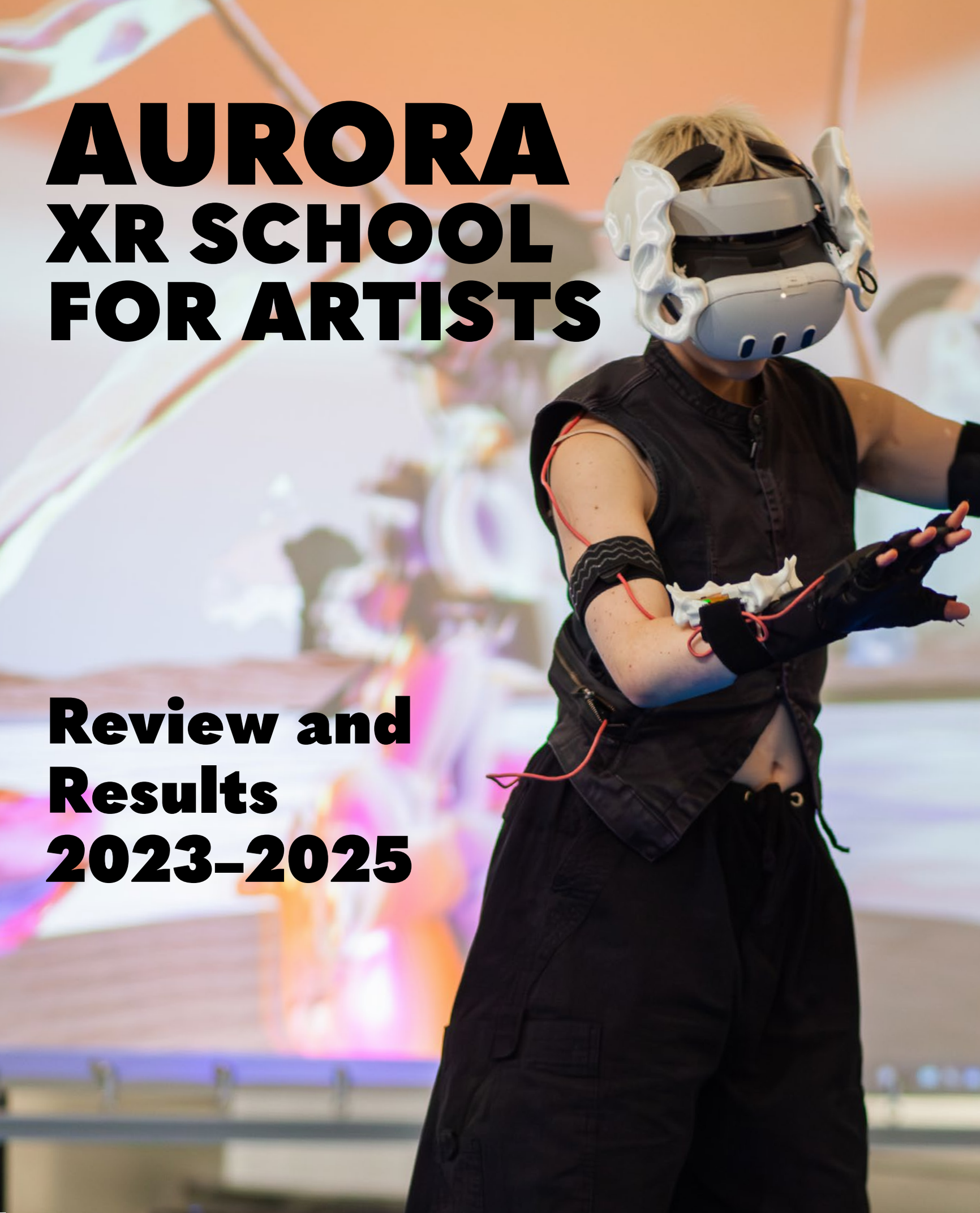
AURORA
XR SCHOOL FOR ARTISTS



Review and Results 2023–2025

Content

Introduction

Virtual, mixed and augmented reality (extended reality, XR for short) offer immense potential for innovative cultural projects as spaces and subjects for artistic exploration. Representatives of Berlin's independent arts scene and creative industries act as driving forces behind novel, often bold approaches using XR technologies. In doing so, they make a significant contribution to Berlin's international appeal and innovative strength as a cultural metropolis.

Berlin-based art & culture professionals can only develop innovative concepts if they have access to the necessary knowledge of what is technologically feasible. These concepts' implementation and realisation, in turn, are only possible if creatives have the appropriate digital skills and infrastructure[1]. And ambitious projects can only be realised in inter-disciplinary teams that include experts in the development of digital applications.

This is where the research project »HERA – Action and Learning Spaces for Extended Reality Projects with the Independent Cultural Scene« at HTW Berlin came into play. With a combination of practice- and needs-oriented offerings in the field of XR technologies, its program AURORA XR School for Artists targeted the independent cultural scene as well as smaller companies in Berlin's creative industry. The focus was on visual arts, performing arts, design, photography, music, literature and video art. The project's core team consisted of 3–4 staff members.

From 2023 to 2025, the AURORA XR School for Artists recorded 3,025 uses of its XR tutorials, 498 registered participants in its programmes, 20 in-person training courses, 6 new XR tutorials, 5 publications, 4 cross-disciplinary networking events and 3 innovative cultural programmes. The latter were implemented and presented to the public in close collaboration with the independent Berlin-based artists Martin Binder, Jens Isensee, Lisa Kaschubat, Tasha Hess-Neustadt and Jane Arnison – for example at re:publica, the A MAZE. / Berlin and tanz.tausch / Cologne festivals, and the Lange Nacht der Wissenschaften (en: Long Night of Science) at HTW Berlin.

