

The place of co-production: A physital space for collaborative urban government

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ABSTRACT

Many studies investigating urban government co-production focus on definitions and applications and often overlook the physical locations where this co-production occurs. This study introduces "physital" spaces—a synthesis of physical and digital elements—to enhance participatory urban governance. The research was guided by the following question: How can a space combining architecture and visualization technologies foster a new culture of collaboration between government and citizens in shaping urban policy? By employing architectural research methodologies that analyze a space's human behavior, the study considers a physital space in the Haifa neighborhood of Hadar with the aim of facilitating collaboration between municipal employees and civil society. The research is a Participatory Action Research (PAR) study and had three stages: *designing* the physital space; *implementing* a participation protocol to explore the functionality of the physital space in shaping urban-social policy; and critically *reflecting on* the emerging cultural dynamics within this innovative setting. The findings indicate that physital space not only fosters effective grouping and community bonding through its oval structure and interactive setup but also motivates participants to engage in dynamic co-production. The study challenges current Smart City paradigms that often limit real community involvement in decision making spaces, demonstrating how physital spaces can bridge the gap between theoretical urban governance and practical, inclusive policy making.

1. Introduction

"In a time of pandemic-induced isolation where the digital realm subsumes our interactions," holds professor/architect Carlo Ratti regarding the paradox of proximity in our increasingly virtual lives, "it is the role of architecture to foster new connections and create those serendipitous moments that are so rare on the web." Ratti's observation serves as a poignant reminder of the tangible bonds that architecture can forge—bonds that digital interfaces cannot replicate.

Whereas the COVID-19 era has witnessed an accelerated shift from the physical to the digital, Ratti's insights highlight architecture's crucial role in engendering human connections in ways the web cannot. It is within this interstice that the concept of urban government co-production arises, framing the dynamics of citizen involvement in urban governance—a notion pioneered by Elinor Ostrom in the 1970s and predicated on the active participation of citizens in municipal service delivery (Nabatchi et al., 2017; Ostrom, 1996).

The dawn of the digital age has not only redefined co-production but

has also prompted local authorities to create services that resonate more closely with residents' needs. The internet's incursion into public sector decision making has heralded various nomenclatures—such as digital government, e-democracy, and open government—each emphasizing a reinforced connection between the public sector and citizens for forging new value (Innes and Booher, 2000; Kneuer, 2016; Twizeyimana and Andersson, 2019).

While substantial focus has been placed on the co-production process, its stakeholders, and partnership dynamics, little attention has been paid to the physical spaces where co-production unfolds. The prevalent research on technology in urban governance primarily regards it as a tool for process enhancement rather than a foundational element of co-productive spaces. This inherently multidisciplinary research aims to synergize the co-production agenda with smart city initiatives that focus on the development of joint decision-making spaces. As explored by the present study, "physital" space blends physical and digital environments to enhance interactions and collaborative processes (Fig. 1). This investigation asks the question: How can a physical space with

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unique characteristics influence urban decision making processes based on a co-production agenda? Or more specifically: How can a space that combines architecture and visualization technologies foster a new culture of collaboration between government and citizens in the shaping of urban policy?

Methodologically, this research is based on architectural design studies that examine the relationship between the built environment and human behavior. The study consisted of three stages: designing, implementing, and reflecting on a physical space tailored for urban co-production. In this framework, we employed architectural design principles to create an engaging environment and used ethnographic methods, including participatory observation, video analysis, focus groups, and in-depth interviews, to reflect on the usage of the space and its impact on participants. The research framework was one of participatory action research (PAR): our research was not conducted on campus, but rather, for the sake of the study, we created a real space (as opposed to simply a model) in the heart of the neighborhood. We also established a coalition containing key real-world actors: representatives of the municipality, activists from the neighborhood, the neighborhood council, and managers of non-profit organizations operating in the neighborhood. The data was real and collected from the Haifa municipality and a local NGO. The case study on which we focused – elderly people during the COVID-19 pandemic – echoed burning issues on the neighborhood agenda.

The results indicated that the physical space significantly enhanced collaboration, fostering a sense of community and increasing motivation among participants. The space's design and technological integration were crucial in promoting dynamic interactions and actionable outcomes in urban policy development.

In addressing these themes, this article aims to contribute to both the academic and professional communities. Through a blend of architectural design and technological integration, this research demonstrates how such spaces can not only facilitate but also motivate collective action, ultimately contributing to more democratic and effective urban governance. This paper seeks to construct a conceptual framework, to generate empirical knowledge, and to offer practical guidelines for developing physical spaces to enhance participatory urban decision making. By combining architectural design and technological integration, this study illustrates how such spaces can, and indeed do, facilitate collective action, leading to more democratic and efficacious urban governance.

2. Literature review - bridging realms: the meeting of physical and digital spaces in urban co-production

As urban areas continue to evolve, the integration of digital technologies into physical spaces, referred to as “physical” spaces, has come to play a crucial role in shaping the future of urban governance. These physical spaces blend physical reality with digital overlays, enhancing both the functionality and accessibility of urban services while increasing the connection between governments and their citizens. This literature review explores the significant transition from traditional, isolated decision-making environments to these more inclusive and technologically integrated models that facilitate broader public participation.

By combining digital capabilities with tangible urban environments, “physical” spaces not only enhance the functionality and accessibility of urban services but also deepen the relationship between governments and their citizens. This combining, or bridging of realms, is crucial for creating spaces that are both technologically advanced and supportive of deep collaboration, ensuring that all stakeholders, especially the public, enjoy meaningful opportunities to shape their urban environments.

The transition from Web 1.0 technologies, which emphasized content generation for city services, to Web 2.0 technologies marked a significant shift in urban policy making.

