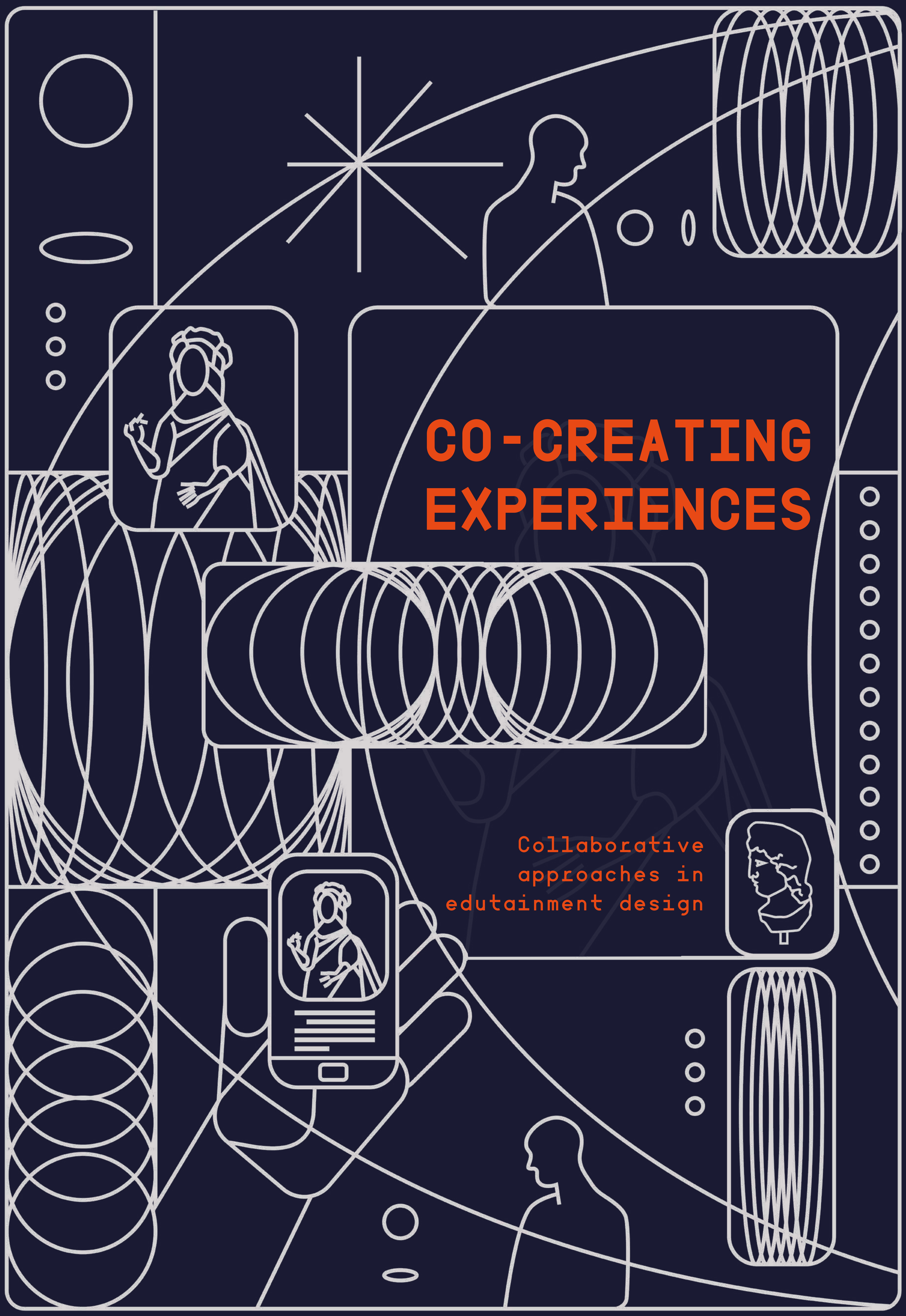


CO-CREATING EXPERIENCES

Collaborative approaches in edutainment design

Authors

Izabela Derda
Erasmus University

Pedro Russo
Leiden University

Zoi Popoli
Erasmus University

Tom Feustel
Erasmus University

Industry Partners

Jan Pomierny
Science Now

Lukasz Alwast
Science Now

Editor

Simon Ings

Designer

Amal Al-Shahari

This report was supported by the Netherlands Organisation for Scientific Research under grant KI.18.044.

Table of Contents

Introduction

Recent developments in artificial intelligence, user engagement, and data utilization in edutainment have led to changes in creative and production processes and opened new spaces for redefining roles between consumers and producers. Museums and other edutainment spaces worldwide experiment with shifting from static, object-driven, hierarchical and sequential exhibitions towards the explorative, audience- and story-driven experiences. Consumer engagement and data- & AI-enhanced tools are being used in creative industries for film, TV, gaming, advertising and interactive exhibition design, but this is still a niche. They are also designed and implemented by a very limited number of studios and agencies. Also, the number of strategic research programs focusing on creative processes around these developments is scarce.

This white paper, *CO-CREATING EXPERIENCES: Collaborative approaches in edutainment design*, finds its roots in the Smartification of audience experience research project - a field study aimed at understanding the shift in design and implementation approaches the in creative industry around co-designing and implementing consumer data- and AI- enhanced experiences. It encourages a change towards co-production involving multidisciplinary teams and an active co-creation of experiences by visitors interacting with their environment. The White paper differentiates aware from unaware co-creation and looks into the ethical considerations around the latter, in which user data is harnessed to guide, enrich, and even to produce the materials in an exhibition.

CO-CREATING EXPERIENCES: Collaborative approaches in edutainment design furthers our understanding of the implications of the above for value creation and creative industries in creative and production processes and its commercialisation potential.

Introduction: New ways of showing

Introduction: New ways of showing

Informative experiences directed at the public and organised around material objects have traditionally presented their content in an encyclopaedic manner[1]. From many users comes a common complaint: that their participation is limited exclusively to observation[2]. This not only makes for a thin and potentially dull experience; it also severely limits the ability of users to engage, discover and, indeed, to learn.

For a number of decades, museums have been challenged to rethink their relationships with visitors: from the New Museology, highlighting the social role of museums in the late 1980s, through a growing focus on engagement, outreach and representation, to the concept of participation popularized in the early 2000s.

Changing tastes and demographics are fuelling a shift from static, object driven, hierarchical and sequential exhibitions towards explorative, audience- and story-driven experiences.

New design approaches are encouraging a shift from exhibitions understood as collections of tangible objects curated for structured exploration, to the active co-creation and co-production of experiences by visitors interacting with their environment[3].

Most galleries and museums are already host to ubiquitous computing, most visibly in the form of smartphones and tablets. At the same time, applications that harness immersion, augmentation of reality, and gamification are emerging to exploit, enrich and extend the gallery and museum space. These applications tie the digital environment ever more seamlessly to physical space, through location-mapping and other location-related systems. Augmented Reality, Virtual Reality, embedded computing, and gesture control are just some of the approaches that enable rich interactions within the hybrid physical space of a museum.

When curators take advantage of the new means available in exhibition design, which enhance interactivity, convey meaning, and tell stories, they can create exhibitions with greater impact[4].

Strategic research programs focusing on the creative processes of exhibition-making are few to begin with; there are very few studies into how new media technologies may be harnessed to better enable visitors to co-create their own experiences.

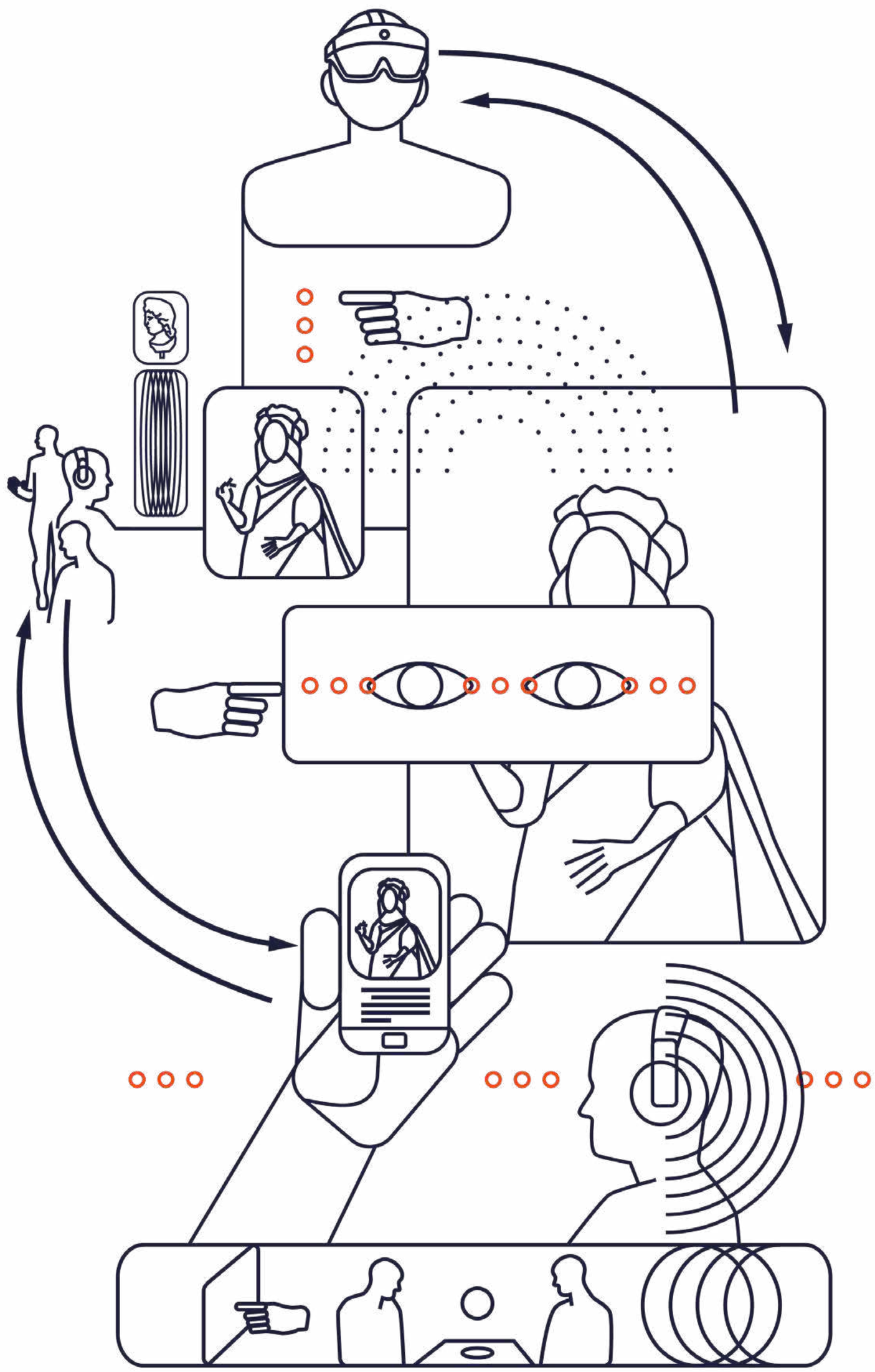
[1] Wang, Q., & Lei, Y. (2016). Minds on for the Wise: Rethinking the Contemporary Interactive Exhibition. *Museum Management and Curatorship* 31(4): 331–348. doi:10.1080/09647775.2016.1173575.

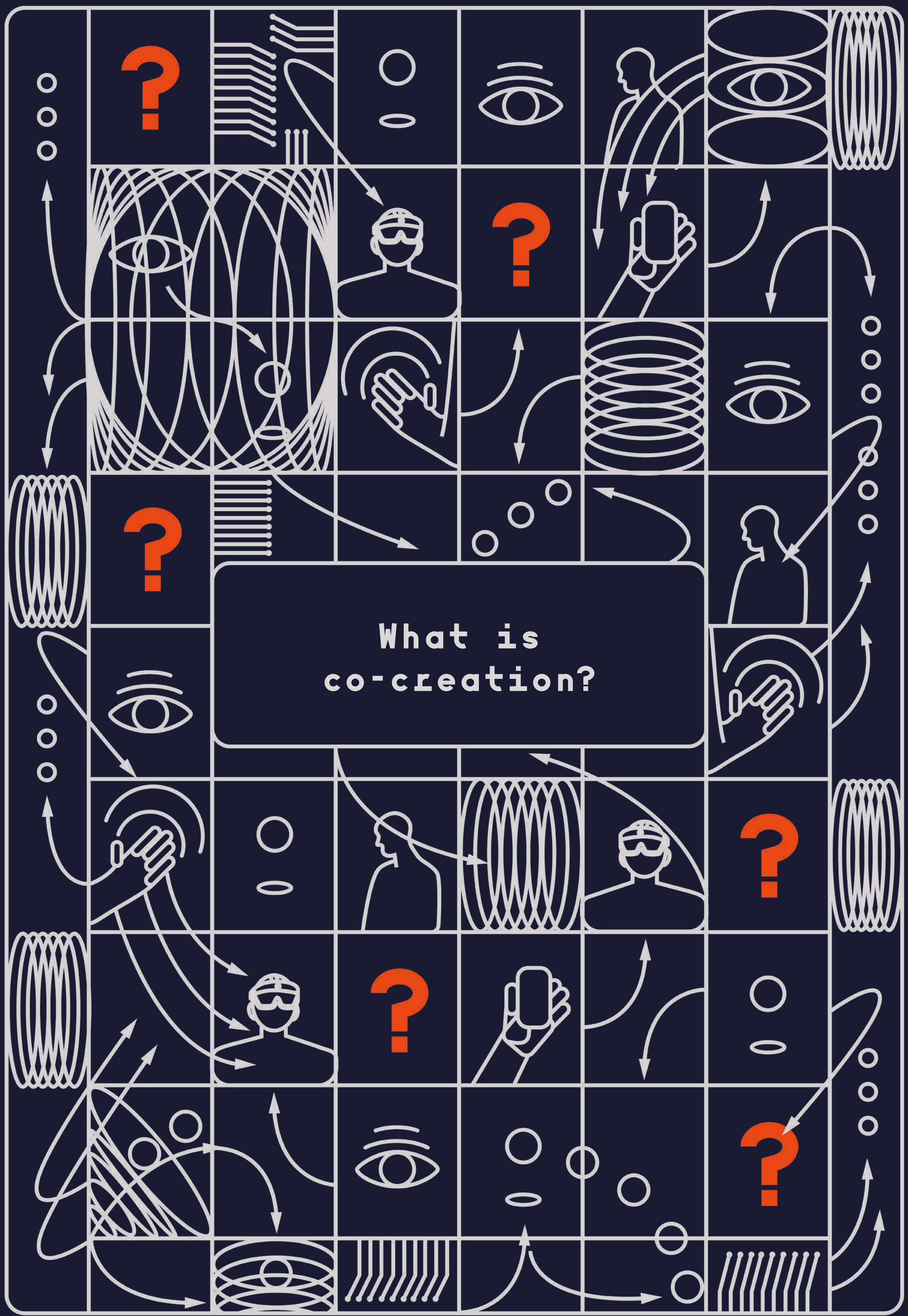
[2] Carrozzino, M., & Bergamasco, M. (2010). Beyond Virtual Museums: Experiencing Immersive Virtual Reality in Real Museums. *Journal of Cultural Heritage 11*(4): 452–458. doi:10.1016/j.culher.2010.04.001.

