualize simulated or generated spaces that may or may not resemble our observable surroundings and the ways we perceive them.

  Henri Lefebvre's *The Production of Space* was published in 1974, when the first personal computer was released on the market. The social impact of networked computer-based spaces was only a dream of cyberneticians, yet Lefebvre was already exploring computer science, which he thought would dominate social space. He described the computer as a tool that condenses space by assembling an indeterminate mass of information relating to a given physical or social space and processing it at a single location.

  In the 1980s the computer was supposed to become a difference machine, and the internet was seen as a utopian possibility for overcoming social inequality. In its rudimental shapelessness its space seemed a perfect ground for revolutionary ideas, a tool to overthrow patriarchy or alleviate the deficits of representational democracy (see Haraway, 1985).

  Several artists featured in the *Spatial Affairs* (Ludwig Museum Budapest, 2021) exhibition are pioneering ways of describing, using, and reflecting space, whether actual or computational. Artists were engaging with the question of spatial transformation long before art institutions started to react to the challenge of digital spaces, with their atemporality and generation of open-ended feedback loops. *Spatial Affairs. Worlding—A tér világlása* (2021–23) was itself a

generative networked space, while the exhibition *Immerse!* (Tallinn Art Hall, 2023) engaged with the sociopolitical impact of such spaces.

> This whole process of spatialization and vectorization is like defining the coordinates of what is possible within a set that is based on training data. It is literally enclosing the future into the boundaries of the past.
>
> **David Benqué**
> **(researcher and designer)**

↘ Hybridity

An object or event is considered hybrid when it exists virtually and physically at the same time. Hybrid events are accessible in real life as well as online, for example in the form of video streaming. A hybrid artwork may consist of a physical installation and digital content (see Nolasco-Rózsás, Kálmán, 2021).

  Initially used in biology to refer to the descendants of two plants or animals belonging to different breeds or subspecies, the term "hybrid" was appropriated in linguistics to point to mixing and interchange between different languages (see Bakhtin, 1981). In the arts, and media art more specifically, hybridization can refer to artworks that incorporate both physical or analog and virtual or digital elements to create an experience beyond such dichotomies. Similar strategies are being discussed under the term "post-digital."

  As part of its research activity, Beyond Matter took on the question of how museum content and cultural heritage can be made accessible to non-local audiences on personal devices via the internet, but it also designed hardware for the specific context of the exhibition space: *The Immaterial Display*. The exhibitions *Spatial Affairs* (Ludwig Museum Budapest, 2021) and *Immerse!* (Tallinn Art Hall, 2023) were both hybrids, expanding beyond the space of their physical exhibition via an online platform (*Spatial Affairs. Worlding—A tér világlása* (2021–23)), walkable documentation of the exhibitions on the *VIEW* platform, and the immersive digital pieces in the shows. Other aspects of hybridity in museology were discussed in at the "HyMEx – Hybrid Museum Experience" symposium (Ludwig Museum Budapest, 2021).

⬋ Hyperobjects

The term "hyperobject" was coined by Timothy Morton (2013) for objects of dubious physicality and materiality, viscous (fixing themselves to everything), massively distributed in time and space, non-local, and never fully perceived. With the ecological crisis, they are increasingly visible to humans.

Hyperobjects can continuously transmogrify and manifest in different ways while transitioning between real and virtual, visible and invisible, presence and absence. Because they are not stable, fixed, or tangible but mobile, mutable, and intangible, they are somewhat autonomous and behave more like entities than objects. They thus problematize objecthood, as well as categories such as medium, matter, and materiality. Morton (2022) posits that the Western conception of objects as solid is inaccurate; they are actually types of liquid.

As Graham Harman (2015) argues, the term "object" should encompass all existing things, whether located in a real, fictional, or imaginary realms, and not reduced to certain characteristics or properties. As he states, the hyperobject is not reducible to its physical constitution, its practice, or its effects (see Harman, 2016).

The concept is now frequently utilized in the art world and beyond, especially regarding objects constituted and developed with new technologic materials, through which these hyper properties better reveal themselves.

The Beyond Matter project has contributed to the production of hyperobjects, mainly with hybrid and online exhibitions, AR apps accompanying the exhibition catalog for *Spatial Affairs* (Ludwig Museum Budapest, 2021), artworks, and resident artists' research projects.

⬋ Immersion

Especially in the 1990s, the term "immersion" has primarily been used in relation to virtual reality and other computer-based imaging technologies. The phenomenon of illusion in historical art could be described as the predecessor of computer-based immersion (see Grau, 2002), where the depth of sensory immersion depends on the realism of the imagery or on the surrounding sound triggering the perception of presence in an illusory environment.

Instead of describing the difference between immersive and non-immersive experiences by opposing embodiment to disembodiment or illusion to reality in relation to specific platforms, imaging technologies, or media systems, an examination of two further terms beyond immersion, namely saturation and ingestion, can provide a description of cultural movements (see Fuller, 2023). Each term describes a condition, sensorium, or state in which the subject is submerged in alternative, often fluid, surroundings.

The Beyond Matter project engages with the phenomenon of immersion on various levels: some of its outputs aimed to evoke immersive experiences (such as *The Immaterial Display*), while others critically engaged with the sociopolitical aspects of immersion in digital environments, whether social media platforms, computer games, or VR environments (such as *Immerse!* at Tallinn Art Hall, 2023). Experiences in an exhibition space while confronted with artworks and exhibits can entail immersion, as discussed at the "HyMEx – Hybrid Museum Experience 2021" symposium (Ludwig Museum Budapest, 2021).

⬋ Interactivity

Interactivity is mainly associated with the computer, a machine that places operator and operand on a same level, in a real-time relationship (see Couchot, Hillaire, 2003). Such interaction oscillates between observer and user, observing and acting, following a narrative or participating in it, alone or collectively. The first interactive computer graphics were generated in 1962; five years later virtual reality emerged, becoming the interactive technique par excellence.

Interactivity is one of the main principles of new media (see Manovich, 2001). Since interaction is a characteristic of living entities, its occurrence in technological objects can reveal the conditions in which such objects exist, manifest, and are processed. Yet all experience with art is interactive and every artwork results from interaction. Minimalism, Op Art, especially Kinetic Art, and then performance encouraged more conscious interactivity. As art became more technological, interactions came to be categorized as "open" or "closed," the latter being with non-technological objects (see Manovich, 2001).

It is worth pointing out that using the term interactivity in relation to computer-based media is tautological because the human-computer interface is inherently interactive: the user controls the computer in real-time, and once an object enters a computer it becomes interactive automatically (see Manovich, 2001).

Beyond Matter made use of interactive techniques across all its initiatives. *Spatial Affairs.Worlding—A tér világlása* (2021–23) and *The Immaterial Display*, for example, were intrinsically based on interaction.

> **Your body needs to be in that space. By relying purely on auditory or visual documentation, a middle layer gets lost.**
>
> **Bhavisha Panchia (curator and researcher)**

⬊ Interface

An interface is the part of a system that allows it to communicate and mediate with another system. It enables a mutual exchange of messages by guaranteeing the encoding and decoding of signs so that meaning can be attributed (see Laurel, 1990). In cultural theory, however, the term human-computer interface (HCI) is generally used to describe the digital, interactive interface between man and machine; here interface denotes not only the technology but a reciprocal relationship (see Hookway, 2014).

The most common HCIs today are probably touchscreens or pads, handheld controllers, mouses, and keyboards. Over time, the concept has evolved to include cognitive and emotional aspects of the user experience. Research into human-computer interaction has given rise to discourses in many scientific disciplines that examine the relationship between humans and digital technology in this context. As the concept evolved, it has come to include the cognitive and emotional aspects of user experience (see Laurel, 1990).

With *The Immaterial Display*, the Beyond Matter project developed a prototype; its interfaces are designed for navigation through digital exhibition models. It consists of a controller module—a chair with a handheld controller and motion sensors—and an immersive display module curved concavely toward the user and convexly toward the audience.

⬊ Material turn

The material turn is a research perspective which claims that objects exert agency over human action, for beyond the object's symbolic or signifying value is a materiality affecting human behavior and understandings of the world—a material culture (see Miller, 1998).