These new technologies facilitated direct communication between city authorities and the public, transforming traditional civic engagement processes (E. Fisher, 2018; Moon, 2018). The advent of Smart City technologies further enhanced this transformation by allowing municipal authorities to harness a vast array of data, shifting urban co-production from mere participation to more dynamic, data-driven interaction (Cardullo et al., 2019; Kitchin and Lauriault, 2018). These developments have led to the creation of two distinct types of spaces within urban governance: virtual spaces for public participation and physical spaces that serve primarily as urban command centers. This dichotomy raises critical questions about the design and utility of physical spaces as new civic squares for inclusive urban policy making.

Since the 1960s, public participation in urban decision making has evolved from top-down planning into more inclusive approaches, such as communicative, collaborative, and advocacy planning, which emphasize active citizen involvement. Co-production, emerging in the 1970s, posits that effective public services require active public participation. This paradigm shift, supported by advancements in digital technology, increases information accessibility and improves service delivery through frameworks such as digital government, e-democracy,



Fig. 1. The ‘physical’ space design blends physical and digital environments to enhance interactions and collaborative processes.

and open government (Davidoff, 1965; Healey, 1992; Innes and Booher, 2000; Parks et al., n.d.; Rosen and Painter, 2019; Thorpe, 2017; Watson, 2014). Smart City initiatives have further leveraged these technologies to develop citizen-centric platforms for communication and needs assessment, although the reliance on virtual platforms may limit comprehensive urban dialogue and engagement (Cardullo et al., 2019; Sadowski and Bendor, 2019).

Traditionally, urban governance spaces have focused predominantly on management and control, as evident in “war rooms” designed for oversight and equipped with tools like sand tables for strategy simulations (Bennett, 1993). Although these spaces have integrated Smart City technologies to enhance urban service management through real-time data (Fig. 2), they generally remain inaccessible to the public, limiting direct civic participation in decision making processes. This exclusion can be starkly contrasted to the democratic ethos of the ancient Agora, where open debates and discussions were accessible to both decision makers and residents, embodying principles of transparency and collective engagement. To truly embody these democratic principles, modern urban governance must therefore evolve to reintegrate physical spaces that are as inclusive and interactive as their digital counterparts.

The integration of physical and digital elements to create “physital” spaces is revolutionizing user interaction across various sectors, enhancing operational efficiency and user experience. These spaces combine tactile and digital interactions, as seen in retail, education, and entertainment, where digital tools augment physical experiences. However, their application in urban governance, and especially in decision making and participatory processes, remains underexplored (Fanzini et al., 2022; Liu et al., 2022). In the context of modern urban governance, the Smart City paradigm—both as an academic concept and a market-driven model—has advanced digital methodologies and tools aimed at enhancing citizen participation and transparency in decision making.

Yet, the physical component of these participatory spaces has often been overlooked, despite the advancements in creating immersive and interactive environments such as CAVE systems and Decision Theaters (Hanzl, 2007; Salter et al., 2009) (Fig. 3). These environments have shown great potential for bridging the gap between theory and practice, although regular public integration in these physical spaces remains infrequent, reflecting a missed opportunity for sustained, participatory urban planning and governance. Collaboration between universities and municipalities on landscape planning and participatory planning initiatives shows promise, but often manifests as one-time events rather than ongoing practices (Noyman, 2015; Orenstein et al., 2015).

3. Research arena

The study’s focus and case study is the neighborhood of Hadar in Haifa, Israel, particularly concerning the issue of urban aging, which has been recognized as a significant challenge for cities worldwide (van Hoof et al., 2018). Various studies and policy papers have been written on the unique social characteristics of Hadar as an urban space with architectural, historical, and cultural legacy and values. The neighborhood was established in 1922 on the mountainside of Mt. Carmel, requiring a complex construction topology (Fisher, 2014). The urban planning associated with the neighborhood is the “garden city,” and the construction typology is 3–4 story residential buildings without an elevator. The mountainous topography on which the neighborhood was constructed and the absence of elevators in the residential buildings make mobility in the urban space more difficult, particularly complicating the urban lifestyle of the senior citizen population (Fig. 8).

When it was first established, the neighborhood was renowned for its many cultural institutions and public buildings, and its residents were originally from the middle and upper-middle class. In the early 1970s, the physical and social deterioration of the neighborhood began (Shilo, 2018). In the 1990s, a wave of immigration from the former Soviet Union populated apartments that had been abandoned with new immigrants seeking affordable accommodation, which they found in Hadar (Komemi and Yavelberg, 2015).

Hadar is also notable for its vibrant community form, with numerous non-governmental organizations (NGOs) and activists committed to improving neighborhood conditions. This active civic engagement was a key factor in selecting Hadar as a case study for the research. In the context of the senior-citizen population, which was specified as the target population for this study, Hadar is typified by an aging population, with 16.7 % of all residents over the age of 65, compared to the national average of 12 %. Of this older population, 58 % are bachelors, widowed, or divorced, compared to the national average of 40 % for this age group. This data indicates that the senior citizens of Hadar are at greater risk of loneliness than the general senior-citizen population of Israel. In addition, approximately 83 % of the senior citizens in the neighborhood live in rented apartments, in contrast to an average of 17 % in Israel as a whole. This indicates that the senior citizens in the neighborhood suffer from greater economic difficulties (Brookdale, 2020) (Fig. 9).

Hadar, with a population of 40,000, is diverse in terms of religion, nationality, and ethnicity. It is economically disadvantaged vis-à-vis the broader city context, with lower housing costs attracting economically vulnerable populations. The neighborhood’s aging residents face mobility challenges exacerbated by the neighborhood’s topography on



Fig. 2. Space of physical command center. Right: Managing a military force on a map. Source: <https://vassallohistory.wordpress.com/lascaris-war-rooms>. Right: The command and control center of the Smart City of Rio de Janeiro. https://www.c40.org/cities/rio-de-janeiro/case_studies.



