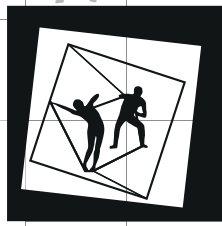


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EURAU - EUROPEAN RESEARCH ON ARCHITECTURE
AND URBANISM INTERNATIONAL CONFERENCE

**IN-PRESENCE /
THE BODY AND
THE SPACE**

The role of corporeity in the era of virtualization

Edited by: Marco Bovati, Anna Moro, Daniele Villa

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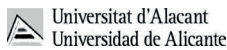
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The Department of Architecture and Urban Studies of the Politecnico di Milano organises at the School of Architecture Urban Planning Construction Engineering (AUIC), EURAU Milan 2024 "IN-PRESENCE / THE BODY AND THE SPACE - The role of corporeity in the era of virtualization", the eleventh edition of the international conference, which takes place from 19 to 22 June 2024.



/ EURAU Milan 2024

11th INTERNATIONAL CONFERENCE

EUROPEAN RESEARCH ON ARCHITECTURE
AND URBANISM INTERNATIONAL CONFERENCE

IN-PRESENCE / THE BODY AND THE SPACE

The role of corporeity in the era of virtualization

For those who deal with the city and the territory, space refers to the body
(C. Bianchetti)

The EURAU Milan 2024 Conference aims to unpack the significance of corporeality in contemporary times and its relevance for the upcoming years. Specifically, the focus is on the relation between body and space and how this relates to architecture, the city and the environment, interpreted as physical facts and processes. Within the background of a technological turn, the focus is now on what has changed or will further change in this relationship and what, on the opposite, remains unalterable, inherently bound to the material and impervious to the virtual.

TABLE OF CONTENTS

16	MARCO BOVATI, ANNA MORO, DANIELE VILLA Spaces, Bodies, Design - A Multidisciplinary Perspective
21	/ COMMITTEES
25	/ KEYNOTE SPEAKERS
27	1 / CONCEIVED
29	ID002 NADIA AMOROSO Visualizing climate action in urban design and landscape architecture. Strategies and impact
33	ID005 JOSEP MONTAÑOLA, MARGARET KRAWECKA, MAGDALENA SAURA Architecture and corporeity. Towards a new concept of place-making
37	ID009 LAMIA ABDELFATTAH, MATTEO ARIETTI, ANDREA BALESTRINI, CHRISTIANE BURKLEIN, GIULIA CASTELLAZZI, DIEGO DEPONTE, ANDREA GORRINI, VIRGILIO DÍAZ GUZMÁN, ZAYNEB KADIRI, GIULIO MARZULLO, FEDERICO MESSA The anatomy of public space. A multidisciplinary perspective
41	ID010 JORGE RAMOS-JULAR, FERNANDO ZAPARAÍN-HERNÁNDEZ Body-space relations in Bill Viola's audiovisual scenographies
45	ID012 ZHENGWEN ZHU Approaching the playground. Spatial practices for the body
49	ID020 MARÍA REDONDO PÉREZ Products, atmospheres and interactions. Relations between the body and Light Art
53	ID023 DIANA SALAHIEH, LAYLA ZIBAR, IRENA FIALOVA Exploring narrative research methods for an embodied reading of Prague's walkability
57	ID025 DANIELA COPPEDE PACHECO CIONI COPPOLA Diagramming & mapping. The underlying system of architecture
61	ID028 ALESSANDRO DI EGIDIO Fighting technological alienation. Performing media as a sustainable practice of human-machine symbiosis

65	ID034	SARAH JAVED SHAH, LIHENG ZHU The [socio-cultural] production of space. Doorstep: Exploring threshold in non-western contexts
71	ID035	FRANCESCA BERNI The weather body, the water space. Exploring the landscape as technological environment
75	ID040	CIGDEM AKIFOGLU, PELIN DURSUN ÇEBİ Bodily experiences on paper space. Imaginary narratives
79	ID041	BEATRICE LAMPARIELLO, SILVIA GROAZ From object to subject. The body architecture of Hans Hollein
83	ID042	LAURA SUIVERI The silent body. Exploring the neglected nexus of type, materiality, and human perception in Carlos Martí Aris
87	ID044	INÊS SALGUEIRO, RUI AMÉRICO CARDOSO, LUÍS S. VIEGAS On the importance of the body's experience in space and the act of drawing for the architectural conceiving process
91	ID046	MARIO COPPOLA Coexistence: The goal of architectural composition now. Architecture as trespassing tool to embrace culture, body, Earth
95	ID047	ANNA PROSKURIAKOVA Reimagining interaction between Industrial heritage and human bodies. Revitalization of post-industrial areas as an opportunity for small and medium-sized Italian cities
99	ID048	NILSU ALTUNOK, PELIN DURSUN ÇEBİ Looking at the city from our body through the "Walkers' Handbook or a Walking Lexicon"
103	ID049	MINGYUE ZHANG, JIN BAEK The body in architectural experience. Merleau-Ponty's phenomenology interpreting the strolling spaces of traditional oriental gardens
107	ID050	ANTÔNIO FREDERICO LASALVIA Paxton after Paxton: Form as formlessness in the dance of architecture
111	ID055	ROBERTO PODDA Eye-foot-hand. Actuality of a phenomenology of bodily life in the "exponential" space
115	ID060	GAMZE SENSOY Tracing the experience through the metamorphosis of body-space relationship
119	ID063	ZÜMRÜT SAHİN The artist's studio unveiled. Exploration of practice, body, and space
125	ID067	RAFAËL MAGROU Re-composing the theatrical space from the fourth wall
129	ID068	FRANCESCA CASALINO Dancing bodies. Anna Halprin and her workshops at Dance Deck and beyond
133	ID071	EZGI SELİN KARADEM, ET AL. How do we use our bodies to investigate our surroundings? Deciphering the individual and collective narratives of the architects
137	ID072	BEATRICE-GABRIELA JÖGER Between virtual and corporeality. Challenges in experiencing architecture today
141	ID073	ELIF CEMRE ÇELİKCAN Spatial cognition and representation of a verbally experienced environment. A study on preschool children's spatial construction through drawing
145	ID074	GEON-IL LEE, JIN BAEK Questioning the meaning of 'atmospheric'. A foundational study on climatic approach to 'atmosphere'

