Constructing the smart city beyond the state: Exploring the conditions for institutional change in Mexico City

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Abstract

Research indicates that citizen participation in the smart city is typically limited in practice. Prior to the Covid-19 pandemic, several institutional factors acted to limit citizen participation in Mexico City's smart city activities. This paper explores whether the exogenous shock of the pandemic disrupted socio-political institutions unhelpful to citizen participation in smart city development. It notes that the pandemic had limited impact on this institutional environment. The paper argues that securing meaningful citizen-oriented smart city innovation therefore requires an alternative approach. It argues that in Mexico City genuine citizen orientation could be facilitated through the construction of an alternative smart city founded on civil society organizations. To support this proposition, it draws on a co-creation exercise led from beyond the state. Developing such an alternative smart city will, however, require institutional work on the part of local actors and key additional resources. The paper explores processes of shifting towards more participatory smart city development models that are relevant to the global pursuit of the alternative smart city.

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Introduction

Over the last two decades the dominant framing of smart city discourse has moved from tech-driven, through city-led, to citizen-oriented (Cohen, 2015). On launching its 'People Centered Smart City' programme in 2020 the United Nations noted that 'smart cities can have a tremendous positive impact on people's lives, but only when people are at the center of the development process' (UN-Habitat, undated: 9). Saunders and Baeck similarly argue for 'people centred smart cities … tapping into the collective intelligence of citizens' (2015: 52). As urban technology becomes more pervasive it should focus on improving quality of life for citizens; involving citizens is crucial to realizing that aspiration.

However, while the case for involving citizens in Smart City development has become more pressing, research demonstrates that it frequently does not happen in practice. There is 'mixed evidence on the question of whether smart city initiatives driven by digital innovation are empowering or disempowering citizens' (Martin et al., 2018: 274). Shelton and Lodato (2019) argue that smart city policy frequently claims to benefit citizens in general, but specific beneficiaries are harder to identify – the citizen is absent in practice. This applies as much in the global south as in the global north (Smith et al., 2023; Sweeting et al., 2022). Hence, while focusing on citizens' needs and citizen participation is framed as normatively desirable both in global smart city policy discourses and by scholars arguing for the equitable and inclusive development of urban technologies (e.g. Cardullo et al., 2019), there continue to be concerns that smart city development, regardless of increasingly citizen-oriented discourses, is dominated by corporate interests (Hollands, 2015) or place marketing strategies pursued by urban entrepreneurs (Irazábal and Jirón, 2021).

While a lack of meaningful citizen participation in smart city development has frequently been documented, the barriers to participation and the question of *how* to get citizens more involved are less frequently interrogated. This article adds to the debate by presenting a theoretically informed account of institutional barriers to citizen participation and how to move beyond them. It draws on: institutional accounts of smart city development (Pansera et al., 2023); bottom-up notions of the smart city (Paskaleva et al., 2021); and the literatures on institutionalism (Scott, 2008) and smart urban experimentation (Sengers et al., 2021).

The paper takes Mexico City as its case study and utilized data collected before, during and after the Covid pandemic. Greater Mexico City comprises 60 municipalities and is home to approaching 22 million people. The city's central area is divided into 16 districts encompassing 1800 neighbourhoods (Cities of Service, undated). The city faces a broad range of urban problems (Perlman and De Dios Pineda Guadarrama, 2011). It has a reputation for grassroots activism and citizen participation in governance processes (Flores, 2016; Hambleton, 2020). Additionally, civil society organizations (CSOs) have historically played key roles in a range of domains (Thelen, 1999). The scale and complexity of the city mean it is a fruitful site for investigating the challenges facing fragmented systems of urban governance, the limits of urban governance, and the interplay between the formal and the informal (Le Galès and Ugalde, 2018).

By the early 2010s Mexico City featured in international comparative rankings of city 'smartness' (e.g. IESE, 2014). The 2012–2018 city administration engaged in a programme of smart activities among which the *Laboratorio para la ciudad* (LabCDMX), created in 2013, was perhaps the most innovative. LabCDMX was intended as a creative space where actors from government, the private sector, civil society and academia could develop technologies useful to the city's citizens (Valencia, 2017). This initiative was privately funded in partnership with the Mexico City government. Several projects were developed, but most were pilot projects that never scaled up. Nevertheless, these projects meant Mexico City attracted external interest for its smart city activities (Machina Research, 2016).

