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Potencialidades (y límites) de las tecnologías virtuales inmersivas: hacia un Urbanismo Tetradimensional / *Potentialities (and limitations) of virtual immersive technologies: towards a Tetradimensional Urbanism*

La ubicuidad de las tecnologías inmersivas virtuales está contribuyendo a transformar nuestro sentido de privacidad e intimidad, difuminando la división entre espacios públicos y privados, domésticos y urbanos. Por un lado, la pandemia del COVID-19 ha impulsado su uso y, por otro, iniciativas como exposiciones y conferencias organizadas en entornos virtuales y digitales nos han dado la oportunidad de interrogarnos sobre el papel actual de la arquitectura en la configuración del mundo. Recorriendo brevemente algunos de los eventos en los que se ha planteado la ruptura del espacio tradicional de la casa y la compleja interacción entre la arquitectura (doméstica) y los medios (sociales), y analizando algunos casos de estudio de prácticas curatoriales contemporáneas, el artículo pretende explorar el surgimiento de nuevas formas de convivencia que tienen un profundo impacto en los espacios domésticos y las relaciones sociales. El paso de una aldea global a un hogar global cuestiona conceptos como edificios, propiedad, privacidad, intimidad, al tiempo que vuelve a abordar la simple verdad de que - incluso en los mundos digitales y precisamente debido a su estado tridimensional - el espacio (físico) todavía importa. Por esta misma razón, las tecnologías inmersivas virtuales se han convertido en una preocupación de la arquitectura, que deja abierta la cuestión de si y cómo esta capa adicional superpuesta a los modelos domésticos y urbanos actuales podría mejorar nuestro hábitat en pie de igualdad.

The ubiquitousness of virtual immersive technologies is contributing to changing our sense of privacy and intimacy, blurring the split between private and public, domestic and urban spaces. On the one hand, the COVID-19 pandemic has propelled forward their use and, on the other, initiatives such as exhibitions and conferences staged in virtual and digital environments have given us the opportunity to interrogate architecture's role in shaping the world today. Briefly going through some of the most important events which have posed the disruption of the traditional space of the house and the complex interaction between (domestic) architecture and (social) media, while analysing some suitable case studies of contemporary curatorial practices, the paper pretends to explore the emergence of new ways of living together which have a deep impact on domestic spaces and social relationships. The shift from a global village to a global home questions concepts like buildings, ownership, privacy, intimacy, while readdressing, at the same time, the simple truth that - even in digital worlds and precisely because of their three-dimensional status - (physical) space still matters. For this very reason virtual immersive technologies have become of architectural concern, leaving open the question of whether and how this additional layer superimposed to current domestic and urban models could improve our habitat on an equal footing.

tecnologías virtuales inmersivas, prácticas curatoriales, domesticidades, cuerpos virtuales, límites borrosos, casa global /// virtual immersive technologies, curatorial practices, domesticities, virtual bodies, blurring boundaries, global home

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Introduction

«On the horizon looms a new kind of society that no longer distinguishes between humans and things, nature and culture, politics, and technology, and instead forms a collection of humans as well as non-human «delegates», all possessed with a voice and a vote... a thing is accordingly no longer a dumb object, but a part of social discourse»¹.

The ubiquity of virtual space has changed both our sense of loneliness and our way of living together, having a deep impact on domestic spaces and social relationships.

The disruption of the traditional space of the house and the complex interaction between (domestic) architecture and (social) media had been already explored, depicting techno-utopian rhetoric scenarios, in the eighties, in such exhibitions as *La Casa Telematica* ('The Telematic House') at the sixty-first *Fiera Internazionale di Milano* in 1982, designed by Italian architect, artist and designer Ugo La Pietra, together with Gianfranco Bettetini and Aldo Grasso. 'The Telematic House' was a full-scale version of an idea which La Pietra had started thinking about on the occasion of the exhibition 'Italy: The New Domestic Landscape', curated by Emilio Ambasz in 1972 at the MoMA in New York, an exhibition that «is now seen as a milestone that contributed to the building of a new landscape linking media, design and architecture while arguably marking the moment in which the Italian radicals started to follow a more (American) commercial aesthetic»². Aesthetically characterized by the most common tropes of postmodern architecture, such as primary shapes, fake marbles, bold colors, the 'Telematic House' was very much like a television set, a theatre in which new domestic rituals were staged blending domestic with public spheres in a space where everyone was at the same time

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1. KUHNERT, N.; NGO, A, 2014. Get Real! Architectural Realities. *Arch + Journal for Architecture and Urbanism*. Autumn 2014. Vol.47, pp. 10-11. ISBN 9783931435295
 2. SZACKA, Léa-Catherine, 2021. Screen's Domesticity: from the Postmodern House to Our House. *Architectural Digest* [online]. Vol. 91, Issue 1, p. 79. Available from: <https://doi.org/10.1002/ad.2656>

Fig. 01. Space Popular, VII Festival Arquia-Próxima 2020. The Arena - Iñaqui Carnicero speaking during the festival.



spectator, actor, set designer. Information flux and spectacle permeated a domestic environment in which the boundaries between the reality of the house and the fictional world of the set were blurred.