[1] *Vgl. Berliner Kulturkonferenz (Hg.) (2026): Auf dem Weg zu einem Berliner Kulturfördergesetz, Digitalität in der Kulturförderung, S. 73–74.*

This final publication focuses on the three innovative XR cultural projects that have been developed. For each project, it provides information on the underlying research question, the artistic and technological implementation, and the output.

Two aspects apply to all three projects: (1) The use of the latest technological features from the years 2023–2025 required an agile, highly experimental and, at times, open-ended approach. (2) The storyboard served as a key interface between the artistic concept and the technological implementation. This is because the development of XR cultural projects is always a productive push-and-pull between visionary ideas and their practical feasibility.

We would like to thank everyone who helped shape and support HERA – whether as Artistic Fellows, jury members, cooperation partners, participants in courses and events, professors providing academic support, administrative staff, or in any other capacity. Special thanks go to the European Regional Development Fund for co-financing HERA as part of its »Strengthening Innovation Potential in Culture III« (INP-III) programme, as well as to the Berlin Senate Department for Culture and Social Cohesion for their kind support.

Maja Stark & Prof. Johann Habakuk Israel
Project Management and Coordination

From Hostile to Hospitable

Augmented Reality for Visualising People-Friendly Urban Spaces

Interactive WebAR via smartphone or tablet

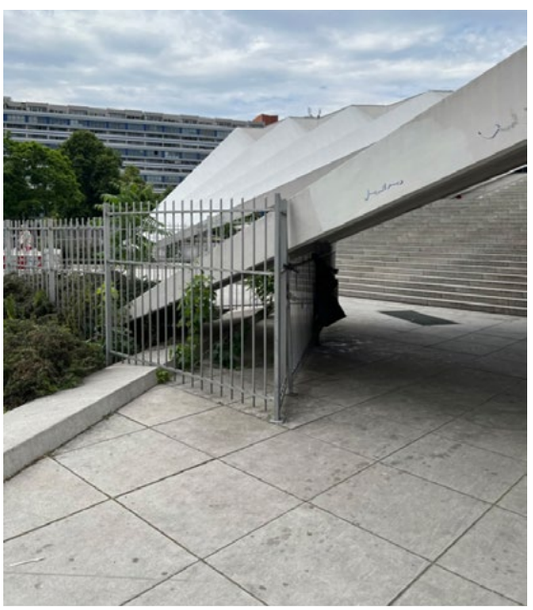
A collaboration with Artistic Fellow Martin Binder

2023/24

1.1. Research questions

How can state-of-the-art WebAR technology be used to draw the attention of a broad audience to hostile design in public spaces – and how can people affected by this social problem be involved in a participatory and meaningful way?

In the project »Safe&Urban« (2021), Martin Binder had already designed dystopian products for a fictional street furniture company. »From Hostile to Hospitable« is a further development of this exploration of discrimination in urban public spaces. At the same time, the two projects are in contrast to one another: whilst »Safe&Urban« focuses on ironically exaggerated forms of hostile design, »From Hostile to Hospitable« deals with concrete solutions and alternatives.



Examples for Hostile Design, CC-BY Martin Binder

Hostile Design:
Sometimes aggressive exclusion strategies through urban design and strategic construction measures in public spaces, e.g. special armrests on benches designed to prevent people from lying on them.

1.2. Implementation

1.2.1. Development

Following the prototyping phase, Three.js, JavaScript and the WebXR Device API were selected for the development, as these technologies offer flexible and widely supported options for 3D and AR development.

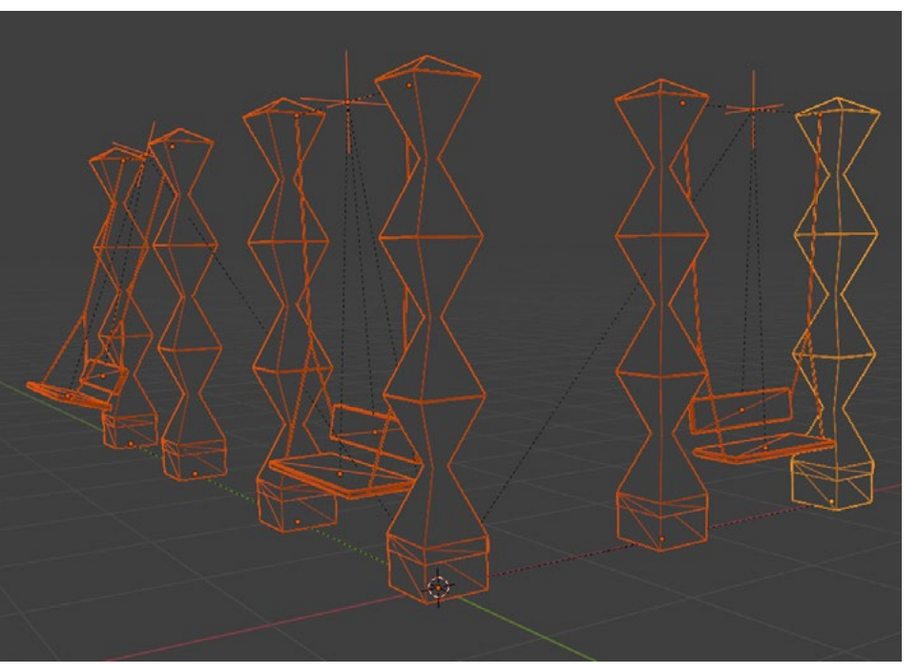
People with varying levels of prior knowledge helped to test and evaluate the application. There was a strong focus on usability: Intended interactions with user interfaces and 3D objects should be as intuitive and easy to understand as possible.