[3] Irace, F., & Ciagà, G. L. (2013). *Design & Cultural Heritage*. Milano: Electa.

[4] Read more: Popoli, Z. & Derda, I. (2021. Developing experiences: creative process behind the design and production of immersive exhibitions, *Museum Management and Curatorship*, doi: 10.1080/09647775.2021.1909491

This paper explores the role of co-creation in the gallery and museum, drawing on the practices involved when exhibition-makers bring new media technology to bear on visitor engagement, participation and (especially) co-creation. We investigate how the visitor's data may help to improve and personalise their experience and increase their satisfaction, and how it reshapes the design process of such experience. At the same time, we recognise the ethical considerations around "unaware" co-creation, in which user data is harnessed to guide, enrich, and even to produce the materials in an exhibition. Since, in our mobile and data-rich environment, much potential visitor data is generated unconsciously and often inadvertently, using this data raises questions around civics, privacy and agency.





What is co-creation?

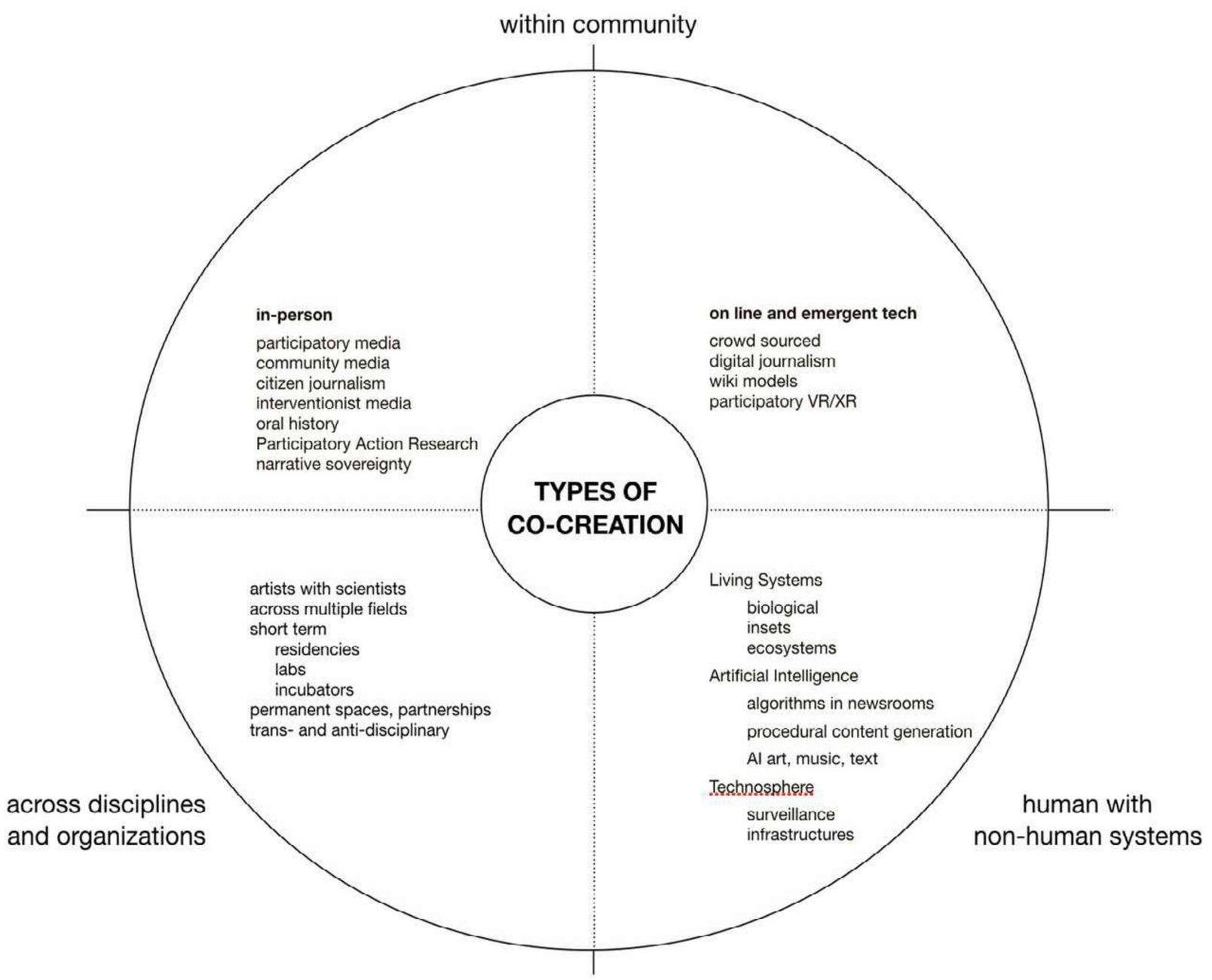
What is co-creation?

In 2019, a field study by the Co-Creation Studio[5] at MIT Open Documentary Lab produced what, for our purposes, is an excellent workable definition of media co-creation. "Co-creation," the authors wrote, "offers alternatives to a single-author vision, and involves a constellation of media production methods, frameworks, and feedback systems. In co-creation, projects emerge from a process, and evolve from within communities and with people, rather than for or about them"[6].

Katerina Cizek, William Uricchio and their co-authors went on to argue that the concept of co-creation reframes the ethics of who creates, how, and why. According to the MIT definition, co-creation extends across and beyond disciplines and organizations, and can involve non-human or beyond-human systems.

Traditional approaches to co-creation consider IN-PERSON CO-CREATION WITHIN COMMUNITIES, while recognising the enhanced transformative potential of TRANS-DISCIPLINARY AND TRANS-SECTIONAL CO-CREATION ACROSS COMMUNITIES.

Graphic 1
Types of co-creation



source The Co-Creation Studio, MIT Open Documentary Lab, https://cocreationstudio.mit.edu/

5 The Co-Creation Studio, MIT Open Documentary Lab, https://cocreationstudio.mit.edu/

6 Cizek, K. & Uricchio, W. (2019). Introduction and Overview. In *Collective Wisdom* (1st ed.). Doi: 10.21428/ba67f642.f7c1b7e5

7 Uricchio cites the Chicago podcast Curious City as a good example of public engagement in the research and editorial process: https://www.npr.org/podcasts/401317007/curious-city

Co-creation is about changing the notion of what constitutes leadership
—William Charles Uricchio

PANEL THOUGHTS

Co-Creating Experiences: Panel Discussion

On Tuesday 18 May 2021 a panel convened to discuss the issues raised in this paper at an on-line event prefaced by a keynote contribution by Professor William Uricchio, founder and principal investigator of the MIT Open Documentary Lab and a professor of Comparative Media History at Utrecht University.

The affordances and drawbacks of co-creative working were discussed across a wide range of use-cases, from exhibition-making to municipal policy. Insights from the panel appear in boxed text at intervals throughout this paper.

In his keynote presentation, **William Charles Uricchio** described the shift he sees happening across sectors: in architecture, urban planning and urban design; in the social sciences, with the advent of participatory action research; also within journalism and documentary-making .

"Co-creation" Uricchio said, "is not a thing. It's a spectrum of practices, some of which lean towards the expertise of the maker, some of which lean towards the knowledge and demands of the community. It's not about the end of expertise, and certainly with institutions like museums, where some people do have more expertise than others, and some people are there precisely to gain more knowledge and insight, we can't pretend that everyone is in the same boat."

In these cases, co-creation "is about changing the notion of what constitutes leadership. Ideas of what constitutes leadership are very much up for grabs now." Co-creation is a dialogic process in which listening is a crucial component.

Co-creation is fundamentally process-driven: ideas spring from relationships, rather than from a single author, and outcomes are plural — a fact which, Uricchio observed, "really flies in the face of our testing methodologies"[8].

Co-creation emerges out of process, and from within communities, rather than being for them or about them.

"This is not an either-or situation — either a 'free-for-all' or the dictatorship of the expert", Uricchio explained. Rather, Co-creation involves complementarity and inclusivity at all points in the production pipeline, re-positioning the "people who used to be seen as audiences – the passive subjects of expertise" as creative partners.

Co-creation ethically reframes who creates, how, and why.
Uricchio pointed out that while the work of his MIT team has been North America-centric, the issues they addressed, while specific, were not unique: co-creation methodologies afford cultures with marginalisation issues a way round institutional barriers to inclusion.

[8] Cizek, K. & Uricchio, W. Collective Wisdom: *Co-Creating Media within Communities, across Disciplines, and with Algorithms* https://wip.mitpress.mit.edu/collectivewisdom

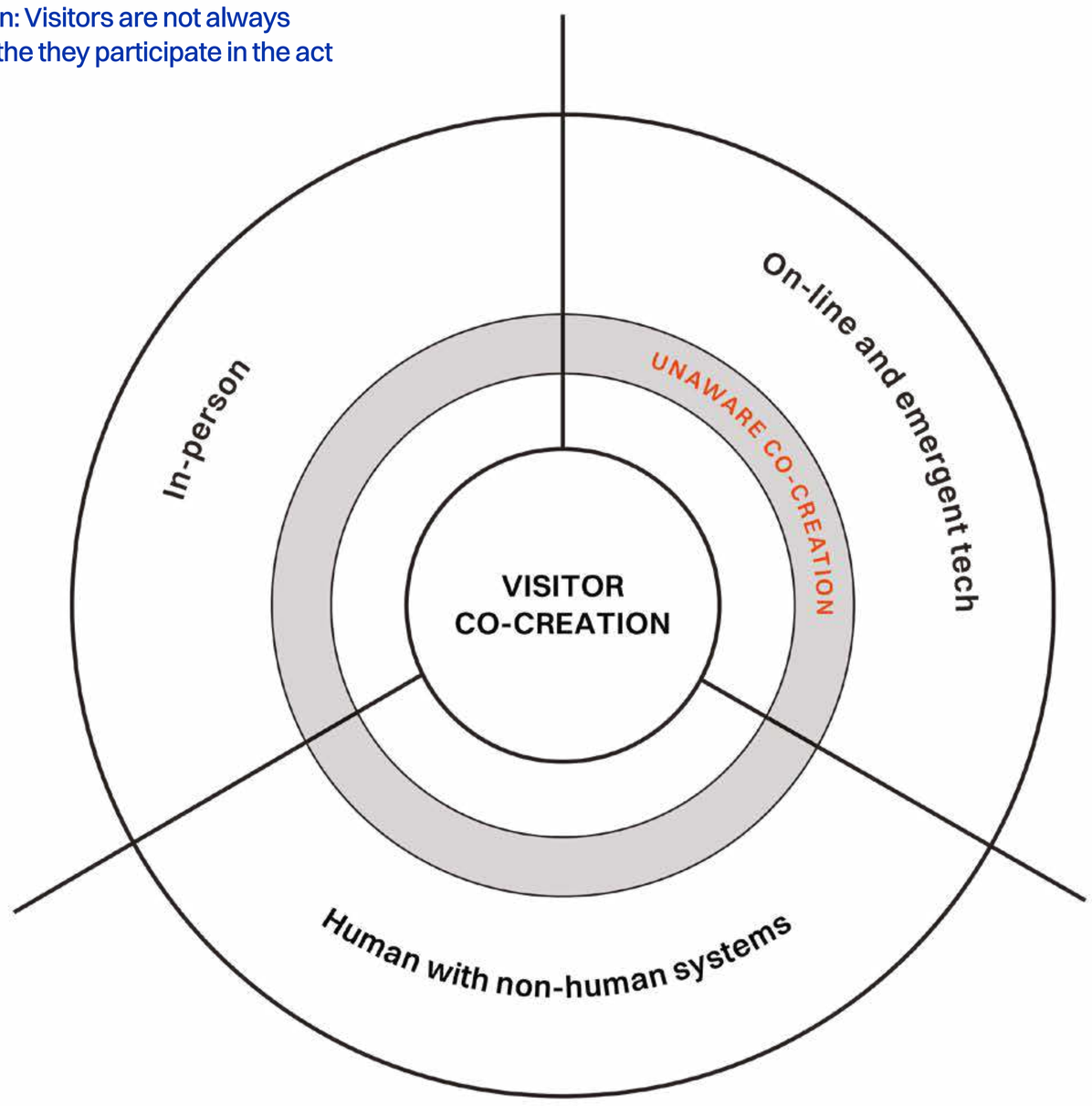
While promising an even more radical extension of the idea, CO-CREATION ON-LINE AND WITH EMERGENT MEDIA raises, pressing questions around access and inclusion. (We may note, for instance, how easily algorithmic systems can reproduce and even exacerbate existing exclusionary social structures.)