When the 2018–2024 populist-left administration took office relationships between local government, the private sector, and civil society were discouraged, with the stated aim of curbing corruption and enhancing efficiency (Ordaz, 2021; Pansera et al., 2023). In 2018 LabCDMX was abolished. Whitney and López García (2023) argue it had not been sufficiently institutionally embedded in the broader governance structure, while Montero et al. (2023) note its reliance on uncontextualized 'best practice' and trendy urbanists. The city government instead created its own technological department, the *Agencia de Desarrollo en Innovación Pública* (ADIP), to develop technological solutions in-house. In January 2019 at a presentation of the city's digital plan led by Mayor Claudia Scheinbaum it was noted that 'With the creation of ADIP, the Government of Mexico City seeks to build a government free of corruption and at the service of the people through openness and digital governance, prioritizing those who need it most' (ADIP, 2019). Rhetorically, the administration sought public involvement, but, in practice, prior to the pandemic, public participation in its decision-making was very limited (Pansera et al., 2023; Sweeting et al., 2022).

Pansera et al. (2023) and Sweeting et al. (2022) adopt an institutionalist perspective and examine the institutional factors contributing to this lack of public participation in smart city development. A core argument was that crucial barriers to citizen participation were not specific to the smart city field, but broader societal institutions, rooted in the history and political economy of Mexico. These powerful social institutions – especially clientelism, lack of trust, and corruption – are deeply embedded and pervade everyday social practices. Path dependency – the difficulty of shifting a 'locked-in' relationship between the state and the citizen – was a core issue. In the face of such path dependency, institutional theory identifies exogenous shocks as representing critical junctures at which disruption creates the potential for a new path to emerge (Lowndes and Roberts, 2013).

With this context in mind, this paper is motivated by the question: *If existing institutions act as an impediment and are highly resilient, and the prospect of creating a citizen-oriented smart city through their transformation is slim, then could the socio-political context allow for an alternative approach 'beyond the state'?* It addresses this question in three stages. First, did the pandemic bring about change(s) in the institutional context in Mexico City that facilitate more citizen-oriented smart city activity? Second, if this did not happen, does the socio-political context suggest an alternative, more citizen-oriented approach would be possible? Third, how would the institutional environment need to change to realize genuinely citizen-oriented smart city innovation?

This study contributes to ongoing moves to enrich our understanding of the smart city through provincializing our knowledge: recognizing diversity in practices and experiences by examining contexts beyond the global north (Irazábal and Jirón, 2021; Prasad and Alizaden, 2020). Our findings address the specificities of Mexico City, but we take Mexico City to be an 'exemplifying case' (Bryman, 2016: 62). Ultimately, the paper seeks to contribute to the 'search for different ways to think about smartness and to explore smaller scale, community-based and more socially progressive uses of new technologies' (Hollands, 2015: 70). Our aim is not to argue that smart innovation is necessarily the best or most urgently required response to urban problems. Nor is the premise that smart innovation is a key citizen demand. The point is, rather, to explore what would be required to translate policy enthusiasms for smart innovation, the genuine opportunities presented by digital, and the discursive commitment to citizen participation into a genuinely citizen-oriented smart city.

The paper proceeds in six stages. Section 2 briefly reviews the analysis of citizen participation in the smart city and highlights the resources of an institutional approach. The third section presents our methods and data. We then address each of the three stages of our argument in turn. Section 4 considers the impact of the pandemic on the citizen-orientation of smart city practice. Section 5 develops the argument that there is potential in Mexico City to foster an alternative citizen-oriented smart city. In Section 6, we consider what is needed to realize that potential. Our conclusion returns to the broader relevance of our argument.

Citizen participation in the smart city: An institutional approach

The 'Smart City' has been defined in diverse ways (e.g. Albino et al., 2015; Irazábal and Jirón, 2021), with differing emphasis upon social, organizational and technological innovation. For current purposes, the key point is that smart city innovation typically focuses upon developing responses to urban problems that involve applying digital technologies: the key questions are which problems are addressed and who participates in decisions over problem selection and solution design (cf. Caragliu et al., 2011: 70). Our focus is upon the extent to which citizens' interests and priorities, rather than those of other stakeholders, shape and direct innovation processes. There are two broad perspectives on this question: the 'top-down' and 'bottom-up'.

