



Toward Civic Co-production: Using Worldbuilding to Go Beyond Participation in Urban Planning and Enact More Equitable Cities

Johanna Hoffman*

Independent Researcher, Oakland, CA, United States

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*Correspondence:

Johanna Hoffman
johanna@designforadaptation.com

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Even as calls for more participatory urban planning have grown over the past half century, achieving meaningful and effective participation remains elusive. While disciplines beyond urban development are experimenting with narrative-driven engagement toolsets to cultivate greater degrees of public investment and collaborative capacity, less exploration on the power of such tools has been conducted in urban development circles. Toward the objective of reconciling the challenges of community engagement with the growing uncertainties and inequalities of contemporary cities, this paper explores the value of aiming beyond participatory planning toward co-production, and assesses the role of worldbuilding, a design approach with origins in fiction, in doing so. Specifically, the worldbuilding methods implemented in a project to envision dense urban environments in 2070 is positioned within growing calls for urban development to move toward co-production. The paper contributes to the wider discourse on tactics for collaboratively envisioning and enacting more equitable cities.

Keywords: worldbuilding, urban planning, participation, equitable futures, civic co-production, civic engagement

INTRODUCTION

Community-based participation has long been identified as essential in urban planning, yet issues regarding effectiveness persist. Defined here as the engagement of residents in decision-making processes concerning issues that impact their lives (Sarker et al., 2008; Mahjabeen et al., 2009; Mensah et al., 2017), community-based participation often suffers from factors such as low levels of financial and institutional support (Deakin and Allwinkle, 2007; Foth et al., 2009; Rinner and Bird, 2009; Stewart and Lithgow, 2015)¹. Persistent lack of investment contributes to limited efficacy of participatory processes, which in turn has been found to increase certain aspects of urban inequality over time (Einstein et al., 2019; Sideris, 2021).

Given the obstinacy of these problems, calls to refocus urban planning from increasing public participation toward supporting civic co-production have begun to grow. Since first appearing in the 1970s (Bracci et al., 2016), co-production has experienced renewed interest in recent decades. Current attention focuses on how its framing—which pushes for developing knowledge through

¹Foth et al. (2009) stated the case plainly, declaring “Conventional ways to engage people in participatory planning exercises are limited in reach and scope.” Rinner and Bird (2009) found that “Significant advances in public participation geographic information systems technology and online mapping platforms have not translated into enhanced citizen participation in democratic planning processes.” Stewart and Lithgow (2015) took a similar stance, stating that the reality of community “falls well short of the ideal of meaningful citizen input into decision-making”.

negotiation, collaboration, and the sharing of power (Ryan, 2012; Munoz-Erickson, 2014)—presents opportunities to address existing limits of participation by challenging systemic power imbalances and enacting more effective systems of cooperation in planning spheres (Einstein et al., 2019; Sideris, 2021). Arguments often highlight the value of co-production's emphasis on collaboration over inclusion (Polk, 2015; Strokosch and Osborne, 2016), pointing out that when inclusion occurs within systems not specifically designed to support the interests of more marginalized groups, inequities can often occur (Fullilove, 2004; Klein, 2008; Burton, 2015; Goetz et al., 2020).

Co-production as a framework for planning offers potential for enacting more effective power sharing, but only if community groups have the tools to compel public organizations and agencies to support the process of doing so (Beck and Forsyth, 2015; Miller and Wyborn, 2020). Although far from a simple solution to longstanding issues in community-based participation work, co-production identifies certain tactics as valuable tools in creating conditions capable of supporting structural re-organization of political, governmental, and economic systems. The literature identifies two factors as particularly important for such efforts: more effective iteration in design and planning processes, and investment in new forms of public communication (de Blois et al., 2010; Lizarralde et al., 2012; Jones et al., 2015; Bracci et al., 2016; Forman and Cruz, 2019).

Constructed on the assertion that co-production can be a potent means of achieving more equitable urban conditions, this paper explores the potential of the under-explored toolset of worldbuilding to enact systems of co-production and support more effective participatory practices in urban development. It focuses on the value of worldbuilding in achieving the two aforementioned aspects of co-production, namely more frequent and impactful iteration and communication in urban planning. Toward this goal, the research evaluates the use of worldbuilding in a case study for which I led research and narrative design, in achieving these two aspects of increased iteration and communication. Titled Future World Vision (FWV), the case study was an interactive, immersive virtual experience of a dense urban environment in 2070, created by the American Society of Civil Engineers (ASCE), with their development partner Experimental Design, a worldbuilding-focused studio based out of Los Angeles, CA. After commenting briefly on the project context, I reflect upon the specific methodology used in the project. I close with some conceptual and pragmatic implications to consider when implementing worldbuilding processes into multi-stakeholder collaborative planning contexts. Methodologically, the research fits within the tradition of assessing specific case studies through a mediation between theoretical assessment and empirical observations (Swaffield and Deming, 2011), and the value of reflection on professional experience as it relates to wider fields of research and practice (Brannen, 2008; Smith, 2012; Fleming and Zegwaard, 2018; Alpi and Evans, 2019; Haeffner et al., 2022).

The structure of the paper is as follows. Section At the Limits of Participation explores existing and persistent issues in participatory planning process. Section Toward

Civic Co-production delves into literature on challenges for co-production of city spaces to rethink the nature and aims of contemporary urban development processes. Co-production helps to clarify the goals of participation and identify structural inequalities embedded in planning systems. Section Worldbuilding and Co-production explores worldbuilding as a design method in disciplines beyond urban development, reviewing existing literature on its capacities to enhance collaborative design and its potential in guiding transformation in urban development toward effective co-production. Section Imagination for Collaboration: A Case of Worldbuilding-Based Design investigates the use of worldbuilding methods in the FWV project case study. Section Discussion discusses the worldbuilding methods employed in the case study within the context of co-production and identifies conceptual and pragmatic implications for using such methods within urban planning contexts. The paper concludes with a reflection on co-production and worldbuilding, and an agenda for future research.

AT THE LIMITS OF PARTICIPATION

As the challenges of twenty-first century urban life accelerate it is becoming increasingly apparent that aiming for greater participation in planning may not be enough. Urban planning continues to suffer from a lack of effective public, community-based participation, which contributes to less socially resilient and more economically fractured urban environments (Krumholz, 1996; Sandercock, 1998; Burayidi, 2000; Yiftachel and Huxley, 2000; Monno and Khakee, 2012). Planning language can be complex and regulations labyrinthine, hard for the uninitiated to understand without assistance. Planning projects and departments often do not support the budgets needed to adequately provide that help. As a result, it is typical for community engagement to occur just a few times throughout a project's life span, resulting in frequent reports of community members feeling unheard, undervalued and unseen (Campanella, 2011). For those who do get involved, urban planning's arguably difficult legacy of exclusion and displacement can create contexts in which collaborative discussions become mired in anger and distrust (Longstreth, 2006).