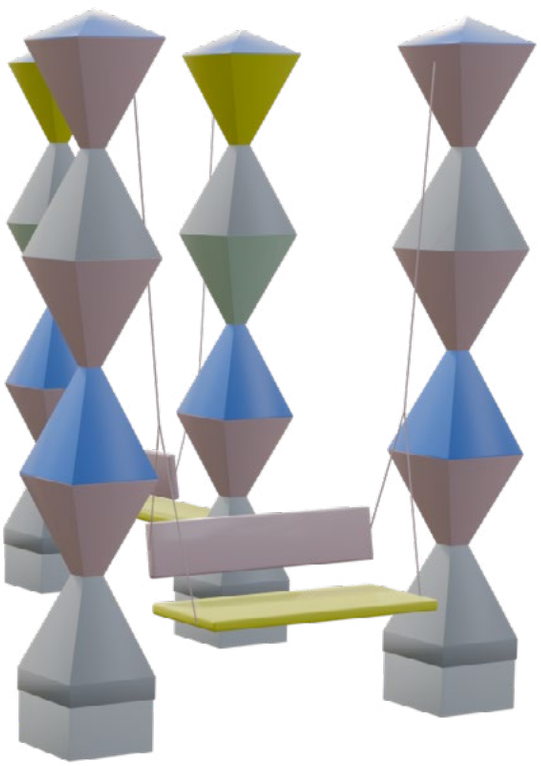
Various browsers, particularly on Android and iOS devices, have specific characteristics that must be taken into account in the code. Extensive testing across different platforms was therefore crucial to ensure a consistent user experience and to optimise »From Hostile to Hospitable« on all systems.

Testing and evaluation of the Web AR application in public spaces, CC-BY HERA / HTW Berlin

WebAR also places specific demands on the production of digital media content: »From Hostile to Hospitable« is loaded via mobile data, so file sizes must be kept small. Only low-poly models with compressed textures are used, and the size of individual scenes is limited to a maximum of 7 MB.

WebAR enables augmented reality (AR) directly in the web browser, without the need to download an app first.





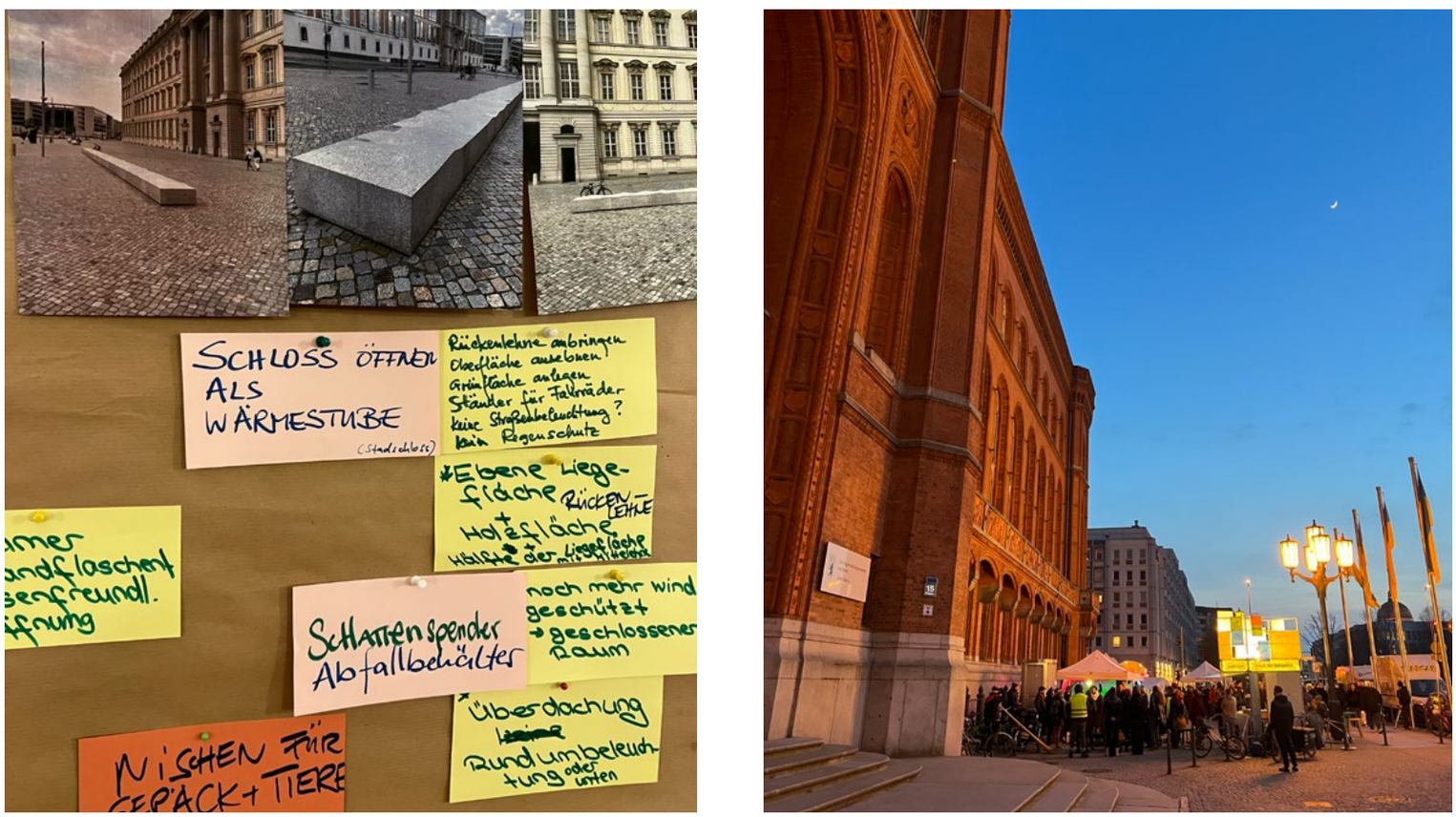
Development of low-poly 3D models for the application, CC-BY Martin Binder / Dagmar Schürrer, HTW Berlin

1.2.2. Participation

The artistic concept places the participation of those affected at the heart of the development. This takes place in three dimensions:

- → in the selection of locations for the AR interventions,
- → in the design and improvement approaches at the respective locations, and
- → through direct interviews with those involved, who provide the main audio content for the application.