Television and screens in general had already been protagonists in many other exhibitions held in the fifties and in the sixties: the appealing collage *Just what is it that makes today's homes so different*, produced by artist Richard Hamilton in 1956 in the frame of the 'This is tomorrow' exhibition, pointed out the centrality of television in fifties British domestic life; the 'House of the Future', designed by Alison and Peter Smithson in 1956 for the 'Daily Mail Ideal Home Exhibition', or the drawings produced by François Dallegret for Reyner Banham's article entitled 'A Home Is Not a House', halfway between hippie and ultra-technological aesthetics, investigated the interaction between architecture and its environment through television, screens and media technologies. The impact of media on the relationship between the public and the private and on domestic intimacy was also dealt with by Beatriz Colomina in her 1995 article 'The MediaHouse'. Television, fax machines, computer networks³ brought the outside world inside; 24-hours pay-television channels, and music video channels like MTV, in the early eighties, paved the way for the multiplication of screens, which would transform the togetherness symbolized by television as the focal point of the home into an individual experience consumed by different members of the household in different part of the house.

In fact, while the above mentioned references posed the issue of the consumption of television in terms of an individual experience, now 'virtual reality' – as the experience of digital 3D models via wearable immersive media has been called – provides an opportunity to refocus our efforts in addressing new forms of togetherness.

3. The internet, as we know it, was developed in 1962 by the experimental computer network known as ARPANET, which was comprised by a selected group of American universities and research centres. The purpose of the 'network' was to share and collaborate on projects. For more information see: COHEN-ALMAGOR, Raphael, 2011. Internet History. International Journal of Technoethics [online]. Vol. 2, Issue 2, pp. 46-64. DOI 10.4018/jte.2011040104

«With the outbreak of COVID-19, domestic and private environments turned into public spaces and theatres of the everyday. Now more than ever, we live in media houses where screens are the ultimate mediators between inside and outside. The real and the simulacra get superimposed, creating an advanced level of individualism that allows us to – paradoxically – live together». ⁴

Virtual spaces, accessible from our homes, are becoming more and more an escape solution and a way to connect with others. For Spanish architects and designers David Jiménez y María Ángeles Peñalver, founders of *Common World*, new processes and methodologies must be put in place in order «to be in a virtual space where the virtual part doesn't feel like a plan b». ⁵

Learning from exhibitions and curatorial practices

Online exhibitions based on VR immersive technologies address issues about the dissolution of individuality (private) towards collective (public) space in the home, and the reconfigurations of spatial and temporal dimensions of our domesticity. By doing so, they give us the opportunity to explore the idea of other forms and meanings of being situated in space, which may affect the way people behave and interact with each other. Not to mention the fact that they represent experimental platforms from which possible futures could emerge.

An example of such platforms is the *VII Festival Arquia/Próxima 2020*, under the theme *Punto de inflexión* (Turning Point), designed by the London-based practice Space Popular (Lara Lesmes y Fredrik Hellberg), and curated by Gonzalo Herrero Delicado for The Arquia Foundation, which has been so far the first-ever architecture conference held in virtual reality. When transporting the event online, Space Popular created nine virtual rooms, organized on a grid reminiscent of the festival's originally intended site: Barcelona's Ensanche⁶. Each room was created with recognizable elements of the city of Barcelona, ranging from buildings and facades to pavements and streetlamps. Moreover, they were customized according to different purposes: The central *Arena* (fig. 1) had an amphitheater layout to host different kinds of events, such as roundtable discussions, lectures, award ceremonies; the 4 rooms of *Galería Próxima* were dedicated to the 4 sections in which the *Próxima* nominated projects had been curated; the *Galería Becas* hosted the exhibition of the competition projects awarded with scholarships; the *Galería Documental* was dedicated to the documentary by Javier Peña commissioned by Fundación Arquia for this edition. As Hellberg and Lesmes explained, «all this generates a close and familiar space for anyone visiting the platform, which is very important to generate interaction among them». ⁷

4. SZACKA, Léa-Catherine, 2021. Screen's Domesticity: from the Postmodern House to Our House. *Architectural Digest* [online]. Vol. 91, Issue 1, p. 83. Available from: <https://doi.org/10.1002/ad.2656>

5. Common-World, 2021. Homepage. In *Common World* [online]. Available from: <https://www.commonworld.space/>

6. Due to Covid-19, the event took place online.

7. INGRAM, Tracey, 2020. Why do Virtual Spaces Always Mimic the Real World? (Hint: It's not because designers are lazy). *Frame* [online]. 17 November 2020. Available from: <https://www.frameweb.com/article/space-popular-interview>.

Fig 02. Space Popular, Galería Próxima - Block One seen from above (Online 2020).