Current scales and speeds of technological, political, and environmental change compound these longstanding issues (Burayidi, 2000; Batty, 2008). With public anxiety growing about climate change, income inequality, and mounting political divisions, coalescing more engaged citizenry in planning processes is arguably growing more difficult (Swim et al., 2011; Carter et al., 2015). When faced with the impacts of climate catastrophe and economic insecurity, believing that disaster is unavoidable and planning for coming decades is accordingly useless can appear to be an easier choice (Chakraborty and McMillan, 2015). Traditional planning practices of linear master plans and top-down strategy have been found to exacerbate such tensions (Leach, 2008; Cannon and Müller-Mahn, 2010; Christopherson et al., 2010), with increasing numbers of designers and planners acknowledging that greater degrees of diversity and collaboration in the design and development

process are not just critical to making cities stronger but are key to making cities work (Jacobs, 1961; Lynch, 1985; Freestone, 2000; Campanella, 2011).

Many planning approaches have been developed over the years over the years to address the need for more effective community-based participation. The field of “communicative planning” in particular, has offered significant insight into tactics and processes for emphasizing civic dialogue, communication and consensus-based decision making in urban planning (Healey, 1998, 1999; Forester, 1999; Olsson, 2009; Kivits and Sawang, 2021). Over the years, such processes have become widely accepted and implemented in planning theory and practice (Verma, 2007). Critical analysis of the field, however, emphasizes the fact that such tactics have done less to address issues of systemic power imbalances and community agency (Westin, 2021). As Westin writes, “Even if communicative planning thereby offers more for reflections on power than critics have acknowledged, the theory still leaves conceptual voids regarding constitutive *power to* and *legitimate power over*.”

As such, simply calling for greater degrees of collaboration in urban planning does not adequately challenge the structural imbalances that maintain and exacerbate spatial and temporal inequities in urban spaces (Monno and Khakee, 2012; Blühdorn, 2013; Legacy, 2016; Ma, 2017). Larger political and economic shifts are required to transform planning systems toward more dynamic collaboration between top-down regulatory measures and resources, and bottom-up development processes (Cruz and Forman, 2010; Cerna, 2013; Huchzermeyer and Misselwitz, 2016).

TOWARD CIVIC CO-PRODUCTION

Aspects of co-production can serve as guides for challenging the systemic inequities that continue to characterize much of urban planning and development process. The term refers to the “active involvement and engagement of actors in the production” of knowledge and/or spaces “that take place in processes either emerging or being facilitated and designed to accomplish such active involvement” (Frantzeskaki and Kabisch, 2016). While the concept of co-production has existed since the 1970s thanks to the work of political scientist Elinor Ostrom, it has received increasing degrees of attention over the past two decades (Bracci et al., 2016).

Recent interest emphasizes the field as lens for understanding how multiple perspectives and areas of expertise can inform the visioning, planning and development of urban environments in reciprocal ways (Munoz-Erickson, 2014). Increased attention in literature on dynamic civic engagement and involvement of citizens in the creation and implementation of policy, services and planning efforts, mirrors a growing adoption of the term in wider realms of professional practice (Brandson et al., 2011). As Kleinhans et al. (2022) articulate, “(c)ontemporary urban development is increasingly characterized by collaboration and co-production between ‘experts’ and the ‘public’ in urban planning processes.” That emphasis on reciprocity and collaboration emphasizes the need for and ability of planning

to address issues of power in urban development process, an acknowledgment of the fact that many participatory processes occur without meaningful power sharing taking place.

Co-production as both an aim and a framework of practice, however, has limits when it comes to effective implementation of the power sharing that contributes to more equitable development. Factors that can impede co-production include issues such as internal resistance of public organizations to citizen involvement. As Voorberg et al. (2014) note, this can occur through the lack of viable communication infrastructure, ineffective training systems for public officials, or “the risk-averse culture of public-sector organizations.” Because community-based participation is often viewed as complex, time-consuming, and undependable, administrative contexts can be less conducive to “incorporating citizens in public service delivery.” Such limits are indicative of the fact that co-production, like communicative and participatory planning approaches, is not a silver bullet for addressing issues of power imbalances and the inequities such imbalances can create (Frantzeskaki and Rok, 2018; Tonkiss, 2020).

Still, a growing cadre of practitioners have begun to harness the co-production term to address those imbalances, creating a burgeoning trend of pushing for systemic change in planning and development to achieve greater degrees of civic collaboration. Wolfram and Frantzeskaki (2016) emphasize the idea that the strength of such structures depends on cities being seen as shaped by “interactions between multiple socio-technical and social-ecological systems.” The organization *Architects Declare* (2020) has called for a “different practice of architecture,” declaring that with the “interlinked crises of climate breakdown, biodiversity loss, and societal inequity,” architects must push for “radical, systemic change,” based on facilitation more than dictation. The UN Sustainable Development Goals articulate the importance of partnerships and collaborative governance (United Nations, 2015), yet provide little details as to how such a goal might be achieved. MacDonald et al. (2018) insist that organizing large, multi-stakeholder coalitions “requires sophisticated implementation structures for ensuring collaborative action.” Bayro-Kaiser (2020) provides more specificity, insisting that ameliorating urban inequality depends on “co-ordination and communication between top-down and bottom-up approaches, the reduction of tensions between formal and informal urban areas, and modes of co-production that consider local action as well as long-term and large-scale effects.” Practitioners and researchers such as Cruz and Forman (2010) have called for “new spaces for collaboration across sectors that can link top-down and bottom-up interests to mobilize an unprecedented project of redistribution of both resources and knowledges across metropolitan, regional and continental scales.” Cole (2020) echoes their insistence, writing that spaces of collaboration between urban residents and urban professionals allow for “greater equality between all stakeholders” to more effectively be achieved. Doing so is not a panacea but can set the stage for existing inequities to be challenged and more reciprocally supportive systems to arise.

Using top-down resources to support bottom-up development approaches has been found to address aspects of systemic power

imbalances and redistribute agency to potent effect (McGuirk, 2014; Aravena and Iacobelli, 2016; Brillembourg and Hubert, 2019). Over the last decade, practitioners and theorists such as Cruz and Forman (2010) and Forman and Cruz (2019) have contributed to this discourse with their work documenting development along the border between San Diego and Tijuana. Their research has shown that “socio-economic inclusion and experimentation in urban form come not from sites of economic power but from areas of poverty, in marginalized spaces.” That inclusion and experimentation, they insist, allows for greater degrees of self-determination in community development over time, and greater degrees of social resilience as a result. They use these findings to point out the limits of participatory planning and call for reshaping socio-economic dynamics of urbanization from traditional top-down measures to a more dynamic balance between top-down regulations and bottom-up development². Others have echoed their call, defining the value of co-production as “co-ordination and communication between top-down and bottom-up approaches, the reduction of tensions between formal and informal urban areas, and modes... that consider local action as well as long-term and large-scale effects (Bayro-Kaiser, 2020). This more collaborative approach is presented as a vital means of addressing urban inequality at its roots (McGuirk, 2014), with the potential to enact processes where “citizens themselves, pressed by the urgencies of socio-economic injustice, are pushed to imagine alternative spatial and socio-economic protocols” (Cruz and Forman, 2010) and then enact those visions in their communities.