People affected by homelessness are under-represented in virtual and hybrid spaces. The low-threshold, web-based application makes their voices heard and provides them with a platform for their perspectives. The project was carried out in collaboration with three organisations that act as advocates for those affected: Querstadtein e.V., Stadtmission am Zoo and UfO (Union for Homeless People's Rights).



Workshop on gathering ideas (left) and a discussion on hostile design at a vigil against homelessness in front of the Rotes Rathaus (right), CC-BY Martin Binder

1.3. Project Results

1.3.1. WebAR Experience »From Hostile to Hospitable«

»From Hostile to Hospitable« is an artistic, site-specific WebAR experience for Berlin. To start it, open the link app.hostile-berlin.de (last accessed: 25/12/12), work through the short tutorial, and off you go: an interactive map navigates you to seven locations around Alexanderplatz, the Humboldt Forum and Ostbahnhof – everywhere you encounter Hostile Design.

Once users have found a location, they overlay it in augmented reality with a 3D stencil (digital twin). By placing this stencil, the app knows where it is. This triggers the visualisation of the alternative design to Hostile Design – and, in parallel, the audio storytelling: perspectives on the locations from speakers who have themselves been affected by discrimination through urban planning measures.

Augmented reality tree and map view, CC-BY HERA / HTW Berlin

Three examples

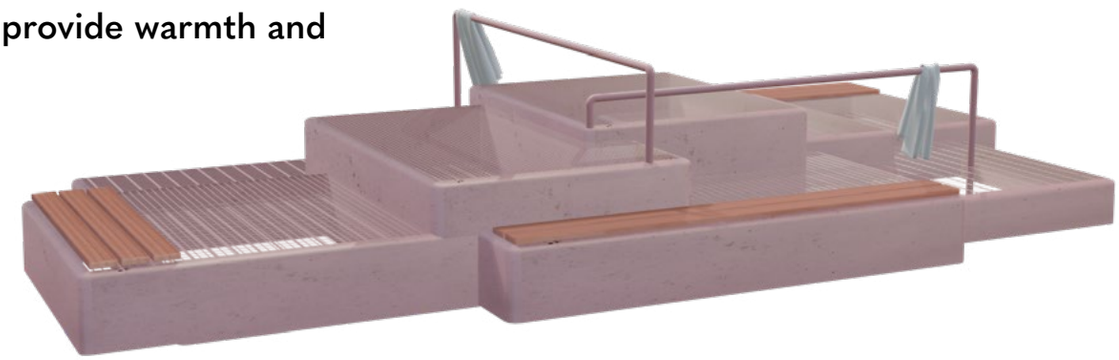
Ventilation shaft at Alexanderplatz, emitting warm air

Hostile Design:

Brackets screwed onto the shaft prevent people from sitting or lying on it to keep warm during the colder months.

Visualised antithesis:

Seating and lounging areas to provide warmth and racks for hanging clothes.



Digital 3D model, CC-BY Martin Binder / HTW Berlin

Large square near the Spree in front of the Humboldt Forum

Hostile Design:

Completely sealed surface and curved granite benches that prevent people from lying on them.

Visualised antithesis:

Users interactively design and green the palace and square, with parasols, water features and deckchairs.

Screenshot in augmented reality, CC-BY Martin Binder / HTW Berlin

Pyramids on the square in front of Ostbahnhof

Hostile Design:

Pyramid tips have been placed on former cubes to prevent people from sitting down and lingering.

Visualised antithesis:

Inviting, swinging Hollywood swings and parasols in bright colours.

Screenshot in AR, CC-BY Martin Binder / HTW Berlin

1.3.2. Reusable open-source code

Download

Two generalisable features from »From Hostile to Hospitable« are available as open source for free reuse: a basic WebAR scene with surface detection – and a timeline for creating a temporal choreography. By simply adding links, 3D objects, animations and audio files can be faded in and out at selected points in time, thereby allowing even more complex sequences to be integrated into the base scene.

1.3.3. Interdisciplinary academic paper

Barsht, Leonid, Martin Binder, Dagmar Schürrer, und Maja Stark. 2025. »From Hostile to Hospitable: Using Interactive WebAR Technology to Address Hostile Design in Public Spaces and to Visualise Utopian Alternatives in the Context of AR Activism«. Proceedings of the 21st International Conference on Culture and Computer Science: from Humanism to Digital Humanities, KUI '24. New York, NY, USA: Association for Computing Machinery. Doi: 10.1145/3719236.37192444, 1–10.

Novocene – A Possible Future

Mixed Reality for an Artistic Exploration of the Climate Crisis and Speculative Future Scenarios

Interactive experience for Meta Quest 3

A collaboration with Artistic Fellow Jens Isensee

2024–2025

1.1. Research Questions

Is it possible to engage artistically and aesthetically with something as colossal as the climate crisis and its destructive consequences? How can the narrative of the possible end of all narratives be successfully told? And how can a balance be struck, hopefully somewhere between didacticism and fatalism on the one hand, and naïve ignorance and blind faith in technology on the other?

Based on these artistic research questions posed by Jens Isensee, the interdisciplinary collaboration explored how the Anthropocene and speculative future scenarios can be conveyed through an innovative mixed-reality (MR) experience.

A look at the interactive application in the exhibition setting, CC-BY Jens Isensee

1.2. Implementation

1.2.1. Development

»Novocene« was developed with the software Unity. To ensure that the development process remained faithful to the artistic vision, a »state machine« (system of states) was implemented: this directly mirrors the structure of the storyboard developed by Jens Isensee.