Considering the dependence on virtual space due to Covid-19 crisis, the use of digital communication technologies was accentuated, and many projects used videoconferencing tools in order to close the distance between each other. However, for Herrero Delicado that was not engaging for neither of the participants, which is why he proposed «to do something that was more social»⁸ for the *Arquia-Próxima 2020* event, «where people could talk to each other, discussing, bitching or gossiping about what was happening»⁹. The design and shape of the rooms promoted social exchanges between everyone who participated in the event, with a «traditional» gallery setting (fig. 2), which can be described as walking into a conventional two-dimensional website, in which «between pages you may bump into a friend who is also visiting and take a few steps down to the side gardens for a chat».¹⁰ Taking into account that the event was proposed to operate at an international scale, all 3D assets were conceived as extensively accessible rooms. This means that «they had to be as ‘simple’ as possible and quite ‘cheap’ rooms – at least in terms of bytes – in order to be used in every device and connection».¹¹ For example, the avatars¹² (fig. 3), specifically designed for the virtual space of the rooms of the event, were two-dimensional graphic entities that contained two images

8. FAIRS, Marcus, 2020. Space Popular designs world’s first VR architecture conference as alternative to ‘boring’ Zoom talks. *Dezeen* [online]. 3 November 2020. Available from: <https://www.dezeen.com/2020/11/03/space-popular-worlds-first-virtual-architecture-conference/>

9. Ibidem

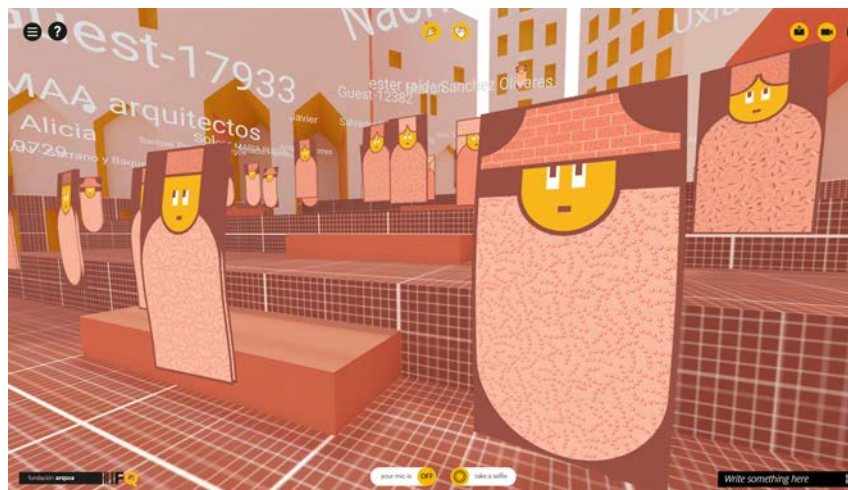
10. KHAN, Zohra, 2020. An architectural conference in VR by Space Popular reflects virtual togetherness. *Stir World: See, think, inspire, reflect* [online]. 13 November 2020. Available from: <https://www.stirworld.com/see-features-an-architectural-conference-in-vr-by-space-popular-reflects-virtual-togetherness>.

11. LESMES, Lara; HELLBERG, Fredrik, 2020. Punto de Inflexión. *Spacepopular.com* [online]. Available from: <http://www.spacepopular.com/2020---punto-de-inflexion--vii-festival-arquia-proxima>.

12. The term is derived from the Sanskrit word Avatara, which is originally referred to the incarnation of a Hindu god and particularly the god Vishnu. These entities used avatars as their physical representation in the mortal world of humanity; it was the vehicle through which they had access. With the rise of computer technologies and videogames, the word defines users’ representation in virtual worlds (See: WAGGONER, Zach, 2009. *My Avatar, My Self: Identity in Video Role-Playing Games*. North Carolina: McFarland & Company, p. 8. ISBN 9780786454099).

Fig. 03. Space Popular, Avatars designed by Space Popular for Arquia- Próxima 2020 (Online 2020).

Fig. 04. Marleen Stikker, Avatar generator for the platform De Digitale Stad (Online 1994).



(back and front) and, even if quite abstract, were given the possibility of moving their eyes, heads and bodies in response to different navigation and audio inputs, in order to grant mutual interaction. Avatars are important to create a sense of identity and digital presence in an exhibition – one that allows the representation of the visitors in space. This aspect can also be noted in the project *De Digitale Stad* (DDS) (1994) by Marleen Stikker. This interactive system simulated digital cities,

«allowing their citizens to navigate more intuitively. Users could fetch their mail at an email facility called ‘post office’, they could set-up their own homepages called ‘houses’ that were reachable by traveling across ‘squares’, or they could hang out in a café, which we nowadays see as a chat room».¹³

13. ALBERTS, Gerard Marc; WENT, Marc; JANSMA, Robert, 2017. Archaeology of the Amsterdam digital city: why digital data are dynamic and should be treated accordingly. *Internet Histories* [online]. April 2017. Vol. 1, Issue 1-2, p. 149. Available in: <https://doi.org/10.1080/24701475.2017.1309852>

Additionally, the platform had customizable avatars,¹⁴ (fig. 4) that «created a simple but effectively distinctive images for every user»¹⁵, and in doing so one could apperceive a sense of presence and *being* in the space.

In both *De Digitale Stad* and *Arquia- Próxima 2020: Turning Point*, their platforms allowed their visitors to interact with each other through their virtual representations. While in *DDS city*, because of the limited technologies at the time, visitors were able to talk with each other in the *Café* only by a chat function, *Próxima* added onto this social aspect by allowing people to use their microphones to chat with each other and even listen when someone was approaching. In other words, visitors' virtual presence could be felt and had an effect on the space, which a virtual architecture event had never achieved before. And it is precisely this social component that makes *Próxima* set itself as an important reference.