Fig. 3. Right: Example of a lab planned in CAVE form. Photo from ETH Zurich, a Sensory-Motor systems laboratory in Switzerland. Source: (Kuliga et al., 2015). Left: A participatory planning process supported by an immersive display. Source: (Salter et al., 2009).

the Carmel mountainside, where street inclines can exceed 12 %, and the historical urban layout dating back to the 1920s features buildings without elevators. These factors combine to complicate life for the aging population, necessitating innovative solutions for urban mobility and accessibility.

4. Methodology

The present study was innovatively designed to both construct and reflect on such a space, drawing extensively from architectural research methodologies. This approach is crucial, as the study proposes a new architectural design tailored to facilitate urban government co-production, with the aim of enhancing how stakeholders interact within these environments.

The core objective is to use experimental analysis methods (Zifferblatt, 1972) to assess how the design of the new physital space

influences stakeholder behavior. Architectural research methodology typically begins by gathering data that describes the physical design and how the space is used on various occasions. It then evaluates the effects of the physical design on human behavior, aiming to understand and optimize the interactions within the space (Groat and Wang, 2013).

The study consists of three stages: designing, implementing, and reflecting on a physital space designed for urban co-production (Fig. 4).

4.1. Physital space design

The physital space, situated in the Technion’s Hadarion building at the heart of the neighborhood of Hadar (Fig. 5), mirrors the architecture of modern decision making rooms utilized in Smart Cities, which are known for IoT technology and real-time data flows (Stehle and Kitchin, 2020). This space, which occupies 34 square meters, features an oval layout with concave walls and high ceilings that enhance the immersive

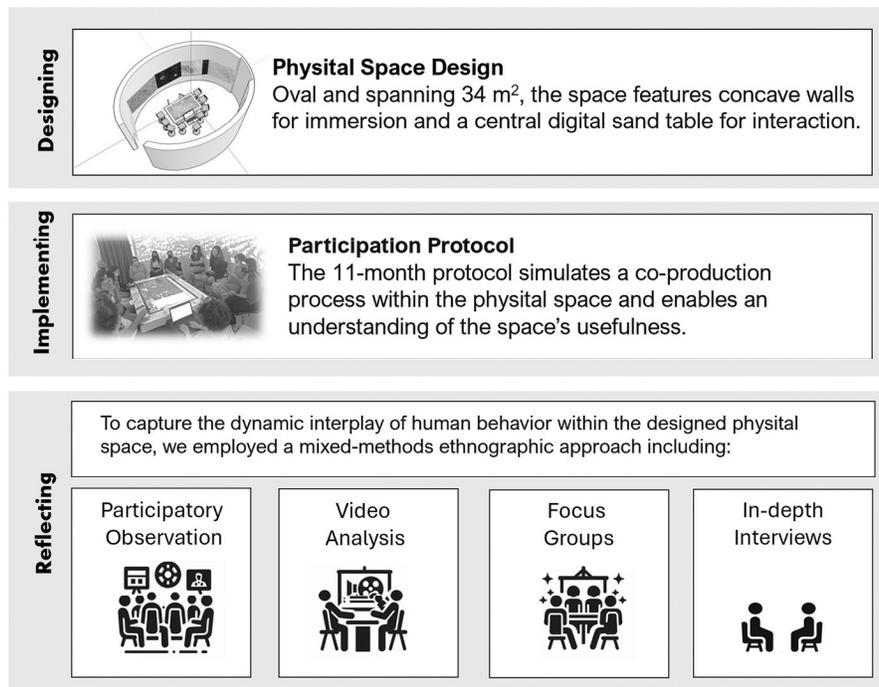


Fig. 4. The study consists of three stages: designing, implementing, and reflecting on a ‘physital’ space design.