1.2.2. Visual Storytelling

The narrative of »Novocene« is supported by numerous 3D models and animations. The interplay between the virtual and physical worlds in mixed reality gains particular significance, especially when considering how human decisions affect our shared environment. This was achieved through:

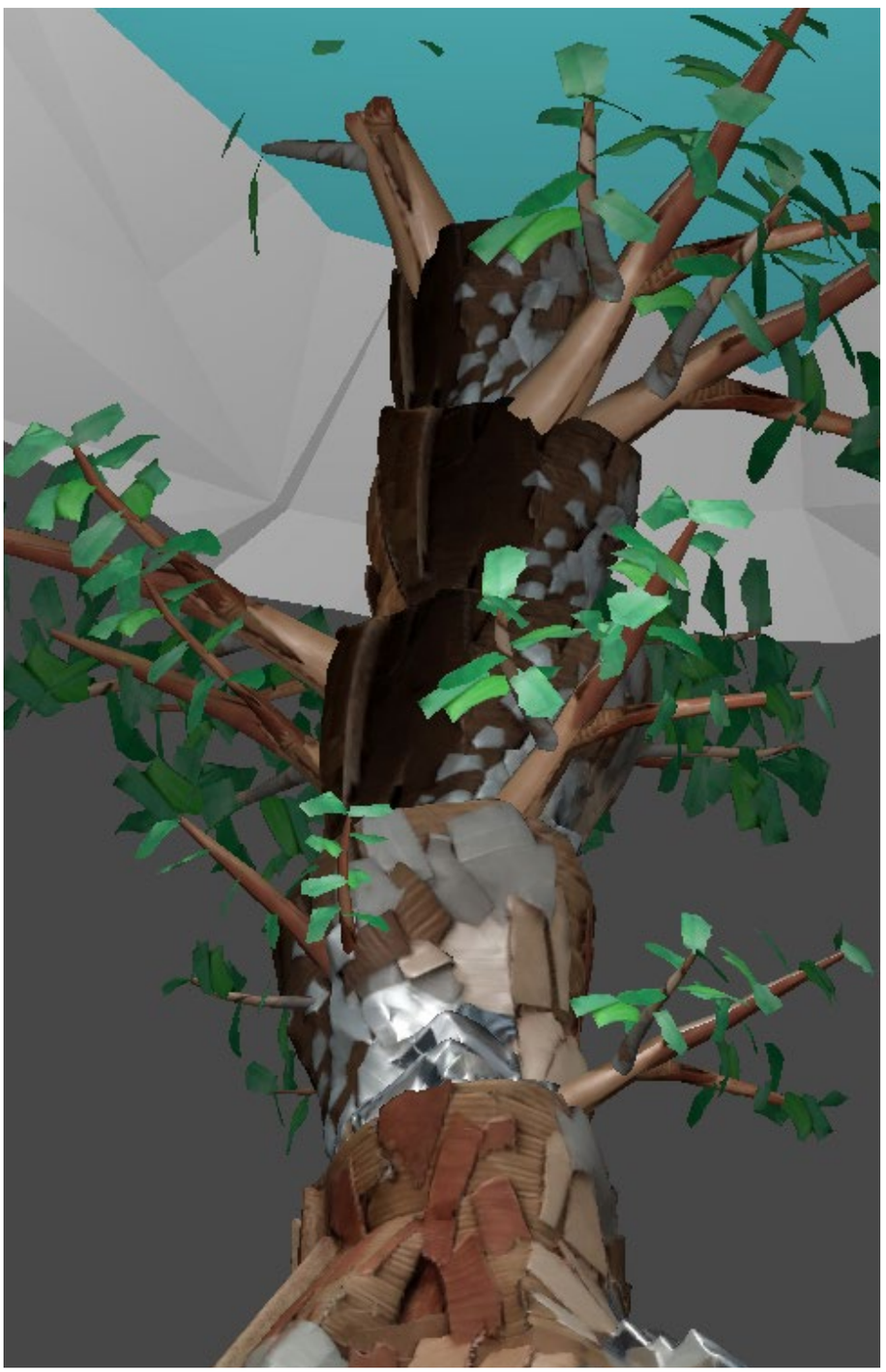
- → the integration of passthrough and scene understanding functions from the Meta XR SDK,
- → the creation of a mesh using the Mixed Reality Utility Kit (MRUK), and
- → the use of a passthrough shader.

Testing the application with passthrough, CC-BY HTW Berlin

In the passthrough mode of a head-mounted display such as the Meta Quest 3, the physical environment is captured by cameras and displayed in real time.

1.2.3. Use of Artificial Intelligence

Various AI tools were used to produce images, videos, sounds and 3D models. Some interactive objects, such as the tree stump and the watering can, were first constructed from cardboard, then photographed from all angles using the AI-powered smartphone app »Kiri-Engine« and automatically converted into 3D models with minimal post-processing.



A physical tree stump, its digital extension and a mixed-reality video, CC-BY Jens Isensee

1.3. Project Results

1.3.1. Mixed-Reality Installation »Novocene – A Possible Future«

»Novocene« begins in the physical exhibition space with a tree-stump sculpture made of cardboard and a head-mounted display (HMD). Anyone who puts on this HMD experiences a fast-paced, artistic and essayistic 15-minute journey from the untouched Holocene, through the man-made Anthropocene, to the Novocene as a possible future. Various interactions, such as pressing radio buttons, watering plants or setting spotlights using a construction light, drive the storytelling forward.

Call for interaction, CC-BY Jens Isensee

As an engagement with the global climate crisis, »Novocene« aims to foster empathy for scientific facts; as a philosophical reflection, the work seeks to awaken a sense of global responsibility and awareness of the urgency of action.

Furthermore, »Novocene« traces the history of media and offers an ambivalent perspective on humanity's faith in technology. The title is inspired by the environmental philosopher James Lovelock, who, in his 2019 publication »Novocene«, advocates hyperintelligence as a possible solution to the man-made crisis.