Nested and merged spaces

What is it that makes architectural virtual exhibitions so different, so appealing?¹⁶ As opposed to their static web pages counterpart, virtual exhibitions provide a more immersive experience, featuring navigation and interactive elements from video games. As Mark Wolf pointed out, videogames are a unique medium which «combine real-time game play with a navigable, onscreen diegetic space and the first to feature avatars and player-controlled surrogates that could influence onscreen events: real-time user interaction in one machine».¹⁷ Although a deeper insight into the mutual influences between architecture and video-games goes beyond the scope of this paper, it should be stressed that video-game design, and above all the mechanic of open-world video games, have opened up new research horizons into the interconnections of virtual and non-virtual spaces, paradoxically having the potential to foster disruptive spatial practices and experiences, on the one hand, and, on the other, re-enacting hegemonic discourses and power structures.¹⁸ Likewise, the possible implications of the fact that in virtual worlds your avatar might

14. Net-users were able to acquire a different and parallel identity online; it was still possible, at the time, to navigate anonymously without being directly connected or traced. But more importantly, the system provided a social platform and community where real connections with others could be made without the need to go out of the house.

15. Alberts, Gerard Marc; WENT, Marc; Jansma, Robert, 2017. Archaeology of the Amsterdam digital city: why digital data are dynamic and should be treated accordingly. *Internet Histories* [online]. April 2017. Vol. 1, Issue 1-2, p. 152. Available in: <https://doi.org/10.1080/24701475.2017.1309852>

16. "What is it that makes today's architectural exhibitions so different, so appealing?" is the title of the article by critic Sylvia Lavin for the publication *As Seen: Exhibitions that Made Architecture and Design History* in 2017. See: LAVIN, Sylvia, 2017. What is it that makes today's architectural exhibitions so different, so appealing? In: *As Seen: Exhibitions that Made Architecture and Design History*. RYAN, Zoë (ed.). Chicago: Art Institute of Chicago. pp. 118-123. ISBN 9780300228625

17. WAGGONER, Zach, 2009. *My Avatar, My Self: Identity in Video Role-Playing Games*. North Carolina: McFarland & Company, p. 8. ISBN 9780786454099

18. Jack Denham y Matthew Spokes, for instance, reflects about the possibility of positioning open-world video games as both contested spatial experiences and opportunities to challenge spatialised inequalities. For more information, See: DENHAM, Jack; SPOKES, Matthew, 2020. The Right to the Virtual City: Rural Retreatism in Open-World Video Games. *New Media & Society* [online]. 4 May 2020. No. 6. Available from: <https://doi.org/10.1177/1461444820917114>.

take any form, even extending your body into architecture, lie beyond the aims of this text. We are more interested in raising questions about whether spatial interactivity might change the perception of (real) space or not.

James Paul Gee has coined the term ‘affinity spaces’ to define spaces where people with an affinity (i.e., shared interests and passions; in his case, affinity for playing a video game) gather; they contain both physical and virtual spaces (and sub-spaces) that are nested within one another and interconnected (such as Twitch TV and YouTube channels, the game itself, conventions, clubs, coffee house, etc.). According to him, «space is a ‘social’ term. The word ‘empty space’ means a space that is not being used socially. It is certainly never empty of things».¹⁹ Affinity spaces, as Gee details, are also spaces where people organize themselves through emergent and bottom-up forms of socialisation, competing with institutions and states.²⁰ Agreeing with David Harvey’s studies,²¹ we cannot help but express our scepticism about this kind of alleged freedom, questioning to what extent these spaces are not influenced by the market. However, our main research concern is tentatively exploring the potentials and the limitations of the powerful tools and devices provided by immersive technologies, with a special focus on their consequences on domestic spaces and the renegotiation of their boundaries.

According to Space Popular, we are moving from the ‘global village’ to the ‘global home’, as we can now cohabitate virtual worlds from the comfort of our homes. In their visionary speculation for the future of virtual immersive and augmented environments, Lara Lesmes y Fredrik Hellberg state that the overlay of physical environments at each end of the shared virtual realm produces what they define a ‘Venn room’²² (fig. 6): «The Venn Room by Space Popular depicts a series of possible scenarios of cohabitation in which issues of integration, interface, exposure, overlap, representation, storage and ownership in the augmented future for our domestic environments are put into perspective through everyday narratives»²³. Space Popular figure a third spatial entity in which qualities of the other spaces involved merge, and blend with each other, generating a hybrid space «where the overlay of both rooms equates to a shared glitch from which whole new worlds emerge»²⁴, worlds in which formal and functional categories collide and can challenge our behavioural codes and rituals. The ‘Venn Room’ exhibition (fig. 5) puts on the table the idea of an

19. GEE, James, 2020. *What Is a Human? Language, Mind, and Culture*. Springer International Publishing AG, p. 233. ISBN-13 978-3030503819

20. Ibidem, p. 234

21. See: Harvey, David, 2019. *Rebel cities: from the right to the city to the urban revolution*. London: Verso. ISBN-10: 1844678822