In terms of digital technologies, the material turn designates a reaction to the idealized discourse of digital immateriality prevalent at the end of the twentieth century. By highlighting the physical infrastructure within which digital information flows, studies in new materialities (see Parikka, 2012) and media archaeologies (see Kirschenbaum, 2008) bring the ecological, economic, and labor impacts of technologies into digital discourse, as well as the wetware and embodiment explorations that characterize the human role in digital systems and infrastructure.

Because they play an important social role in the preservation, study, and communication of material culture, museums have felt the impact of the material turn in thinking about and presenting their collections (see Schulze, 2014). *Les Immatériaux* (Centre Pompidou, 1985) and *Iconoclash* (ZKM│Karlsruhe, 2002) represent curatorial and museographical explorations of cultural materiality. Based on these case studies Beyond Matter explored the material layer of the digital.

> **The material world is not reducible to the models that we make of it, even if those models are built into said world. The material world is full of surprises, agencies, and relations that are beyond these models.**
>
> **Adam Bobbette (geographer and writer)**

⬊ Metaverse

Today, "metaverse" is the term colloquially used to describe the vision of a shared online world—a merging of the virtual world (virtual reality), augmented reality, cyberspace, and the real physical world into a common digital space without internal boundaries (see Burns, Dionisio, Gilbert, 2013). But no exact definition of the metaverse exists. It is interpreted differently by tech companies and in non-commercial contexts.

Neal Stephenson coined the term in 1992 in his science fiction novel *Snow Crash* for a three-dimensional virtual world in which people act as avatars, a successor of the internet. Metaverse predecessors include *Second Life*, launched in 2003 as an online social platform in a computer-generated space where avatars move around, converse, play games, or conduct business. Other examples can be found among massively multiplayer online games (MMOG or MMO) or massively multiplayer online role-playing games (MMORPG), which allow numerous participants to play in a persistent virtual world.

In contrast to the large tech companies, intensive work is being done by museums, artists, and cultural workers on decentralized solutions for online multi-user environments in the hopes of making the design of the metaverse democratic and accessible to as many people as possible—especially since the Covid-19 pandemic. With the *VIEW* platform and the software for the virtual exhibition *Spatial Affairs. Worlding—A tér világlása* (2021–23), among other initiatives, Beyond Matter contributed to these alternative approaches.

⬊ Non-local audience

Non-local visitors (see Weibel, 2021) are audience members primarily reached via an institution's online offerings, in contrast to the physically present visitor. While the local audience can be viewed in a more differentiated way using audience-research methods, the non-local audience is a heterogeneous group that is more difficult to evaluate.

Museums still largely focused on physically present visitor groups until Covid-19, when contact restrictions and the temporary closure of cultural institutions inevitably shifted the focus to the non-present audience. To continue to reach audiences, most museums had to expand their online presence and develop digital formats. For Peter Weibel, the emergence of the nonlocal audience as a target group for museums highlighted the discrepancy between a distance culture long since developed and promoted by constantly new telecommunications media and a proximity culture enforced by many museums' adherence to the delusory practice of maintaining auratic objects (see Weibel, 2021).

In this context, the digital exhibition models developed throughout the Beyond Matter project and published on its *VIEW* platform can be understood as proposals for virtual presentation and mediation display systems that can enable museums to expand their exhibition space.

> In his essay "The Author as Producer," Walter Benjamin argues that it's not only about what's being represented, it's about how you make content and the ways in which it's going to be distributed. In what ways does one turn into a worker or producer of something? And then how does that something get into the world, and who is it for?
>
> **Esther Leslie
> (professor of political aesthetics)**

⬊ Post-digital

In recent years the term "post-digital" has been applied across a broad range of disciplines and attributed meanings so contradictory that they do not lend themselves to comprehensive mapping. A common underlying tendency in these deployments and definitions is that post-digital doesn't signify a departure from the digital but gesture toward the reality that pertains to digital technologies. Accordingly, the post-digital turn encompasses discourses and practices on the novelty, naturalization, materiality, construction, apprehension, and control of the manifold manifestations of information technologies.

In the art and museum context, the "post-digital condition" points to the hybridity of artworks shaped conceptually and physically by digital processes while materializing as objects and taking the existing language of contemporary art for granted. It connects to the post-contemporary context, in which temporality is fragmented into various parallel but entangled strands (see Paul, 2021). The post-digital turn has changed relational and productive dynamics in art curation and mediation, but also challenges institutions to constantly update themselves, in the technological sense—which involves the field of conservation—but also in terms of scope and practices (see Giusti, 2019).

The Beyond Matter project investigates the post-digital turn and is a product of it. The seismic shift of digitization and its impact on the production, presentation, and mediation of visual arts formed the main subject of inquiry for the exhibition *Spatial Affairs* and at the "HyMEx – Hybrid Museum Experience 2021" symposium (both Ludwig Museum Budapest, 2021).

↘ Posthumanism

Posthumanist research takes various approaches, the most prominent being critical posthumanism and technological posthumanism (see Herbrechter, 2009). Critical posthumanism deconstructs the idea of the human as the only entity capable of action and examines the transmission of dichotomies such as woman/man, nature/culture, and subject/object (see Loh, 2018). This deconstructivist critique of humanism and its traditions (especially the anthropocentrism that sees the human as an ideology-free, ahistorical being), which have determined European intellectual history since at least the Renaissance, makes clear that such humanism has been superseded by posthumanism. On the other hand, technological posthumanism shares intersections with transhumanism, the science of optimizing humans as "man x.0" with the help of technology.

Posthumanism has been criticized for its philosophical abstractness, made fruitful only through application in various cultural fields. But it has also been argued that the vagueness of posthumanist concepts is precisely what makes it possible to deconstruct normalized and normalizing categories (see Braidotti, 2014).

Posthumanist concepts have had a decisive influence on curatorial and exhibition practices. New digital presentation possibilities in particular have prompted negotiations around the potential of non-human actors to create action. Developed within Beyond Matter, the virtual exhibition platform *Spatial Affairs. Worlding—A tér világlása* (2021–23) can be taken as an example of how to give works of art a certain independence.

↘ Postphenomenology

Postphenomenology is a philosophical field of study focused on the social and cultural role of science and technology. It explores the technological mediation of human relationships with the world by empirically analyzing concrete technologies. Proponents argue that users of technology develop extended perceptual affordances in their interactions—that is, they establish embodied relations with devices which reshape their experience.

The various research methods of postphenomenology stem from Don Ihde's proposal in *Postphenomenology: Essays in the Postmodern Context* (1993), which elaborates a postphenomenological philosophy of technology. Ihde explained that postphenomenology is rooted in the twentieth-century phenomenological tradition adapted to converge with US-American pragmatism and empirical studies on concrete technologies (see Ihde, 1993). Its roots can also be located in the tradition of the philosophy of technology and its best-known representatives are Peter-Paul Verbeek (2015) and Hans Achterhuis (2001).

The Beyond Matter project probed these issues throughout its products and iterations. It undertook empirical studies of cultural heritage by designing digital exhibition models, and it generated embodied experiences by creating experimental human-computer interfaces (HCI) to navigate these digital reinterpretations. *The Immaterial Display* HCI manifested a postphenomenological approach to the study, presentation, perception, and experience of past exhibitions in the reality of digital culture.

↘ Practice-based research

If artifacts are a product of research-related practice and form the basis of contributions to knowledge, we can say that research is practice-based. Practice-based research is undertaken to gain new knowledge partly by means of practice and its outcomes. In a research endeavor, claims of original contributions to knowledge may be demonstrated through creative outcomes in the form of designs, music, digital media, performances, or exhibitions. While the significance and context of such claims are still mostly described in words, a full understanding can only be obtained with direct reference to the outcomes (see Candy, 2006).

Practice-based research attempts to overcome the discrepancy between theory and practice. The practitioner's engagement with

the relationship between theory and practice is central. US sociologists Anselm Strauss and Barney Glaser's grounded theory shows how practical research seeks to generate theory from systematically collected data, rather than through logical deductions from a priori assumptions (see Carr, Kemmis, 1986). Especially in the social sciences, theory is only meaningful if it proves itself in practice. In artistic and design research, designs, models, and prototypes play an important role as expressions of applied practice.