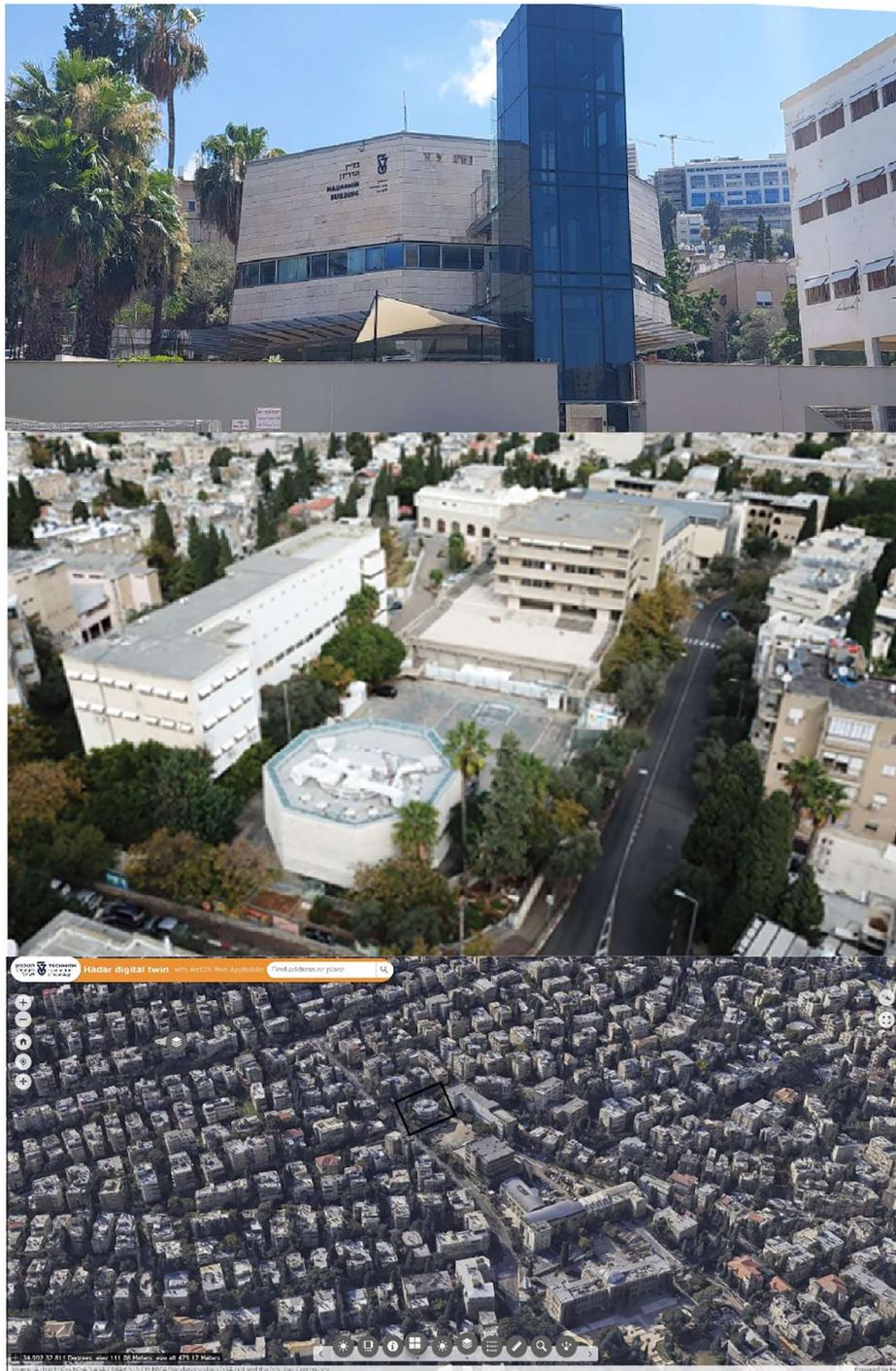


Fig. 5. The physical space location. Top: Photograph of the Hadarion building. Photograph by Batel Yossef Ravid. Middle: Photograph of the Hadarion building and the buildings around. Photograph by Batel Yossef Ravid. Bottom: Aerial photograph of the Hadarion building, located at the heart of the neighborhood of Hadar. Source: Social Urban Digital Twin.

visual experience. In this way, they are similar to Decision Theaters and CAVE environments, which are known for their innovative visual presentations (Boukherroub et al., 2018). The main visual area is the southern concave wall, which is eight meters in length; projections begin at 80 cm above the floor and reach a height of 320 cm, covering a vertical space of 240 cm. This setup hosts the Social Urban Digital Twin (SUDT), a 3D-model that combines social dynamics with physical urban layout, facilitating enhanced decision making processes (Yossef Ravid and Aharon-Gutman, 2022) (Fig. 6).

Directly across from the concave southern wall, the northern wall

holds essential technological equipment such as projectors and an audio system, which contribute to the immersive environment. The northern wall also supports photography and recording equipment that documents interactions and meetings within the space. Positioned centrally between these two walls is a digital sand table that incorporates object-identification technology. This 120 × 180 cm table, 120 cm high and surrounded by bar stools, encourages active and engaging discussions among participants, making it a focal point for interaction within the physical space (Fig. 7).

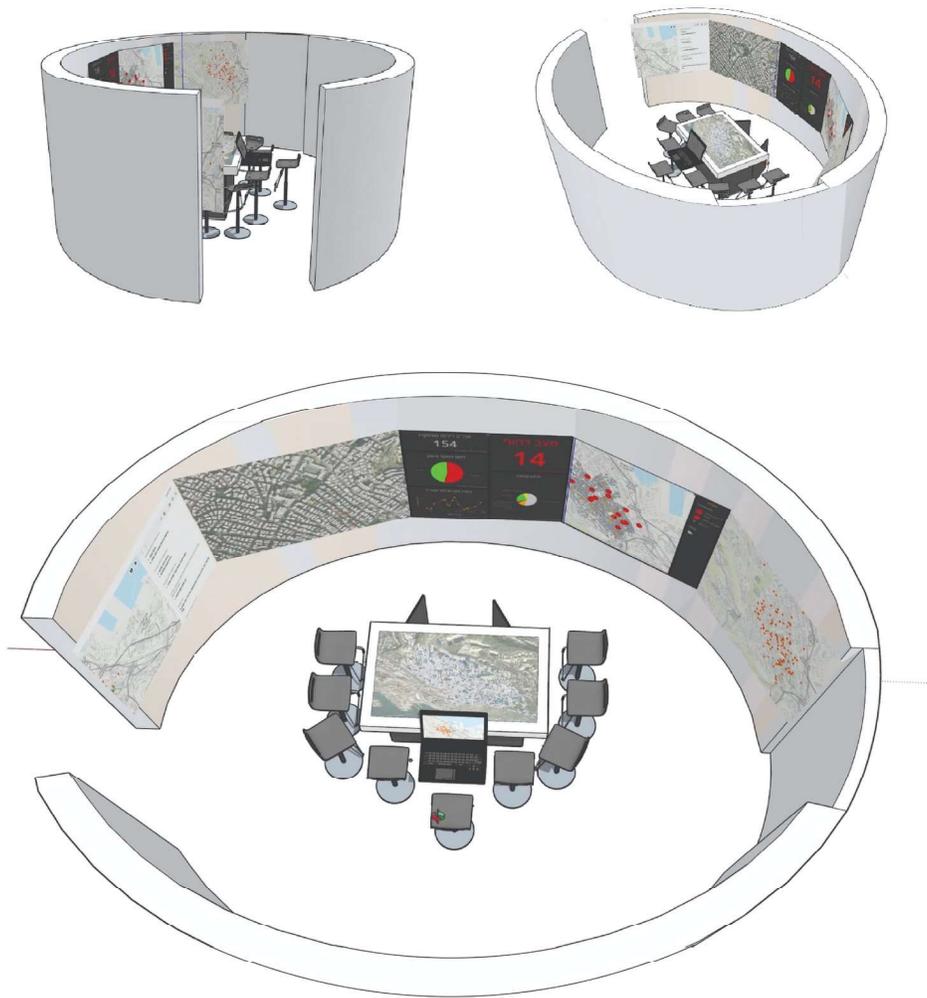


Fig. 6. The physical space. The southern concave wall serves as a wall of visual functionality. The northern wall serves as a wall of systemic functionality, containing the technologies necessary for the room's function (an audio system, a projection system, and a spatial documentation system). At the center of the space stands a touch table with an object-identification system.