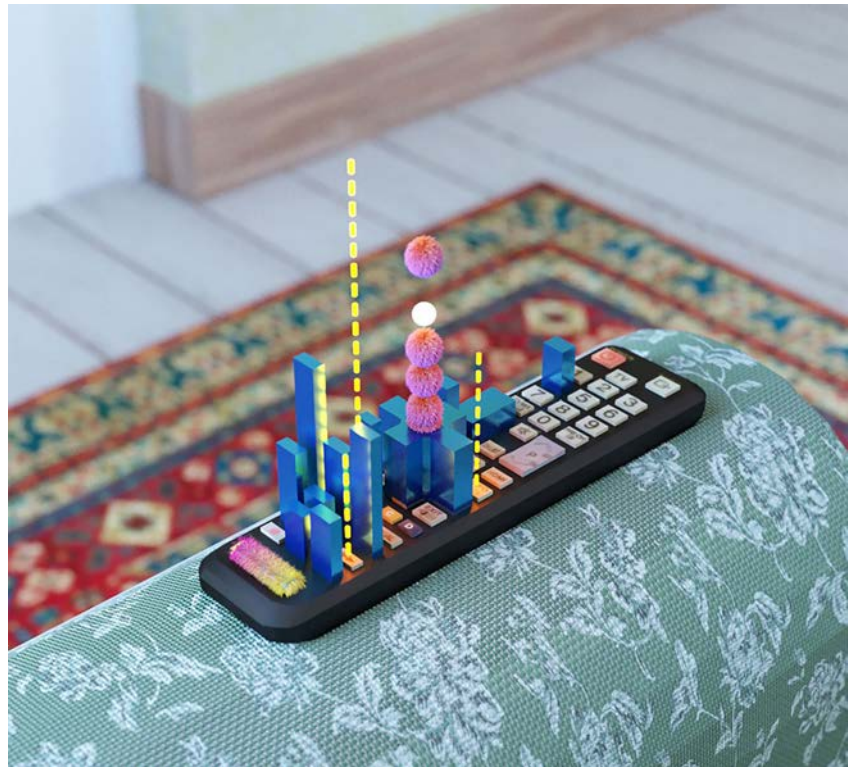
22. The ‘Venn Room’ was a spatial mixed reality experience first shown at the Tallin Architecture Biennale in 2019, curated by Yael Reisner.

23. LESMES, Lara; HELMBERG, Fredrik, 2019. The Venn Room. In *SpacePopular.com* [online]. [Accessed 15 may 2021]. Available from: <http://www.spacepopular.com/exhibitions/2019---the-venn-room>

24. LESMES, Lara; HELMBERG, Fredrik, 2019. Who owns the global home?. In *Tallinn Architecture Biennale. TAB19 “Beauty Matters”*, Rebecca Collings (ed.). Tallin: Estonian Museum of Architecture, p. 145. Available from: <http://www.spacepopular.com/virtual/2019---who-owns-the-global-home>

Fig. 05. Space Popular, Augmented potential of objects to be smart. The Venn Room (TAB19 «Beauty Matters» 2019).

Fig. 06. Space Popular, 3D model layout of the exhibition “The Venn Room” (TAB19 “Beauty Matters” 2019).



interactive house, in which, just as in video games, every object expands and generate an array of applications and uses. It becomes a possible scenario of misalignment in which several controversial issues about a renewed role of architecture may emerge: in a world in which there is no body to shelter, everything is changing by the second, and walls are made of pixels, concepts like buildings, ownership, privacy, intimacy are being questioned at their core.²⁵ The traditional functional zoning and domestic layouts no longer need to be coordinated: their own mission becomes totally inappropriate and unnecessary, because merged reality can bring their previously designated spaces and rooms momentarily together.

An example of the latter issues is the *Freestyle: Architectural Adventures in Mass Media* exhibition curated by Shumi Bose at Royal Institute of British

25. Ibidem

Fig. 07. Space Popular, Freestyle exhibition space at RIBA (London, 2020). Photo: Francis Ware.

Fig. 08. Space Popular, Freestyle virtual exhibition at Mozilla Hub (Online 2020).



Architects and organized by Space Popular. Using immersive virtual reality, the exhibition explored the relationship between mass media and architecture through a tour of six centuries of architectural style in the U.K, inhabiting both physical and virtual space.²⁶ At its physical locality, a large matte black-timber model (fig. 7) occupied most of the exhibition gallery at RIBA, and it could come alive once visitors put on VR (virtual reality) goggles. The Virtual exhibition space was both accessible through the gallery as well as the computer. A visitor at the RIBA gallery had the opportunity to share the same spatial and temporal experience as someone in a completely remote location at her/his home, thus dissipating the concept of boundaries (fig.8).