Of course, these problems should be considered a challenge, not a prohibition: CO-CREATION BETWEEN HUMANS AND NON-HUMAN SYSTEMS has the potential to reform, reimagine and recontextualise the relationship between individuals, society and data. In engaging with non-human systems including databases, archives, data visualisations and machine perceptions, users are given the tools to conceptualise their being, actions and identities at different scales. Even the most wicked problems (anthropogenic climate change, for example) become comprehensible at human scale. Equally, the political and social dimensions of even the most normative personal action (for example, on-line shopping) can now be understood in a global political context. Experiences that exploit such capacities guide their users beyond an appreciation of objects and phenomena, towards an understanding and an imaginative grasp of connections and networks .

In discussing forms of co-creation— we believe another dimension must be added to our discussion. In some of these instances of co-creation, the human participants will be **aware of the co-creation** process into which they have been recruited. In other cases, however, the participants **are unaware** that their data — generated unconsciously, or inadvertently — are being used to co-create their experiences.

Graphic 2

Visitor co-creation: Visitors are not always aware of the fact the they participate in the act of co-creation



source Graphic from the authors

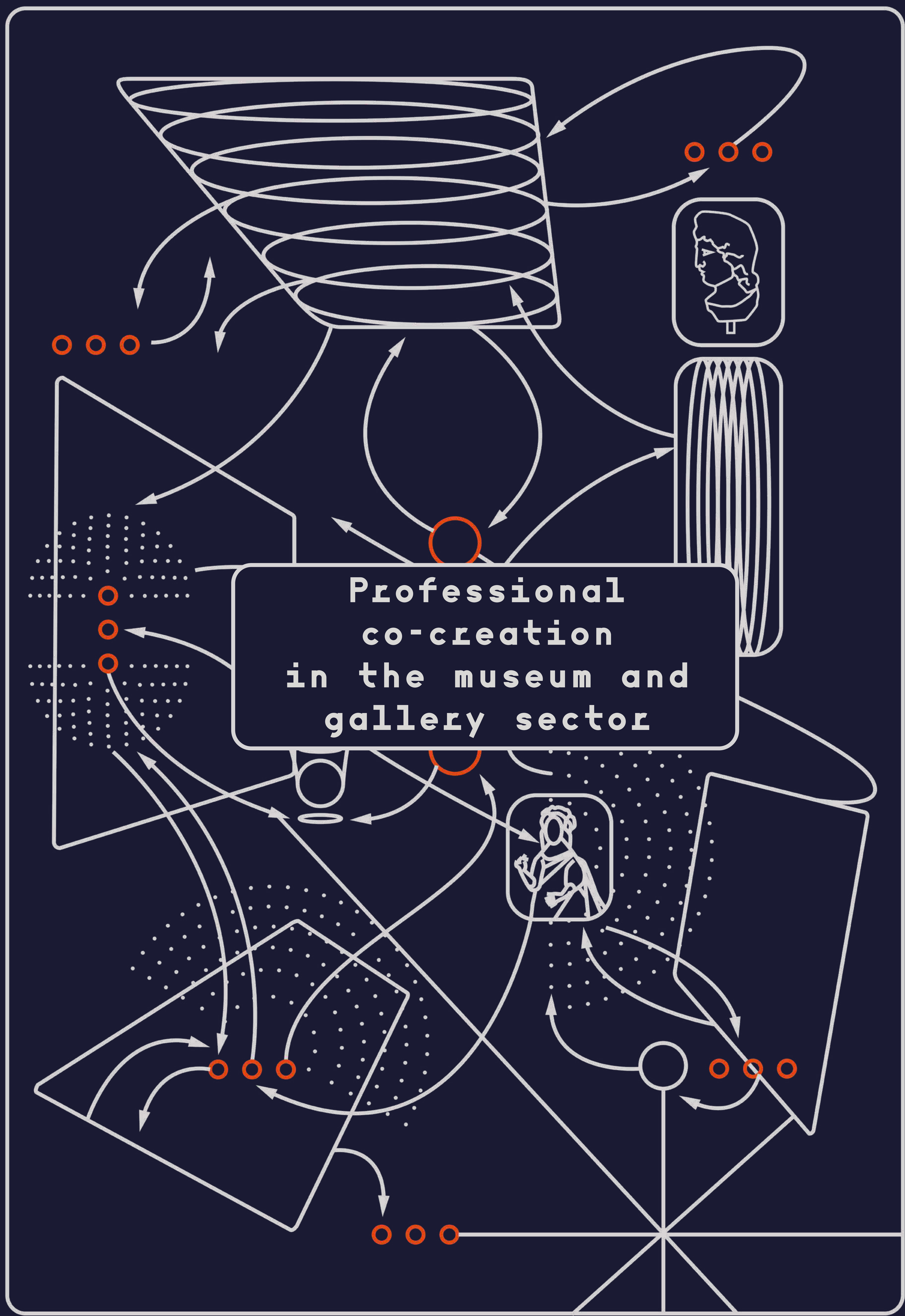
In this latter case, we need to establish, with some urgency, whether this data belongs to the data source, or to the data harvester. We need to know how fluid and contingent the answers to this question can be. What room for manoeuvre is there, as we design such experiences? Ultimately, we need a clear answer to the question: can there even be such a thing as unaware co-creation? Or is the term “unaware co-creation” simply a politer word for exploitation?

This is a point to which we return later in the paper.

In the context of museums, art galleries and other edutainment spaces, discussions of aware or unaware co-creation become particularly acute, as art and objects are not simply seen; they are also enacted. Museums and galleries provide a context in which the value, significance, and narrative of objects become readable to a participating public in certain (presumably productive) ways. This is why visitor data is already used to inform museum and gallery design.

Attendant questions around accessibility, trivialisation, marginalisation and factfulness are not new, either. But as media technology makes it possible for museums and art galleries to enter a richer dialogue with users, and even shape their experiences in real time, these same questions acquire a new urgency, and may need to be recast to encompass new technological possibilities.

For example, if we visit a gallery together, and my visit diverges markedly from yours, who and what generated those differences, to what end, and by what authority? How do museums and galleries embrace diversity, without inducing the sort of mass solipsism in which no individual experience speaks to any other?



Professional co-creation in the museum and gallery sector

Professional co-creation in the museum and gallery sector[9]

Aware co-creation in this sector falls easily into two categories, at least for the purposes of formal discussion. There are the co-creative strategies adopted across disciplines and organisations; and there are opportunities for co-creation between experience designers and their public.

The field of professional co-creation is well-developed in the museum and gallery sector. The very business of staging an exhibition typically involves the collaboration of multidisciplinary design teams. Long before the emergence of digital media, institutions engaged in sophisticated participatory research and innovative experiments in audience involvement.

Nonetheless, the storytelling of contemporary, media-rich (immersive) exhibitions is qualitatively different from the exhibition of tangible objects curated for structured exploration.

Looking at these changes through the lens of co-creation reveals and clarifies these changes.

Museums have always worked collaboratively, working together with artists to co-create exhibitions of their work or collaborating with other museums and lenders of artworks. However, exhibition design is becoming an increasingly collaborative process, bringing together creative individuals from different disciplines and backgrounds.

Museums need the cooperation of multiple collaborators to bring an immersive exhibition to life. Incorporating external collaborators so early in the creative process marks a shift in the exhibition production process.

> **Your first task is to interpret the brief from the institution. Very often the teams who are writing the brief don't have our experience or language or framework and the brief is littered with hype words and hype elements that are not based in reality.**
>
> **—Jan Pomierny & Łukasz Alwast (Science Now)**

Specialists from different disciplines become part of the museum team during the various stages of the creative process — a process difficult to describe as a straightforward series of steps.

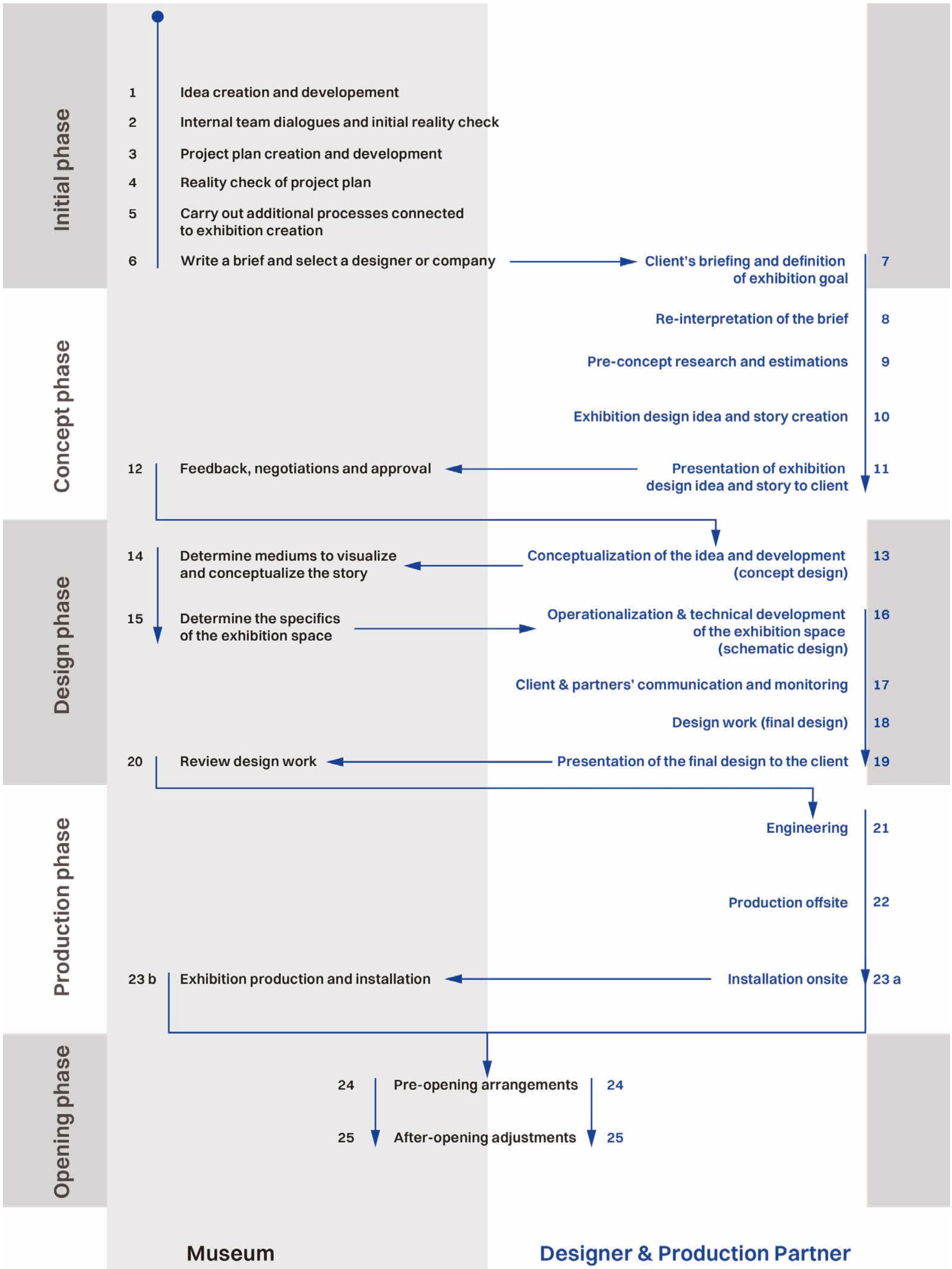
Studio Louter's work with the Mauritshaus[10] in the Hague in 2019 offers a particularly rich example of this process. For "Shifting Image - In Search of Johan Maurits", artefacts were assembled, texts solicited and projection walls designed to explore the role the museum's 17th-century founder Johan Maurits played in Dutch Brazil: a wealth of facts and perspectives that challenges visitors to form their own views regarding the institution's relationship with its founder.