This was an important research method in the Beyond Matter project, applied, for example, to the generative digital exhibition platforms and the hardware interface *The Immaterial Display* developed for the museum space. As prototypes, these projects sought to collect data on user experience of digital media in the museum. Various outcomes of Beyond Matter were components of a practice-based research, including its online, physical, and hybrid exhibitions, which have contributed to curatorial knowledge.

⬐ Re-

Re- is a prefix indicating repetition. Reconstruction, re-enactment, remake, revision, revival, and reinterpretation all refer to iterating an act or creating a copy of something that once existed.

The restoration of artworks and artifacts is a firmly established discipline, but the re-enactment or re-creation of past exhibitions is not yet widespread. A growing attention to exhibition histories and curatorial practices can be recently observed, however, as indicated by efforts to define the genealogy of curating and declare it a profession. A side effect of this process has manifested in restaged exhibitions, such as Harald Szeemann's *When Attitudes Become Form* (1969), recreated at Fondazione Prada in 2013. Some important exhibitions have already been virtually reconstructed, such as the first documenta (1955).

In the Beyond Matter project the prefix gained specific importance in relation to the digital models of past exhibitions *Iconoclash* (ZKM|Karlsruhe, 2002) and *Les Immatériaux* (Centre Pompidou, 1985). While creating these virtual models, the prefix turned out to

be counterproductive, since the exhibition and its model could not be described as the real thing and its copy, the original and its reproduction, or the image and its likeness. A computer-based manifestation of an exhibition concept is a virtual model, proxy, or emulation, rather than a reconstruction, remake, re-enactment, repetition, or revival. But virtual models do enable revision and foster reinterpretation of the past assemblies of objects they refer to.

⬐ Scenography

Scenography is the design of interiors, architectures, and atmospheres for theater and film productions but also for exhibitions spaces. It includes temporary architectural structures, lighting, sound, exhibition texts, and other scenic devices contributing to the way in which viewers experience three-dimensional space. In the widest sense, scenographers create ephemeral spaces for presentation and interactivity (see Thümmel, 2021).

Scenography originated in theater, where it initially referred to illusory paintings of architecture and environmental surroundings used as the backdrop of performances. In the exhibition context, scenography shapes the ways in which exhibits are perceived, but also defines narratives and relationships between exhibits and visitors, thus playing an essential part in knowledge production. The concept of expanded scenography stresses these aspects and their underlying materiality. In visual arts and theater, some practitioners use scenography to intervene or irritate (see Hemken, 2015; McKinney, Palmer, 2017; Hann, 2019).

Scenography's crucial role was considered within several activities of Beyond Matter, as the project focused closely on the spatial aspects of exhibitions. Outcomes such as *Les Immatériaux: A Digital Model* explored the effect of historical exhibition scenographies by recreating them in digital space, while exhibitions like *Spatial Affairs. Worlding—A tér világlása* (2021–23) can be seen as experiments in born-digital scenographic practice.

⬐ Simulation

In postmodern philosophy, simulation refers to a situation in which human experience is completely mediated by signs without relation

to any underlying reality. This is understood to be caused by the ubiquity of media, especially mass media—television, radio, advertising, and digital media such as the internet. Information technologies' destabilization of relations between humans and the world is a prominent topic in the writing of Jean-François Lyotard (see Lyotard, 1984) and the exhibition *Les Immatériaux* (Centre Pompidou, 1985).

The term was popularized in Jean Baudrillard's book *Simulacra and Simulation* (1981), which traces three historical stages according to their predominant means of signification: premodernity, in which copies tried to be faithful to the original; modernity, in which mass-produced copies resembled the original in every way; and postmodernity, in which the copy or model precedes the original. At this stage reality is constructed from models, making it impossible to distinguish from simulation. The concept of the virtual condition likewise posits that the dichotomy between virtual and real is no longer valid, since supposedly virtual interactions have actual impacts on the physical world and our lives.

The exhibition *Immerse!* (Tallinn Art Hall, 2023) implicitly engaged with the subject by reflecting on the importance of maintaining consciousness about immersing ourselves in virtual worlds.

◥ Space of the exhibition

The space of an exhibition is defined not only by its architecture, its scenography and exhibits, but also by its constellation of relations (see Bismarck, 2022), which echoes two fundamentally different understandings of the notion of space. The former reflect the container theory of space, based on Isaac Newton's understanding of time and space as absolute, while the latter reflects relational theory, rooted in Gottfried Wilhelm Leibniz's idea that space is composed of relations between objects, and cannot exist in the absence of matter.

Expanding beyond the physical exhibition site or extraterritorializing the curatorial space (see O'Neill, 2012) has been a widespread practice in contemporary art exhibitions of recent decades; they often function as platforms or assemblies for various temporal, discursive, and collaborative formats. Ideally the curator's

interpretation should remain unstated and implicit within the space (see Smith, 2012), in order to foster relations among the various actors that constitute the exhibition.

Various Beyond Matter initiatives reflected on the spatial aspects of exhibitions and how computer-generated spatial production may change the role of exhibition space. *Spatial Affairs* (Ludwig Museum Budapest, 2021) explored multiple notions of space, while *Spatial Affairs. Worlding—A tér világlása* (2021–23) suggested a virtual deconstruction of the white cube. *Matter. Non-Matter. Anti-Matter. Past Exhibitions as Digital Experiences* (ZKM | Karlsruhe, 2022–23) offered an array of examples for curatorial practice in digitally constituted, computer-based space, while the models of past exhibitions engaged with the possibility of emulating disassembled exhibition spaces.

> I still don't know how to define what an exhibition produces. It's not an object, you can't characterize it as a path. It's not simply an addition, a gathering of works, because there is something more to it. Sometimes I am tempted to think about the exhibition as a gesture, or sometimes the best I come up with for myself is the idea of a phrase, like putting accents on a certain pitch or a certain note.
>
> **Peter Szendy**
> **(philosopher and musicologist)**

◥ Systems of representation

The phrase "systems of representation" was coined by Stuart Hall, the Jamaican-born British sociologist, cultural theorist, activist, and founder of the *New Left Review*, to describe structures and processes involved in the production of meaning (see Hall, 1997). He explained that representation "is the production of meaning of the concepts in our minds through language" (Hall, 1997, 17). Hall initially recognized two processes or systems of representation. The first is a conceptual map that all humans develop, and which unfolds through our everyday living as biological (and cultural) organisms with a proclivity towards "organizing, clustering, arranging, and classifying concepts and establishing complex relations between them" (Hall, 1997, 17). Cognitive scientist Jean Mandler's work

provides information about experimental work that seems to confirm the existence and development of this conceptual map in humans (see Mandler, 2004). The second system of representation Hall identified is language itself, which continually evolves as part of culture into distinct multimodal signs that enable the encoding and decoding of meaning into discourse. In every human society and for every human being, these two systems converge via communicative actions and activities. (Consider our ubiquitous use of emojis.)

As we become involved in sense-making activities such as exploration, interpretation, and reflection, our engagement with these systems occurs dynamically and as part of our embodied interactions in and with the world. In our contemporary society, effervescent with hybridity, the "things of the world" can include real objects such as the artifacts physically available to us during an exhibition in a gallery. They can also include virtual objects and imaginary creatures, such as the digital objects and avatars we use when interacting with an application that offers a virtual reality experience.

In Beyond Matter, the archival reconstructions and exhibition data used to create them existed as socio-material arrangements in the real world. Systems of representation ground the experience so that as visitors engage with them the hardware used for the interaction and the software coded in language actively mediate and translate between the computer simulation in the present and the exhibitions as events that occurred in the past.

⬂ Temporality of the exhibition

If the exhibition is a temporally limited organizational structure of objects, discursive, and scenographic elements, we may ask which temporal dimensions play a role in the perception, reflection, and generation of meaning of and within that format.

Based on the time forms of narrative time and narrated time identified in narratology, the philosopher Emmanuel Alloa (2017) distinguishes between exhibition time (i.e., the time during which a work is presented) and exhibited time (i.e., the time that is recorded, narrated, or reproduced in the work). In addition to these

are the temporal episodes during which visitors view the exhibition or its individual parts, viewing times that are only rarely congruent with the exhibition time—as in the case of immaterial performances.

With the reconstruction of past exhibitions, especially through digital models, the chronology of exhibition time and viewing time(s) is deconstructed, and temporal updates to their discourses become possible.