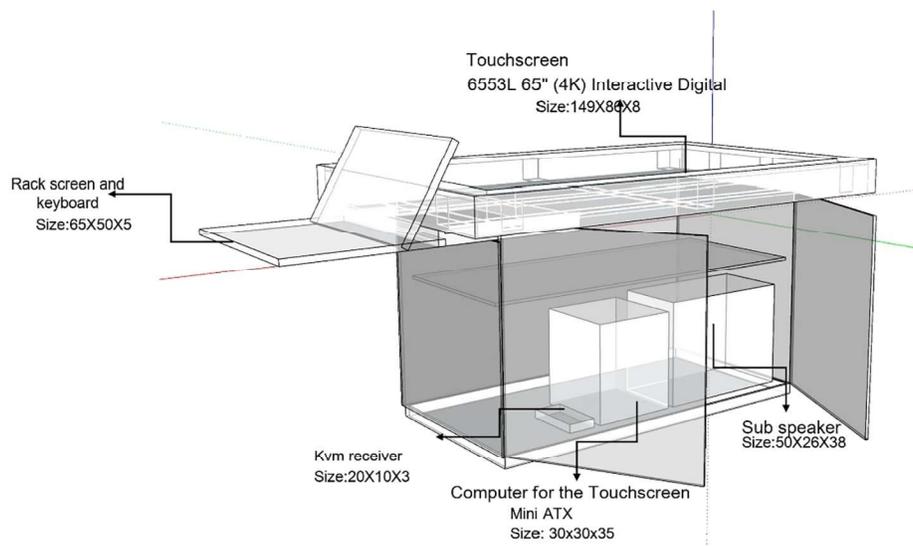


Fig. 7. Specifications and characterization of the digital sand table. Designed and planned by Arch. Batel Yossef Ravid.

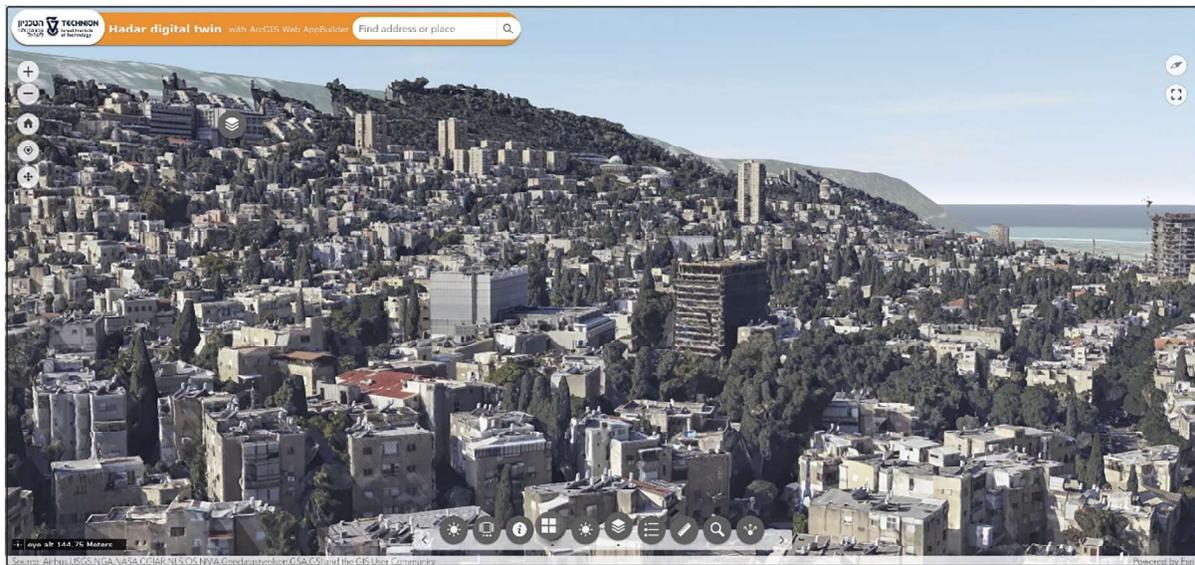


Fig. 8. Hyper-realistic modelling of the neighborhood of Hadar, which is located on a mountainside and characterized by steep topography and buildings of 3–4 stories without elevators. Source: Social Urban Digital Twin.