26. The *Freestyle* online exhibition can be accessed from: <https://hubs.mozilla.com/SSDbqoS/freestyle>

Once virtually inside, a miniature 3D model manikin, who acted as the host (fig.9), began to tell the story of how mass media affected architectural styles. Virtual and real world held close ties with each other throughout the narration by strategically maintaining the presence of some objects in both worlds: that was the case, for example, of 16th-century Italian architect Sebastiano Serio's seminal book, both opening in the virtual reality and tangibly present in a real display cabinet in the gallery a few feet away from the model, or of the colourful carpet designed by Space Popular which, present in both worlds, allowed «visitors to maintain a sense of physical orientation while immersed».²⁷

These examples clearly show that the practice of curating has expanded its scope and field of action. Not only is the role of the curator to bring together and connect practitioners, institutions, governments, industry, and communities, to bridge collaborations with each other: as Fleur Watson states, the new curator «identifies and articulates creative content that explores progressive and experimental ideas»²⁸, by means of a wider range of formats and digital media, which include virtual environments. Traditionally, exhibitions of architecture and design have focused on displaying the outcomes, finished work or artefacts of architectural practices by means of representation. Now the curator provides a shared space in which experimental approaches and cutting-edge methods of exploring and cutting across traditional disciplinary boundaries can be tested. The urgency to find new modes of interaction has directed the curator's choice in favour of more accessible, democratic, and sustainable virtual platforms, thus premiering new formats of cultural diffusion which redefine the meaning of boundaries, limits, portals, passages.

We have already crossed the threshold of a new paradigm, and we find ourselves at the edge of a new challenging world in which information can be inhabited in the form of three-dimensional places in which our virtual presence can be embodied. «Of the many design tasks and challenges architecture will face, perhaps the first one will be tied to our need for togetherness»²⁹. The «sense of togetherness»³⁰ already embedded in the term 'Global Village', which was popularized by the Canadian philosopher Marshall McLuhan in the 1960s, has currently reached another level. Previously, it was limited by one-way mass media, like radio or television, which restricted the number of interactions among people. Later on, other forms of togetherness have been granted through means such as the telephone, the letter, the telegram, the video-calls, but, since they do not involve the body, they have affected very little architectural spaces, whereas virtual worlds and platforms are changing this scenario,

27. SAYER, Jason, 2020. From the Printing Press to Pinterest, Surveying Mass Media's Influence on Architecture. *Metropolis Magazine* [online]. 11 March 2020. Available from: <https://www.metropolismag.com/design/arts-culture/space-popular-free-style-riba/>

28. WATSON, Fleur, 2021. *The New Curator: Exhibiting Architecture and Design*. New York: Routledge, p. 14. ISBN 9781351029827

29. LESMES, Lara; HELMBERG, Fredrik, 2019. Who owns the global home?. In *Tallinn Architecture Biennale. TAB19 "Beauty Matters"*, Rebecca Collings (ed.). Tallin: Estonian Museum of Architecture, p. 145. Available from: <http://www.spacepopular.com/virtual/2019---who-owns-the-global-home>

30. Ibidem, p. 137.

Fig. 09. Freestyle exhibition. The host presenting Act 1: Fifteenth to Sixteenth century of the immersive film (2020).



integrating a multiplicity of different kind of interactions with an indefinite number of places, invading our homes and renegotiating the meaning of domestic space.

Physical space (still) matters

In the spaces of (auto)surveillance of ‘The Telematic House’, characterized by the individual consumption of television, the architectural space of the home, still detached from the body, took the aesthetic of the media itself: ³¹ armchairs equipped with its own screen at their back, double bed split in two, each half equipped with its own separate screen. Architectural space was still the inhabitable space of the physical structure of the house. Now, virtual reality and immersive installations make the media themselves inhabitable; nevertheless, physical space still matters. Every single architectural detail of our homes, in the framework of mixed reality environments, has the potential to become an interface between its material existence and other potential and virtual existences. The size and layout of our homes themselves determine the way we can interact (standing, walking, etc.) in virtual worlds.

«Therefore, as long as you choose to access virtual worlds from within the safety of your privately owned property, your physical home will inevitably become the skeleton upon which these are built. As you bring your domestic blueprint into the virtual environments that you share with others, hybrids are formed, overlapping formal and functional categories in unprecedented ways and thus challenging our social codes and rituals.»³²

The impact in architecture of virtual and augmented reality technologies, because of their three-dimensional status, have become of architectural concern.

Virtual reality is, by definition, based on references taken from real life and therefore, even if it is audio-visually perceived, it is experienced multi-sensorially; as Elizabeth Grosz explains, by «singling out and intensifying certain regions of the body, it is stimulating it to maximal

31. SZACKA, Léa-Catherine, 2021. Screen’s Domesticity: from the Postmodern House to Our House. *Architectural Digest* [online]. Vol. 91, Issue 1, p. 83. Available from: <https://doi.org/10.1002/ad.2656>

32. LESMES, Lara; HELMBERG, Fredrik, 2019. The Venn Room. *Space Popular* [online]. Available from: <http://www.spacepopular.com/exhibitions/2019---the-venn-room>.

degrees»³³ and in doing so it makes it possible to inhabit virtual spaces from the physical spaces. In virtual worlds, we are constantly auto-completing stimulus triggered at a visual and audio level by means of our library of haptic sensations, «tapping into past memories to create an experience that is completed across time»³⁴. In an interview with Léa-Catherine Szacka,³⁵ Lara Lesmes explains that they advocate for what they call a ‘haptic revival’, that is to say a renewed interest in the sense of touch and the importance of materials (natural and synthetic) as a form reaction to the parametricism of the last decades.