> **In Kant's schema, humans cannot understand the world without basic cognitive frameworks, such as space and time. But we never make complete sense of it either. The world is always perpetually beyond our capacity to access it. Human cultures resort to trying to infinitely perfect the limited tools that we have at hand to understand the world.**
>
> **Adam Bobbette**
> **(geographer and writer)**

⬂ Virtual condition

The virtual condition is a current tendency in cultural spheres toward the interdependence of physical and digital spaces, as well as the coexistence of multiple exhibition temporalities for art's mediation and reception. It is based on an ontological perspective of virtual realism, which considers the virtual to be as real as the physical.

The virtual condition relates to and results from a dynamic genealogy of culture-related general conditions, such as Jean-François Lyotard's postmodern condition (1979), in which the metanarratives that were a quintessential feature of modernism had become generally untenable; the post-medium condition described two decades later by Rosalind Krauss (1999); or Peter Weibel's post-media condition (2021) as new technologies and telecommunications infiltrating the arts. It overlaps with various other contemporary conditions, such as the digital condition identified by Felix Stalder (2010), the planetary condition by Yuk Hui (2021), and the curatorial condition by Beatrice von Bismarck (2022).

The Beyond Matter project scrutinized the virtual condition in art production and mediation by means of practice-based research,

resulting in a plurality of media that includes virtual and augmented realities, digital models and digital artworks, presented in a network of computer-based and physical exhibition spaces that generated hybrid experiences.

The liquid and the crystal capacities of our screens and devices are working together, infecting each other so that it becomes this melted thing. An indistinguishable, indiscriminate mulch of arbitrariness with no intention or direction.

Esther Leslie
(professor of political aesthetics)

↘ Virtual reality

Virtual reality commonly refers to computer-based simulated environments accessed through immersive interfaces such as a head-mounted display (HDM)—glasses or helmets with displays close to the wearers' eyes, which use motion sensors to react to their head movements. The visual experience may be supplemented with other sensory inputs such as the auditory and haptic. Advanced systems track the movement of the user's body to simulate movement in the virtual world with which they are interacting. Unlike other forms of extended reality, such as augmented or mixed reality (AR or XR) which show users images of their surroundings combined with virtual elements, virtual reality is a complete immersion in a simulated world.

The term itself goes back to French author Antonin Artaud's discussion of theater in his book *The Theatre and its Double* (1985). Early technological precursors of today's virtual reality include stereoscopy and dioramas, both popular in the nineteenth century. Head-mounted displays were developed in the 1960s, while various types of immersive interface were launched in the 1940s and 1950s, such as flight simulators. This is one example of the military's use of extended reality, which accelerated in the 2010s and 2020s (see Greengard, 2019). In museology and cultural heritage, virtual reality can be used to experience and study sites which are significant but physically inaccessible for conservation or environmental reasons (see Kenderdine, Yip, 2018).

Several artworks in the physical exhibitions and residency projects of Beyond Matter used virtual reality technology, and it formed a prominent discussion point at the "HyMEx – Hybrid Museum Experience 2021" symposium (Ludwig Museum Budapest, 2021). One of the main tenets of the Beyond Matter project was the deconstruction of the meaning of the term described above, and its reconstruction on a posthumanist ontological grounding in the context of art curation and mediation.

Excerpts from the artwork *Les émulateurs* (2022) by Geraldine Juárez, in collaboration with Matt Nish-Lapidus and Bani Haykal, complement this glossary of project-specific terms. *Les émulateurs* is a sound piece that originally accompanied selected artworks exhibited in *Matter. Non-Matter. Anti-Matter* at ZKM|Center for Art and Media Karlsruhe (2022–23).

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Kristaps Ancāns is an artist and educator whose practice spans installation, sculpture, language, AR, and moving image. He studied painting and environmental art at the Art Academy of Latvia, graduating in 2014, and completed a master's degree in fine art at Central Saint Martins in 2016. Ancāns has been awarded the Latvian State Culture Capital Foundation Scholarship and the Cecil Lewis Sculpture Scholarship of the University of the Arts, London. He is a laureate of the Helen Scott Lidgett Studio Award 2016/2017 and the Paul Puzinas Grant, and has been nominated for the Purvītis Prize and the Arts Foundation Fellowship. He lives and works between London and Riga.

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Annet Dekker is a curator and researcher. Currently she is assistant professor of comparative cultural analysis and MA coordinator for archival and information studies at the University of Amsterdam, as well as serving as visiting professor and codirector of the Centre for the Study of the Networked Image at London South Bank University. She publishes regularly in numerous collections and journals and has edited several volumes, including *Documentation as Art: Expanded Digital Practices* (coedited with Gabriella Giannachi, Routledge, 2022) and *Curating Digital Art: From Presenting and Collecting Digital Art to Networked Co-curating* (Valiz, 2021). Dekker's monograph *Collecting and Conserving Net Art: Moving Beyond Conventional Methods* (Routledge, 2018) is a seminal work in digital art conservation.

Adela Demetja is a curator based in Tirana and Frankfurt am Main. She holds a master's in curatorial and critical studies at the Städelschule and Goethe University, Frankfurt am Main, and studied at the Academy of Arts in Tirana. She is the director of Tirana Art Lab—Center for Contemporary Art, which she established in 2010. As an independent curator she has presented numerous international exhibitions, collaborating with institutions such as the National Gallery of Arts Tirana, National Art Gallery of Kosovo, Maxim Gorki Theater Berlin, Portland Institute for Contemporary Art, Project Biennial D-0 Ark Underground in Konjic, Action Field Kodra Contemporary Art Festival in Thessaloniki, Lothringer 13 Halle in Munich, Villa Romana Florence, and the Haus am Lützowplatz in Berlin. She curated the Albanian Pavilion at the 59th Venice Biennale (2022), represented by Lumturi Blloshmi.

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Irmgard Emmelhainz is an independent translator, writer, researcher, and lecturer based in Mexico City. She holds a PhD from the University of Toronto (2009). Her writings on film, Palestine, art, culture, and neoliberalism have been published in specialized journals and magazines across the world and translated into twelve languages. Emmelhainz has presented her work at an array of international venues, and she teaches art theory and documentary cinema. Her most recent books are *Jean-Luc Godard's Political Filmmaking* (Palgrave Macmillan, 2019), *Toxic Loves, Impossible Futures: Feminist Living as Resistance* (Vanderbilt University Press, 2022), *The Tyranny of Common Sense: Mexico's Post-Neoliberal Conversion* (SUNY, 2021), and *The Sky is Incomplete: Travel Chronicles in Palestine* (Vanderbilt University Press, 2023).

Elena Esposito is professor of sociology at Bielefeld University and at the University of Bologna. She has published extensively on the theory of society, media theory, memory theory, and the sociology of financial markets. Her current research on algorithmic prediction is supported by a five-year advanced grant from the European Research Council. Her latest book is *Artificial Communication: How Algorithms Produce Social Intelligence* (MIT Press, 2022).

Fruzsina Feigl is a curator and project manager based in Budapest. Between 2020 and 2022 she was an assistant curator at the Ludwig Museum – Museum of Contemporary Art in Budapest, where she contributed to the *Spatial Affairs* exhibition and catalog as assistant curator and editor (2021), and acted as a project coordinator for the Beyond Matter project. Since October 2022, she has worked as a project manager for education at the Moholy-Nagy University of Art and Design, Budapest.

Bernard Dionysius Geoghegan is a media theorist and historian of science teaching history and theory of digital media at King's College London. An overarching theme of his research is how cultural sciences shape and are shaped by digital media. His attention to cultural factors in technical systems has also figured in his work as a curator, notably for the Anthropocene Project (2013–14) and Technosphere Research Project (2015–19) at the Haus der Kulturen der Welt. In 2023, Duke University Press published his book *Code: From Information Theory to French Theory*.

Marialaura Ghidini is a curator and researcher whose work explores the intersections between art, technology, and society. Interested in working with various exhibition formats outside the gallery, she founded the curatorial platform or-bits.com (2009–15) and has curated the online project UnProductive Solutions (ongoing), #exstrange on eBay (2017), the print project *Silicon Plateau* (The Centre for Internet and Society, 2018); and *The C(h)roma Show* (2014) in an electronics shop in Bangalore, India. She has researched web-based curatorial work since undertaking her PhD with the research unit CRUMB (The Curatorial Resource for Upstart Media Bliss) at the University of Sunderland (2015), and recently published the archive projects curating.online (2021) and *The Broken Timeline* (2022)—conceived with Annet Dekker and Gaia Tedone. Currently Ghidini works as curatorial consultant and practices independently, including under the moniker ://ftp, a curatorial agency she started with Gaia Tedone in 2021.