Calls for civic co-production focused on addressing systemic power imbalances in urban development offer helpful frameworks for supporting more effective power-sharing and reciprocal relations. Two factors are identified in the literature as particularly important. The first is iterative planning. As Kaiser et al. (2017) write of Lemos and Morehouse (2005), “an iterative and interactive model” of collaboration is essential, which in turn depends on interdisciplinarity, stakeholder participation, and the production of usable knowledge, “which can be incorporated into all stakeholders’ decision-making processes.” Practitioners and theorists like Cruz and Forman echo this demand, insisting that allowing for plans to adapt over time, as the needs and ideas of communities change, is essential to enabling co-production to occur (Cruz and Forman, 2010; Forman and Cruz, 2019). This emphasis aligns with additional research on the value and necessity of iterative process on civic collaboration (Brudney and England, 1983; Beck and Forsyth, 2015; Jones et al., 2015; Miller and Wyborn, 2020).

The second is developing new forms of public communication to facilitate greater dialogue and collaboration between impacted communities and civic professionals. As Bracci et al. (2016)

²That linking of top-down and bottom-up is fundamental to Cruz and Forman’s demands for “co-producing” the city. A means of “investing top down up-resources and capacities to support, and give full integrity to, the intelligent efficacy of bottom-up processes,” they insist that co-production “requires new spaces for collaboration across sectors that can link top-down and bottom-up interests to mobilize an unprecedented project of redistribution of both resources and knowledges across metropolitan, regional and continental scales” (Cruz and Forman, 2010).

write, “continuous communication and interaction (should be) ensured,” and that effective interaction depends on “the establishment of a two-way channel of communication, continuously adjusted over time, between the public administration and its citizens.” Cruz and Forman specifically emphasize the value of art and cultural interventions as “cognitive systems to enable communities to access the complexity of urban policy, activating the capacities of the bottom-up for political action” (Cruz and Forman, 2010; Forman and Cruz, 2019).

Others echo these calls. Bayro-Kaiser (2020) declares that cities should be thought of “as a process where decisions are made along the way involving manifold perspectives as well as sustainable and resilient development.” Cole (2020) describes iterative process as a way to “resolve competing views and arrive at a shared agreement of what could or should be manifested in the project and, in particular, how it supports the larger socio-ecological system in which it sits as an overriding guide.” Affecting such degrees of iteration in design requires larger investments in time allotted to planning projects. Hes and Hernandez-Santin (2017) insist such investments offer three key benefits. “First, it permits stakeholders to co-invest in a project, collectively set a direction for the work from the outset, and to begin nurturing a broad culture of stewardship. Second, it permits a design team’s self-actualization and growing their capacity, as well as enabling them to engage with and learn from a broader community of stakeholders. Third, it facilitates an understanding, caring, and lasting commitment of the stakeholders to share any risks as the project unfolds. The long-term engagement of stakeholders is critical since, if the momentum is lost, “projects can degenerate into business as usual” (de Blois et al., 2010; Lizarralde et al., 2012).

Meaningful implementation of co-production depends in part on understanding which tools can achieve more effective iteration and communication in urban planning and under what framing conditions³. Subsequent sections explore how worldbuilding as a design approach presents opportunities to do so.

WORLDBUILDING AND CO-PRODUCTION

Worldbuilding is a growing field of research and design practice with qualities that emphasize and empower fundamental aspects of the collaboration that co-production demands, specifically that of communication. As an avenue for articulating worlds with strong rules, histories, climatic contexts, and social dynamics,

³It also challenges the long-established roles of design professionals as visionaries and master planners (Collins, 1979; Chapman, 2007; Campanella, 2011) by emphasizing the value of facilitation and mediation instead (Department for Communities and Local Government, 2011). Effective facilitation depends largely on skillful communication (de Blois et al., 2010; Lizarralde et al., 2012). RIBA has advocated for the architect’s role as “visual communicator and enabler of good design decisions” for over a decade. Many researchers have since explored how investing in more effective and dynamic modes of public communication strengthens civic trust, allowing for more meaningful and longstanding improvements in urban equity to occur as a result (Mabon and Shih, 2018; Lin and Geertman, 2019; Åström, 2020).

worldbuilding provides a valuable framework for multiple participants to share connected stories (Cechanowicz et al., 2016). The more detailed a world becomes, the more questions it can be asked, providing an increasingly nuanced space for exploring the potential repercussions and opportunities stemming from possible future change.

Given the growing need for envisioning and planning increasingly uncertain futures, more researchers have turned to worldbuilding to understand how its capacities to enhance communication can facilitate more dynamic design. Collie (2011) highlights the importance of storytelling in community engagement planning efforts, stating that “the ‘cities of the imagination’ generated by science fiction and other forms of narrative provide a powerful means of understanding, communicating and enriching the connections to place in urban communities.” Sheppard et al. (2011) takes the conversation into a more futures-oriented direction, stating that “There is an urgent need for meaningful information and effective public processes at the local level to build awareness, capacity, and agency on climate change, and support planning and decision-making. . . (that) collaboratively localize, spatialize, and visualize possible climate change effects and community responses in the community’s ‘backyards.’”

As narratives are processed differently than other forms of information, worldbuilding has the capacity to challenge existing views and belief systems without threatening deeply held values (Zaidi, 2019). Studies show that imagination and creative exploration can be powerful avenues for reconciling differences in outlook and attitude (Coulton et al., 2016). These qualities make worldbuilding a powerful way of collaborating across disciplines, backgrounds, and beliefs. Because worldbuilding often invites more dynamic iteration and communication than conventional design and planning methods, employing such elements into planning can create contexts for greater degrees of collaboration and public investment. Recent research suggests that, with its focus on “what could be,” worldbuilding tools are uniquely positioned to inject creativity and openness into the often tense process of citymaking (Candy and Dunagan, 2017).

By supporting iterative process and communication (Schoemaker, 1991; van der Heijden, 1996; Candy, 2010; Malinga et al., 2013; Chakraborty and McMillan, 2015; Chermack and Coons, 2015; Candy and Dunagan, 2017; Candy and Kornet, 2017; Merrie et al., 2017), worldbuilding has potential to support growing calls to enact co-production of civic spaces. On its own, it does not have the capacity to address issues stemming from lack of power sharing. Like other methods of community engagement and co-production, its effectiveness depends on the intentions and systemic dynamics in which it is used (Monno and Khakee, 2012; Blühdorn, 2013; Legacy, 2016; Ma, 2017; Einstein et al., 2019; Sideris, 2021). Still, its potential in supporting aspects of communication and iterative capacity deserves greater attention and assessment in urban planning discourse. At present, however, there is a palpable gap concerning effective ways to integrate worldbuilding tools into urban planning efforts.

To be clear, tools and approaches aiming for civic co-production, on their own, are not enough to shift fundamental

power imbalances in the management, visioning, and development of urban spaces. As Boonyabancha and Kerr (2018) write, “(t)he shift in power and the change in relationships and structures that comes with empowerment—and which constitutes real development—is something that can only be done by people themselves.” In that vein, finding ways to facilitate community capacities for self-determination becomes more paramount.