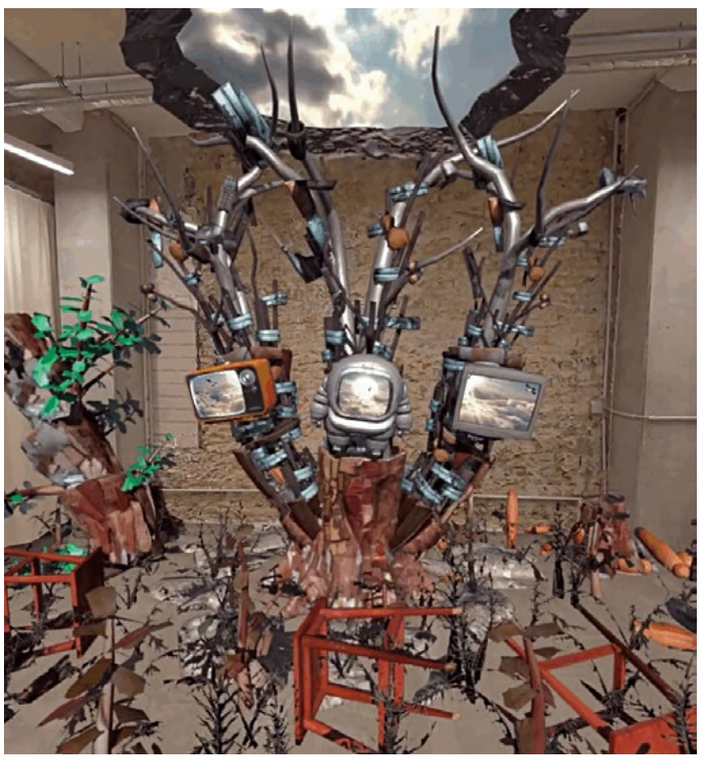
CRT TV, robot and flat-screen TV in »Novocene«, CC-BY Jens Isensee

1.3.2. Reusable open-source code

Download

Several features for mixed-reality applications on Meta Quest HMDs have been released as open source. They can be flexibly integrated into personal projects as required. Among other things, the package enables:

- → the simple implementation of ceiling penetrations,
- → a torch effect,
- → object anchors, and
- → an underwater scene with a dynamically rising water level.



Ceiling breach and torchlight effect, CC-BY Jens Isensee / HTW Berlin

1.3.3. Interdisciplinary academic article

Stark, Maja/Knepel, Julian/Isensee, Jens (2025): »NOVOCENE – An Artistic Mixed Reality Experience on the Anthropocene and a Possible Future.« In: Lucas Olivero et al. (eds.): Proceedings of the 22nd ACM International Conference on Culture and Computer Science: Remixing Analog and Digital (KUI, 25). ACM Digital Library, Article 18, 1–7. Doi: 10.1145/3769526.3769639.

Phygital Intimacy

Mixed Reality as a Medium of Togetherness

Participatory mixed-reality performance
featuring live dance and sound generated by movement
A collaboration with the Artistic Fellows
Lisa Kaschubat, Tasha Hess-Neustadt and Jane Arnison
2025/26

1.1. Research questions

Sophie K. Rosa's concept of radical intimacy[2] understands care and community as political resistance. Inspired by this theory, »Phygital Intimacy« explores how innovative technologies can function not as a divisive but as a unifying element. The aim is to create a sense of connection and intimacy between the performers themselves, as well as between humans and machines, through a shared experience in hybrid reality.

»Phygital Intimacy« led to expressive scenes reminiscent of compositions in late Renaissance painting, CC-BY Marisol Valqui Julius

1.2. Implementation

1.2.1. Development

Like »Novocene«, »Phygital Intimacy« was developed in Unity for the Meta Quest 3, but extends this approach into a participatory multiplayer application. Development focused on

[2] *Sophie K. Rosa (2023): Radical Intimacy. Pluto Press, London; Las Vegas, NV.*

transmitting Tasha Hess-Neustadt's physical performance in real time into the mixed-reality environment for a scalable number of participants from the audience.

A key focus was on network synchronisation and the real-time transmission of the dance movements to Tasha's avatar. Key tools were amongst others the »Rokoko« motion capture suit and the »Photon Fusion« framework.

Tasha Hess-Neustadt's physical body and their virtual representation as an avatar, CC-BY Jonas Pahl (le.) und Lisa Kaschubat (ri.)

Another focus was on the capture and 3D visualisation of body postures, as assuming specified poses is one of the central elements of the performance. The target poses are visualised as transparent VFX particle clouds. As participants in mixed reality do not have their own digital bodies, these clouds function as »holographic« stencils into which they can physically step.

1.2.2. Sound through Movement

Motion sensor in a 3D-printed case, CC-BY Lisa Kaschubat / Jane Arnison

For »Phygital Intimacy«, sound artist Jane Arnison has developed motion sensors specifically tailored to the performance. These wearable sensors capture physical movements in real time and convert the data into sound via communication with sound software. Arnison constructed the hardware using microprocessors and a range of motion sensors. She developed the custom software in C++ and Max/MSP, which was integrated into »Ableton Live« via »Max for Live«. Depending on the programming, the captured motion data can control various sound parameters such as voice, bass, frequency, pitch and volume. Tasha Hess-Neustadt wears several of these motion sensors on their body.
Their data is fed into the sound software, where it influences the sound parameters. Meanwhile, for performers from the audience, hand movements are tracked via the Quest 3 in order to influence the sound.