9 Read more: Popoli, Z. & Derda, I. (2021). Developing experiences: creative process behind the design and production of immersive exhibitions, *Museum Management and Curatorship*, doi: 10.1080/09647775.2021.1909491

10 Studio Louter (2019). *Changing perspectives*. https://www.studiolouter.nl/en/mauritshuis-shifting-image-in-search-of-johan-maurits

Graphic 3

Professional co-creation in the museum and gallery sector



source

Popoli, Z., &. Derda, I. (2021). Developing experiences: creative process behind the design and production of immersive exhibitions, *Museum Management and Curatorship*, doi: 10.1080/09647775.2021.1909491

Graphic 4

Exhibition “Shifting Image - In Search of Johan Maurits”, Mauritshuis, The Hague; Exhibition Content Design: Studio Louter

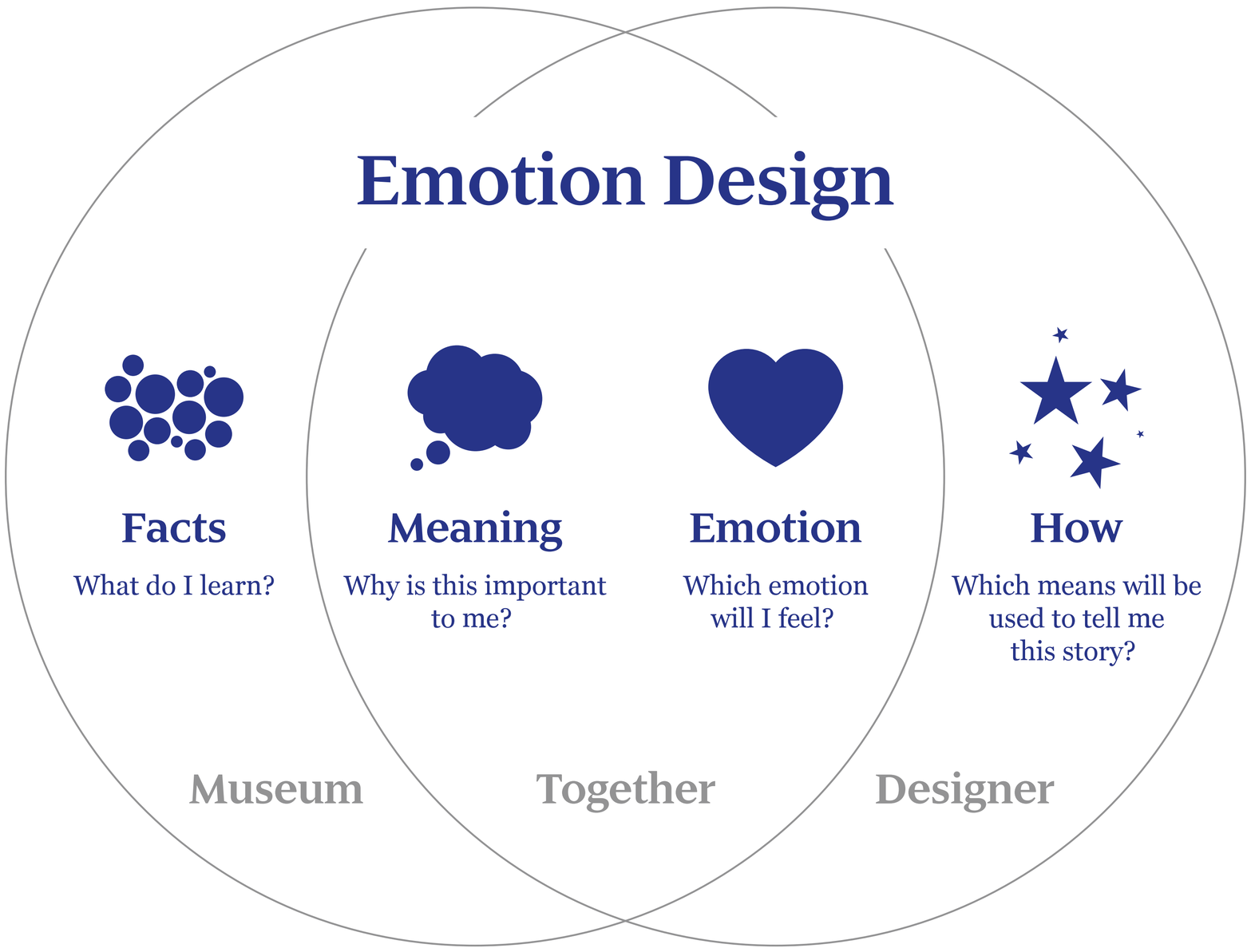
A successful exhibition is the result of a balanced collaboration between curators and designers, in which an open flow of feedback and communication exists in all design and production phases. The museum team remains, however, the client whom the design and production partners have to please.
The museum team preserves control of the creative process, since they are the ones who decide if the outcome of each phase satisfies them enough to give their approval and continue with the next design and production phase.

source

Johan Maurits and the Mauritshuis,
https://www.mauritshuis.nl/en/discover/exhibitions/johan-maurits/
Studio Louter (2019). Changing perspectives.
https://www.studiolouter.nl/en/mauritshuis-shifting-image-in-search-of-johan-maurits

Graphic 5

Emotion Design - Studio Louter's approach to content design for museums. The method serves as a compass that guides studio's multidisciplinary design team in the creation of concepts and content. It starts with identifying the "heart" of the story and enables the team to make rational decisions about how to transmit the story in a coherent, meaningful, emotionally affecting way.



source Studio Louter. Emotion Design. https://www.studiolouter.nl/en/emotion-design

> **I hate black screens. A black screen makes visitors feel that they have missed out on something. There was something to see over there, and you missed it! So multimedia asks a lot of an institution, whose people aren't necessarily the most digital people in the world. You have to be very dedicated. You need a team that makes sure that everything is turned on in the right way and works the right way. If something isn't working, you have to solve it immediately. You need a backup team. You have to be spot on"**
>
> **—Hedwig Wösten (Mauritshuis)**

It is noteworthy that the proliferation of different roles required by exhibition design and production has been filled by external collaborators, while the core museum team has not expanded.


Aware visitor
co-creation

Co-creating experiences with an aware public

Visitors can be co-creators in two ways: either by actively participating (mentally or physically), or by interacting with the environment, other visitors, and museum staff.

Active participation requires visitors to develop and shape their own experiences physically, emotionally, and either as planned by the museum or spontaneously. (Given the playful nature of this process, we are not surprised to find that the first examples of co-creation were directed with children and families in mind.). Some innovative exhibitions go so far as to assemble themselves from objects delivered by their audiences — for example, the exhibition "Your Stories" at the National Museum of Serbia, an experience that introduces personal objects into museum spaces[11].

This approach elevates the role of users from mere spectators to active actors and explorers, as can be seen in the following examples. The Dutch "Temporary Museum", a 2017 exhibition of objects created and curated together with refugees, interrogates the role and status of the "visitor"[12]. 'What a Genderful World', a temporary exhibition running in 2021 in Amsterdam's Tropenmuseum, uses various media installations to challenge visitors with regard to how they think about and look at gender[13].

Van Der Putten brings an example of a behavioural object installation by Nicole de Groot, Joost Mollen & Max Peeperkorn.

"Hello World" (2019) is a colony of freedom-loving, cube-shaped robots that want to explore the world, but cannot exist without each other. "At their own accord, the box creatures start moving in unknown directions, uninterested in the presence or motivations of humans. Regardless, visitors project different behaviors on the movement of the cardboard bots". (http://joostmollen.com/index.php/robotics/hello-world/)

PANEL THOUGHTS

CO-CREATION AS KNOWLEDGE PRODUCTION

In the panel discussion, **Pepijn Wilbers**, owner and creative partner at Studio Louter, and **Hedwig Wösten**, manager of exhibitions and projects at Mauritshuis, Den Haag, Netherlands provided valuable political context for their co-creation of the exhibition "Shifting Image - In Search of Johan Maurits", discussed in this paper. The exhibition harnessed the circular design architectures of co-creation to open up its research practices to public scrutiny. The reputation and standing of the institution's founder — earlier the subject of a heated Twitter storm — emerged from archival and interpretative work that was itself a key element of the exhibition.

Indeed, "Shifting Image" neatly demonstrated a point raised in the panel discussion by **Peter van der Putten**, Assistant Professor at the Leiden Institute of Advanced Computer Science (LIACS): ideally, co-creative endeavours develop out of the process of bricolage or "tinkering". In this form of working, knowledge of a system emerges primarily from practice and experiment. Van der Putten noted how this form of working demands a holistic perspective:

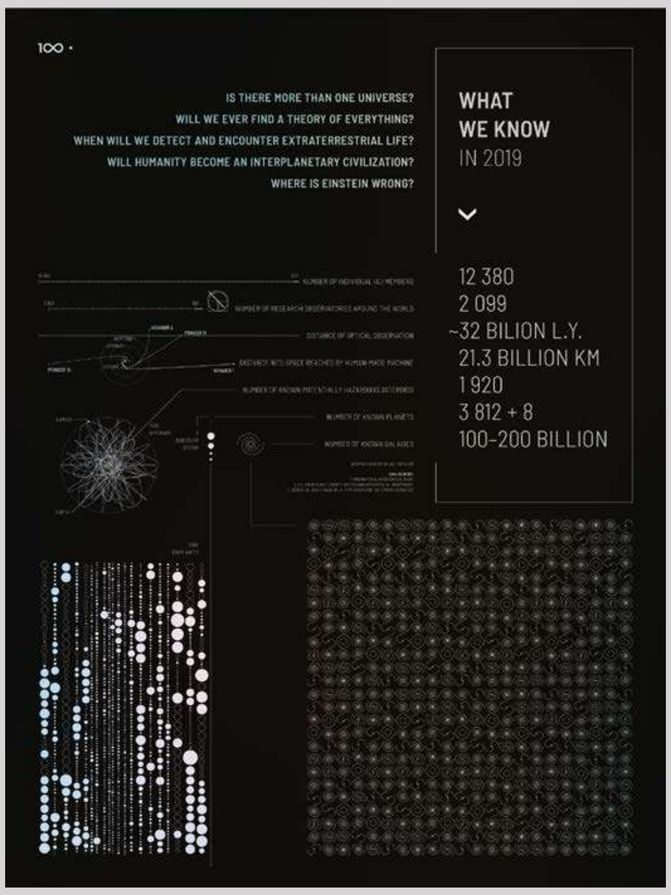
> "When people think about interactive installations, they think about the installation being interactive. But an interactive installation is something that causes an audience to interact. We should really focus, not on the installation itself, but on what kind of interaction is being generated in the audience."

[11] National Museum of Serbia. *Your Stories*. http://www.narodnimuzej.rs/tvojeprice/

[12] Tijdelijk Museum (2017). https://www.tijdelijkmuseum.org/about/

[13] Studio Louter (2019). *Thinking outside the box*. https://www.studiolouter.nl/en/tropenmuseum-what-a-genderful-world

[14] Read more about Above and Beyond: https://www.capjournal.org/issues/28/28_05.pdf



Graphics from open source package:
http://100exhibit.iau.org/

ABOVE AND BEYOND: AN OPEN-SOURCE APPROACH TO EXPERIENCE CO-CREATION

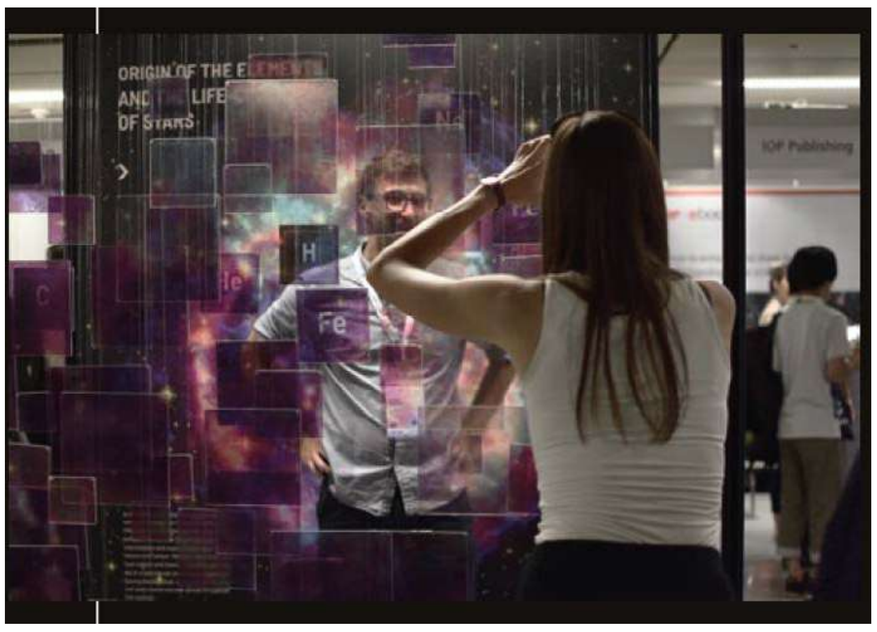
Launched in 2018, "Above and Beyond — Making Sense of the Universe for 100 Years"[14] was an exhibition providing a journey through a century of astronomical research, built around three distinctive installations: the origin of elements, the Moon landing, and the Hubble UltraDeep Field.

All exhibition content and designs have been available under an open source license for adaptation and reuse.

Anyone can reproduce the full-scale show. There is also a scaled-down, low-cost version, its content adapted into 100 posters for easy reproduction. Exhibitions based on these materials (often translated) were replicated through the International Astronomical Union network and national astronomical societies, bringing the show to Algeria, Aruba, Bulgaria, Canada, India, Japan, Spain, Tunisia and Uruguay.

Hosts were encouraged to procure locally relevant objects; the Leiden exhibition, for example featured an early 20th-century calculator and the prototype of a space observatory. The source code for 3D-printed models of astronomical objects has been made available; Lego constructions offer a low-cost alternative where such printing facilities are not available.

Creating an open-source, multi-venue exhibition of such flexibility has led the organisers to reconsider the nature of artefacts appropriate for such ventures. The storytelling opportunities afforded by social media, though still requiring substantial production effort, may power dynamic developments in the low-cost open-source exhibition sector.