Jiří Gruber is a Czech intermedia artist and theorist. He studied at the Faculty of Arts of Masaryk University and at the Faculty of Fine Arts of Brno University of Technology. He completed a study internship at the Academy of Fine Arts in Prague and at the Hochschule für Gestaltung (HfG) in Karlsruhe. Gruber's approach is long-term, multidisciplinary, and emphasizes collaborative practice. He lives and works between Brno, Tirana, and Belgrade.

Esteban Gutiérrez-Jiménez holds a PhD in arts and architecture and is an assistant professor and coordinator of the digital arts master's program at the Instituto Tecnológico Metropolitano (ITM) in Medellín. His research is part of a broader initiative on digital literacy that aims to provide the conceptual tools for educated digital technology usage as well as producing theoretical study of cultural output. Studying the technological framework and discourse force of digital artifacts, he is able to develop a creative process that uses digital data and code as aesthetic material in order to produce visual works that combine the formal characteristics of traditional creative media with the possibilities of digital media.

Graham Harman is distinguished professor of philosophy at the Southern California Institute of Architecture (SCI-Arc) in Los Angeles. His most recent books are *Art and Objects* (Polity Press, 2020) and *Architecture and Objects* (University of Minnesota Press, 2022). His forthcoming works are *The Graham Harman Reader* (Zero Books, 2023) and *Objects Untimely: Object-Oriented Philosophy and Archaeology* (with Christopher Witmore, Polity Press, 2023). A founding member of the speculative realism and object-oriented ontology movements, he was recently named as one of the twenty most influential living philosophers by US rankings website Academic Influence.

Kai-Uwe Hemken is a professor for art history and aesthetics at Kunsthochschule Kassel, a curator working with various institutions in Hanover, Berlin, Düsseldorf, Weimar, Dresden, Eindhoven, and New York, and formerly curator of the art collections at Ruhr University Bochum. His publications, summer schools, conferences, and research projects focus on twentieth- and twenty-first-century art and curatorial

theory and practice, including the VR reconstructions of documenta 1955, the 1926 International Art Exhibition in Dresden, and the 1929 exhibition *Film und Foto* (Raum 1) in Stuttgart.

Yannick Hofmann is a media artist and curator currently working for the Deutsches Museum Nuremberg. As artistic director of the intelligent. museum project since 2020, he has been working with a team of software developers and museum-visitor researchers on hybrid formats and applications for the museum of the future. His goal is to revolutionize museums and make them places of experience and experimentation, a social space where art, science, technology, and public discourse come together.

Johanna Jolen Kuzmenko is an art historian interested in both art history and contemporary art. As an art critic, her exhibition reviews have appeared in several Estonian publications. As a researcher, Kuzmenko has contributed to the exhibition catalog *STODOM: A Combination of Letters that Changed Estonian Photography* (2020) published by the Museum of Photography, Tallinn. She works as a gallery attendant at Tallinn Art Hall and collaborates with the Art Museum of Estonia, conducting educational programs and public tours. In 2021, she served as a researcher for the preparations of the annual exhibition of the Estonian Association of Architects.

Borbála Kálmán is a curator and art historian at the Ludwig Museum Budapest, where she cocurated and project managed the symposium "HyMEx – Hybrid Museum Experience 2021," and cocurated the international exhibitions *Extended Present – Transient Realities* and *Emplotment* in 2022. Her involvement as assistant curator in the Ludwig Museum's *The Whale That Was a Submarine – Contemporary Positions form Albania and Kosovo* (2016) was a turning point in her curatorial research, reinforced by her thesis critically reassessing the role of the art museum in diverse cultural contexts for the Central European University's cultural heritage studies program. Kálmán was selected for the FOCUS 2022 program of the Institut français, and previously worked as a manager and art historian for Várfok Gallery, Budapest, as an independent researcher in the contemporary art scene in Myanmar, and as an art consultant for Pansodan Gallery, Yangon. She graduated from Péter Pázmány University in 2007.

Sebastian Klein joined GIM | Gesellschaft für innovative Marktforschung, Heidelberg, in 2008 and is responsible for international brand and product development research in the food, home and technology, and fast-moving consumer goods (FMCG) sectors. He regularly works on projects related to the cultural sector, such as visitor surveys for music festivals and evaluations of museum exhibitions. Klein holds a bachelor's degree in musicology and sociology, completed a master's degree in sociology from the University of Hagen, and has worked at the Institute of Sociology, Media, and Cultural Studies at the University of Karlsruhe (today Karlsruher Institut für Technologie (KIT)).

Felix Koberstein is an art historian and curator. He is a founding member of the nonprofit art space Flur11 in Brunswick and was its codirector from 2014 to 2018.

He then worked at the Heidelberger Kunstverein as curatorial assistant, before joining the team at ZKM | Center for Art and Media Karlsruhe and ZKM | Hertz Lab. Koberstein is scientific associate at ZKM on the practice-based research project Beyond Matter, where he is involved in the digital modeling of historical exhibitions. He recently cocurated the first edition of the miniature biennale titled *A World to Work With* in Düsseldorf.

Bogna Konior is assistant professor of interactive media arts at New York University Shanghai. She is the coeditor of *Machine Decision Is Not Final: China and the History and Future of AI* (Urbanomic, 2023).

Moritz Konrad works across disciplines and media, focusing on internet cultures, visual phenomena of digital everyday life, and frictions between popular and highbrow culture. He completed his bachelor's degree in painting and graphic arts at the State Academy of Fine Arts Karlsruhe in 2019. Currently he is studying art research, media philosophy, and exhibition design at the Karlsruhe University of Arts and Design (HfG).

Sybille Krämer was full professor of philosophy at the Free University Berlin. Since her retirement in 2018, she has been a guest professor at the Institute of Culture and Aesthetics of Digital Media at Leuphana University Lüneburg. She served as a member of the German Science and Humanities Council (2000–06), of the European Research Council (2007–14), of the senate of the German Research Foundation (DFG, 2009–15), and as a permanent fellow at the Berlin Institute for Advanced Study (2005–08). She has held several international visiting professorships and fellowships and was awarded an honorary doctorate by Linköping University in 2016. Her research areas include mathematics and philosophy in the seventeenth century; social epistemology; philosophy of culture, language and writing; performative studies, media studies; cultural techniques, digitality and history of computation; testimony and witnessing. She is the author and editor of several publications. Her latest essay is "Should we really 'hermeneutise' the Digital Humanities? A plea for the epistemic productivity of a 'cultural technique of flattening' in the Humanities," *Journal Cultural Analytics* 7, no. 4 (2023).

Marcella Lista is an art historian and, since 2016, head curator of the New Media Department at the Musée National d'Art Moderne (MNAM). She devoted her early research to the revival of the total work of art in the avant-gardes, before turning her attention to media archaeology and choreographic experiments in the museum space. Lista's recent exhibitions as curator include *Hito Steyerl: I will survive* (2021) and *Hassan Khan: Blind Ambition* (2022), and recent books include *Eric Baudelaire: Faire avec* (Paraguay Press, 2022), coauthored with Erika Balsom. She cocurated the exhibition *Saodat Ismailova. Double-horizon* at Le Fresnoy – Studio national des arts contemporains in 2023.

Anna Longo received her PhD in aesthetics from University Paris 1 – Panthéon Sorbonne. She currently directs the program Technologies du temps: accélération et limites at the Collège international de philosophie (CIPh, Paris) and she teaches at Institute Mines-Télécom Business School in Evry (Paris). Longo's latest book, *Le jeu de l'induction: automatisation de la production de connaissance et réflexion philosophique* (Éditions Mimesis, 2022), explores the transformations in the conception of inductive reasoning that led to algorithmic predictive systems and proposes a critique from the perspective of aesthetic knowledge.