1.2.3. Dramaturgy of the Live Performance

The dramaturgy of the live performance brings together the musical and the dance-performance aspects of »Phygital Intimacy«. It was developed in close collaboration between Lisa Kaschubat, Tasha Hess-Neustadt and Jane Arnison, and took shape over the course of several meetings and rehearsals, which required a phase of experimentation and technical familiarisation. Motion sensors place musical composition and dance in constant interplay, merging into a sound-dance choreography. Tasha's performance is structured into successive sound sections, which are assigned to individual sensors and gradually activated within the software. For example, kicking movements of the legs trigger drums or bass, whilst the arms control higher frequencies and vocal distortions. The result is an interplay between the sensors' range of motion and bodily movement.

1.3. Project Results

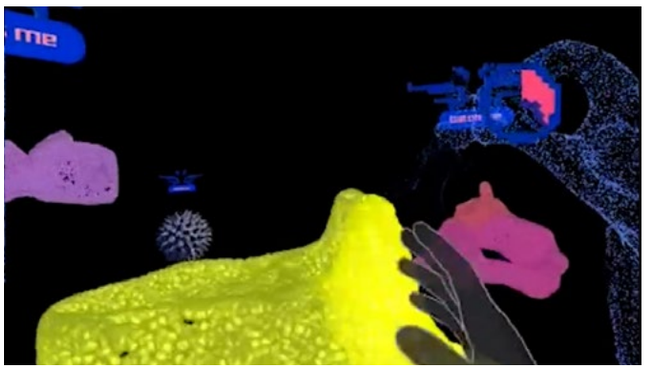
1.3.1. Participatory Mixed-Reality Performance with live dance and avatar

In »Phygital Intimacy«, 5–7 audience members are invited onto the stage. Wearing head-mounted displays (HMDs), they become performers in the mixed-reality multiplayer experience. One or two large projection screens display the view through an additional HMD for the audience outside the performance.

For 30 minutes, mixed reality becomes a medium for togetherness, connection and closeness. The medium guides participants into poses that foster awareness of their own physical presence in the space and the coexistence of other moving bodies. The choreography gives rise to intimate pairings and group formations reminiscent of expressive compositions in painting and sculpture. Repurposed gaming elements reinforce the sense of hybrid togetherness as digital »health points« are earned and shared equally amongst the players.

»Phygital Intimacy« in Berlin and Cologne 2025/26, CC-BY Jonas Pahl (TL) / Marisol Valqui Julius (BL/R)

»Phygital Intimacy« is divided into four levels:



CC-BY Lisa Kaschubat

Level 1 focuses on the interaction between humans and digital entities. Players interact with digital objects – they touch, embrace, follow or avoid them, and listen to them when they speak. The positions of these elements choreograph an improvised dance.

CC-BY Lisa Kaschubat

Level 2 presents body poses as virtual 3D stencils, which are adopted first alone and then in pairs to progress to the next level. In this level, for example, the players can be seen in the images at the bottom right and bottom left on page 21.

CC-BY Jonas Pahl

Level 3 marks a turning point: dancer Tasha joins in and demonstrates how body movements create sound collages. Tasha appears both as a physical body and as a digital representation in the form of an avatar. The avatar is animated using data from the motion sensors on Tasha's body (Rokoko).

CC-BY Marisol Valqui Julius

Level 4 forms the climax of »Phygital Intimacy« in virtual reality (VR) with an expressive dance performance. Gathered in a circle sitting on beanbags, the audience perceives the dancer solely as an avatar: body and technology merge into a single entity.

1.3.2. Standalone version as MR experience with an avatar

To ensure that »Phygital Intimacy« can be experienced and demonstrated without live dance, there is a standalone version in which, in mixed reality, the avatar dances alone instead of alongside a dancer.

Download

1.3.3. Reusable open-source code

The package contains a sample project with two advanced XR implementations in Unity:

→ a seamless »hole punching« portal between mixed reality (passthrough) and virtual reality
→ a network-based solution for live streaming of motion capture using Rokoko Studio.

3D visualisation portal, CC-BY Lisa Kaschubat / Carolina Ovando / HTW Berlin

Artistic Fellows

Jane Arnison

Jane Arnison studied music at the Sydney Conservatorium of Music and holds a Master's degree in Sound Studies from the Berlin University of the Arts. She divides her time between her own artistic projects and commercial work as a composer, sound engineer and producer. She also shares her expertise, for example as a university lecturer in music and in her book »Mixing in Flow – A Critical Approach to Mixing Sound«, published by Routledge/Taylor & Francis in 2025.

janearnison.com

Martin Binder

Martin Binder is an artist and designer based in Berlin. His interdisciplinary work combines art, design and urban practice, focusing on the relationship between humans and nature as well as the political dimension of public spaces – particularly in the context of hostile design. After studying industrial design at the Free University of Bozen-Bolzano, in St Petersburg and Helsinki, he completed a Master's degree in »Art in Context« at the Berlin University of the Arts.

CC-BY Rebecca Rütten

bindermartin.com

Tasha Hess-Neustadt

Tasha Hess-Neustadt is a dance artist based in Berlin and Munich. As a performer, Tasha's practice encompasses contemporary dance, improvisation, physical theatre and voice work. In their choreographic work, Tasha frequently explores themes of construction and deconstruction, as well as utopian and dystopian imaginaries; they investigate the materiality of the body and, at times, its extension into the digital realm.

tashahessneustadt.com

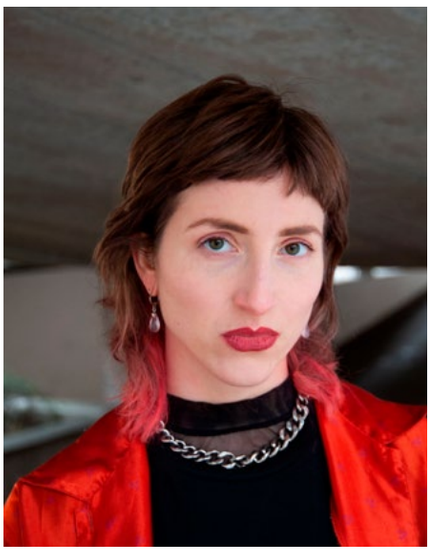
Jens Isensee

Jens Isensee is a transmedia artist based in Berlin. His work includes interactive and participatory installations, mixed-reality experiences, experimental and essayistic short films, as well as temporary cardboard sculptures featuring 3D-printed elements and embedded technology. All of these focus on a critical examination of developments and crises in contemporary culture, society and the environment.