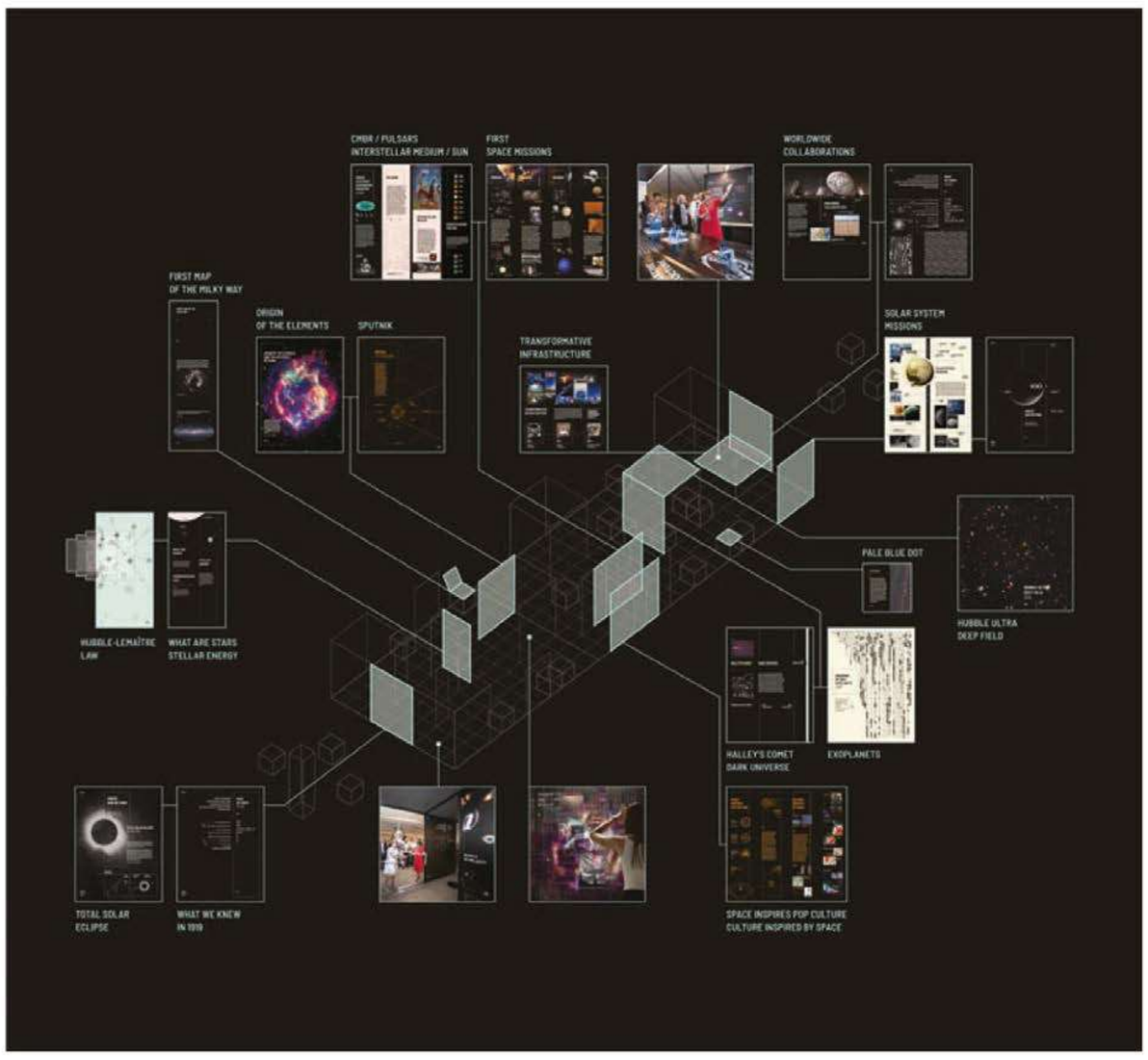


Figure 4. *The grid structure and story framework translated into the ensuing construction solution. Credit: Science Now*

New media and co-creation

In 2016, Cleveland Museum of Art teamed with digital interactive studio ArtLens to create a gallery space filled with artworks generated in real time by its visitors[15]. Screens and other devices enabled the creation of virtual painting and pottery, and the creation of collages made up of digital fragments of artworks found in the gallery.

Such direct, headline uses of new media, should not, however, distract us from all simpler and more straightforward ways these media can involve audiences in co-creation. Social media streams offer museum collections extended exposure through shared images, audio and video files. They can be explored further using additional channels, such as virtual reconstructions and on-site gaming scenarios.

Mobile applications are offered by 35 per cent of museums, while 34 per cent plan to offer such a service[16]. These applications open up a more active conversation between visitors and the museum space. By integrating the various aspects of the museum experience in an ongoing narrative experience, a personalized story can be constructed, combining interactions inside the museum with interactions before and after the visit. Artefacts, historical figures, buildings and events become the characters of a storytelling experience that unfolds in the form of a dialogue between visitors and the museum.

> **If people leave the exhibition and then they want to follow up on something or it inspires them to some behaviour or attitude, I think that's the principle which is worth pursuing.**
>
> **—Jan Pomierny & Łukasz Alwast (Science Now)**

Digital culture in museums has grown along with the transformation of the notion of cultural accessibility, to the point that a virtual museum experience may be a highly inclusive alternative to a more traditional visit. Indeed, the two forms of visit may be successfully blended; visitors to the Hague's museum quarter soon discover that artistic and contextual information is QR-coded into in the district's fabric[17].

[15] The Cleveland Museum of Art. https://www.clevelandart.org/

[16] Tallon, L. (2013), *Mobile Strategy in 2013: an analysis of annual Museums & Mobile survey.* https://www.slideshare.net/LoicT/mm-survey-2013-report-v1

[17] Studio Louter (2020). *The Hague's Museum Quarter.* https://www.studiolouter.nl/en/municipality-of-the-hague-museum-quarter


Non-human
contributions
to co-creation

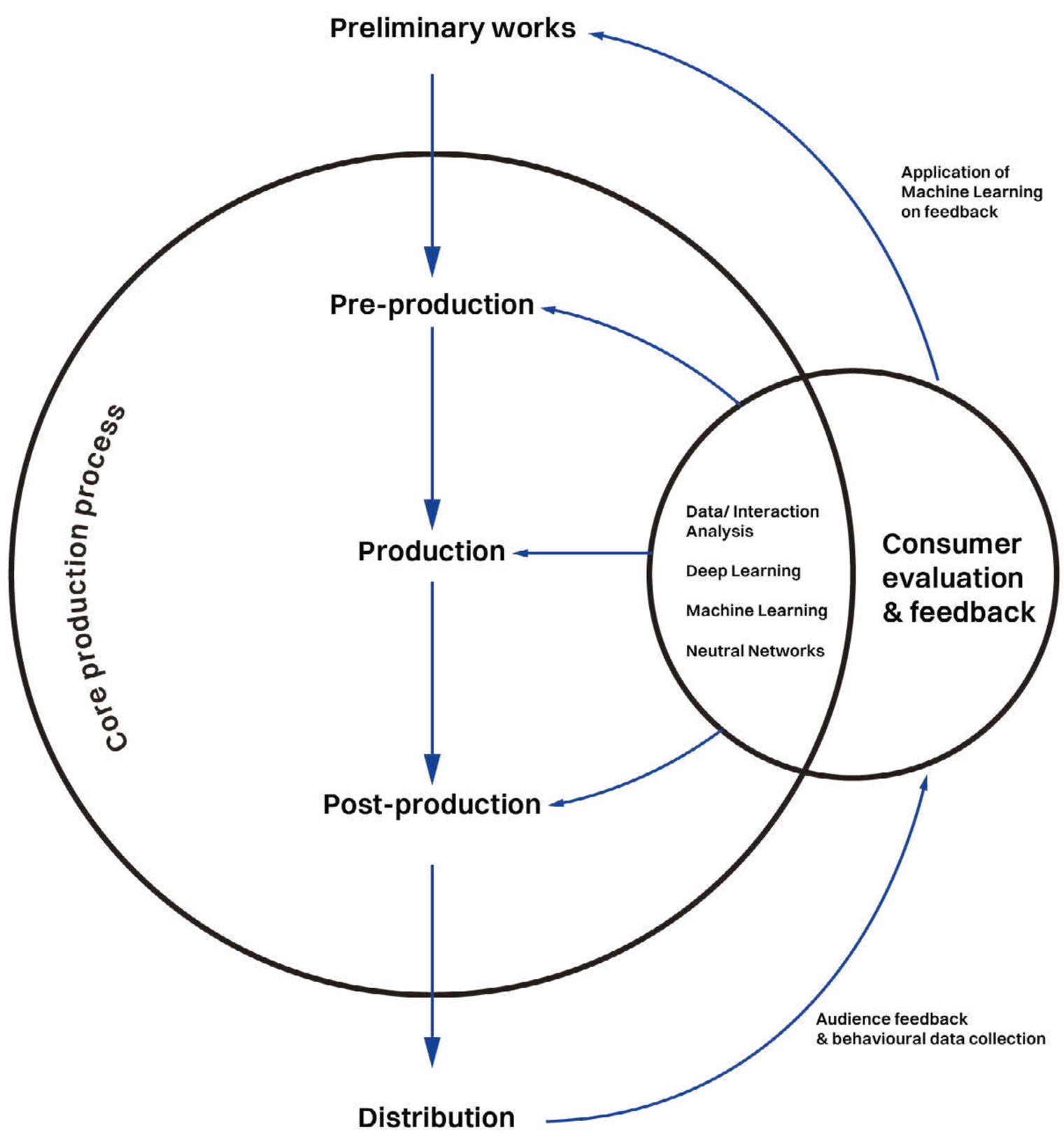
Non-human contributions to co-creation : The case of production process

Cyclical production processes informed by AI are normally associated with major media players like Netflix and Amazon Prime Video, who wield massive data sets to build recommendation engines and strategize future production. But a similar approach is now being applied to smaller audience groups, and it significantly affects the shape of even artisanal production processes.

Traditionally, audiovisual media production processes consist of three phases (pre-production, production, and post-production) preceded by a period of conceptual work. AI support adds a new stage — and a revised architecture — to the production process. "Consumer data collection, analysis and application" informs all other stages of production, from preliminary development to distribution.

This reconfigures the production workflow, turning what is essentially an assembly-line process into a cycle of prototyping, evaluation, production and feedback.

Graphic 6
High level AI-supported media production process



source Derda, I. (2020), "Did you know that David Beckham speaks nine languages?": AI-supported production process for enhanced personalization of audio-visual content. Pre-print, doi: 10.31235/osf.io/e2dqv

Applying this workflow to gallery co-creation, in 2016 the Cleveland Museum of Art opened an interactive studio where users could draw a shape using any one of a number of digital devices. An "artificially intelligent" algorithmic system, drawing from a database of scans in memory, then matched that shape with an item in the museum's collection. This afforded the user an intuitive, creative and entertaining away of exploring the museum's archive[18].

> **To create a feeling of immersion in an exhibition is a psychological process. It makes sense to experience the work as much as possible from the visitor's point of view. If you can really test it on yourself, you'll have a lot of freedom to change and adjust. Steve Jobs said "It ain't finished till it ships". A more agile production process leaves you more open to continuous insight and new ideas, right up until you release your design. We should be open to all new insights and ideas, even if they're almost too late. Better that than stick with the idea you had half a year ago and you're starting not to believe in anymore."**
>
> **—Peter Slavenburg (Northern Light)**

[18] Ng, L. (2021). How Are Museums Harnessing Immersive Technology to Provide Experiences? *Museum Next*. https://www.museumnext.com/article/how-are-museums-harnessing-immersive-technology-to-provide-experiences/

Visitor co-creation

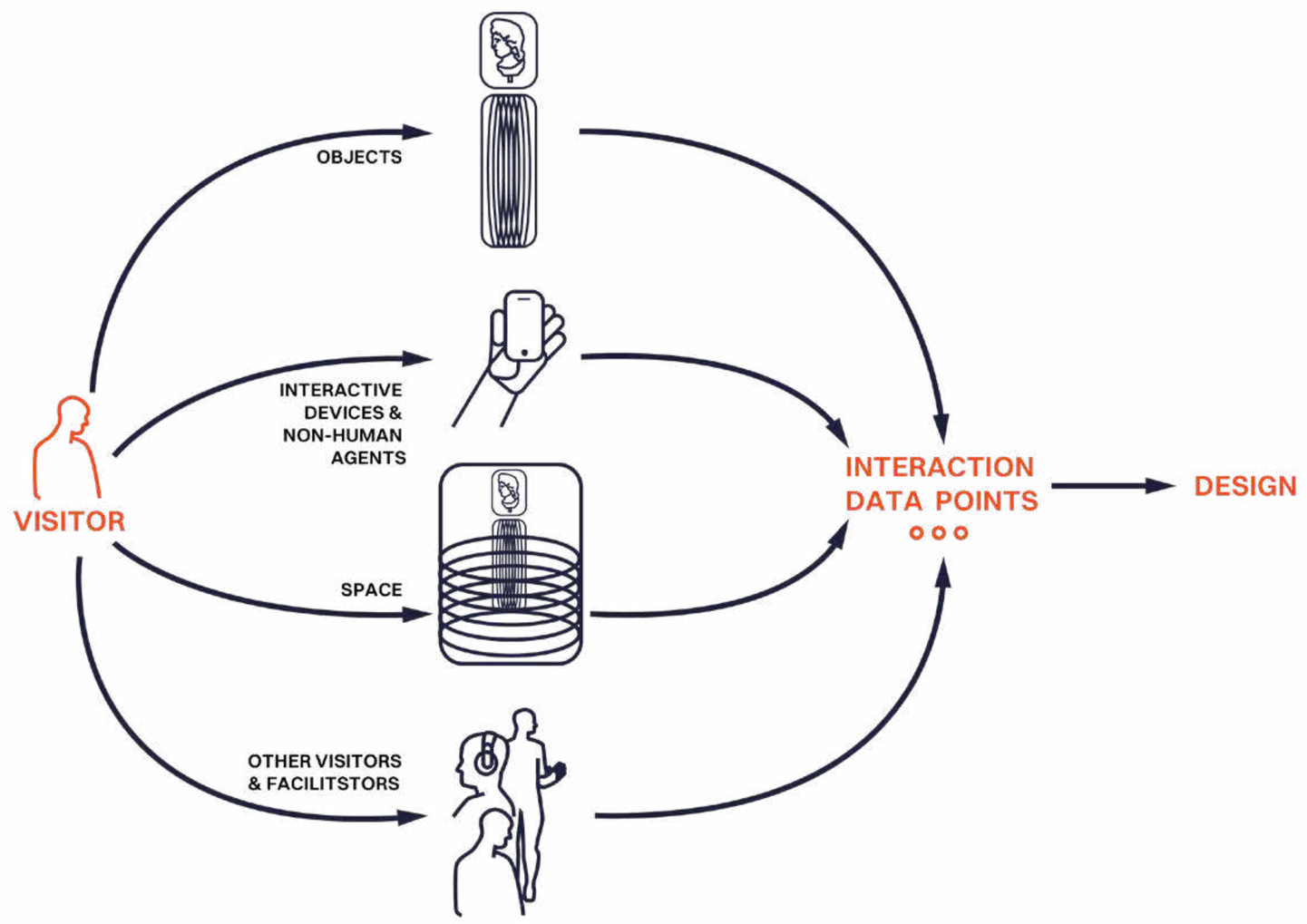
Unaware co-creation in the museum and gallery sector

We have seen how digital media contribute to aware forms of co-creation, both within the profession and in collaboration with users.