It is for this reason that worldbuilding merits deeper investigation in the urban planning and development discourse. Literature focuses on the value of worldbuilding in design in general, particularly in product design and technological innovation (Dunne and Raby, 2013; Hanna and Ashby, 2016; Nagele et al., 2018). Less exploration on how the approach fits into community planning and urban planning processes has occurred, and no research has yet been conducted on the connection between worldbuilding and civic co-production.

IMAGINATION FOR COLLABORATION: A CASE OF WORLDBUILDING-BASED DESIGN

This section explores the worldbuilding methods employed in a case study, specifically a worldbuilding project envisioning dense urban futures in 2070 for a virtual reality educational video game created by and for engineers and urban designers. The FWV project was chosen due to its use of the worldbuilding process, focus on urban environments, and navigation of collaborative design between groups with disparate backgrounds. The project’s interactive, immersive environment embodied Sanders’s conceptual framework for making collaborative design tools in tangible form (Sanders and Stappers, 2008). Certain limits stem from using a case study beyond the bounds of traditional urban design and development to explore potential innovations in development systems. However, precedent exists for interdisciplinary assessment and case study comparison (Parker, 1986; Austin et al., 2008; Bates, 2018; Ramirez-Lovering et al., 2018). Additionally, the growing role of artificial intelligence and interactive technologies in urban spaces makes lessons learned and methodologies used in human-computer interaction based-projects of increasing relevance to urban development issues (Alavi et al., 2018; Yigitcanlar and Cugurullo, 2020).

The section draws on my professional experience and personal reflection in supporting and facilitating the worldbuilding methodology used on the FWV project while working at Experimental Design. I provide an account of how worldbuilding was implemented in the FWV project and how it facilitated collaboration between participants of disparate backgrounds. I situate these efforts within the greater context of challenges in collaborative design practices, and the limits of translating process from a strictly worldbuilding based practice to one with tangible urban planning impacts in the physical realm.

Such a research process has distinct advantages and disadvantages. Case study assessments in general, due to their specificity, have long been critiqued for being limited in what

they offer as research studies to wider theoretical discussions (Lucas et al., 2018). Yet there is a growing awareness of the value of the case study assessment method, including those based on an author's professional experience, particularly in identifying potential in methods from different disciplines to inform and improve those in others (Brannen, 2008; Smith, 2012; Fleming and Zegwaard, 2018; Alpi and Evans, 2019; Haeffner et al., 2022).

A framework for comparison was developed by selecting three steps distilled from literature of worldbuilding process and design: brainstorming, prototyping, and feedback and iteration. These terms occur frequently in worldbuilding related literature, as well as research on community planning process in urban development projects (Bowen, 2010; Karasti, 2014; Sabiescu et al., 2014; Cechanowicz et al., 2016; Baumann et al., 2018; Faliu et al., 2019).

Brainstorming concerns the articulation of high-level concepts oriented around hypothetical “what if” questions crafted to guide collective imagination in the design process. Research is often an embedded part of the brainstorming process, albeit to differing degrees of dedication, detail, and breadth. Prototyping is a means of fortifying the quality of proposed design solutions by developing and testing different options (Preece et al., 2015; Miao et al., 2017). It refers to the process of exploring the high-level concepts developed in the brainstorming phase through experiences, products, and objects crafts to test out potential impacts of proposed ideas. Feedback and iteration occur as a process of reflection on impact and experience of developed prototypes, and input on how they might or might not be refined as a result (Arnstein, 1969; Billger et al., 2017). Each project used a worldbuilding process that differed slightly from this framework but maintained crossover to allow for functional comparison.

Project Context

The FWV project explored in this paper is one aspect of a larger worldbuilding process. The FWV work is an effort to explore potential long-term future urban conditions for five different types of potential urban environments—a floating city, a dense mega city, a rural city, an arctic city and an off-world city. Findings from the five different environments is intended to guide ASCE's understanding of how engineering practice might change in coming decades, and to support engineering professionals and students to prepare for potential changes accordingly.

The following assessment pertains to work conducted on the dense mega city environment. The virtual interactive space developed for the mega city environment portion of the FWV work was designed to house 50 million people, a population that could be typical for dense mega cities in coming decades (Union Nation, 2019). Its geography was loosely based on that of Los Angeles, CA due to the city's current size, as well as the fact that many large cities today experience similar issues of socio-economic inequality, traffic congestion, limited essential resources such as water, and suburban sprawl (Dethier, 2017; Pečar and Papa, 2017; Sunley et al., 2017; Chee and Neo, 2018; Kalyazina et al., 2018).

The worldbuilding process used in the FWV mega city effort followed a methodology developed by Alex McDowell, the creative director of Experimental Design and a widely acknowledged leader in the worldbuilding field (Coulton et al., 2017; Wolf, 2017; Breauleux et al., 2019; McDowell, 2019; Silva and Brandao, 2019; Wille, 2019). According to McDowell and researchers affiliated with his Worldbuilding Institute at USC, his methods incorporate “extensive research at the individual, community, and world scales; a constant redefinition of research questions; a research and world map; as well as expert interviews, speculative fiction, character lenses and development, narrative design, and rapid prototyping” (Cechanowicz et al., 2016).