Elen Lotman is a cinematographer who has shot numerous feature films, shorts, and documentaries. Her films have won awards and shown at film festivals such as Camerimage, International Documentary Film Festival Amsterdam, Tampere Film Festival, Black Nights Film Festival, and Moscow International Film Festival. Lotman was nominated for best cinematography for the full-length documentary *My Dear Mother* at the ReelHeart Filmfestival in Toronto, which was awarded with the Estonian People's Award for the best feature documentary at the Parnu International Documentary and Anthropology Film Festival in 2020. Her virtual exhibitions filmed for Tallinn Art Hall were chosen among world's ten best virtual exhibitions of 2020 by the *New York Times* and *Wallpaper Magazine*. She is associate professor of film arts at the Baltic Film, Media and Arts School of Tallinn University, curates the School's PhD studies artistic research branch, and serves as copresident of the European Federation of Cinematographers (IMAGO). In 2021 Lotman defended her PhD thesis "Experiential Heuristics in Fiction Film Cinematography," and it was awarded *laudatur* status.

Mauro Martino, a leading figure in the integration of AI into art, founded the Visual Artificial Intelligence Lab at the MIT-IBM Watson AI Lab and is head scientist there. His works such as *News Explorer* (2015), *Forma Fluens* (2017), and *AI Portraits* (2018–19) seek to revolutionize sculpture through artificial neural networks. Acclaimed in scientific journals *Nature* and *Science*, his projects have also earned accolades like the Vizzies Visualization Challenge Gold Medal and a Webby Award. Martino's pieces have been exhibited in venues from the Venice Biennale to the Serpentine Gallery, London, with a permanent presence at Ars Electronica, Linz. He is professor of practice at Northeastern University, Boston.

Ali Akbar Mehta is a transmedia artist, curator, researcher, and writer. His research-based practice produces immersive, interactive archival projects that map knowledge related to violence, conflict, and trauma by foregrounding overlooked bodies, data, networks, and ecologies. His performances, installations, and talks have been presented in galleries and alternative spaces in India and Europe. Currently Mehta is part of the curatorial team of the Helsinki Biennial 2023, *New Directions May Emerge*. His doctoral research at Aalto University, "Practicing Online Performativity: Archiving in the Age of Data, Power, and Violence," investigates (infra)structural and performative relations between online archives and their users. He is a cofounder of the Museum of Impossible Forms, Helsinki, and was artistic codirector there from 2018–20. He holds a master's degree in visual cultures, curating, and contemporary art from Aalto University.

Cvijeta Miljak is a designer, artist, and researcher. As a member of the Systems of Representation Research Group of the School of Arts, Design and Architecture of Aalto University, Helsinki, she is engaged in a doctoral investigation into creative participatory practices and community involvement with cultural heritage as part of the Beyond Matter project. Miljak's background lies in the visual culture domains of graphic design, photography, moving images, and new media, and going further back, in linguistics and literature. She explores emerging narratives, intermedial poetics, and the implications of digital tools by developing nonintrusive participatory evaluation practices to re-examine forms of storytelling in post-digital media. Her works have been shown and awarded internationally, such as at Ars Electronica in Linz, the Interfilm International Short Film Festival in Berlin, the Finnish Museum of Photography and the Kiasma Theatre in Helsinki, the International Festival of Films on Art in Montreal, the Pro Arte Institute in St. Petersburg, and ISEA2022 in Barcelona.

Daria Mille is a curator and research associate at ZKM | Center for Art and Media Karlsruhe. Her research focuses on the historical and contemporary intersections of art, science, and technology, including the cultural and artistic implications of digitization and the artistic positions of the 1960s. Most recently she curated and cocurated the exhibitions *BioMedia: The Age of Media with Life-like Behavior* (2022–23 at ZKM and Centre des Arts Enghien-les-Bains), *Critical Zones: In Search of a Common Ground* (2022–23 at various locations in India in collaboration with Goethe-Institut Mumbai), *Negative Space: Trajectories of Sculpture* (2019), and *Art in Motion: 100 Masterpieces With and Through Media* (2018 at ZKM and 2023 at the Shenzhen Museum of Contemporary Art and Urban Planning). Mille lectures internationally, writes scientific essays, and participates in various juries.

Felix Mittelberger studied art history and philosophy at the Friedrich-Alexander University Erlangen (FAU), art, science, and media theory at the University of Art and Design Karlsruhe (HfG), and archival science at the University of Applied Science Potsdam. As the chief archivist at ZKM | Center for Art and Media Karlsruhe since 2018, he is responsible for the Institutional Archives and the Archives of Artists and Theorists at ZKM.

Lívia Nolasco-Rózsás's curatorial, research, and writing practice is defined by an interdisciplinary approach to the arts, its media, and its relations with the sciences and information technology. Currently she serves as research associate at ZKM | Center for Art and Media Karlsruhe. She has curated exhibitions around themes such as the genealogy and social impact of planetary computation or electronic surveillance and democracy at institutions worldwide since 2006, including at ZKM, the Nam June Paik Art Center in Seoul, Tallinn Art Hall, and the Ludwig Museum in Budapest. In 2019 she commenced her curatorial research into the virtual condition and initiated and led the project Beyond Matter.

Elena Papadaki is a visual historian, cultural theorist, and curator based in London and Brussels. She leads the master's program in design at University of Greenwich, London; her research interests lie in the intersection of technology-reliant artworks, curation, interactivity, and audience reception. Having previously held posts at the Hellenic Ministry of Culture and Sports and the International Council of Museums (ICOM), she has over ten years of professional experience in the arts and museum sector. Papadaki is currently serving as a pathway councilor for the Royal Society of Arts in London, acting as a key advisor and expert to the "Students for Change" delivery group and as cochair of 28th International Symposium on Electronic Art (ISEA2023: Symbiosis).

Christiane Paul is curator of digital art at the Whitney Museum of American Art and professor at the School of Media Studies at the New School, New York. She received the Thoma Foundation's 2016 Arts Writing Award in Digital Art, and her books are *Digital Art* (Thames and Hudson, 2003), *New Media in the White Cube and Beyond* (University of California Press, 2008), *Context Providers: Conditions of Meaning in Media Arts* (with Margot Lovejoy and Victoria Vesna, Intellect, 2011), and *A Companion to Digital Art* (Wiley Blackwell, 2016). At the Whitney Museum Paul has curated exhibitions such as *Profiling* (2007), *Cory Arcangel: Pro Tools* (2011), *Programmed: Rules, Codes, and Choreographies in Art 1965–2018* (2018/19), and *Refigured* (2023), and is responsible for artport, the museum's internet art portal.

Anastasia (Natassa) Philimonos is a curator of contemporary art and PhD candidate in contemporary art history and theory at the University of Edinburgh. Her thesis examines the impact of technology on the concept of the border as it appears in the history of art and ideas. Philimonos has curated research-driven exhibitions exploring environmental injustice, labor relations in the art world with a focus on gender and race, and the technological mediation of life. She teaches art history, contemporary cinema, and body studies at the University of Edinburgh.

Siim Preiman is an artist, teacher, critic, and curator at Tallinn Art Hall. His work as an author is characterized by environmental awareness and a desire to move towards a more equal society. Preiman holds a bachelor's degree in art history at the Estonian Academy of Arts, Tallinn, where he is currently pursuing his master's degree in contemporary art. His recent curatorial projects include Cloe Jancis' solo exhibition *Wishing Well* at Tallinn City Gallery (2022), the group exhibition *Pinefulness* at the Vana-Võromaa Cultural Centre (2022) and Tallinn City Gallery (2021), and *Wearing a Hundred Shirts* (2021) with Sten Ojavee at Tallinn Art Hall.

Simon Schneebiegl completed his studies in sociology, focusing on political sociology, media sociology, and quantitative methods, with a master's degree in 2018. Since then he has worked in market research as a research manager. At GIM | Gesellschaft für innovative Marktforschung in Heidelberg, he works in the quantitative field and conducts research on a wide range of topics.

Gaia Tedone is a curator and researcher with an expansive interest in the technologies and apparatuses of image formation. In 2019 she completed her PhD at the Centre for the Study of the Networked

Image, London South Bank University, with a practice-based study entitled "Curating the Networked Image: Circulation, Commodification, Computation" (2019). She writes, teaches, and curates around this topic. Tedone collaborates with several universities, research centers and art academies in Italy, Switzerland, and the UK, where she lectures on digital culture, post-critical museology, and multimedia languages. Currently she is head of the Visual Arts and Painting Department at LABA, Brescia, and works as an independent curator, including under the moniker ://ftp, a curatorial agency she started with Marialaura Ghidini in 2021.