In spite of their potentialities, virtual spaces still depend on our physical environments. The degrees of freedom (‘DoF’) added to 3DoF technologies – which means you can roll, yaw, and pitch (rotate along any axis) – by 6DoF technologies – which imply that you can move and walk along the 3 axes and, hence, in any direction³⁶ – offer an embodied experience, a true sense of presence in the virtual environment. But this fact consumes space and, at the same time, requires a substantial rethinking of the sense of privacy and intimacy. On the one hand,

«The imminent arrival of stand-alone VR devices to everyday life will only increase the need for space, as the umbilical cord that now link us to our heavy computers will be forever cut, granting us limitless freedom of movement only to realize it was another cord the one keeping us constrained all along, one much harder to cut: private property.»³⁷

And, on the other hand, since accessing virtual worlds expose our patterns of movement, these same patterns, «if accumulated over time, will reveal your physical home and habits. Inevitably, the way you choose to hide or reveal them will say as much about you as my clothes do today»³⁸. Hence, virtual and augmented reality technologies fundamentally still

33. GROSZ, Elizabeth, 2001. Embodying Space. In *Architecture from the Outside: Essays on Virtual and Real Spaces*, (Massachusetts: Massachusetts Institute of Technology, 2001), p. 18. ISBN 9780262571494

34. LESMES, Lara; HELLBERG, Fredrik, 2019. Who owns the global home?. In *Tallinn Architecture Biennale. TAB19 “Beauty Matters”*, Rebecca Collings (ed.). Tallin: Estonian Museum of Architecture, p. 141. Available from: <http://www.spacepopular.com/virtual/2019---who-owns-the-global-home>

35. SZACKA, Léa-Catherine, 2021. Screen’s Domesticity: from the Postmodern House to Our House. *Architectural Digest* [online]. Vol. 91, Issue 1, p. 83. Available from: <https://doi.org/10.1002/ad.2656>

36. «This seemingly small difference has tremendous implications in the requirements for physical space: whilst one could be visually transported to a forest without leaving the sofa through a 360 video with 3DoF, this is far from the true sense of presence brought by the embodied experience of walking through it with 6DoF. In this way, new virtual media that offers 6 Dof poses the true challenge to our everyday environments as it offers the possibility to visually inhabit spaces that might have very little in common with our living-rooms, bedrooms, bathrooms or kitchens.» (In: LESMES, Lara; HELLBERG, Fredrik, 2019. The Venn Room. *Space Popular* [online]. Available from: <http://www.spacepopular.com/exhibitions/2019---the-venn-room>).

37. LESMES, Lara; HELLBERG, Fredrik, 2019. Non Speculative Virtual House. *Space Popular* [online]. February 2019. Available from: <http://www.spacepopular.com/virtual/2019---non-speculative-virtual-house>.

38. LESMES, Lara; HELLBERG, Fredrik, 2019. The Venn Room. *Space Popular* [online]. Available from: <http://www.spacepopular.com/exhibitions/2019---the-venn-room>

Fig.10. MAIO, The Grand Interior: Towards a Diffuse House, Matadero, Madrid, 2020. Showing our domestic appliances being virtualized. Photo: Galerna.



deal with space: they end up reaffirming the intertwined, inseparable nature of non-virtual and virtual spaces, even if apparently focusing on a spot and ignoring its wider (social, economic, political, etc.) context. Following the findings of Sebastian Möring and Olli Leino³⁹ about gaming, we can state that we are facing an erosion of categories separating the so-called 'virtual' from the 'real'. Synthetic and virtual worlds

«... offer us no respite anymore: achievements and choices in these realms of play, experimentation and self-fashioning are no longer isolated and disconnected from who we appear to be [...]. Achievements are tallied in our own accounts, not in those of our avatars. Audience watching us play on Twitch.TV are interested in what we do on this side of the screen at least as much as they are in what the avatars are doing on that side of the screen.»⁴⁰

Consequently, as architects and urban planners, we should test and enrich our interpretative and conceptual framework, because the interrelation between virtual and non-virtual spaces is key in our efforts to better understand society and our lived experiences.

The relation between society and architecture has always existed. Societal transformations have inspired architectural interventions to house our rituals, norms, and cultural patterns: architecture mirrors back to our collective values.⁴¹ Because of ever increasing rents, affordable apartments are progressively becoming smaller. We are compelled to reduce our possessions, to avoid being forced to rent extra storage spaces out of

39. See: MÖRING, Sebastian; LEINO, Olli, 2016. Beyond games as political education –Neo-liberalism in the contemporary computer game form. *Journal of Gaming & Virtual Worlds*. 8(2), pp. 145–161.