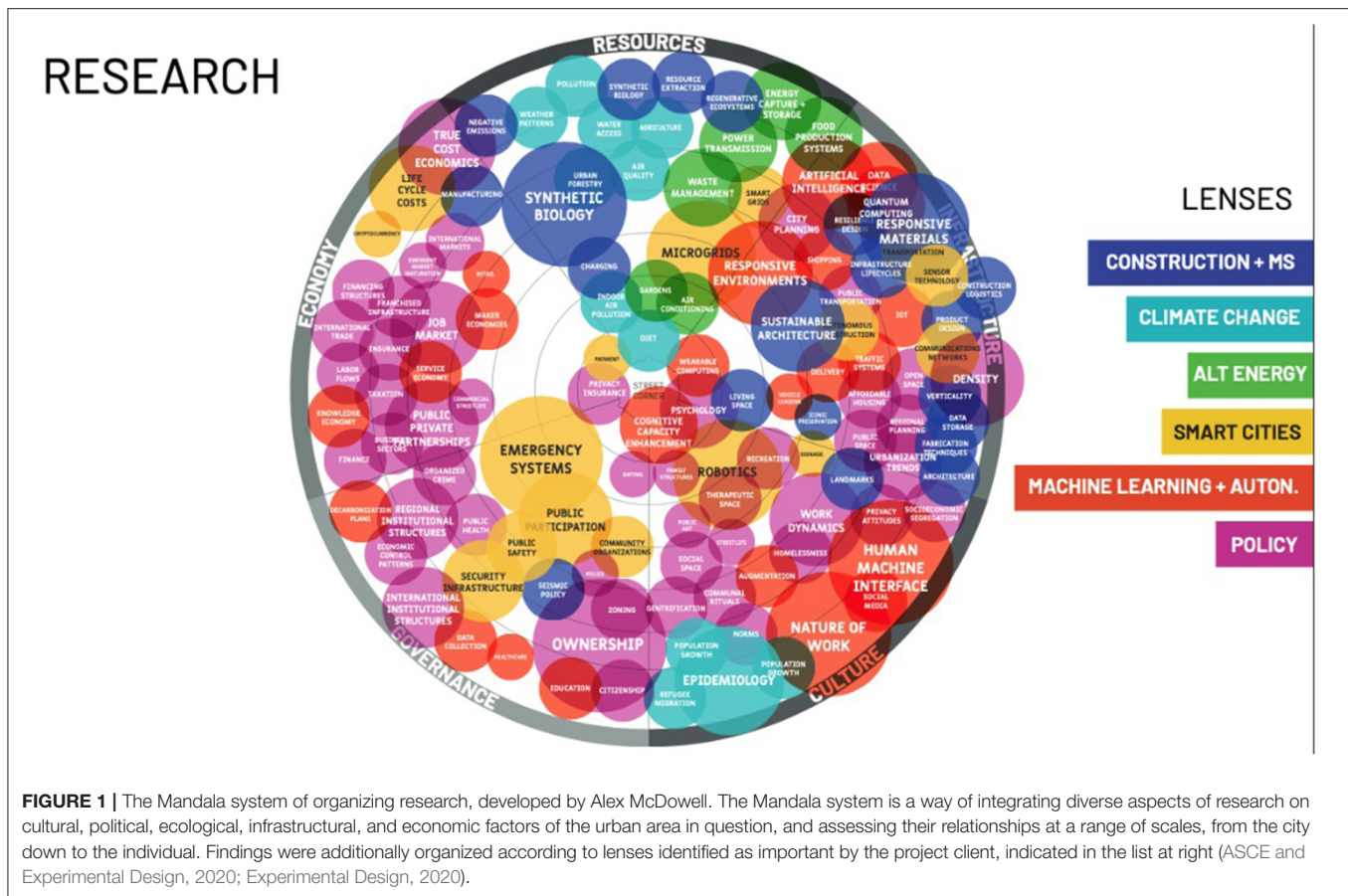
Brainstorming

The intent of the project was to create an interactive video game for professional engineers and students to use to explore issues urban engineering might experience over the next half century. The development of the virtual reality space focused on answering questions pertinent to the engineering professions, such as “How are construction materials and technologies changing?” and “What does infrastructural resilience look like in 50 years?”

The FWV mega city project process began by brainstorming key “what if?” questions to initiate research. “What if?” questions are posed as provocations intended to invite participants to step beyond the confines of existing conditions and explore the possibilities of longer-term trajectories. As the project was geared toward engineers, questions were initially focused to address concerns relevant to engineering. Questions were devised through a combination of collaborative sessions with expert participants and preliminary research conducted by members of the Experimental Design team. All questions sought to understand what urban conditions might be like in 2070. Examples of such questions included:

1. What if all areas of the city were accessible by public transit?
2. What if streets served other purposes beyond transportation?
3. If the future is multi-model as many people seem to predict, what does that mean for things like personal car ownership rates, and first-mile and last-mile transit connections?
4. What if 3d printing and AI were the basis for urban construction and development?
5. What if urban spaces and systems were responsive to inhabitants' preferences and needs?
6. What if transportation occurred vertically as well as horizontally?
7. What if cities grew and shrank in response to their environments?

Questions were organized to facilitate deeper research according to McDowell's mandala system (Von Stackelberg and McDowell, 2015). The mandala system arranges information according to five primary categories. In this case, those categories were political systems, ecological systems, economic systems, cultural systems and infrastructural systems. As urban development has traditionally been viewed as a resource and land-management issues (Krumholz, 1996; Sandercock, 1998; Burayidi, 2000; Yiftachel and Huxley, 2000; Elwood, 2005; Corburn, 2009;



Monno and Khakee, 2012), this wider-ranging approach to research on urban conditions can still be considered as somewhat novel.

The five primary categories were complemented with focus areas identified as important to the project at hand. With the FWV megacity project's engineering audience, focus areas were identified through collaborative workshops as climate change, high tech construction and material science, policy, alternative energy, and artificial intelligence and autonomy.

Research questions and findings were organized according to primary categories and focus areas, as well as by scale of relevance (see **Figure 1**). Regional scale factors were placed at the edge of the mandala, while neighborhood and individual scale impacts were placed toward the center. The point of the mandala framework is to explore and reveal connections between the many different factors shaping urban life that are often viewed as separate.

Research questions were answered *via* primary and secondary research. Secondary research involved literature reviews of pertinent studies. Primary research involved interviews with experts, both individually and in cross-disciplinary groups. Experts were identified across a wide range of areas, such as nuclear fusion and solar power, as well as across disciplines including epidemiology, blockchain technology and sociology.

Nearly fifty experts were interviewed over the course of 9 months, over fields as diverse as affordable housing and regional

planning policy to robotics and indoor air quality management. As research evolved, research questions were redefined to account for new connections between disparate fields and previously unforeseen areas of inquiry.

Workshops were conducted to explore where people from different backgrounds and areas of expertise agreed and disagreed on subject matter issues and questions. Questions about waste management engineering, for example, were first directed to experts in waste management, but insight from experts in fields such as disaster response, aeronautics and energy efficiency was also welcomed, providing a depth of feedback and collaboration across disciplines that are typically treated in silo.

Prototyping

In addition to researching emerging trends and issues that could shape urban life in 2070, early stages of the project involved writing science-fiction narrative shorts. Writing short speculative fiction about the lives of characters that might live within the mega city environment in 2070 was a way of both synthesizing research and prototyping the range of experiences that residents living in different areas of the city might have. Story became the space to synthesize seemingly disparate pieces of research. People will always require food, water and shelter, and cities will always have to provide for those needs in some fashion.

Written narratives for the FWV mega city project were a means to test the human impacts of design proposals and refine

Nikal gets up and goes to work. Nikal is female, 36 years old. She is assertive and upper middle class. She's an engineer working for the megacity.

She wakes up in her own apartment, which is spacious, two bedrooms, her own bathroom and kitchen and living area. She was in a bad mood the previous night and the room reconfigured according to the environmental presets she has for angry times — chairs facing the walls and hanging pictures slightly askew. As she walks inside the living space from her bedroom, the room reconfigures itself according to her morning preferences — furniture oriented to face the middle of the room, window blinds up.

Her kitchen is automated to put out all of her morning supplements and food and caffeine. She has half fresh food bc she is well connected in her job working for the city and the rest powdered, she takes age blocking supplements and drinking down three full glasses of water before leaving the apartment. Her kids are at her husband and his girlfriend's place, around the corner from her apartment; the apartment they all used to share before Nikal moved out. They built her current place in a couple days when she decided she wanted more of her own space. Luckily they'd all been in the district long enough to accrue the right to more space and to build those new spaces quickly.

This morning she's focused on transit watch and people movements, monitoring and documenting uploads of where people are flowing through the city, how morning commutes are going, if people are coalescing in new parts of town or new additions to street areas, etc. A part of her job she takes very seriously is making sure that biometric and facial recognition data is erased at the end of the day on which it was collected. This is basic policy but she feels a particular connection to and importance about it — she doesn't want the system to absorb any more of her information than it already does. She's at work two hours before another human comes in — 4 out of every 6 work hours are spent just her and the systems.