Amanda Tristão Parra is a Brazilian cultural producer, archive producer, and arts and media researcher. She holds a bachelor's degree in the audiovisual field and has experience working on TV, film, and video productions and audiovisual archiving. Parra participated in the Beyond Matter project as a resident archive researcher within ZKM|Center for Art and Media Karlsruhe's *Iconoclash* archives as part of a case study developed for her masters in media arts cultures (Erasmus Mundus degree).

Annette Urban is professor of modern and contemporary art history with a focus on new media at the Institute of Art History at the Ruhr University Bochum (RUB). Since 2022, she is head of the sub-project Virtual Art within the Collaborative Research Center Virtual Environments (SFB 1567) coordinated at RUB. As of 2016 she is a member of the DFG Research Training Group 2132 Documentary Practices: Excess and Privation, likewise at RUB. Her research also focuses on site-relatedness in media art and digital (im)material labor in contemporary art. Recent texts include "Re-Building Virtuality: Lebensweltliche Mikrokosmen und die Referenzialisierung des 3D-Designs in der Gegenwartskunst" published in *Bildhafte Räume, begehbare Bilder. Virtuelle Architekturen interdisziplinär* (Brill/Fink 2022), edited by Kassandra Nakas and Philipp Reinfeld.

Marie Vicet completed her PhD with the study "Contemporary artists and music video, from the birth of MTV to the appearance of YouTube (1981–2005)" at the University Paris Nanterre in 2017. Her current research focuses on the exhibition *Les Immatériaux* (Centre Pompidou, 1985) and has been supported by the German Center for Art History (DFK Paris, 2019–20) and Les Amis du Centre Pompidou (2022). From 2020 to 2022, she was a temporary teaching and research assistant in the Visual Arts Department of the University of Picardie Jules Verne. For the project Beyond Matter and the 3D reconstruction of *Les Immatériaux*, she was a researcher in the New Media Department of the Musée National d'Art modern (MNAM).

Beatrice von Bismarck teaches art history, visual culture, and cultures of the curatorial at the Academy of Fine Arts (Hochschule für Grafik und Buchkunst) Leipzig. She has worked as a curator of the department of twentieth-century art at Städel Museum, Frankfurt am Main, was cofounder and codirector of the Kunstraum der Universität Lüneburg, initiated the Cultures of the Curatorial master's program at Leipzig, and codirected the itinerant TRANScuratorial Academy (Berlin, Mumbai, Phnom Penh 2017–18).

Recent publications include the edited book *Archives on Show. Revoicing, Shapeshifting, Displacing—A Curatorial Glossary* (Archive Books, 2022), *Broken Relations: Infrastructure, Aesthetics, and Critique*, 2022 (coedited with Martin Beck, Sabeth Buchmann, and Ilse Lafer, Spector Books, 2022), and the monograph *The Curatorial Condition* (Sternberg Press, 2022).

Kim West is a critic, researcher, and editor based in Stockholm. His research focuses on the contemporary development of critical aesthetic thought, the cultural history of popular avant-gardes, and the institutional and technical transformations of art's forms of mediation. His PhD thesis "The Exhibitionary Complex: Exhibition, Apparatus, and Media from Kulturhuset to the Centre Pompidou, 1963–1977" (Södertörn University, 2017) is available on monoskop. org. His recent publications include *Kritik av konstens frihet: en motrapport* (with Gustav Strandberg and Josefine Wikström, Hägarsten, 2022); the English-language version is forthcoming in the *Nordic Journal of Aesthetics* in fall 2023 as "Critique of the Freedom of Art: A Counter-Report"). West is a founding member of the independent multidisciplinary research group Agentur (agentur.ooo). He currently works at the Aesthetics Department at Södertörn University, where he codirects the research project Autonomy, Culture, Action: On Culture's Spheres of Political Action in the Neoliberal Welfare State (funded by Riksbankens Jubileumsfond, 2021–24).

Siegfried Zielinski is Michel Foucault professor of media archaeology and techno-culture at the European Graduate School, honorary doctor and professor of the Hungarian University of Fine Arts in Budapest, and guest professor at Tongji University of Shanghai. Previously he was chair of media theory at Berlin University of the Arts and director of the Vilém Flusser Archive (until 2016), founding rector (1994–2000) of the Academy of Media Arts Cologne, and rector of the Karlsruhe University of Arts and Design (HfG, 2016–18). Zielinski has published numerous books and essays, mainly focusing on the archaeology and variantology of the relations between art and media. His latest monograph is *Variations on Media Thinking* (University of Minnesota Press, 2019). In cooperation with Peter Weibel he curated several exhibitions at ZKM|Center for Art and Media Karlsruhe, such as *Without Firm Ground: Vilém Flusser and the Arts*, *Allah's Automata: Artifacts of the Arab Islamic Renaissance (800–1200)* (both 2015), *DIA–LOGOS: Ramon Llull and the ars combinatoria*, *Art in Motion: 100 Masterpieces with and through Media* (both 2018). Zielinski is member of the Academy of Arts in Berlin and the North-Rhine-Westphalian Academy of Sciences, Humanities, and the Arts.

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LINKED MATTER

Beyond Matter website
https://beyondmatter.eu

**Beyond Matter VIEW Platform –
online exhibitions**
https://beyondmatter.eu/projects

Generic Exhibition Platform
Les Immatériaux: A Virtual Exhibition
Iconoclash as A Digital Experience
Immerse! – Virtual Exhibition
Spatial Affairs – A Digital Twin (video documentation)
Spatial Affairs. Worlding – A tér világlása
(video documentation)
Tirana Floating Archive
Pandemonium by Ami Clarke
Fantastic Confabulations with the exhibitions
Call Signs by Jazmina Figueroa and *Drifting, Browsing, Cruising* by Theodoulos Polyviou,
and Eleni Diane Elias
Tirana Time Capsule #2 by Alex Walmsley

Matter. Non-Matter. Anti-Matter
https://beyondmatter.eu/antimatter
Online booklet of the exhibition (ZKM | Karlsruhe)

https://beyondmatter.eu/archived-matter
Online booklet of the exhibitions (further iterations, Archived Matter)

**Commissioned online and app-based artworks
for *Matter. Non-Matter Anti-Matter*
(ZKM | Karlsruhe)**
https://apps.apple.com/vn/app/perfect-museum/
id6447444488
Jeremy Bailey: *Perfect Museum*

https://play.google.com/store/apps/details?id=com.
NNT.NeverNotThere&pli=1
Damjanski: *Never Not There* Google Play Store

https://apps.apple.com/us/app/never-not-there/
id6444377047
Damjanski: *Never Not There* Apple App Store

https://lesemulateurs.beyondmatter.eu/
Geraldine Juarez: *Les émulatuers*

https://beyondmatter.eu/ar
AR Statue Dangling from a Crane

**Online exhibitions and artworks featured in *Matter.
Non-Matter. Anti-Matter* (ZKM|Karlsruhe):**
https://yehwansong.github.io/The-Next-Biennial-
Should-be/
The Next Biennial Should Be Curated by a Machine

https://distant.gallery/the-broken-timeline
The Broken Timeline at Distant Gallery

https://dimoda.art/
Dis/Location at DiMoDa

**Online and app-based project realized
throughout the Beyond Matter Residency
for *Matter. Non-Matter Anti-Matter* (Tirana Art Lab)**
https://play.google.com/store/apps/details?id=com.
Transmatter.art.PixelandBlood&pli=1
Olson Lamaj: *Pixel and Blood*

https://www.hbcbftw.com/
Valentina Peri: *Her Boyfriend Came Back From The War*

Further online projects
https://www.tiranafloatingtours.org/journeys
Tirana Floating Tours

**Video content produced throughout the
Beyond Matter project listed by partner organization**
https://vimeo.com/user146969821
Vimeo account of Beyond Matter:
online talks, series of interviews, panel discussions,
residency program presentations