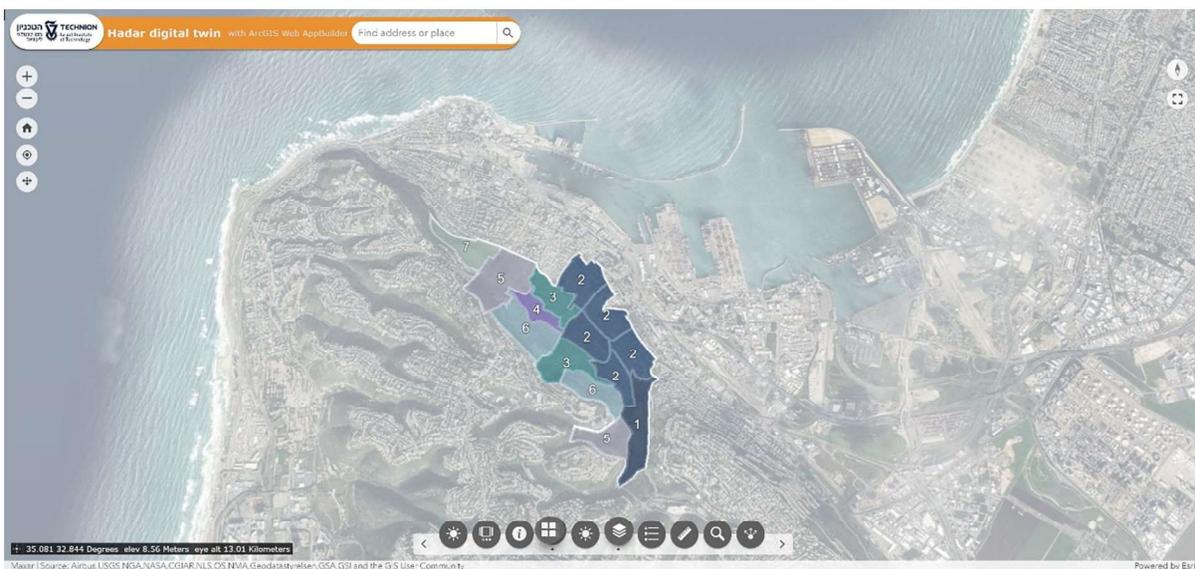


Fig. 9. Aerial photograph of the neighborhood of Hadar over a map of the city of Haifa. The neighborhood is divided into 14 statistical areas, and most of the neighborhood is characterized by low socioeconomic ranking. Source: Social Urban Digital Twin.

4.2. Participatory action research protocol

A co-production process was conducted within the physital space over an 11-month period (January–November 2021), with a specific focus on addressing urban aging in the neighborhood of Hadar. The protocol was organized into five distinct milestones, each involving intensive data collection, processing, and discussions surrounding the Social Urban Digital Twin (SUDT) model. These milestones typically culminated in three-hour workshops, each meticulously crafted to enhance the dynamic, visual interactions that are crucial for effective co-production. While a detailed discussion of the protocol’s structure and outcomes will be undertaken in a separate academic paper (Weiner et al., 2023), this article focuses on examining the physital space itself—its design, its functionality, and its impact on the co-production process (Table 1).

4.3. Reflection

The mixed-methods ethnographic approach utilized to dynamically capture human behavior within the physital space included:

- (a) Participatory observation – The research team attended and played an active role in each of the milestone workshops.
- (b) Video analysis – The research team analyzed the footage filmed during the workshops (the physital space we designed is supported by an array of cameras that facilitate filming and documentation of the processes occurring in the space).
- (c) Focus groups – At the conclusion of each of the workshops, we conducted a focus group with the 14 participants in which we asked them about the value created by the physital space used for the process.

(d) In-depth interviews – After the conclusion of the process, we conducted eight semi-structured in-depth interviews with participants who played an active role and served as dominant figures throughout the co-production process (Table 2). Each interview lasted approximately 1 h and was conducted within the physical space. The first 30 min of the interview were structured around three key questions:

How does the physical space contribute to the process of co-production in collaborative urban governance?

What elements or features of the space make it feel immersive for participants?

Which components of the physical space help you communicate your knowledge more effectively and inclusively with other participants?

The remaining 30 min were dedicated to an open discussion, allowing participants to share their broader experiences and reflections on the entire co-production process.

All the sources were transcribed in full for the purpose of documenting and analyzing the internal logic of the culture that was produced at these meetings. All texts were subject to thematic analysis with the aim of impartially refining the issues that “arose,” without the imposition of hypotheses or preconceptions.

5. Findings

This article focuses on the experience of space in a joint development project involving municipal employees, social activists, and residents. The physical space, equipped with advanced technology, evoked positive reactions and excitement among participants. Thematic analysis revealed two main findings: 1) that the physical space fostered participant bonding and group cohesion, and 2) that the experience within the space motivated collaborative action.

5.1. Grouping

5.1.1. “We are all facing it. We are not going anywhere”: the immersive form’s significance for the experience of the participants in co-production

The physical space we designed is immersive in form. It is oval-shaped and has a net area of 34 square meters. During the interviews, the participants noted the sense of intimacy created by the space, as explained by the municipal department head in a semi-structured interview: “[The space] provides a mental embrace, an enveloping. At the table, you are on the forefront of decision making, and at the same time you see an almost complete picture on the wall. It is an embrace of the issue, protection – you feel an embrace. It makes you relax.”

A participant in one of the concluding workshops acknowledged the advantage of the space but at the same time also noted the challenges it creates: “It’s totally amazing to be here, although I wanted you to break down the wall to make more room” (a social activist). That is to say: there is a line between embrace and suffocation, and this line creates a

fascinating tension within the room. The concave walls in the relatively small space not only demarcate the circle in which the group comes together, but also creates a unique visual experience generated in the physical space by projecting a 3D model on a concave wall. The deepest point of the wall provides depth of field that draws the gaze of the participants (Fig. 10). In other words, whereas the round wall envelops, or, in their words, “embraces” them, bringing them together into one group, the concave wall on which they are watching the projection creates a vanishing point that focuses and magnetizes the group. In this way, the lab created a collective feeling based on the focus of the common gaze and discussion. In their words, the concave wall on which they viewed the projection “focused us,” creating a process of participation, because “we are all looking at it. We are not going anywhere” The issue of focus arose in the material again and again: “It focuses, creates interest. You can see what is being discussed.” In other words, on the one hand, the reflective process draws attention to the advantage of the design of the space enveloping the group, whereas on the other hand, it focused the participants’ gaze as a shared gaze, transforming an assortment of individuals from different disciplines and with different interests into a single group.

However, the group’s form stemmed not only from the structure of the space, but also from the table at its center, or, more precisely, from the participants’ grouping around the table.