However, it is in the very nature of digital media that they especially enable unaware co-creation, thanks to their ability to reduce visitor interactions to data streams.

Data constantly generated from visitor interactions (with other visitors, with exhibition content, even with the space itself) may then be applied in the process of creation.

Graphic 7
Interaction as unaware co-creation



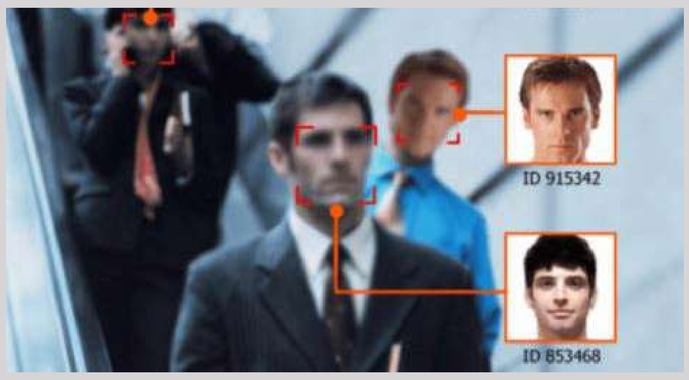
Author Izabela Derda, ESHCC

Positional data and path tracking can be used to reveal the personal choices taken as an individual navigates an exhibition: in a non-linear immersive experience, this data can then be used to create bespoke contexts and narratives for each user. Facial recognition is used to bolster positional data and can also identify and cater for repeat visitors[19]. Biometric data harvested from radar sensors that can track heart rate and respiration, and even from camera systems that recognise and categorise emotion, are used to tailor content and context for different users.

These capacities raise important ethical issues (“ETHICAL DIMENSIONS OF AI IN CO-CREATION” on page 27).

It is easy enough to imagine that a visitor to an art gallery, informed that their data is shaping the art around them, will appreciate their role in the creation of a unique, bespoke piece of art. However, it is just as easy to imagine disgruntled visitors fleeing an exhibition which panders to the assumed preferences of people it sorts (badly) into predetermined categories.

[19] Chun, R. (2016). Can Big Data Make for Better Exhibitions? Artsy.net. www.artsy.net/article/artsy-editorial-can-big-data-make-for-better-exhibitions



ETHICAL DIMENSIONS OF AI IN CO-CREATION

The use of AI in surveillance is well established, as is its use in securing exhibitions and exhibition spaces. For instance, visitors to the World Museum in Liverpool in 2018 had their visits and identities recorded by facial recognition systems assembled to protect the exhibits in the 'China's First Emperor and the Terracotta Warriors' exhibition[20].

The surveillance capacities of AI would not, in themselves, be a cause for concern, were it not for the tendency for technology, once installed (often at considerable cost) to remain in place and be harnessed to purposes unforeseen during its original installation. Institutions make the most of their investments, but what happens when they invest in technology primarily designed for surveillance, security and the amassing of intelligence?

Civil liberties implications attach to such systems, which are typically sold to the public on the basis of their offering improved customer service and better visitor experiences — enabling people, say, to navigate a museum complex while avoiding queues.

Establishing the ethical viability of an algorithmic technology's use in an exhibition is not enough; we need to establish how that technology is harnessed by the institution throughout its operational life.

These new relationships ought also to be considered from the point of view of civics and legality, and in particular in light of the European Union's General Data Protection Regulation.
Data is generated easily enough from visitor interactions — but are we allowed to use data provided unknowingly by visitors? Should audiences always be made aware that this is a practice?

While privacy and the protection of personal information are well regulated by law, other uses of data, such as the application of algorithms or the inclusion of data subjects in the development of data projects, are not necessarily regulated. And while some data practices are perfectly legal, they might not be morally acceptable[21].

> **OK, so someone just placed a huge augmented cow on your front lawn, which you can't see but other people can. Is that permitted? Yes or no? It's your house, after all. It's your front lawn. But other people are using that space in ways you can't control. There is no legislation around this issue. But there will be. Because in addition to real-world ownership there will, I think, be forms of virtual ownership, over objects that we have created in the realms of AR and VR.**
>
> **—Kees Veerman**

[20] *Behind the scenes of Terracotta Warriors: digital technology* National Museums Liverpool https://youtu.be/zhSrKLxACR0

[21] World Museum in Liverpool, China's First Emperor and Terracotta Warriors, https://www.liverpoolmuseums.org.uk/whatson/world-museum/exhibition/chinas-first-emperor-and-terracotta-warriors

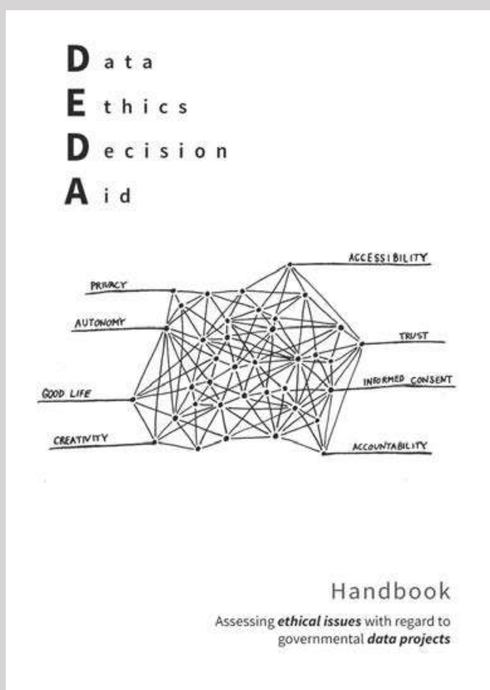
Non-human (AI) contributions to unaware co-creation

Non-human (AI) contributions to unaware co-creation

As digital infrastructures become more immersive, so the lines between audiences, subjects, and makers become increasingly blurred, and often erased. And as we have seen, introducing artificial intelligence (AI) into the media production process moves it from a linear- one-to-many model to a cyclical delivery mechanism, informed and shaped by real-time consumer evaluation and feedback collection, analysis, and application.

For example, artificially intelligent systems may observe consumers' interactions with content by analysing the semantic and sentimental content of social networks. This information could then be used to tailor proposals to the existing preferences and to predict a given audience's likely reactions to upcoming content.

This opens the way for far-reaching content personalization and new types of media experience. It can also, and just as easily, threaten editorial integrity and artistic independence, degenerating quickly into a simple marketing tool.



PANEL THOUGHTS

ETHICAL CO-CREATION

A dialogic approach to digital ethics outlined by **Aline Shakti Franzke**, a Researcher at Duisburg University in the department of Political Science, NRW School of Governance, which may have immediate utility to the museum and gallery sector.

Developed originally for the Municipality of Utrecht, the "Data Ethics Decision Aid" (DEDA)[22] developed by Franzke and co-workers Iris Muis and Mirko Tobias Schaefer has since been adopted by a wide range of institutions, companies and consultancies.

Rooted in the insight that "meaning good is not the same as doing good" the aid (originally an app, now a handbook for workshops) encourages interdisciplinary conversations, mutual challenge and discussion. It is not a code of conduct. Rather, it is a guide to practice that incorporates ethics at the earliest possible stage of a data system's development.

In the panel discussion, Franzke observed that while broad ethical questions are easily identified (relating to, for example, responsibility, transparency, privacy, bias and informed consent), their actuation and expression is technically embedded, in questions around algorithms, sourcing, anonymisation, visualisation, access, and open data and re-use.

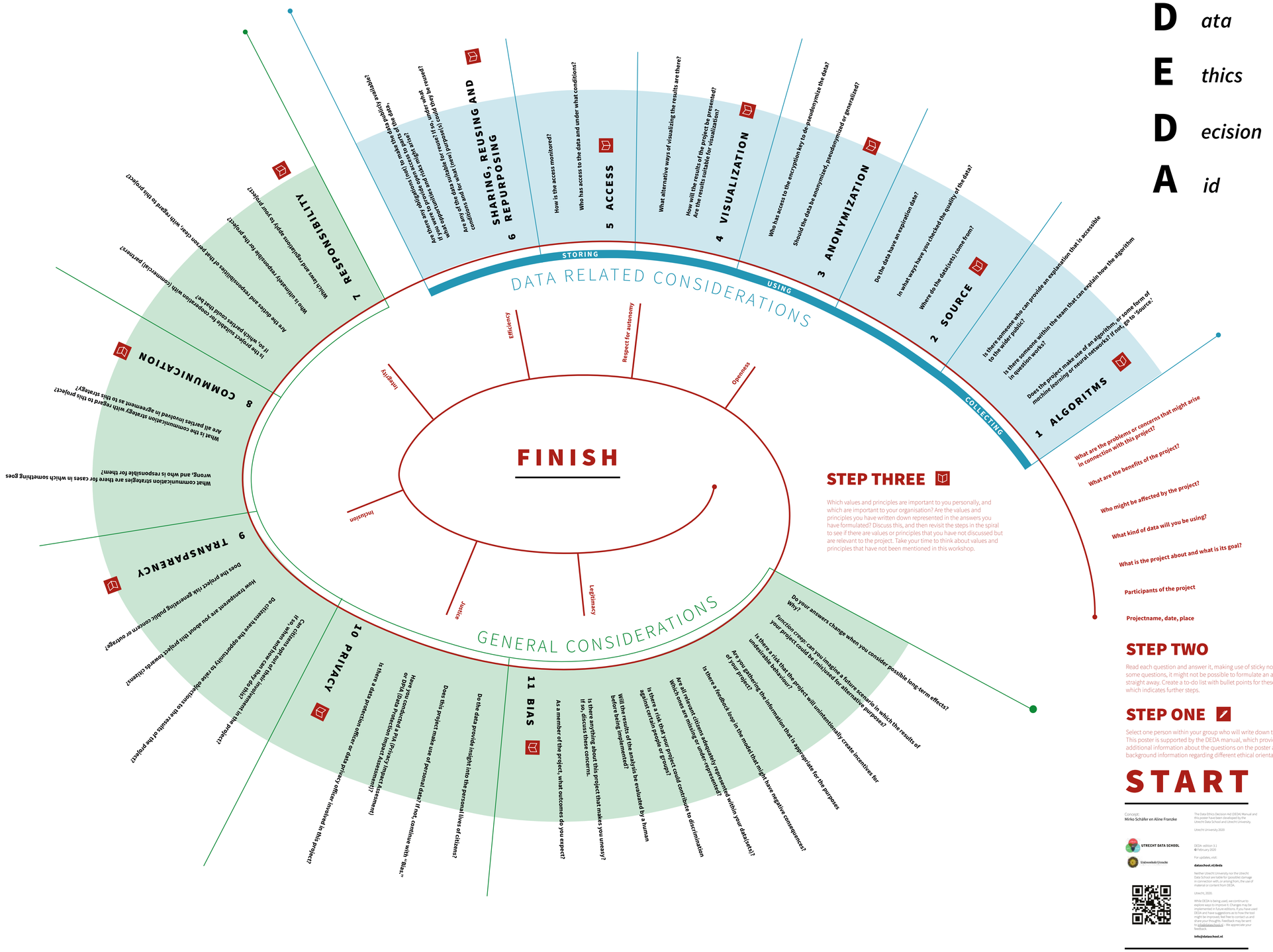
The DEDA handbook encourages open conversation across sectors in order to achieve ethical consensus, before ethical decisions are embedded in the technology.

This has the added benefit of affording all parties the tools to communicate the ethical dimensions of their project to each other and to their wider publics.

[22] Franzke, A.S., Muis, I. & Schäfer, M.T. (2021), Data Ethics Decision Aid (DEDA): a dialogical framework for ethical inquiry of AI and data projects in the Netherlands.
Ethics and Information Technology.
doi: 10.1007/s10676-020-09577-5.
https://dataschool.nl/deda/?lang=en

Graphic 8

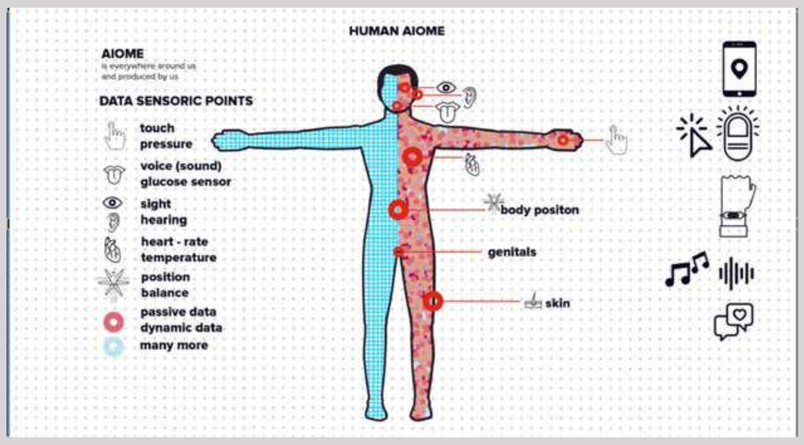
Data Ethics
Decision Aid (DEDA): a dialogical framework for ethical inquiry of AI and data projects in the Netherlands