Ownership - parts of the megacity are organized into their own geological hazard abatement districts, in which the space / land owners can tax selves like a typical business district and those taxes can be set in perpetuity, the abatement districts are their own smaller scale of district government. within that, people have shares in a given housing system that you can take with you when you move, like a housing subscription — it's like housing as a service. there are also versions that operate based on land trusts, where the higher you pay into the trust, the less your rent is. the longer you are within that given site, the more benefits you can get from the trust. (Hill, 2020)

If the megacity uses sensor-based systems to become more responsive, there is an agreed upon lack of privacy for those who enter and use the megacities resources. The megacity promises that no facial recognition and other types of biometric data will be used/sold for nefarious purposes and all individually connected pieces of information (specific faces, etc) are deleted after 1 day. All data is owned by the city, not by the companies who make the sensors. This means that the city has to have its own algorithmic processes and does not farm out management to third parties. Megacity denizens pay more in taxes to support that system. Biases in data analysis continue to be a significant issue. The megacity addresses this by publishing the logic behind its algorithms but few take the time to read the logic (it's akin to the number of people who read the full signed agreements for app usage today — it takes too much time). (Gepshtein, 2020; Perona, 2020; Hoornweg, 2020)

FIGURE 2 | Writing science fiction about residents' daily lives helped synthesize the research and identify the range of experiences that people living in different neighborhoods might have. The right column shows takeaways of some of the research conducted. The left shows a story that resulted. The process kept the human experience of space as a key foundation of design (Hoffman, 2020).

them accordingly, through a narrative form of rapid prototyping (see **Figure 2**). Investigating the kinds of energy grids that could power a city of fifty million in safe, carbon neutral ways, for example, came hand in hand with understanding how those grids would impact what residents saw when they left their homes each day. While primary and secondary research guided the big picture context for what urban life in 2070 could become, written narratives connected big picture context to human-centered concerns.

Although somewhat similar to “user journeys” often employed in industrial and digital design fields to dictate the experiences of those who use them (Robinson and Harrison, 2017; Allanwood and Beare, 2019; Baumers et al., 2020; Nannan et al., 2021), this approach focused more on provocation. Generated stories were not designed to craft the experiences of people moving through the city. They were made to see the city through the eyes of the tens of millions who lived there. They grounded energy infrastructure with the needs of people who dream about going on vacation, having nice clothes, and eating delicious food. They investigated transit systems through the priorities of communities from different neighborhoods, each with different needs, challenges and systems of support.

The form of the FWV mega city began to take shape by combining research, narrative development, and visual prototyping. Moving across temporal scales from 2020 up to 2070 allowed for assessment of changes stemming from climatic issues, land use trajectories, energy use patterns and air quality. Moving across spatial scales allowed for iterative understanding of how infrastructural systems affected and shaped resident experience (see **Figure 3**).

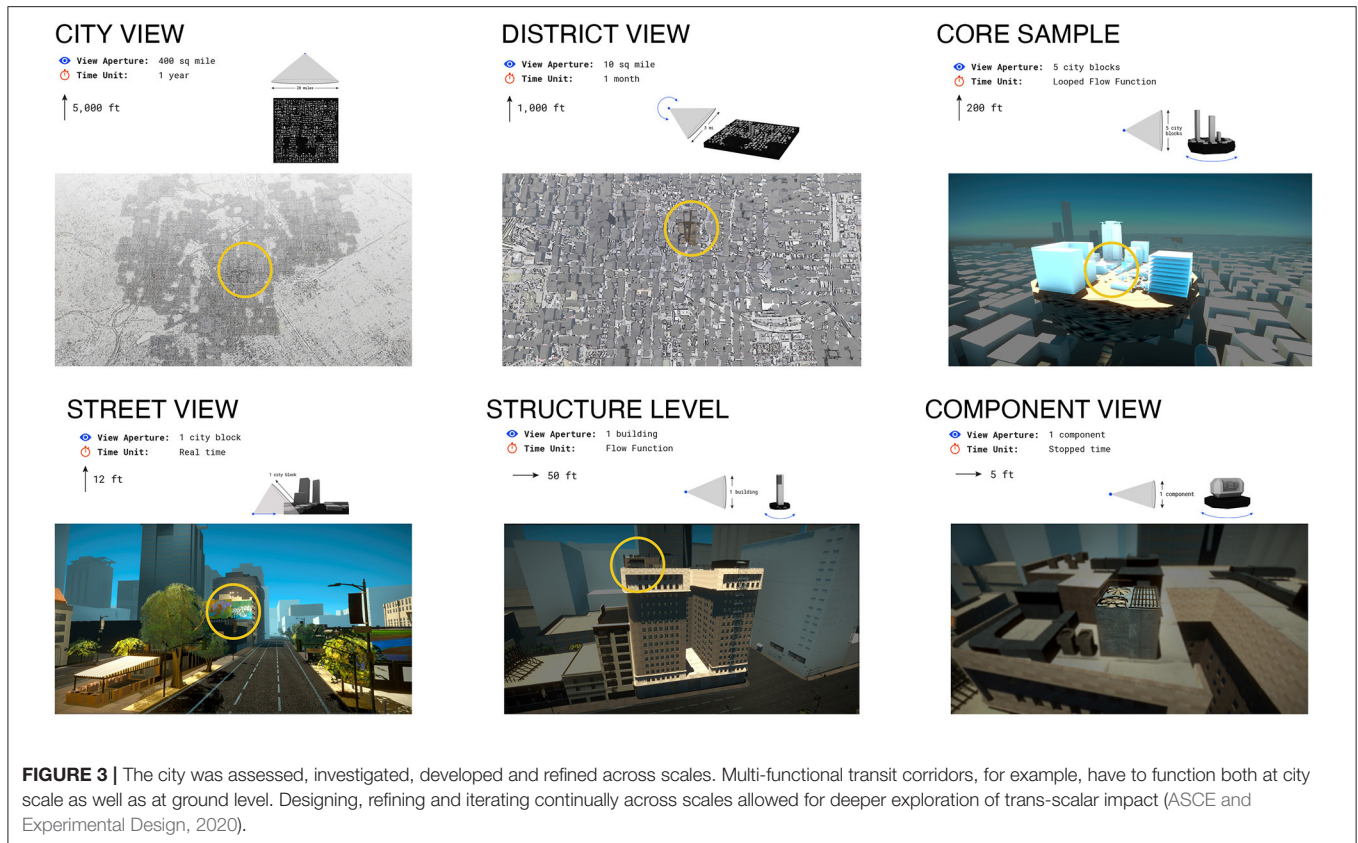
All scales were approached as equally important windows for understanding the impacts of intervention prototypes. Assessing how factors such as incorporating historic foundations might work at district scales, for example, was as essential as investigating their influence on the pedestrian experience at

street level. Trans-scalar impacts were vital aspects of ongoing workshops. Greater levels of detail provided at street level views and neighborhood scales allowed for more nuanced levels of feedback from stakeholders regarding the potential impacts of proposed designs, unforeseen externalities, and changes to be considered. Infrastructural elements such as interconnected green space and public pedestrian walkways were developed, assessed, and reshaped according to stakeholder feedback and their impacts across a range of scales.