- 149 ID081 ZÜMRÜT SAHİN, NILSU ALTUNOK, PELİN DURSUN ÇEBİ, FATMA ERKÖK
Performing the everyday. Temporal spatiality constructed by body movements
- 153 ID085 YUE ZHONG
Touching the surface "Nahsicht" theory of Alois Riegls in tactile interaction between body-space
- 157 ID087 VALENTINA RADI
Generative thresholds. The simultaneity of passages
- 161 ID090 FRANCESCA COPPOLINO, VINCENZO VALENTINO
Spectrographies. Body, cinema, memory in the architectural project
- 165 ID095 ANDREA CRUDELI
The corporeal imagination of tactility. The methodology of Harquitectes
- 169 ID096 PABLO BERZAL CRUZ
Performing space. An approach to architecture through performance
- 173 ID097 MELİKE NUR SAHİN
Transformation of the objective-subjective dialectic in the body-space relationship throughout architectural periods
- 177 ID099 MARTINA CARANDENTE, ANNUNZIATA AMBROSINO
Space and rhythm. The cult of the body
- 181 ID102 FÜLYA SELÇUK, FERHAT HACIALİBEYOĞLU
From me/my body to margin: Discovering the minor spatialities of daily life through subjective trajectories
- 185 ID105 DEMET SATI, PELİN DURSUN ÇEBİ
Rethinking the body-space dynamic: Space as a body.
A comprehensive investigation through phenomenology and language
- 189 ID108 VOICA MARIUS, MARIA TÎLVESCU-NICULA, MARIA-CRISTINA CLENCIU
Unique experiences in the approach of architectural education
- 193 ID109 LINGZHENG ZHU
Writing as Cosmogogenesis. A Chinese genealogy of bodily traces in digitally augmented spaces
- 199 ID110 SIMONA CAPALDO
The transitional project for disused buildings. An alternative to the vulnerability of bodies and spaces for another way of doing architecture
- 203 ID115 TIANQIN CHEN, ANTÓNIO CARVALHO
Integration of aesthetics and accessibility. Enhancing living spaces for ageing communities
- 209 ID117 PAOLA BUCCARO
Beyond the threshold: The effects of the dematerialisation on the relationship between city and home
- 215 ID120 FRANCESCO TOSETTO
Natural tension. Myth, shape, body
- 217 ID127 LEONOR REIS, CARLA GARRIDO DE OLIVEIRA, FILIPA DE CASTRO GUERREIRO
Fragmented narratives: Drawing memory and time in the scarp of Fontainhas
- 221 ID129 ESTHER LORENZ
The Augmented Kinesthetic City. Embodied experience of Hong Kong's urban morphology
- 225 ID130 SEGAH SAK
Ankara train station as a locus of conflicts