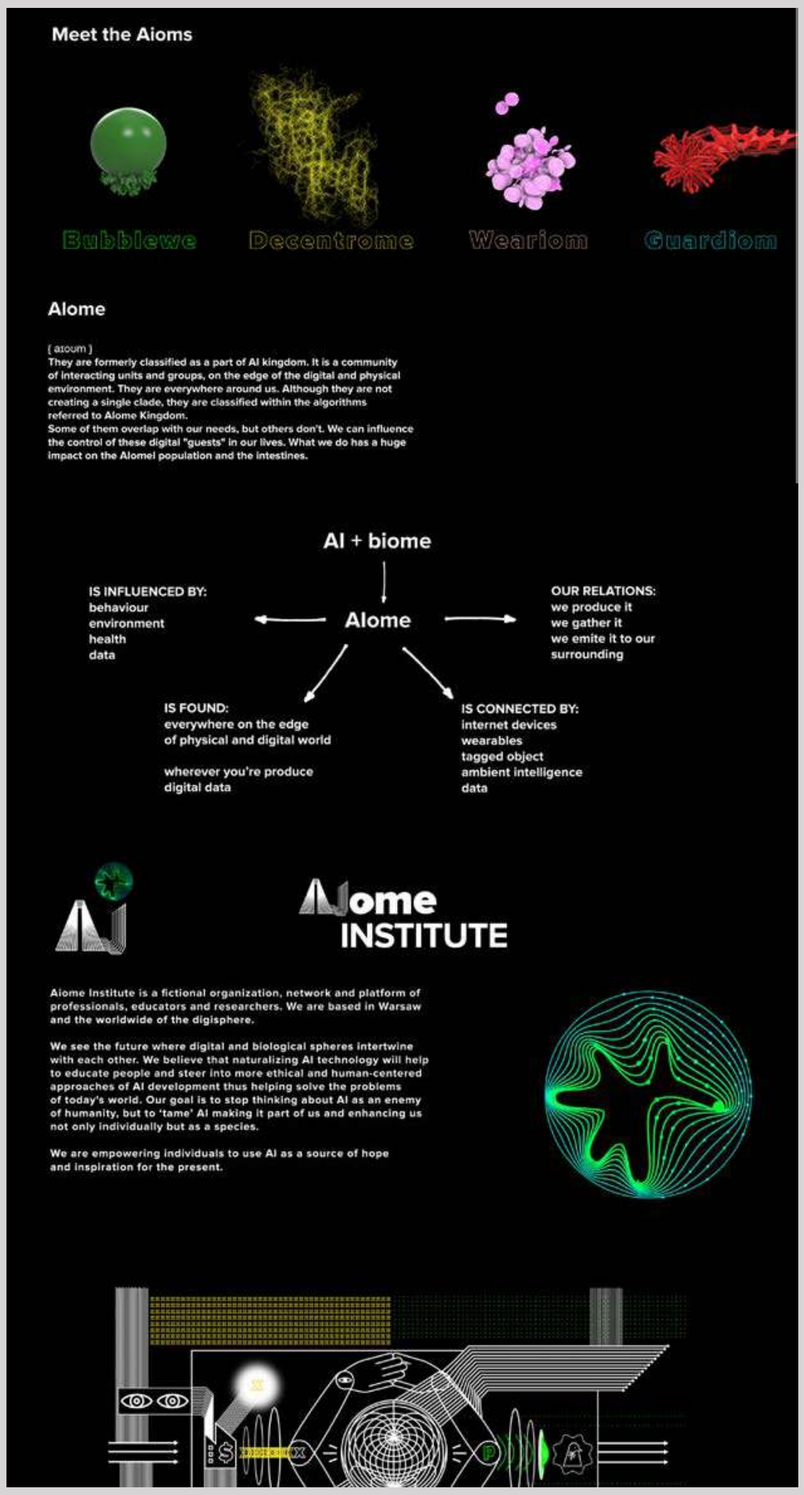


D *ata*
E *thics*
D *ecision*
A *id*

Non-human (AI) contributions to unaware co-creation

source Franzke, A.S., Muis, I. & Schäfer, M.T. (2021), Data Ethics Decision Aid (DEDA): a dialogical framework for ethical inquiry of AI and data projects in the Netherlands. Ethics and Information Technology. doi: 10.1007/s10676-020-09577-5. https://dataschool.nl/deda/?lang=en





AIome[23] — DIGITAL MICROWORLD

The concept of an "AI-ome" (as developed by Amal Al-Shahari, Barbara Drozdek, Paweł Grabowski, Sara Wołczyńska, Filip Zawadka, Jerzy Zientek) — a living environment composed of and generated by artificially intelligent systems — arose out of the work of the "ART + DESIGN + SCIENCE" residency program (2019), initiated and run by Science Now.

AI invisibly penetrates most aspects of many people's social lives. It is not very well understood. These characteristics of Invisibility and remoteness encourage our apathy on the one hand and our paranoia on the other. The "AIome" is an attempt, through biological metaphor, to make AI visible and understandable, by equating it with the microbiome of bacteria and viruses.

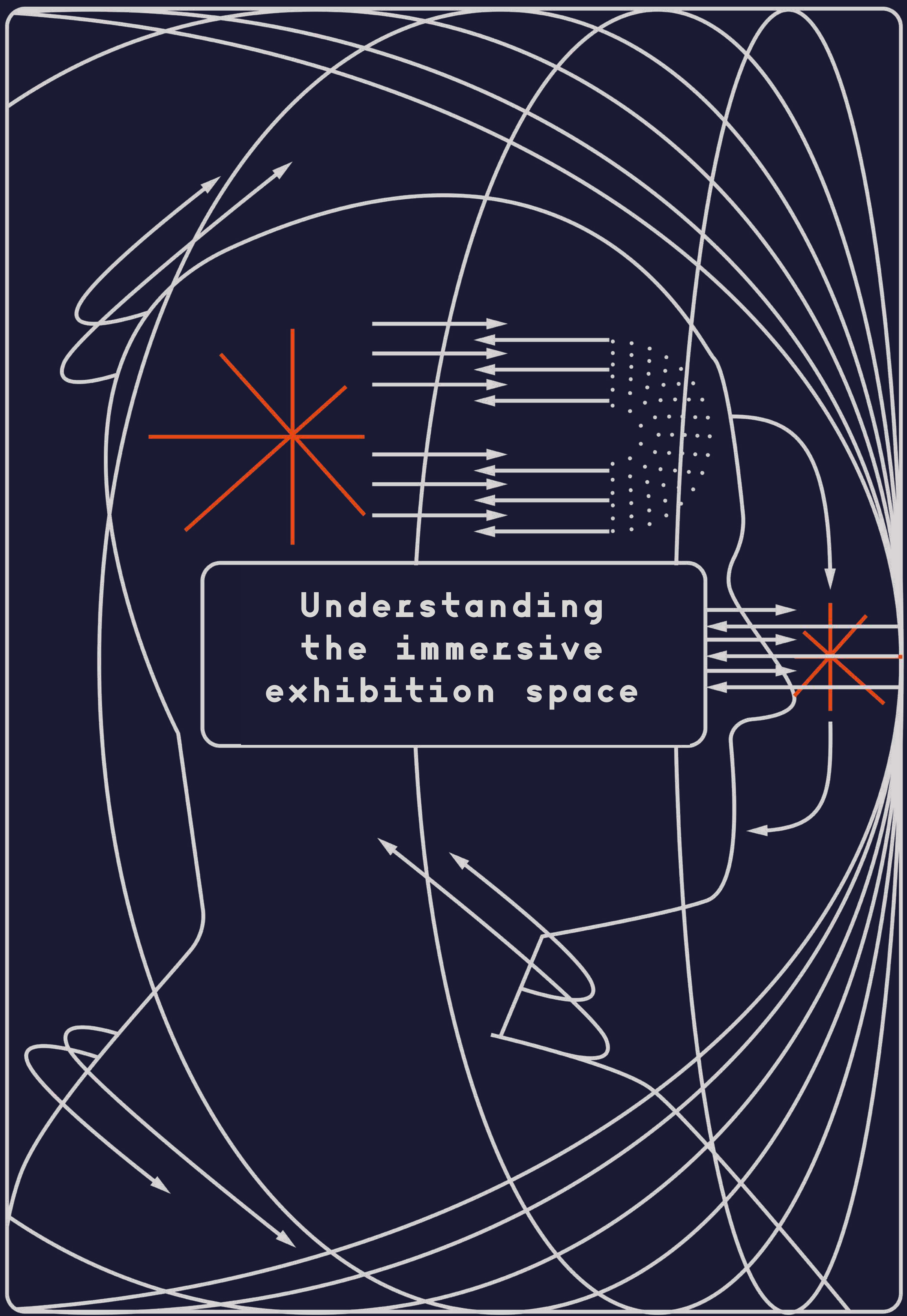
Bacteria and viruses are essential for life. They are invisible in ordinary settings, and their behaviours are not fully predictable. Healthy coexistence with bacteria and viruses involves understanding, research, and occasional precaution.

Following ethnographic and experimental research, the programme concluded that AI is best understood tolerated, and managed as part of our natural habitat.

Giving AI a more organic form moved fearful public narratives around AI towards more natural and human-centered discourses about the management of everyday risks.

Further conceptual work gave birth on an"AIome institute" — a fictional organization that would connect and network professionals, educators and researchers, creating content for better understanding of AI roughly in the manner of a health institute. The goal is to stop thinking about AI as an enemy of humanity, but to 'tame' AI, making it part of us and enhancing us not only individually but as a species.

[23] See more: https://www.behance.net/gallery/93858503/AIome-the-world-of-the-digital-microbiome



Understanding the immersive exhibition space

Understanding the immersive exhibition space

New technologies have the potential to make museums and art galleries hybrid places in which the virtual and digital aspects of stories are combined with corresponding physical artefacts.

Such spaces are often dubbed "immersive". However, some care is required when wielding this term. Immersion describes the feeling of being submerged by a completely different reality, able to grasp, absorb, and engross our attention and perception. A broad spectrum of experiences — from literature and music to learning can be considered "immersive" in the broad sense of the term. More narrowly, "immersion" can refer to a multisensory experience that "transports" visitors to a different time, place or situation and makes them active participants in what they encounter.

> **You can still do very good exhibitions which are analogue and mechatronic and can still be immersive, without using sophisticated multimedia. I think that for an exhibition to be immersive, it has to trigger at least a few senses at the same time. I think the more the more senses you stimulate, the better. But the effort has to be holistic. There's no room for randomness.**
>
> **—Jan Pomierny & Łukasz Alwast (Science Now)**

It is easy — but wholly erroneous — to assume that, with the advent of such immersive experiences, the physical artefact is being somehow "dethroned".

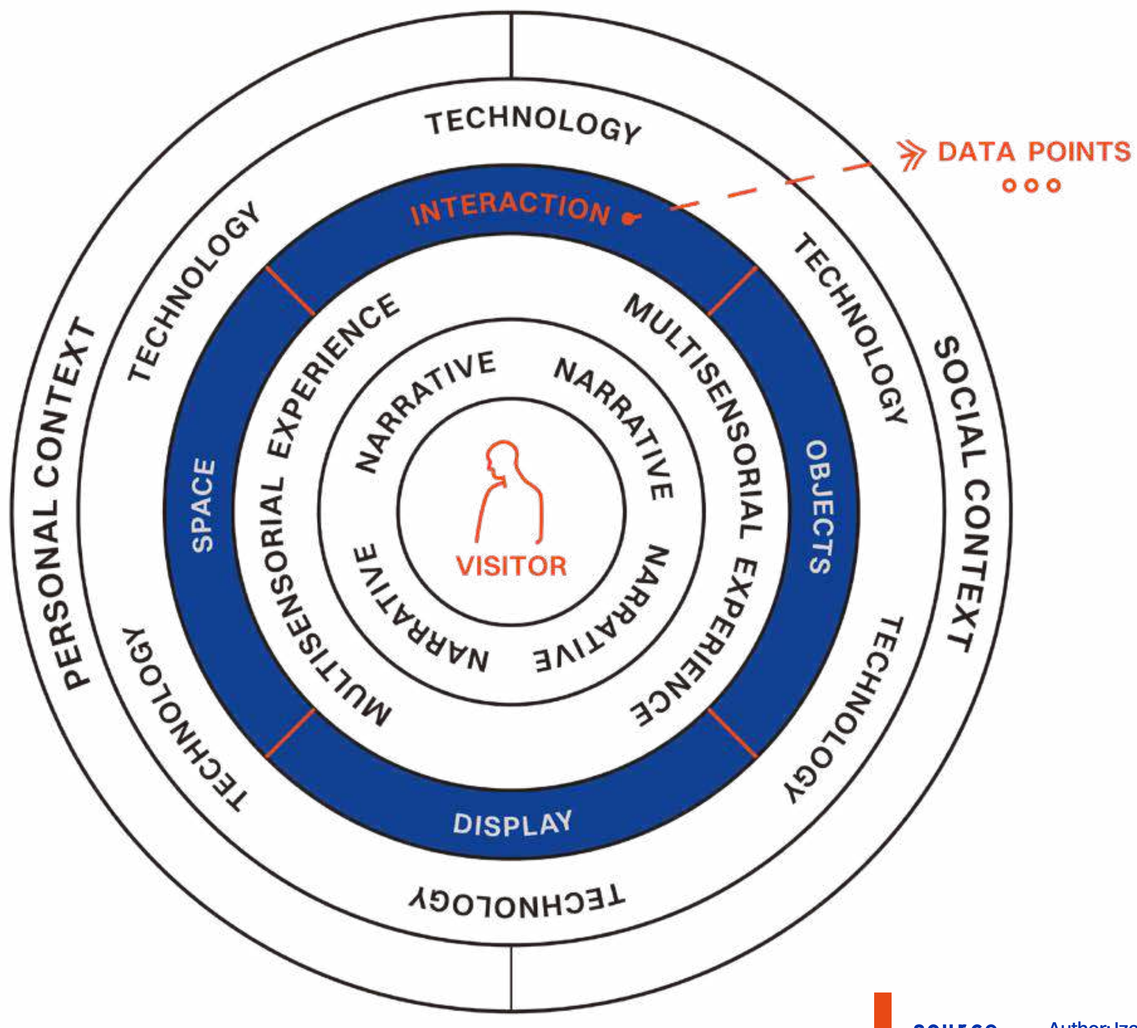
This is not the case. It is true that the shift in modern curatorship means the visitor is placed at the centre of the experience.

But of course, any exhibition, new or old, radical or traditional, requires a level of authenticity, and this, ultimately, is provided through the exhibition of artefacts. This is why we say technology has a secondary, supportive role and is used only when it can add value to the exhibition concept (see graphic 9).