Feedback and Iteration

Ongoing feedback and stakeholder collaboration were fundamental aspects of the worldbuilding process. Rather than treated as sources of periodic input, clients and participating experts were approached as collaborators throughout the design process. Involvement occurred through regular feedback sessions in small groups, as well as in larger workshops. Modes of narrative exploration and prototyping, in visual and written forms, provided space for collaborative exploration about what could be changed, adapted, or improved in the emerging mega city environment. Back and forth in the worldbuilding space allowed teams to reflect on proposed designs together, to assess how realistic they were, what issues arose, and what needed to be changed to better accommodate those involved. Feedback was fuel to refine mega city designs and spatial storylines.

Forums for ongoing feedback were built into the virtual reality experience as well as the creation of the mega city space. A dashboard was created to invite participants to mark issues they found interesting or problematic, and to comment on ideas and suggestions made by others. When engaging with the space, participants have the options of leaving comments and initiating dialogue with others. As such, the mega city space serves as a container for ongoing discussion about potential urban futures, empowering participants to devise systems and



approaches they would prefer to see and collaborate with others in the process.

DISCUSSION

The potential for worldbuilding to improve participatory planning efforts and enact systems of co-production in urban development by challenging systemic power imbalances, merits serious consideration. However, little attention to its potency has been paid in academic and professional discourse. This section assesses the worldbuilding methods employed in the FWV case study within the context of need for greater iterative capacity and enhanced modes of communication in planning processes to facilitate stronger degrees of stakeholder agency and self-determination. Particular focus is paid the conceptual and pragmatic implications for transplanting the worldbuilding method from a context like the FWV project into a collaborative, participatory, real-world planning venue.

Subsequent reflections are based on an understanding of the differences in context of the FWV project compared to typical real-world planning project settings. For example, a majority of stakeholders involved in the FWV project were experts in the field of engineering and/or had some experience and understanding of urban development related processes. In most participatory planning processes, public stakeholders are not necessarily experts in urban planning or design, a fact which can create or exacerbate divides in trust, communicative capacity, and length of time required for collaboration to begin to thrive.

Conceptual Implications

Emphasis on Provocation and Play as Opportunity for Trust Building and Communication

The FWV project employed worldbuilding to utilize the power of provocation and play in the design process. By translating questions about long term urban trajectories into a video game, the effort created a contained, play-based place to explore and provoke questions about what urban futures might become. This approach connects to larger bodies of research documenting the input play enacts on collaborative modes of creative intervention (Ampatzidou et al., 2018; Almendra, 2021; Robles, 2021) Studies run by researcher Wargo and Alvarado (2019) find that the process of collaboratively rewriting the narratives of collective realities through play can form the basis for powerful partnerships. Young children regularly create play worlds that still invite input and influence from others. As such, play serves a form of communication-based collaboration with which people know intrinsically how to engage. The more detailed a play world is, the more it can allow its players to explore the ramifications of seeing in entirely different ways. Play mixed with constraint is worldbuilding (Cechanowicz et al., 2016; Robles, 2021).

Play can also be a powerful means of reconciling differences in belief and attitude. A recent paper found that games can effectively reveal “the underlying processes or concepts that drive a system or activity” through the process of play (Coulton et al., 2016). Because games invite curiosity, exploration, and iteration, employing elements of play into

urban planning can create powerful shifts in how people invest in the process, encouraging participants to explore the complexity of existing problems through more imaginative lenses. Injecting the planning process with play can help to release seemingly entrenched degrees of tense and longstanding struggle. Cultivating trust through the shared experiences that play provides can engage people over the longer periods of time that enacting proposed change often requires (Beattie et al., 2020). That worldbuilding uses these aspects of storytelling, something to which all people have some level of understanding and connection, creates inviting, play-based contexts for collaboration to occur.

The FWV effort cultivated play by making a video game environment for collaborators to test, see, and feel into what a potential long term urban future might be. Such immersive, sense-based environments not only cultivate contexts for imaginative play and exploration, but also illuminate and critique the kinds of baked-in beliefs that limit conceptions of how change can occur. Speculative architect Liam Young distilled the idea in a 2015 interview, insisting that speculative visions that provoke real feeling—love, hate, confusion, and more—helps us to “not just anticipate, but actively shape... futures through their effects on collective imagination.” For Young, play-based speculation is a means to instigate “debate, raise questions and involve the public as active agents” in how our cities evolve (Young, 2015).

Findings from the FWV project suggest that the worldbuilding process can enhance communication through play. In doing so, it can help to welcome stakeholders not just as participants in design and development work, but as collaborators, creating the reciprocal relationships between design professionals and impacted communities that co-production demands (Wosk Centre for Dialogue, 2020).

Storytelling as a Foundation for Shared Language

The FWV project's use of worldbuilding indicates that centering the human narrative through storytelling can become a powerful tool to cultivate dialogue and enhance communication across areas of expertise. FWV project stakeholders and collaborators included experts in fields as diverse as economics, renewable energy, and epidemiology, sectors which often operate in silo and infrequently attempt interdisciplinary research or design (de Waal et al., 2019; Hodgson et al., 2019). These are sectors which likewise employ different definitions and usages for similar terms. Perceptions of “risk,” for example, resonate differently in engineering sectors compared to those of environmental health (Althaus, 2005). Articulating design proposals as provocative, play-based stories offered an opportunity to bridge those divides. Beginning the project by asking open-ended questions in the research phase created spaces for people to work together by orienting within their respective areas of expertise. Translating large-scale systems into narrative digital experiences in the FWV project provided a context for debate, iteration, and refinement across differences in professional backgrounds, because it rooted conversation away from abstract concepts toward place-based narratives. These findings point to the

potential worldbuilding offers for co-production by improving means of communication.

Shared Language as a Tool to Challenge Systems of Power

Worldbuilding's support of collaboration through communication has the potential to serve as a means of challenging aspects of inequitable power systems that have long been problematic in urban planning and development contexts. This is an area which has been critically assessed for decades, particularly in the communicative planning field (Huxley, 2000; Das, 2020; Calderon and Westin, 2021), which many rightly pointing out that participatory processes, communicative planning included, are problematic when they do not acknowledge the presence of systemic inequities enacted by state and economic infrastructure, and how they can negatively impact attempts at inclusive planning. As Huxley (2000) notes, “communicative planning theory has tended to obscure planning's problematic relation to the state,” creating a growing acknowledge of the “relations of power and inequality.” Grassroots, community-based organizing has long been acknowledged as an essential way to challenging systemic inequalities (Jacobs, 1961; Stephen, 1993; Fields, 2015; Broto and Alves, 2018), yet quandaries as to how to effectively support such organizing persist. By emphasizing the power of storytelling, one of humanity's oldest communicative tools and a process to which all people have some level of connection (Wilding, 2017), worldbuilding offers a design method that can enhance degrees of community agency and self-determination.

Pragmatic Implications

Feedback and Iteration Impacted by Time Frames and Facilitation

Within the FWV project, stakeholder feedback and subsequent iterations focused on specific design questions within the virtual reality urban space. That feedback was invited during workshop experiences conducted on an iterative basis, spread out over the course of 1 year. Due to the commenting feature built into the video game experience, feedback was also designed to be an ongoing aspect of how the game was played once complete. While those modes of feedback do not result in changes in the urban design of the virtual city space, input was recorded to spur ongoing debate and conversation about potential complications, ideas, and potential improvements. In doing so, the FWV project created a framework of possibility in which the character of the virtual city was less a predetermined outcome than the result of iterative, collaborative conversation (Buchanan, 2013).