- 229 ID132 AI CHENG, WU YUE, FILIPPO ORSINI
The interplay of action art and architectural spatial practice. A case study of Chengdu
- 233 ID134 ANGELO GANAZZOLI
The tomb as an architectural garrison in the era of virtualization.
The recovery of the sacred dimension of architecture
- 237 ID135 TIAGO ASCENSAO
Ready-made architectural processes: Re-signification of reality as a solution
- 241 ID137 SARA GALANTE DE CAL
From 'common place' to a 'place in common' through architectural design
- 245 ID139 GIACOMO D'AMICO, ROSA MARINA TORNATORA
Designing beyond Earth. An evolution in body-space-architecture paradigm
for space design
- 249 ID142 MARTINA RUSSO
Ludomestic. Critical perspectives on dwellings, from standardization to
Reversible Destiny lofts by Arakawa+Gins
- 253 ID148 MARTINA CRAPOLICCHIO, SANTIAGO GOMES, ROSSELLA GUGLIOTTA
Elements of everyday life. Domestic spaces and actions in a pedagogical experiment
- 257 ID150 JEONGHEE KO, BAEK JIN
Reimagining Myeongdong. An act-oriented approach to urban resilience and adaptation
- 261 ID153 LUÍS CARLOS BUCHA
The shell as spatial emergence: A house for and from the body
- 265 ID173 YIDAN LIU, MARCO BOVATI, PAOLO VINCENZO GENOVESE
Cultural narratives in transitional spaces of Miao Villages.
A case study of Guzang Festival and Jiubai Village
- 269 ID174 CARLA COLLEVECCHIO
Corporeal landscapes: Sculpture as a pedagogical device
- 275 ID177 MARIA LUNE NOBILE
The city as a laboratory. Investigating body space interactions in the contemporary city
- 281 ID181 BILGE CAN, FATMA ERKÖK
Critical potentials of embodied mind through the works of Raumlabor
- 285 ID184 MARGARITA DANOU, SEVINA FLORIDOU
Voroklini coastal promenade and re-configuration of the Verki coastal estuary
- 289 ID190 ELIF CEMRE ÇELIKCAN, ASLIHAN SENEL
Spatial correlators in the functioning of autobiographical memory:
wandering through Virginia Woolf's home
- 293 ID194 OZAN AVCI
The Body as the site of architectural knowledge
- 299 ID205 MICHELA BAROSIO
Types, codes and algorithms for a perception's centered design
- 303 ID206 GIANLUIGI DE MARTINO, VIVIANA SAITTO, STEFANO GUADAGNO
Not only human. Not only terrestrial. Teaching through the measurement
of body and space
- 307 ID212 CLAUDIA PIRINA, GIOVANNI COMI
To the rhythm of dance. Interactions between body, light and architecture
- 311 ALISIA TOGNON
1/ ENDNOTES

313 **2 / INTER-ACTIVE**

- 315** ID004 LUCA LAZZARINI, GLORIA LISI, MARO MAREGGI
The Walking Body. A reflection on the walking–design relationship based on the experience of Laboratorio del Cammino
- 321** ID006 DAFNI RIGA
Bodies on the move. Exploring the effects of speed in the body-space relationship
- 325** ID008 ALBA BALMASEDA DOMÍNGUEZ
Bodies, water and the city: Collective bathing in urban surroundings
- 329** ID021 NICOLETTA BRANCACCIO
Embodying the oblique. How space coding and construction of reality can explain the relation between space and emotions
- 333** ID024 BELEN ZEVALLOS BORGES
Making a case for space in schools. The learning landscape of Wütoschingen
- 337** ID030 SIDDHARTH SRIVASTAVA
The body and its urbanity. Cities in India
- 341** ID033 YOURI SPANINKS AMARO
The body is the machine. Interpreting Lisbon’s threshold spaces through corporeity
- 345** ID036 CAROLA D’AMBROS
How body shapes architecture. The immersive experiences of Villa Fontana and the Twin Villas
- 349** ID037 SILVIA SFLIGIOTTI
The art of arriving. A somatic approach to a critical understanding of the built environment
- 353** ID039 BUKET SAMANCI, IREM SÜTÇÜ
Dynamic interactions between boundary and the body: Instantaneous spatial formations
- 357** ID045 SUSANA VENTURA
The composition of architectural sensations: Blocks of intensive body-space and their potential to transform environmentally-sensitive architecture
- 361** ID054 CHRISTINA GEORGA
When cinema introduces the new embodied spatial experience. Regaining hapticity through the cinematic lens of Michelangelo Antonioni
- 365** ID058 RAFFAELLA CAVALLARO
The pedagogical value of the body in the design of contemporary learning spaces. Giving the child back his ninety-nine worlds
- 371** ID059 ROBERTO JUAN CARDINI
Interactions in the processes of occupation and appropriation of space. Interpretation of practices in the Mercato Sonato, Bologna
- 375** ID065 IPEK ÖZER
Reading body and place relationship through public art
- 379** ID069 SEÇİL YATAN GÜL, ASLIHAN SENEL
Notational Drawing. A study of an embodied knowledge of architectural space
- 383** ID070 FRANCESCO IULIANO
The interaction inhabitant-space as a design tool. How an inhabitant-centred design approach can shape the renewal of the existing building stock
- 387** ID080 NATALIA MATESANZ VENTURA
Affectent bodies and spaces in the reshaping of the established city. Urban communes and counter-drag in the free city. San Francisco, 1966-75