> **There was a tendency, a while ago, to emphasise interactivity and playfulness for its own sake, as though galleries and museums were competing with amusement parks. This was a mistake. If you go head to head with Disney you will lose, because Disney has much more money and a lot of expertise. What it doesn't have is the skull of a real Viking. It doesn't have the Nightwatch. That's the real power of museums, and what we do is we let the visitor experience why that is important.**
>
> **—Pepijn Wilbers (Studio Louter)**

Graphic 9

Visitor-centric exhibition design model: The visitor is immersed in the narrative and multisensorial experience. By interacting with objects, display and space, they provide a stream of data, which can be potentially collected and re-applied in the exhibition production process.



source Author: Izabela Derda, ESHCC

PANEL BOX OUT

Technology is subordinate to storytelling and experience

—Izabela Derda

WITH A VISITOR AT HEART: A NEW DESIGN MODEL

A new design approach to exhibition experience development, highlighting the shift from object-centric to visitor-centric principals, was outlined by Izabela Derda, a Researcher and Lecturer at Erasmus University in the department of Media and Communication, Erasmus School of History, Culture and Communication.

As Derda observed, in popular discourse, immersive exhibitions are often (indeed, almost exclusively) associated with the extensive use of new technologies, and a high level of visuality. This overlooks the way immersive technologies are used to bring forth the narrative of the exhibition and to enhance the overall audience experience by providing inspirational and emotional layers. The multisensory layer, which surrounds and exposes the theme of the exhibition, supports the submersion of museum visitors in the storyline. For this reason: “exhibition design is not tech- but story-driven, and digital methods serve only to reinforce the storytelling and create an immersive environment.”

In the panel discussion, she explained that co-creation occurs when story, space, technology, and visitor interactions are integrated. “By interacting, through aware interactions (with touchscreens, say) or through less aware, non-linear explorations of the exhibition space, visitors provide streams of data. Every interaction is a data point. And those streams can be applied to adjust the exhibition (even in real time) to a visitor’s needs and expectations or to inform future developments.”

But what, exactly, is an artefact?

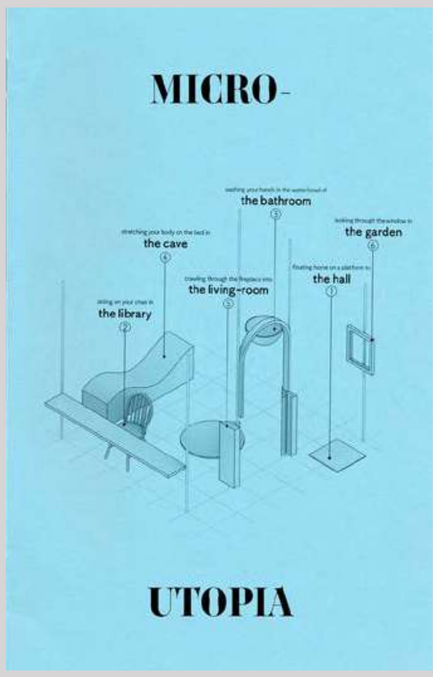
The desire to express and expose art through digital technology speaks strongly to the 20th century's rejection of the idea that the art needs to be purely material, and that era's experiments in art as the instigation of an idea or feeling.

Art experienced through digital or mixed reality experiences, however, may still centre around an "object", however "immaterial" it may be.

Concepts of space, place and venue have been commonly explored and differentiated in the museological literature. However, with the advent of mixed-reality experience design, these well-worn and often very helpful ideas must be re-examined and re-formulated.

The tendency for a critical vocabulary to slide seamlessly and inadvertently from one register to another, and to do so in particular when we discuss exhibition *spaces,* creates many challenges for those who study experience-related behaviours and social transactions.

> **Visitor journey in immersive experiences is different because it's not linear. The visitor decides on his own how he's come to move through the building, and you can use the building to tell your story.**
> **—Pepijn Wilbers (Studio Louter)**



Axonometric drawing of tactile objects encapsulating virtual spaces upon being touched by the 'inhabitant', Micro-Utopia: The Imaginary Potential of Home, Paula Strunden, 2018.

IMMERSION IN ACTION: MICRO-UTOPIA

A visitor to Paula Strunden's installation Micro-utopia[24] explores physical spaces while wearing a VR headset. The installation "proposes a shared, immersive and interactive version of a home, where space is born from the finely-tuned sensorial interplay between the body and virtual/physical objects connected to the Internet of Things." (micro-utopia.org). The visitor sees a virtual environment, but otherwise experiences a physical environment. The visitor's experience of space becomes multi-layered: physical and virtual realities overlay each other, and the full installation can only be fully apprehended by a visitor inhabiting this mixed sensory space. In Micro-utopia, it is the viewer, not the artwork, who is caught in-between worlds.

Even practitioners working day-in, day-out on mixed reality projects find themselves having to continually define and redefine basic spatial concepts, as they communicate the particular affordances of different projects.

[24] Micro-utopia trailer © Paula Strunden https://vimeo.com/297042466

Augmented art experiences often overlay digital content onto physical spaces — they are a species of a holographic projection. The impression — that virtual and real worlds are merging — is hard to talk about as it leaves the actual content suspended, ontologically speaking, between two worlds.

In the augmented reality exhibition "Mirages and Miracles" by Adrien M and Claire B, for example, visitors observe motionless, inorganic objects which — seen through the screen of a tablet computer — "come to life"[25].

Are these augmented objects "present"? Something that is "present" is usually supposed to be tangible. Just as we can manipulate it, it can, in certain circumstances, impact us. If we are not able to grab something with our hands, how can it be "present? Is it present "elsewhere"? If so, where? Or is it not present at all?[26]

Of more import to a discussion of co-creation: while space is commonly perceived by everyone and thereby makes interaction possible, this is only partly true for augmented space.

For augmented space to be perceived by everyone in the same way, users must access to the same AR experience. AR experiences can, however, be highly individual and personalised in terms of their content, and experience design. They can even be co-created by the users to a certain degree, leading to very different, individualised perceptions of the same physical space.

The potential fragmentation of the social visual experience may prove problematic. But it can also be considered an opportunity, freeing co-creative partners from spatial norms.

After all, the feeling of immersion arises, not from an apprehension (or misapprehension) of "what seems real"; it arises from being immersed in a particular activity. It is the cognitive state of gradually increasing engagement building up towards states of flow and presence.

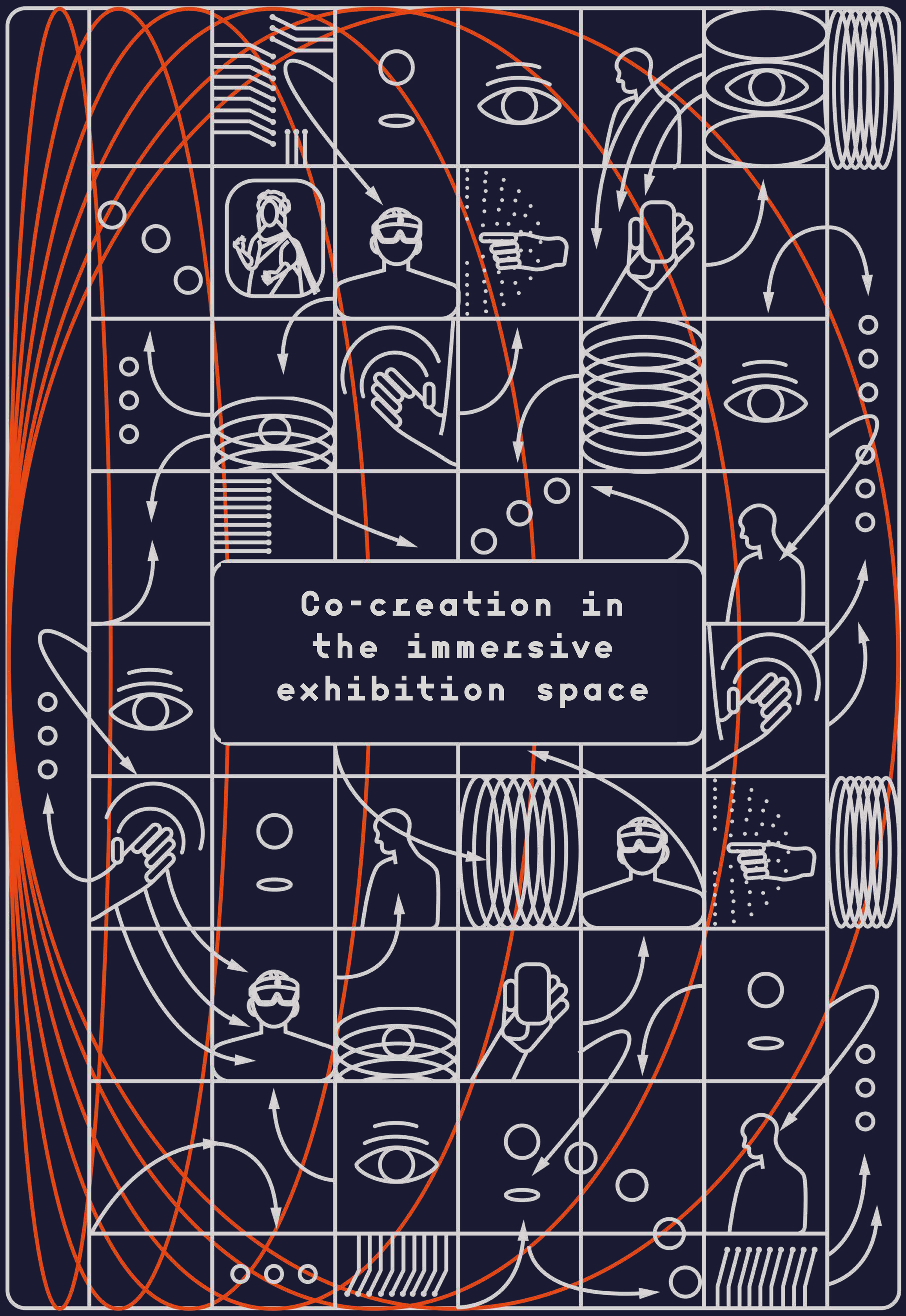
If, in particular, a user realises that an AR application can help them fulfil a particular task, a sense of being immersed follows quickly after — a concept called "challenge-based immersion"[27].

From this, an important lesson may be drawn: that even projects directed wholeheartedly towards immersion need not bind themselves to an artificial standard of (usually visual) realism.

[25] Mirages and Miracles, © Adrien M and Claire B https://vimeo.com/248983439

[26] **Read more: Derda, I., Feustel, T. & Popoli, Z. (2020),** *(In-)Between spaces: Challenges in defining the experience of space in mixed reality-driven art exhibitions*. Pre-print, doi: 10.31235/osf.io/te3a4

[27] Calvillo Gamez, E. (2009). *On the core elements of the experience of playing video games*. Doctoral thesis, UCL (University College London).



Co-creation in the immersive exhibition space

Co-creation in digitally augmented spaces

We are surrounded by space (a physical attribute of the world), and out of that space, we create places (socially produced spaces), by adapting corners of space for our different means. The technologies of Augmented Reality free places from spaces. They even enable us to map multiple places onto one space W albeit in ways seriously hampered (for now) by the technology's sensory and haptic limitations.

AR's visual and sensual appeal can be imposing and memorable. The mere "consumption" of AR is not, however, sufficient to convert spaces into places. Places are, after all, co-created. For place-making to occur, users have to actively interact with each other, sharing a perception of a given space's function and purpose. In AR, a shared perception of a place's reason for being bolsters the user's belief in the reality of that place, and thereby strengthens AR's ability to create virtual places.

If all users experience the same content, each from their different perspective, the emerging social consistency increases belief in the realness of the augmented content.

The ability of AR to enable shared experiences is, then, integral to its role in generating believable immersive experiences. If several users witness the same augmented content, they are more inclined to forget about the fact that the content is virtual, and accept it as their reality.

Further, the integration of physical artefacts into AR, that remain after the experience has ended, have a substantial impact on place-making because they link the content to the reality of the user.

> **You create a space for people who have their own experience rather than fully designing every aspect of it. People have more room to kind of shape their own experiences.**
>
> **—Cas Ketel (XR Creator)**

Conclusions

1. Develop a common language

The conceptual grid around co-creation is hazy. Establishing a common language will allow designers and researchers alike to move more freely in the area of experience design, and support understanding of visitors' behaviors in the spaces of experience and interdependencies between visitors, spaces and content.

2. Acknowledge unaware co-creation

It is in the very nature of digital media that they especially enable unaware co-creation, thanks to their ability to reduce visitor interactions to data streams. Data constantly generated from visitor interactions (with other visitors, with exhibition content, with the space itself) may then be applied in the process of creation.

3. Consider ethical considerations around unaware co-creation

It is crucial to recognize the ethical considerations around "unaware" co-creation, in which user data is harnessed to guide, enrich, and even to produce the materials in an exhibition. Since, in our mobile and data-rich environment, much potential visitor data is generated unconsciously and often inadvertently, using this data raises questions around civics, privacy and agency.

Credits

Authors

Izabela Derda
Erasmus University

Pedro Russo
Leiden University

Panel Discussion Speakers

William Charles Uricchio
Founder and Principal Investigator of the MIT Open Documentary Lab

Pepijn Wilbers
Owner and Creative Partner at Studio Louter

Hedwig Wösten
Manager of Exhibitions and Projects at Mauritshuis, Den Haag, Netherlands

Aline Franzke
Researcher at Duisburg University in the Department of Political Science, NRW School of Governance

Peter van der Putten
Assistant Professor at the Leiden Institute of Advanced Computer Science (LIACS)

Izabela Derda
Researcher and Lecturer at the Erasmus School of History, Culture and Communication

Industry Partners

Jan Pomierny
Science Now

Lukasz Alwast
Science Now

We thank our interviewees for participating in the Smartification of Audience Experience Study.

To learn more about our research project visit:
SmartficationOfAudienceExperience.com