40. Ibidem, p. 155.

41. BORASI, Giovanna, 2021. Cuddling Rooms, Body Banks, and Collab Houses. In *Canadian Centre for Architecture* [online]. March 2021. Available from: <https://www.cca.qc.ca/en/articles/issues/29/a-social-reset/77993/cuddling-rooms-body-banks-and-collab-house>.

home. Flexibility is the mantra of our domestic spaces, which, now more than ever, need to adapt to our daily routines that include working from home. In our tightly packed apartments, turning our dining table into a work-desk has now become a fundamental part of our daily tasks: a ritual for survival. We are simultaneously internalizing and externalizing «different services and spaces that do not necessarily occur within the same bounded domain». ⁴² (fig. 10) Not to mention that «one's personal lifestyle in the city involves the frequenting of a network of facilities, such as public baths, laundromats, and cafeterias, rather than having all of one's needs fulfilled within and by one's home... in other words, the entire city becomes one's home». ⁴³ Likewise, as Echevarría explains, these new forms of social organization «tends to expand throughout [our public and private landscapes] ..., transforming it into a new city». ⁴⁴ These transformations are supported, according to Yoshikazu Nango, «by economic principles and a capitalistic logic», ⁴⁵ epitomized in devices that make individuals reconfigure the way they use their spaces, redirecting them from a *global village* to a *global home*. ⁴⁶

The pandemic, however, by highlighting the importance of living in quality domestic spaces that adapt to the changing conditions of our lives, has enhanced attention to residential spaces. We are learning – at our expense – that what we have named so far an ‘emergency situation’, triggered by the pandemic, is actually a consequence of pre-existing conditions: (massive) collective housing have been used as arrangements of power relations and order, connected to behaviour normalization. From a spatial point of view, the lack of storage space and of access to light and green outdoor spaces, the size and number of rooms, the absence of liminal and intermediate spaces (such as balconies, rooftops, porches, garages), which characterize most of residential spaces, have demonstrated that they are completely unfit to the new psychogeography of isolation. Likewise, the global pandemic has exposed the fragility of the capitalist system, unleashing several parallel and intersectional pandemics, since it has affected and continues to affect each person differently, accentuating pre-existing vulnerabilities and inequalities. The very measures adopted to contain the spread of the virus, such as the reduction of mobility and confinement, show great social inequalities, since they start from the assumption that all people have a decent home in which to confine themselves, while the reality is quite different. How can the above-mentioned

42. PUIGJANER, Anna, 2020. Towards a Diffuse House. In *e-flux architecture* [online]. 28 July 2020. Available from: <https://www.e-flux.com/architecture/HOUSING/333708/TOWARDS-A-DIFFUSE-HOUSE/>

43. NANGO, Yoshikazu, 2021. Solitary and social. In Canadian Centre for Architecture [online]. March 2021. Available from: <https://www.cca.qc.ca/en/articles/issues/29/a-social-reset/77757/solitary-and-social>.

44. ECHEVERRÍA, Javier, 1994. *Telépolis*. Barcelona: Destino. p.2. ISBN 8423323668

45. NANGO, Yoshikazu, 2021. Solitary and social. In Canadian Centre for Architecture [online]. March 2021. Available from: <https://www.cca.qc.ca/en/articles/issues/29/a-social-reset/77757/solitary-and-social>.

46. Devices like Alexa by Google or Siri by Apple are augmenting our homes and transporting them anywhere we go while connected to our mobile devices. Out-sourcing has become an essential aspect of our lives, from Uber-eats acting as our kitchen to Zoom app as our schools and working spaces.

erosion of categories, separating the virtual from the real, face the challenges posed by this situation?

Open conclusions

In 1972, José Joaquín Aracil, in his article entitled 'Principio y fin de una utopía' baptized the Taray housing blocks in Segovia with the term 'urbanismo de tres dimensiones'⁴⁷ (*three-dimensional urbanism*), which reflects the success, in terms of social significance, of the international approaches advocated by CIAMs against the criticalities of the modern city model. Yona Friedman's theories about the *Ville Spatiale*, the theoretical models produced by Ricardo Bofill in his 1970 Architecture workshop titled, not by chance, 'La ciudad en el Espacio' (The City in Space), all demonstrate the possibility of creating a functional mix in collective housing that allows the coexistence in the same building of diverse activities, urban routes and intermediate spaces. Virtual and augmented reality gives us the opportunity to superimpose another layer on this model, a '*four- or tetra-dimensional urbanism*' in which collective dwellings can be equipped with an extra space, which democratically guarantees access to these new immersive technologies on an equal footing. Our presence is both offline and online, it is locally and globally located, is receiving, and sharing our data between spaces and other people.

Whether this space will be translated into extra rooms or larger rooms in the individual dwelling or into collectively shared spaces in the dwelling blocks, similarly with community laundries or nurseries...or whether they will be spaces that expand the private sphere (of the individual home) towards the public sphere (of the street and the city) or spaces which the housing blocks exchange with the city... or whether they will be open or closed spaces, or spaces dedicated exclusively to these activities or spaces of transitory colonization and occupation, still remains an open question. Like the colourful carpet in the RIBA gallery in the *Freestyle* exhibition, it will be necessary to find the most appropriate way to maintain a certain connection with reality and guarantee a certain sense of physical orientation, interacting with the physical and topographic context of the neighbourhood and the city, with its social fabric and values. This would imply the re-conceptualization of urban spaces, by the redefinition of social, cultural, and economic patterns, ownership, urban governance, urban transportation as well as the reformulation of public-private realms and natural environment, heading towards a more holistic approach which bursts into the public consciousness the importance of affection, care, and empathy to improve human and non-human habitat.

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47. See: ARACIL BELLOD, José Joaquín, 1972. Principio y fin de una utopía. *Arquitectura: Revista del Colegio Oficial de Arquitectos de Madrid (COAM)*. Vol. 166, pp. 49-53.

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