391	ID084	INÊS SALEMA GUILHERME, RUI JORGE GARCIA RAMOS, GISELA LAMEIRA Everyone and everywhere. Intergenerational practice as evidence of the bodies in the space
395	ID086	GIULIA AZZINI The human scale of riverscapes. A body-centered perspective for fragile territories
399	ID092	THIRUNESHA NAIDOO Interactive designed public spaces: Shaping Melbourne's general markets through performativity and performance
403	ID093	CASSANDRA COZZA Children architectures. Spaces for discovering and caring inhabited by different and changing corporealities
409	ID100	GIANFRANCO ORSENIGO "You must have been there". Designing re-socializing spaces within prisons
415	ID106	FRANCESCA MUSANTI, ANDREA MANCA, CLAUDIA PINTOR Sensitive places. A phenomenological perspective for accessible design
419	ID124	MAHDI ALIZADEH The pursuit of presence in Siza's architecture. A phenomenological narrative of Piscina das Marés
423	ID131	MARIA OLIVEIRA EPIFÂNIO DA FRANCA, ANA SOUSA BRANDÃO ALVES COSTA A journey around my apartment. The relationship between dwelling and the COVID-19 pandemic lockdown
427	ID136	ELEONORA ANTONIADOU The body as a tool in architectural pedagogy. Global tools Body Workshops
431	ID140	GLORIA CALDERONE Designing bodies: New challenges for a more corporeal urbanism
435	ID141	ANDREA SCALAS Grounding. Body and contact with prehistoric matter
439	ID155	ANDRÉS SEÑORET Does social interaction at a street level promotes community ties? Density, diversity, bodies and affect in neoliberal downtown Santiago
443	ID157	ANDREA MANCA The maieutic value of form. A genealogical ramification of engagement in architectural and urban project
447	ID166	BARBARA COPPETTI Retrospective Prospective. The body inhabits the world
451	ID170	JAVIER SÁNCHEZ MERINA Microarchitectures. Exploring intimate connections between body, space, and the understanding of diverse realities
455	ID171	PAOLA SCALA Traces, bodies and the public space
459	ID172	YIORGOS HADJICHRISTOU Body in space. Space as a body. Interaction of bodies in Malleable courtyards
463	ID182	BILGE CAN, FATMA ERKÖK Searching for the traces of avant-garde theory in practice. A parallax view of Diller and Scofidio
467	ID191	E. BURCU ERYILMAZ Les immatériaux and the paradigm of interaction
471	ID193	ORFINA FATIGATO Project as a process of transition: Precision, adaptability, indeterminacy

- 477 ID195 SORAIA PATRÍCIA ANTUNES DOS REIS, CARLA GARRIDO DE OLIVEIRA , FILIPA DE CASTRO GUERREIRO.
Cross-border cooperation: For a sustainable territorial planning. Insights from Rio de Onor and Rionor de Castilla in the northwest of the Iberian Peninsula
- 481 ID200 NEIL LAMB, WHITNEY BEVAN, MARÍA JOSÉ MARTINEZ SANCHEZ
Enhancing student learning, inclusivity, and a sense of belonging in higher education through community engagement and civic projects
- 485 ID203 GERARDO SEMPREBON, CHANG LIU, ZHI LEI
The enigma of density. Testing design proposals to revitalize Hua'anli urban village (Wuhan)
- 489 ID216 CRISTELLE LECOEUR
First semester in architecture: A body confronted with the reality of suburban spaces
- 492 STEFANO SARTORIO, FRANCESCO AIROLDI
2/ ENDNOTES

495 **3 / AFFECTED**

- 497 ID007 AIKATERINI ANTONOPOULOU, SEBASTIAN AEDO JURY
The body of the crowd as a cartographic tool through the Kill the Bill movement in Bristol
- 501 ID027 JULIA NERANTZIA TZORTZI, MARIA STELLA LUX
Citizens as main characters in urban adaptation. People's experience and contribution in the development of Decision Support Systems
- 505 ID056 ALESSANDRO GAIANI
Post natural inclusion
- 509 ID061 CINDY MENASSA-KÜELBY
Rethinking design: Body, behavior, nature, and our role in balancing ecosystems
- 513 ID062 FRANCESCA DI FUSCO
Interdisciplinary dialogue: Body, space and well-being. The impact of architectural and urban configurations on paces of care
- 517 ID078 SARA NAFI
Exploring the synergy between transit-oriented development and architectural humanism. Qatar's transit evolution: bridging architecture and urban living
- 521 ID079 CICEK KARATAS
Navigating fragility and urban memory: The role of the Beledna Memory Map in preserving intangible cultural heritage post-earthquake in Antakya, Hatay, Turkey
- 525 ID089 FRANCESCA MELINA
A paradigm of the contemporary city: Temperature as embodied perception
- 529 ID091 ZHENG WU
Wind-driven urban design. Design urban ventilation corridors from the block scale
- 533 ID098 DANIELA BUONANNO, LUCIANA MACALUSO
Tree-space-body. Urban forestry in Naples and Palermo
- 537 ID101 DEEMA ALATTAR
Examining outdoor thermal comfort and the use of public transportation system: A sustainable approach for Qatar's rapidly evolving cityscape
- 541 ID118 CATARINA FREITAS, GISELA LAMEIRA
Visual urban quality and health. A pre-intervention analysis method
- 545 ID121 GENNARO VITOLO
Contemplation and rebirth: Cemeteries between atmospheres and inner journeys