5.1.2. “It [the table] makes it possible to look people in the eye and say that this is what we are doing”: integrative functioning

At the center of the physical space, we installed a 180 × 120 cm digital sand table standing 120 cm above the floor and enabling viewing of the content of the table while standing or seated around it in tall chairs. Around the table, we arranged bar stools with a pneumatic piston, enabling each chair to turn on its axis. The table and the chairs facilitated the room’s functioning as a space of assembly and discussion. The digital sand table displayed an ArcGIS dashboard, which offered a summative look at the social data pertaining to the neighborhood scale, and the table’s touch-screen technology enabled participants to engage in interactive exploration of the different information layers as required by the discussion. In practice, this content was complementary to the content displayed by the SUDT model that was projected on the concave wall.

The participants in the process noted that the combination of the sand table and the projection wall gave those present in the physical space the feeling that they had nowhere to escape to. The barstools, which facilitated axial movement, helped their focus, which could shift from the touch table to the concave projection wall. However, if we have thus far described the role played by the oval space in helping turn the individuals who participated in the process into a unified group, the thematic analysis taught us that grouping around a table also played a major, complementary role in group communication. As noted by a director of a non-profit organization that supports organizing the neighborhood’s residents: “It is round, so it enhances participation; we really sit together – it’s not each person on a computer, alone. Everyone looks at the situation assessment together, and decisions need to be made.” This indicated to us that the participants had an experience of a circle within a circle; the oval room was the first round form that helped the group develop, and grouping around the table served to reinforce this feeling (Fig. 11).

The wooden frame around the table is narrow (10 cm) and precludes opening laptop computers. At the same time, the participants are not permitted to bring food or beverages into the space. A few of them wrote down notes in a notebook. Therefore, as the wall embraced them and did not allow them to flee, sitting around the table under such conditions also prevented them from escaping into the world of technology via a laptop or smartphone. Our interviewees noted, with smiles, that the darkness of the space made them feel uncomfortable about using their smartphones. Meaning, not only did the grouping occur around a table, but this form of seating also encouraged social interaction, as noted by

Table 2

List of semi-structured interviews with participants of the co-production process.

Date	Interview profile	Sessions attended
12/26/2021	Female, NGO CEO	1,2,4,5
12/26/2021	Female, Elderly Citizen Dpt.	2,3,4,5
12/26/2021	Female, Social Worker	1,2,3,4,5
12/28/2021	Male, Municipality Community Worker Coordinator	1,2,5
2/3/2022	Female, Community Organizer	1,2,3,4,5
2/3/2022	Male, Elderly Citizen Activist	1,2,4,5
2/23/2022	Female, Community Organizer	1,2,3,4,5
4/27/2022	Male, CEO of Welfare NGO	1,2,3,4,5

one of the participants: “It [the table] allows [us] to look people in the eye and say that this is what we are doing. It is good and important for coordinating views” (a social activist in the neighborhood). In other words, the sand table created a feeling of convergence, grouping, and belonging, on the one hand, and facilitated a process of group discussion stemming from the constellation that encourages conversation between people, on the other hand. A social activist from the neighborhood explained this dynamic in a focus group as follows: “The group discussion that occurred here, the sitting together and making decisions, is also something that is done more properly when looking at shared data together.” The association made by the interviewee between “sitting together” and “looking together” is very instructive and provides insight into the importance of the association between the oval space, the immersive projection, and the table.

However, the table resulted not only in grouping and communication as an object in space; rather, in the thematic analysis, we learned that the participants regarded grouping around the table as an idea that brings together people from different disciplines. According to the interview of the director of a non-profit organization that is active in the neighborhood:

“[Like]the different perspectives you provided, everyone brings different disciplines to the table. At first, I was opposed to it. Perhaps this was because of a feeling that they were again taking us to the physical places, but over time I changed my view, and this was one of the things that I think is most important to promote. [The things you bring up here] constitute an approach and an issue that I adopted along with the process. We might say that it threatened our original plan, because suddenly there were more options. It required us to go outside the box a bit, to think a bit differently.”

This is an important sentiment, which was voiced repeatedly in different ways. It helps us increase the level of abstraction and understand grouping around the table not only as a physical act of the body but rather also as an act of the mind. Policymaking, which is always an interdisciplinary act, requires focus and integration. The table, and the flow of information, knowledge, and processes into a 3D digital model of the city, represented both on the table and on the oval wall (Yossef Ravid and Aharon-Gutman, 2022), produced communication between different fields of expertise. At first, this integration created a threat (many of the participants defined the experience as overwhelming, and therefore as also encouraging closedmindedness and grasping to the familiar). Noticeable in the gradual process, therefore, is the effectiveness of the act and a willingness to expand awareness to include additional data and other forms of interpretation, as well as a willingness among participants to change views and to rethink initial assumptions which they held for years.

Thus far, we have dealt with ways in which the physical space – meaning, the architecture and technology of the space – helped transform the participants into a consolidated group, and the ways in which the methodology of working around a single table furthered interdisciplinary thinking.

5.1.3. “After seeing your tool, we, as public servants, cannot not take action”: motivation for action

According to the thematic analysis, not only did the physical space encourage group consolidation, but designing policy in a space that creates an experience of the data – a user experience that works on the subconscious by integrating real data and a hyper-realistic model – played an important role in motivating the group to take action. In the interview, a social worker in the neighborhood described the dynamic as follows:

It works on the senses, and it is intense – like a punch in the face. Truly, all the senses. I could almost smell the place. It makes the heart very heavy. As public figures, we cannot ignore or say we did not know; after seeing your tool, we, as public servants, cannot not act.

A social activist described the feeling created by the space as follows:

“It is very much a physical experience that I am having now, as a result of it.” Another social activist noted: “After seeing the data in your space, we want to create something practical, and your tool helps.” That is to say, the thematic analysis highlighted the interviewees’ linkage of “we saw” and we must “act.” The participants in the process in the physical space taught us that co-production that occurs in a physical space is not an event of making data accessible, but rather an emotional and physical experience produced in space. The experience of the data through which the social situation of the neighborhood is mediated activates emotions and motivates people to take action. In the words of one participant in the process who managed several non-profit organizations operating in the neighborhood: “The entire goal of this process [co-production] is for us to come out with proposals for projects, for us to get activists from the neighborhood behind it, and for it not to be based only on intuition but rather on the analyses we conducted at this table.”