The decision for how much time to invest in iteration was largely placed at the discretion of the FWV client, highlighting the larger structural issues that often dictate whether robust degrees of iteration occur (Mahyar et al., 2016; Webb et al., 2018). This is an indication that worldbuilding alone is not enough to engender more iteration in planning process. As a design approach based on iterative design (O'Sullivan, 2019; Saunders, 2019) it can be a helpful tool, but the degree and frequency of

iteration depends on greater structural factors such as funding sources and overarching project aims (Smith and Stirling, 2010).

What-If Questions as an Opportunity to Enhance Communication and Iterative Design

Framing the design and planning process by identifying what-if questions was a key opportunity to set the stage for co-production in the FWV project, through both enhanced iteration and communication. Asking “why not?” is a well-documented means of challenging the status quo, of making space to explore alternatives, articulate preferences, and cultivate feelings of empowerment as a result (Taura and Nagai, 2010; Coulton et al., 2016; Joklová and Kristiánová, 2017; Stelzle et al., 2017; Beattie et al., 2020). Studies have shown that asking provocative questions often allow for more outside the box thinking compared to declarative statements and provide opportunities for enhanced degrees of communication to occur (Dunne and Raby, 2013; Lupton, 2018). “What if?” questions have been regularly found to encourage iteration in urban design and policy projects, with researchers frequently recommending the tactics for use in deliberative design processes across building and neighborhood scales (Klosterman, 1999; Rosenman et al., 2007; Mattelmäki T and Vaajakallio, 2011; Salter et al., 2020).

Facilitating Stakeholder Agency and Self Determination

How effective the worldbuilding methods used in the FWV project were in facilitating stronger degrees of stakeholder agency and self-determination is difficult to gauge. On one hand, degrees of iteration in the narrative and spatial design process enabled stakeholders to advocate more vocally for changes which they thought needed. More detail in spatial designs led to more effective collaboration in large part because those involved in giving feedback could be more vocal about what did and did not, in their opinion, work. This back and forth in the worldbuilding space allowed for more reflection on proposed designs, more in depth assessment of efficacy, potential for resulting problems, and what needed to be changed to better accommodate ideas and needs of those involved.

On the other hand, as previously mentioned, a majority of stakeholders involved were experts in the field of engineering and/or had some experience and understanding of urban development related processes. As this is not typical of many public planning projects, whether or not methods used in the FWV project would effectively augment capacities for stakeholder agency and self-determination is not possible to state with confidence at this time. However, it is worth noting that the fact that FWV emphasized visual and spatial communication of the worldbuilding space was a benefit when it came to creating forums for diverse stakeholders to articulate and advocate for preferences. That outcome is aligned with findings from wider research efforts regarding the power of visual and spatial design (Taranu, 2009; Nassauer, 2012; Bento and Laopoulou, 2019; van Dijk, 2021).

CONCLUSIONS: IMPLICATIONS FOR THE ROLE OF WORLDBUILDING IN CIVIC CO-PRODUCTION AND A FUTURE RESEARCH AGENDA

As previously stated, participatory planning continues to suffer from issues of effective implementation (Smith, 1973; Sools and Mooren, 2012; Yazar et al., 2020). Problems with communication across disciplines and areas of expertise are often widespread (Perrone, 2017; Brenner, 2019; Neuman et al., 2021). Stakeholders are typically invited to engage in design and planning projects sporadically (Larsen and Hansen, 2008; Mehdipanah et al., 2017; Bates, 2018). Communication tools often stay in forms useful to designers, such as plans, sections, diagrams, that those without professional training may be less able to understand.

More effective co-production of urban space offers an opportunity to create the more equitable forms of urbanism that the challenges of this century demand (Langdon, 2017; Reneman, 2017; Royce, 2018; Cheon et al., 2019; Forman and Cruz, 2019; Tomin, 2020). In particular, co-production presents a frame through which systemic inequities in planning systems can be addressed. It does not, on its own, offer avenues to revolutionize entrenched inequities. Rather, its toolsets provide certain reformist benefits. By providing means for enhanced iteration and communication in development processes, worldbuilding can be a powerful way of enacting more equitable urban environments.

Worldbuilding’s potential to support processes of co-production connect to its approaches for improving iterative capacity and public communication in urban planning and development. Narratives are powerful avenues to create common language required to collaborate across areas of expertise, experience, and worldview (Wargo and Alvarado, 2019; Zaidi, 2019). That worldbuilding relies on imagination and storytelling, qualities to which all people have some level of understanding and connection, can create more inviting contexts for collaboration to occur (Coulton et al., 2016; Bayer and Hettlinger, 2019; Daigle et al., 2019; Hamilton et al., 2019; Wargo and Alvarado, 2019; Yilmaz and Cigerci, 2019; Beattie et al., 2020).

As demonstrated in my recounting of methods employed in the FWV project, using storytelling to center the human narrative in urban development can become a means of cultivating communication across differences (Lloyd and Oak, 2018; Recupero et al., 2018). While stakeholders in the FWV project shared degrees of knowledge and experience in urban development related issues, they came from a wide array of disciplines and professional backgrounds, indicating the potential for worldbuilding methods to facilitate dialogue amidst certain divides. More research on how worldbuilding facilitates communication across areas of cultural and behavioral differences is needed.

Based on findings from the FWV project, worldbuilding appears to be less effective in implementing greater degrees of iteration in urban design efforts. While the approach’s

emphasis on “what-if?” questions supports enhanced levels of both communication and iteration, it does nothing to ensure that the time required for meaningful and sustained iteration will be supported. As worldbuilding is a design approach rather than a framework for systemic change, its impact is largely dictated according to the discretion of project initiators and funders.

It is clear that worldbuilding is not a panacea for achieving co-production in urban development, nor in challenging systemic inequities. Unless greater change in development systems occurs, it is possible that a more widespread use of worldbuilding may merely upcycle notions of solidarity economies and community collaboration for continued modes of exclusion (Diamond, 2018; Miller, 2018). On its own, the approach is not enough to change entrenched inequality, social divisions, and rising rates of civic tension (Van Deusen, 2002; Dassé, 2019). To realize the full benefits that worldbuilding can provide, development and planning must be reframed to promote greater systemic support of collaborative process (Hoch, 1994; Allen et al., 2012). Worldbuilding, with its focus on storytelling, can serve to enhance community-based capacities for communication and iteration that support greater degrees of agency and self-determination, and initiate stronger challenges to systemic

inequalities as a result. Yet the method is not sufficient on its own to enact systems level change.

Areas for further study include: investigation into how what-if questions can act as a critical foundation for enhanced communication and collaborative capacity; assessing current limits of how worldbuilding feeds into existing planning sequences to cultivate better integration between collaborative vision and sustained implementation over time; exploration of how greater degrees of community-based co-production using tools such as worldbuilding can enact systemic level change.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

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