- 549 ID122 GRETA CALIENDO
Cultural heritage and public space. Affecting social complexity of Contemporary City
- 553 ID138 FRANCESCA ZANOTTO
Diverse bodies, multiple scales: Architectural strategies for urban biodiversity
- 559 ID144 GIOVANNI COMI
Thinking in architecture. Matter as mediation between body and nature
- 563 ID152 ALESSANDRO FRIGERIO, LAURA MONTEDORO
Overtourism in UNESCO sites and its effect on urban public space. An EU project experience of research by design in Athens, Florence and Krakow
- 569 ID158 AYELEN BETSABE ZUCOTTI
The tags associated with the Munch Museum and its relationship to the Oslo community
- 573 ID159 KRYSTALLIA KAMVASINOY, LORENZO STEFANO IANNIZZOTTO
Bodies in the Void: Addressing socioecological challenges through temporary practices in *Terrain Vague* sites
- 577 ID168 NADIA MOUNAJJED
The body and the architectonics of the desert
- 581 ID179 FRANCESCO AIROLDI
Every-Body. Spatial education as a co-design strategy for disaster risk reduction, disaster risk mitigation, and climate change adaptation
- 585 ID180 HOCINE ALIOUANE-SHAW
Using situated pedagogies and the concept of interdependence to engage with the environment and call its future into being
- 589 ID186 SILVIA DI MAURO
Relational stratifications. Body-centered approaches for an adaptive reuse strategy
- 593 ID189 ALESSANDRA SWINY, MARIA HADJISOTERIOU, TERESA TOURVAS
Unsettled. Creating community in a displaced environment
- 597 ID209 SILVIA BASSANESE
Bodies - Figure[s] - Ground[s]. Practices that enable conflictual society to find form of coexistence
- 601 ID210 ALISIA TOGNON, EKIN OLCAY
Mountainous Mastery. Architectural adaptations and urban fabric in Trentino's challenging terrain
- 607 ID213 YI GUO
The affected body in hyper-dense urban habitats: Exploring embodied architectural experiences in Hong Kong and Shenzhen
- 610 SILVIA DI MAURO, KEVIN SANTUS
3/ ENDNOTES

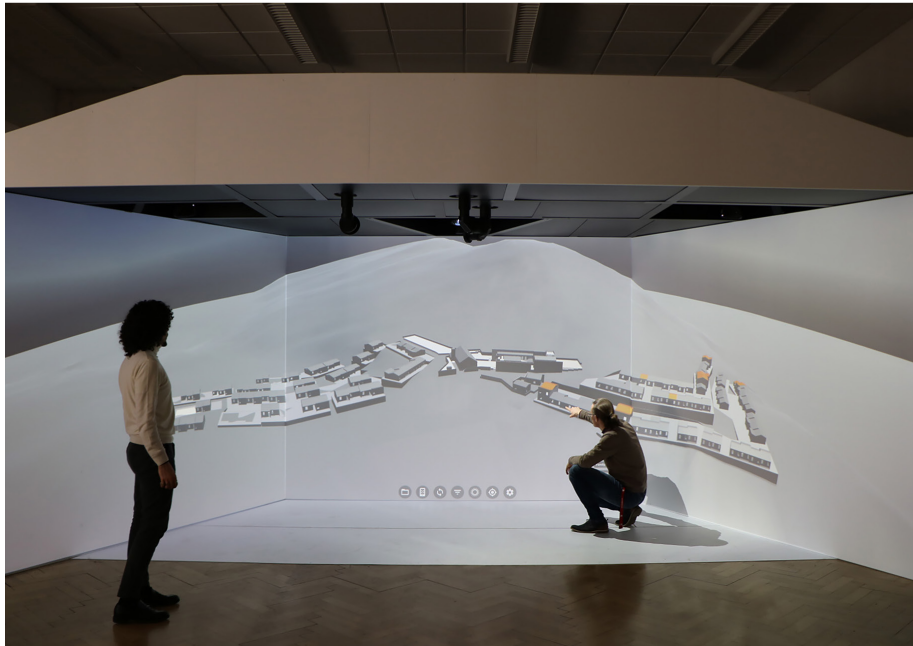
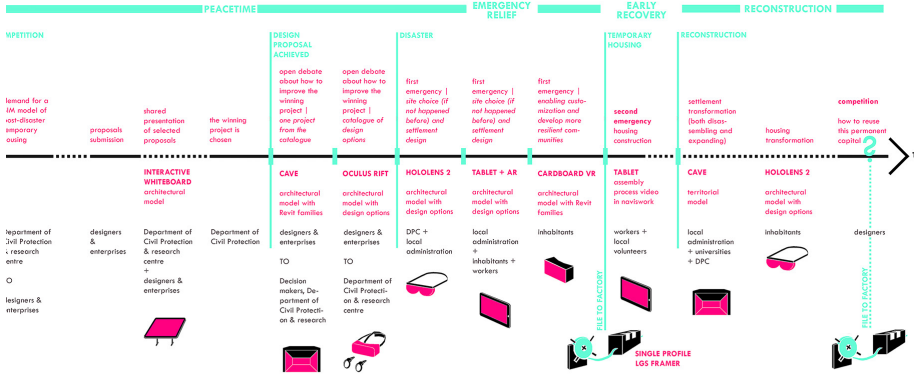
613 4 / VULNERABLE