As already explained above, the experience that stimulates emotion activates the desire to take action; it also turns into frustration in light of the reality of a lack of resources in the contexts of Neoliberalism and the flagging welfare state. Only when the emotion-action equation encounters a lack of resources does a different emotion – frustration – emerge. In our case, frustration emerged not only regarding the lack of resources, but also regarding the sophistication of the tools, which resulted in flooding and lack of certainty in their usage. This was effectively defined by a social activist in the neighborhood who also works part-time for the municipality and therefore wears the hats of both the First and the Third Sector:

“The visuality of the tool and the accessibility are very impressive. It shows many things in an accessible way. I still feel like I am in the frustration stage between understanding the data and saying what can be done about it. It is very frustrating to have reality thrown in your face. They gave me a drill, and I need to understand how to put it together and how to work with it, and perhaps also break a few things along the way... I do not yet know how to work with this tool, and that is what needs to be worked on. How they [physical spaces] serve us, and vice-versa.”

6. Discussion and conclusion

We opened the article by pointing out gaps in the research in two different areas. First, the research on co-production does not regard the physical space where the meetings take place as a significant component in the success of the process. On the other hand, as part of the research and action regarding smart cities, control rooms were established as physical spaces in which urban decisions were made during regular times and especially in time of emergency. The criticism of the smart city agenda both in corporations and in academia is that they are not effective in addressing the challenges and dynamics of social life in cities.

As part of the research, we designed and established a space in which two major principles were enacted: immersiveness and interactivity. We created a protocol of co-production and, for nearly a year, created a decision making process based on the principles of participatory action research. We designed the physical research in which the process took place in a way that allowed us to closely document what was happening in the room – so that the space itself allowed us to produce a process in which we were embedded and, thanks to technology, could simultaneously observe the dynamic in the room as a “fly on the wall.” At the end of the process, we conducted in-depth interviews in the space itself with key figures in the process.

The study’s findings are twofold. First, we found that the space made a decisive contribution to the individuals’ formation as a group. The transformation of the individuals with different interests from different organizations into a group was a crucial element in the success of the co-production. Many attributes of the space made this possible: the room is small and prevents any possibility of “hiding” or remaining passive.

Most of the time, the room is darkened to support unique visualization, discouraging people from taking their phones out of their bags (“we didn’t feel comfortable,” they explained). The chairs are high bar stools, which are not comfortable for sitting for an extended period and enable the person to easily stand, wander, and return to their chair. Under these conditions, people also did not take their laptops out of their bags. Some used paper and pen to take notes, meaning that the space experience required interaction and high availability without being able to “escape” the discussion via the many distractions presented by smartphones and computers.

However, the findings show that two particular attributes of the space brought the individuals together and formed the group: the “embrace” of the round wall and the focus created by the digital sandbox located at the center of the table. This means that the space had an internal (the table) and an external (oval wall) center of attraction, so that focus was constantly being produced. These two focus generators brought the group together. Moreover, the analysis of the video documentation consistently reflects the importance of the collective body language: when one of the participants wanted to argue something, they pointed with their finger (at the touch table) or looked (at the oval wall). This collective body language ensured that everyone was consistently “on the same page.” When arguments or differences arose, the speakers changed their point of view, allowing others in the group to identify with it, literally, and therefore to understand them better. Moreover, the concept of physical space has the potential to be adapted as a social policy tool for neighborhoods, empowering local communities by facilitating co-production decision-making processes. By providing a structured yet flexible environment for collaboration, such spaces can enable communities to play an active role in shaping decisions that directly impact their local area.

The second finding is related to the first: the participants testified that working in the space motivated them to act. Here, too, we maintain that this feeling was created by a spectrum of attributes, most notably, the fact that certain factors (for example, the death of elderly individuals alone in their homes during the COVID-19 era; the proportion of disabled elderly people living in the neighborhood; and the rates of urban loneliness) were assimilated into the urban model, which was projected onto the large concave wall. The large-scale projection and the experience of the three-dimensional model gave participants the feeling that they were inside the model and experiencing the reality described in the first person. Under such conditions, knowing the city and understanding the social-urban situation is not translated into an intellectual understanding alone, but also an emotional one. As we showed in the findings section, the members of the group, and particularly those who represented the municipal authority, explained that the discussions primarily imbued them with a feeling of frustration in light of the gaps between the needs and the plans on the one hand, and reality on the other hand. Would the same motivation for action emerge if each “saw” the urban situation separately? We think probably not. To the best of our understanding, the fact that they “saw” something together is what motivated them to act.

The study was conducted jointly by an architect interested in civic architecture and an urban sociologist-anthropologist. This collaboration, in addition to a generous research grant, supported the strengths of the study: the planning, design, and construction of a space, and working within the agenda of participatory action research, which is rich qualitative research that allows critical reflection.

But this collaboration also reflects the limitations of the study and recommend path for follow-up studies. To shed light on the presented findings, additional effort is required to understand the human mechanism explaining the findings: What role does emotion play in knowing the city? We know that working in a group in an immersive space is important (more so, for example, than the immersiveness produced by wearing an Oculus), but what is the mechanism through which the immersive experience of a group motivates people to act? Follow-up studies can and should involve social psychologists and experts from

fields such as the cognitive sciences, educators who work in pedagogy in groups, and more. Only by joining forces with all disciplines will we be able to take a meaningful step forward in identifying the mechanisms that motivate individuals to act together. In our view, there is no more suitable time than the present to further this undertaking.

CRedit authorship contribution statement

Batel Yossef Ravid: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Meirav Aharon Gutman:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Data availability

No data was used for the research described in the article.

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