**Publications released in the framework
of the Beyond Matter project**
http://hymex2021.ludwigmuseum.hu/
"HyMEx — Hybrid Museum Experience 2021"
symposium. Proceedings and video archive

https://www.hatjecantz.com/products/57821-
spatial-affairs
Spatial Affairs publication

https://apps.apple.com/id/app/spatial-affairs/
id1567035743
https://play.google.com/store/apps/details?id=com.
Transbookingxr.SpatialAffairs&hl=gsw&gl=US&pli=1
Spatial Affairs publication AR App

https://www.hatjecantz.com/products/64859-immerse
Immerse! publication

BEYOND MATTER. CULTURAL HERITAGE ON THE VERGE OF VIRTUAL REALITY
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Managing editor, project assistant: Marianne Schädler (ZKM│Hertz-Lab, ZKM│Publications)

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Digital manager: Sabine Jäger (ZKM│Video Studio)

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Art education and mediation: Janine Burger, Alexandra Hermann, Regine Frisch (ZKM│Museum Communication)

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Webinar series moderator: Barbara Kiolbassa (ZKM│Museum Communication)

Aalto University MA fellows: Jennifer Greb, Tim Moesgen, Mirka Sulander

Research fellows: Constança Babo, Esteban Gutiérrez-Jiménez, Amanda Tristão Parra, Natassa Philimonos

Technical project management: Thomas Schwab (ZKM│Museum and Exhibition Technical Services)

UI/UX design and motion design, *Iconoclash as a Digital Experience* and *Les Immatériaux: A Virtual Exhibition*: Matthias Heckel

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Software development for *Iconoclash as a Digital Experience* and *Les Immatériaux: A Virtual Exhibition*: Netzbewegung GmbH

Exhibition architecture for *Iconoclash as a Digital Experience*: Manfred Wolff-Plottegg

Scenographic advisors for *Iconoclash as a Digital Experience*: Nicolas Rauch, Mira Schröder

Audiodesign for *Iconoclash as a Digital Experience*: Nagy Ágoston

Archival team, *Iconoclash as a Digital Experience*: Proiti Seal Acharya, Jiaxuan Cai, Danica Detelic, Theo Ferreira Gomes, Moritz Konrad, Felix Mittelberger, Amanda Tristão Parra, Eva Scholl, Mirka Sulander, Aline Weber, Luka Zimmer, Masha Zolotova

Design, *The Immaterial Display*: Commonplace Studio

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Residency project *Call Signs*, digital consultant: Andrew Madden, David Kaskel

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Residency project *Pandemonium*, programming: Luke Weston

Special thanks to: Christiane Riedel

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Dean of the School of Arts, Design and Architecture: Thomas Auvinen

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Concept development and implementation of Performance Oriented Research (PORe) workshops: Lily Díaz-Kommonen, Cvijeta Miljak

Concept design, *Les Immatériaux: A Virtual Exhibition*: Aalto University, Espoo, Finland

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Coordinator Aalto MA Fellowship Program: Cvijeta Miljak

Administration: Hanna Karkku

Financial controllers: Elena Igonen, Esther Saraste

Musée National d'Art Moderne, Centre Pompidou, Paris, France

President: Laurent Le Bon, Serge Lasvignes (until July 2021)

Director of Musée National d'Art Moderne/Centre de création industrielle: Xavier Rey, Bernard Blistène (until December 2021)

Project coordinator: Julie Champion Lagadec

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Concept, *Les Immatériaux: A Virtual Exhibition:* Philippe Bettinelli, Julie Champion Lagadec, Marcella Lista

Intern: Rossella Cillani

**Archival research*, Les Immatériaux:
A Virtual Exhibition*:** Andreas Broeckmann,
Marie Vicet

**3D modeling, *Les Immatériaux:
A Virtual Exhibition*:** Jean-Philippe Bonilli,
Jean Charlier, Sonia Descamps,
Mica Gherghescu, Arnold Jeanville,
Nicolas Liucci-Goutnikov, Laetitia Poissonnier,
Sylvain Wolf

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Pierre Von-Ow

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Museum of Contemporary Art, Budapest,
Hungary**

Director: Júlia Fabényi

Project coordinators: Jan Elantkowski,
Fruzsina Feigl, Borbála Kálmán, József
Készman

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Nolasco-Rózsás

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Feigl, Jan Elantkowski

Registrar, *Spatial Affairs*: Soma Bradák,
Viktória Mátyás, László Molnár

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Szmolka, Dessin Design

Technical staff, *Spatial Affairs*: Béla Bodor,
Béla Benjamin Bodor Jr., Zoltán Ináncsi,
Ernő Porubszki, György Takács, Márton Walch,
Albert Zelena

**Design and programming, guided tour
software, *Spatial Affairs. Worlding*:**
The Rodina (Tereza and Vit Ruller)

**Soundscape, *Spatial Affairs. Worlding –
Á ter világlasa*:** Enrico Boccioletti

**Concept and project management,
"HyMEx – Hybrid Museum Experience 2021"
symposium:** Borbála Kálmán

Aalto University MA fellows: Selina Oakes,
Pekko Vasantola

Tallinn Art Hall, Estonia

Director: Paul Aguraiuja, Taaniel Raudsepp
(until May 2020)

Project coordinators: Karolin Nummert,
Hanna-Antheia Stern

**Curator Beyond Matter, residency program
and *Immerse!*:** Corina L. Apostol

Graphic design, *Immerse!*: Henri Kutsar

Exhibition design, *Immerse!*: Päär-Joonap
Keedus, Valge Kuup

Technical team, *Immerse!*: Johan Huimerind,
Henri Piiroja, Keiu Maasik

**Tirana Art Lab –
Center for Contemporary Art, Albania**

**Executive director, curator and project
coordination:** Adela Demetja

**Project assistants, assistant curators,
Matter. Non-Matter. Anti-Matter:** Jiří Gruber

**Graphic design, *Matter. Non-Matter.
Anti-Matter*:** Paul Voggenreiter

**Content manager and curator,
Tirana Floating Archive:** Eni Derhemi

Design, *Tirana Floating Archive*: Denislav
Golemanov

**Project assistants, assistant curators,
Tirana Floating Tours:** Erida Bendo,
Eni Derhemi, Redina Qose

Design, *Tirana Floating Tours*: Studio Parallel
Tirana

**Software development, *Tirana Floating
Archive, Tirana Floating Tours*:** Marin Nikolli

Aalto University MA fellow: Lisa Rein

Associated Partners

EPFL Pavilions, Lausanne, Switzerland

Director: Sarah Kenderdine
Project coordinator: Giulia Bini

GIM Gesellschaft für Innovative Marktforschung mbH, Heidelberg, Germany

Evaluation of the exhibition: Sebastian Klein (Senior research director & consultant) Krischan Ditsch, Simon Schneebiegl (research associates)

HAWK University of Applied Sciences and Arts Hildesheim/Holzminden/Göttingen, Germany

Project coordinators: Sabine Foraita, Christian Mahler, Patrick Pütz, Stephan Schwingeler, Stefan Wölwer

Bio Design Lab at the Karlsruhe University of Arts and Design (HfG Karlsruhe), Germany

Head of project: Julia Ihls
Project associate: Anthea Oestreicher
Product design advisor: Freia Achenbach
Scientific advisor: Lioudmila Voropai

This book is published on the occasion of the research project
Beyond Matter. Cultural Heritage on the Verge of Virtual Reality

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Beyond Matter. Cultural Heritage on the Verge
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Exhibitions are sites of knowledge production and exchange, and their spatial qualities are central to contextualizing the information harbored within the artworks they present. In virtual emulations of exhibitions, immersion is not bound to geographical location but to the interplay between materiality and representation. Bringing together partners from around and beyond Europe, the research project Beyond Matter (2019–23) aimed to make sense of the interdependence between physical and virtual and to decipher the impact of that interdependence on the spatial aspects of producing, curating, and mediating art. In exploring the so-called virtual condition, the project proposed new modes for preserving cultural heritage while probing the potentials of digital world-making.

This publication, *Beyond Matter, Within Space. Curatorial and Art Mediation Techniques on the Verge of Virtual Reality*, offers a comprehensive overview of the multifaceted research activities conducted by the Beyond Matter partners and takes a deeper look at the enfoldments of virtual reality. In interviews, scholarly essays, and other texts, the authors document the project outcomes and expand on its theoretical foundations.