- 615 ID017 ALLANA AVILA DORNELES
Vulnerability and Neuroarchitecture. Approaches to care in healthcare environments: a narrative review
- 621 ID032 MICHELA BASSANELLI, CAROLA D'AMBROS
Bodies, Work, Care. How office and domestic space is changing
- 625 ID043 NADIA MOUNAJJED
Pedagogies of care: Practices and methods for a non-ableist body-centered design

629	ID052	LUCA LANA The Gardening Body: The queer ecology of Prospect Cottage
635	ID053	FABIOLA CRISTALLI Sewing along the borders. Spaces and identities in and through modern cross-border cities
639	ID066	GAMZE AKYOL, EKIN OLCAY Echoes of heritage: Navigating the intangible heritage and urban memory in the post-disaster
645	ID077	ANGELA COLUCCI, ANTONELLA CUPPARI, ANNA SCHELLINO Diversity as a resource for inclusive public city. Exploratory walks for public city co-production and co-design
651	ID088	SARA RICCARDI The invisible ones: Bodies and spaces of the Italian prison in the 21st century
655	ID104	CLAUDIA PINTOR, ANDREA MANCA, FRANCESCA MUSANTI As many people, in as many places, as possible. A hypothesis of phenomenological approach to accessible project
659	ID114	FRANCESCA RIPAMONTI Shaping new and diverse gestures. A qualitative approach to the design of Healthcare Centers
663	ID116	INÊS ANDRADE, LUCIANA ROCHA Architecture in conflict. Dichotomies on current challenges in state-subsidized neighbourhoods in Oporto, Portugal
667	ID126	MARIO GALTERISI Built spaces, vulnerable bodies. A study on the influence of stigma in architecture
671	ID133	MICHELA VANDA CASERINI Beyond the ring-road: Ethnographical reading of a spontaneous settlement in Maputo
675	ID146	FIDEL MERAZ, ELEONORA NICOLETTI, MERATE BARAKAT Architectural inclusivity: Adaptive spaces for aural wellbeing of individuals with dissimilar sensorium
679	ID147	MARGARIDA PINHAL, FILIPA DE CASTRO GUERREIRO, CARLA GARRIDO DE OLIVEIRA The palimpsest, strategies to drawing multiples spaces to multiples communities. Martim Moniz, Lisbon
683	ID160	ARIANNA SCAIOLI Empowered bodies. The legacy of Tschumi's work as a driver for social and spatial transformation
687	ID161	MARIANA AGUIAR ANTUNES, CARLA GARRIDO DE OLIVEIRA, FILIPA CASTRO GUERREIRO Res-publica: The social role of architecture and urban design in the production of public housing in Porto
691	ID162	EMILIA CORRADI, CAMILLO FRATTARI Addressing vulnerability through place-based knowledge and co-design practices
695	ID169	SILVIA DI EUSANIO Rethinking urban spaces: An intersectional perspective
699	ID178	CAMILLA CASONATO Standing around the model. Bodies, participation, and landscape representation
703	ID185	ANGELA KYRIACOU PETROU, MARIA HADJISOTERIOU Design practices of inclusion
707	ID187	SAMER WANAN Child's play in the Palestinian landscape: On vulnerability & attachment
711	ID198	FRANCESCO STEFANO SAMMARCO, ANNA TERRACCIANO From Limit to Limine. Piazza D'Armi in Nola: from marginal place to new gateway to the city