jensisensee.de

Lisa Kaschubat

Lisa Kaschubat (she/they) is a transdisciplinary artist based in Berlin. She studied Performance & Time-Based Media and Sculpture at the Berlin University of the Arts. Her artistic practice explores themes such as physicality, interpersonal relationships and emancipation, as well as their intersections with technology and virtuality.



lisakaschubat.com

Projektteam

Leonid Barsht

Leonid Barsht is an XR developer, research assistant and lecturer at HTW Berlin. He has been involved in several projects at the intersection of culture and XR technologies, including the AURORA School for ARtists (2018–2022), XR_Unites (2020–2023) and HERA (2023–2025). The XR projects he has developed in collaboration with artists include »from hostile to hospitable« with Martin Binder and »Phygital Intimacy« with Lisa Kaschubat and team.

Prof. Dr.-Ing. Johann Habakuk Israel

Prof. Dr.-Ing. Johann Habakuk Israel teaches and conducts research in the fields of human-computer interaction, computer graphics, and information visualisation at HTW Berlin, where he heads the research group Human-Centered Immersive Systems (CENTIS). Much of his work on 3D sketching in immersive environments focuses on its characteristics in design processes, learnability, long-term effects and technical implementation. At HERA, he was responsible for professorial project lead.

Julian Knepel

Julian Knepel was a research assistant, XR developer, research assistant and lecturer at HTW Berlin from 2022 to 2025. Following his work on the research projects ViTraS, ARPAS and VENTUS 2, he became an XR developer on the HERA project in 2024. During this time, he created »Novocene« in collaboration with the artist Jens Isensee, which was awarded an Honourable Mention at the A MAZE. / Berlin Festival in 2026.

Dagmar Schürrer

Dagmar Schürrer is a digital artist who works in the fields of expanded animation and extended reality (XR) technologies. She creates hybrid animations and multimedia installations in which she combines scientific concepts from biology and neuroscience with new technologies, translating them into poetic interpretations of human consciousness and its entanglements with the environment.

dagmarschuerrer.com

Maja Stark

Maja Stark is an art historian and project manager. Since 2018, she has been coordinating and leading EU projects at the intersection of culture and new technologies at HTW Berlin, such as the AURORA School for ARtists (2018–2022), XR_Unites (2020–2023), HERA (2023–2025) and, since 2026, the IUNO project. She is regularly involved in interdisciplinary research and publishes in conference proceedings and specialist journals.

Credits

»From Hostile to Hospitable«

»From Hostile to Hospitable« was created in collaboration between the artist Martin Binder, the AURORA XR School for Artists at HTW Berlin (L. Barsht, D. Schürrer, M. Stark) and those affected by hostile design – the latter contacted via homeless advocacy groups such as querstadtein e.V., Fixpunkt e.V. and the Berliner Stadtmission.

»Novocene – A Possible Future«

Artistic concept, story-telling, 3D modelling: Jens Isensee
XR development: Julian Knepel and Leonid Barsht, HTW Berlin
Production: Maja Stark, HTW Berlin

»Phygital Intimacy«

Concept and artistic direction: Lisa Kaschubat
XR programming: Leonid Barsht, HTW Berlin
3D artists: Lisa Kaschubat and Dagmar Schürrer, HTW Berlin
Project coordination and production: Maja Stark, HTW Berlin
Dance and choreography: Tasha Hess-Neustadt
Sound composition and interaction design: Jane Arnison
Avatar and portal design: Carolina Ovando
Chalice design: wro wrzesińska
Set design: Louis Caspar Schmitt

Support for motion capture system: Dockdigital Berlin
Supported by the Berlin University of the Arts

Special thanks to: Warja Rybakova

Acknowledgements

We would like to thank the European Regional Development Fund (ERDF) for funding the project »HERA – Handlungs- und Lernräume für Extended-Reality-Angebote mit der freien Kulturszene« (2023–25) as part of its programme »Strengthening the Potential for Innovation in Culture III« (INP-III). We would also like to thank the Berlin Senate Department for Culture and Social Cohesion for the kind support.

Imprint

»AURORA XR School for Artists – Review and Results 2023–2025« has been published as the final online publication of the ERDF project »HERA – Handlungs- und Lernräume für Extended-Reality-Angebote mit der freien Kulturszene« at HTW – University of Applied Sciences Berlin, available as open access under the Creative Commons licence CC BY-NC-ND 4.0.

Editors:

Maja Stark and Prof. Dr.-Ing. Habakuk Israel, HTW Berlin

Layout:

Dagmar Schürrer, HTW Berlin

Editorial team:

Maja Stark, HTW Berlin

Cover image:

Performance »Phygital Intimacy« at the Kulturforum Berlin, 25 September 2025 (see pp. 17–23). Photo: CC-BY Jonas Pahl.

This publication is funded by the European Regional Development Fund (ERDF) under the programme »Strengthening the Potential for Innovation in Culture III« (INP-III).

AURORA XR SCHOOL FOR ARTISTS

The final publication of the EU-funded HERA project with its program AURORA XR School for Artists highlights three innovative art and culture projects developed between 2023 and 2025 using extended reality (XR) technologies—augmented, mixed, and virtual reality. Through concise texts and rich visual material, it provides insight into the underlying research questions, the collaborative process, and the outcomes of the close collaboration between Artistic Fellows and XR experts from HTW Berlin.

aurora.htw-berlin.de