- 715 ID201 CAMILLA CASONATO, ERICA CANTALUPPI
Heritage, community, and education. The case of Museu da Cidade in Sao Paulo
- 719 ID202 GERARDO SEMPREBON
Architectural design to regenerate fragile buildings in rural China
- 723 ID208 MARIA FIERRO
The "invisible" spaces of marginality: The case of Roma communities
- 727 ID214 DIOGO FARIA
Queer spaces of the cityscape of Funchal
- 730 ARIANA SCAIOLI
4/ ENDNOTES
- 733 5 / AUGMENTED**
- 735 ID011 ALEKSANDAR DUNDJEROVIC, STEPHEN SIMMS, MARIA MARTINES SANCHEZ
Body-centred strategies of urban scenography and cybernetic theatre: Two practice-based research case studies 'The Cybernetic Cabaret' and 'Looking for Andy'
- 739 ID013 ASMA MEHAN
Corporeality in Virtual Spaces: An exploration through AR/VR Technologies
- 743 ID014 AARON PATERSON, MARIAN MACKEN, SAROSH MULLA
Embodied Drawings and Virtual Twins
- 747 ID015 TINO GRISI
The generative artificial intelligence as tool of human augmented intuition and sensitivity in architecture
- 751 ID016 ADEL FERNANDO AL BLOUSHI
Virtual postures. Presence and simulated spatial phenomena
- 755 ID018 JENNIFER SHIELDS, ANNA OSELLO
Cultural heritage and augmented, mixed, and virtual realities: Accessibility and inclusion for people with disabilities
- 759 D019 STEFANIA RASILE
Architecture, death and the digitalization of memory: Cemeteries in virtual commemoration times
- 763 ID022 ANDREEA-GABRIELA NISTORESCU (MARINESCU)
Synthesis and synergy. The role of human-centered design in interior architecture and the dynamic interplay between physical and virtual environments
- 767 ID029 NERANTZIA TZORTZI, TARA SAHAFIAN
Analysis of water element integration in the architecture and landscape of Persian Gardens amid the hot and arid climate of the Iran's desert
- 771 ID038 JUAN CARLOS DALL'ASTA, JOHN LATTO
Reimagining body-space dynamics: Lessons from Shanghai, the contemporary land of Toys
- 777 ID051 ELENA ROCCHI, ELIZABETH LERMAN
Principled innovation in immersive learning environments: A roadmap for transformative change at Arizona State University's Herberger Institute for Design and the Arts using "technologies of human expression"
- 783 ID075 CUI LIU, ZHIYUAN GU
An assessment framework of physical-virtual publicness in public space
- 787 ID076 MAGDALINI GRIGORIADOU, GIORGOS LOUKAKIS, THEMISTOKLIS LEKKAS
Beyond reality: Exploring embodiment-disembodiment in mixed reality environments with non-euclidean geometries, innovative navigation modalities and perceptual dissociation in video games

- 793** ID111 VALENTINA RIZZI, DANIEL BARBA-RODRÍGUEZ
Virtualizing bodies in transformative platforms of corporeality: Embodied visualisation over flesh boundaries
- 797** ID113 ANDREEA ROBU-MOVILA
Neuroarchitecture. From effective computing to affective computing in the design process
- 801** ID128 SARA ANNA SAPONE
Transformation of an anthropic ecosystem. Esseburg Park between physical experience and digital representation
- 807** ID156 SARA CODARIN, KARL DAUBMANN
Humanizing VR: Foregrounding the role of the body in digital twins
- 811** ID163 GIOVANGIUSEPPE VANNELLI, MONICA ROSSI-SCHWARZENBECK
When the body-space relationship needs wider understanding to foster participation. A strategy to integrate reality, virtuality and stakeholders in post-disaster design
- 815** ID176 DARIA BELKOURI, PRITCHARD DOUGLAS
Reclaiming the city for people. Digitisation of city walks to enhance urban co-creation
- 819** ID183 CAROLINA PACCHI
Just cities in the digital era. Hybrid spaces, bodily presence and planning
- 823** ID192 ALVARO GONCALVES, PEDRO GUILHERME, SOFIA SALEMA
Rescuing an Unfinished Vision: A representation of the semi-dome of the Malagueira neighbourhood through Immersive Virtual Reality
- 827** ID199 MARKELLA MENIKOUI, ADONIS CLEANTHOUS
Prosthetic intelligence: Bridging the corporeal-ethereal gap in perceptions of space making
- 831** ID204 PRITCHARD DOUGLAS, DARIA BELKOURI
Assessing quality in the convergence of the physical and virtual: Challenges and imperatives
- 834** GERARDO SEMPREBON
5/ ENDNOTES



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When the body-space relationship needs wider understanding to foster participation.

A strategy to integrate reality, virtuality and stakeholders in post-disaster design

Key Words

Complex design, Temporary shelter, Digital transition, AR and VR, Transdisciplinary research

This contribution refers to a doctoral thesis on post-disaster design that, starting from the design of temporary shelters usually built during the early recovery phase, focuses on the crisis provoked by the seismic event. The dissertation aims to link together different design processes and phases: the temporary response of the early recovery phase, the reconstruction process and the revitalisation of the affected territories.

The complexity of the earthquake's aftermath challenges traditional design strategies and processes.

The research investigates this issue with reference to the Italian context, which is unusual considering the technical performativity and the number of projects realised to house displaced communities, although the lack of a specific post-disaster design culture is urgent to address. In this sense, architectural and urban design has to challenge its boundaries.

By virtue of these premises, the post-earthquake emergency is assumed as a field of exploration to broaden theories, methods and tools proper to architectural design. In this sense, some characteristics ascribable to this complex design demand are emphasised in the contribution: the impossibility of being on site, the large number of stakeholders and their phase-dependent variability. These characteristics lead to a reduction of the body-space relationship – when referring to designers – and at the same time the exponential increase of bodies – referring to stakeholders – involved in design processes. These elements are outlined here as meaningful for post-disaster design, understood as representative of complex design questions.

When an earthquake occurs, many sites are suddenly subject to transformative processes that address the emergency and a different group of stakeholders will correspond to each site; for example, the thesis mainly focused on the 2016 earthquake that affected 56 villages in marginal territories in central Italy.

Although the site visit – the spatial exploration performed by the body through the senses – is

generally considered a topical stage of the design process, when the same institution (the Department of Civil Protection in Italy) has to deal with so many sites and stakeholders, the current innovations that variously merge reality and virtuality can represent a meaningful tool in the design process to deal with such complexity, to foster interaction and decision-making and to ensure a broader interpretation of participation in the perspective of inclusive and open processes.

Within the dissertation, in order to avoid or minimize the reconstruction risk [Vannelli 2023], the post-earthquake design is assumed as a time-based design [Leupen, Heijne, van Zwol 2005] for an open [De Carlo 2013], open-source [Ratti, Claudel 2015], minor [Boano 2020] and processual project [Bocchi 2014]. At the same time, it is considered as a way to foster digital transition in marginal territories. In this sense, the post-disaster heritage can be assumed as a long-lasting construction site in which to develop further re-design processes where the integration of Virtual Reality and Augmented Reality can contribute to the definition of innovative scenarios for participation, simulation and forecasting.

The process described through the scheme presented here refers to a design experimentation for a reusable, flexible and modular housing system that allows for both its disassembly and expansion over time. The proposal intends, on the one hand, to cope with the unpredictable circumstances that may occur and, on the other, to avoid the "box effect" [Lizarralde 2010, p. 31] usually observed in temporary settlements. In the light of the complexity and need for interoperability in the long timeframe of these transformation processes, the possible roles and potential of immersive and non-immersive visualization tools have been explored [Rossi-Schwarzenbeck, Vannelli 2024].

Based on possible design scenarios defined in relation to the occurrence of the disaster, the outlined strategy is structured according to three phases: peacetime, emergency relief/early recovery and reconstruction.

In the light of the above, the simulation considers multiple stakeholders alternatively involved in the process at different stages. The uncertainty inherent in disasters required analysis and forecasting of the roles and relationships between inhabitants, workers, designers, enterprises, local administrations, Department of Civil Protection (DPC), and research centres.

The strategy starts with a design competition for temporary shelters launched by the Department of Civil Protection to provide the national government with a BIM model for post-disaster temporary housing. This procedure is proposed as necessary in the peacetime in order to avoid the acquisition of projects under emergency conditions.

After the acquisition of this first model, once the seismic event occurs, all the projects in the earthquake-affected sites will be realized to accommodate the displaced communities and then, afterwards, possible settlement or housing transformations may arise according to the inhabitants' needs, until the moment when a future competition can be launched for the reuse of the temporary heritage within other projects. In this process, the cooperation between the different stakeholders can be enabled and enhanced through the use of multiple AR and VR tools: the interactive whiteboard, the Cardboard VR, the Tablet featuring AR, the Oculus Rift, the Hololens 2, and the Cave Automatic Virtual Environment.

Within this research, 'participating communities' are understood by expanding the traditional meaning of the word 'community'. Considering that these transformative processes assume a trans-regional scale, the participating communities are the displaced people deprived of their houses, the representatives of the local administrations often unprepared to handle such complexity, but also the workers and designers who suddenly find themselves having to deal with an extraordinary amount and types of projects.

Therefore, in relation to each stage of the process, the preferable relationship between tools, stakeholders and purposes is considered on the basis of an in-depth understanding of the peculiarities of each device: Augmented, Virtual or Mixed Reality; possible number of users; required skills of the involved actors; costs of the tools; possibilities of interaction with the model and required software. As an example, we will refer to the least expensive and the most expensive tool: the Cardboard VR glasses and the Cave Automatic Virtual Environment.

Proposed in the stage between emergency relief and early recovery, cardboard VR glasses can be adopted as very common devices with the aim of engaging inhabitants through an immersive yet non-interactive visualization. In this way, a non-expert community, equipped with very inexpensive virtual reality devices implementing any kind of smartphone, can become part of the decision-making process.

The Cave – the most expensive tool considered in this research – is proposed to be used both in peacetime and during the reconstruction process. This VR space can allow around 30 people wearing special 3D glasses to be simultaneously immersed in the virtual reality of the design proposal and discuss it together. In peacetime, an open debate on how to improve the selected project in the competition is imagined between designers, enterprises, decision-makers,

DPC and research centres (considered as possible owners of the tool, the HTWK Leipzig was considered as such in the doctoral research). Furthermore, the Cave is proposed during the reconstruction phase to discuss the transformation of temporary settlements or the demolition and reconstruction of collapsed buildings between local administration, research centres and DPC.

Thus, the proposed strategy shows how a complex design process can be enabled and implemented in its different stages and according to its many stakeholders when using AR, VR and MR visualization tools. Moreover, the devices considered here were studied not only to realistically and immersively represent an architectural project, but above all to optimize the design, production and construction processes by reconsidering the involved bodies [Bianchetti 2020] merging together virtuality and reality as augmented bodies.

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FIGURES

Fig. 1 - Giovangiuseppe Vannelli. A possible strategy to integrate reality, virtuality and stakeholders in post-disaster design to foster participation, 2022, scheme and pictures. Authors with Christian Irmischer.

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