The role of the citizen in 'top-down' and 'bottom-up' approaches to smart city development

Critical scholarship highlights the dominance of corporate and state interests, rather than citizens' needs, in shaping much smart city development (e.g. Hollands, 2015). Local governments transact with private companies to introduce technology-related infrastructure. This 'top-down' version of the smart city can be criticized for paternalistic 'solutionism' (e.g. Paskaleva et al., 2021) and propagating standardized solutions that lack sensitivity to local contexts and needs (Dunque Franco, 2021). Cardullo and Kitchin note that typically 'citizens occupy a largely passive role, with companies and city administrations performing forms of civic paternalism (deciding what's best for citizens) and stewardship (delivering on behalf of citizens)' (2019a: 813). Similarly, Calzada (2020) warns that technocratic governance risks 'marginalising the most voiceless and vulnerable stakeholders' (2020: 1146). Such concerns are particularly pertinent in many Latin American contexts because top-down imposition of political agendas has long been a feature of political culture (see Valverde et al., 2018).

In contrast, scholars have highlighted the importance of the agency and voices of citizens (Datta, 2019; Richter et al., 2019; Shelton and Lodato, 2019). They have underscored the need for a more powerful conception of citizens, inclusive governance and participatory decision-making in shaping smart cities to ensure smart technologies are deployed humanely and equitably (e.g. Cardullo and Kitchin, 2019a). Yet, the difficulties of securing citizens' participation in smart city innovation are acknowledged (see, e.g., Bull et al., 2019; Cardullo and Kitchin, 2019b; Chantry, 2023; Ghosh and Arora, 2021; Park and Fujii, 2023).

The alternative 'bottom-up' approach to the smart city (Pansera et al., 2023; Paskaleva et al., 2021) implies that citizen perspectives are integral to innovation. In contrast to 'off the shelf' technological fixes, bottom-up approaches acknowledge smart city development as place-specific and politically contested. Bottom-up approaches include quadruple helix models of innovation (Paskaleva et al., 2021); grassroots digital urbanism (Cardullo et al., 2019; Vadiati, 2022); digital insurgency (Basile et al., 2025); or development organized around the digital commons and 'technological sovereignty' (Lynch, 2020; March and Ribera-Fumaz, 2018). The idea of alternative smart cities (McFarlane and Söderström, 2017) challenges the dominant narrative of technology-intensive smart urbanism by arguing for a shift towards knowledge-intensive smart urbanism, where collective intelligence and human-centred approaches take precedence over technological solutions. From this perspective, the route to constructing a genuinely citizen-oriented smart city, from the bottom up, lies 'beyond the state'.

Burns and Welker note '[r]esearch tends to use the term "bottom up" loosely, without perfect clarity regarding what precisely constitutes "bottom up"' (2023: 311). Burns and Welker note that '[i]nsofar as the smart city literature focuses on … loose amalgamations of individuals when theorising bottom-up, it departs from more classical formulations such as the literature on urban

social movements and activist networks as captured in the metaphor of "the grassroots"' (2023: 312). They view the influence of existing community and civil society organizations as understated. Burns and Welker term such organizations 'interstitial' and argue they can play either an inside or a more marginal role. Inside interstitiality refers to 'vertical' mediation between top-down organizations and communities, whereas marginal interstitiality refers to a 'horizontal' role that 'situates actors strategically outside (though never entirely outside) the discursive and material territory of smart urban practices' (Burns and Welker, 2023: 316). This question of what constitutes 'bottom up', and specifically the role of CSOs, is particularly important in Mexico, where *colectivos* and other CSOs have a well-established, central role in social organization (Hevia De la Jara, 2012).

Overall, despite extensive critique of top-down smart cities, 'there have been fewer attempts to consider what alternative, more democratic, and socially just alternatives might look like' (Lynch, 2020: 665) or how they might be brought into being. These are issues we address directly in our discussion of Mexico City below.

An institutionalist perspective

To analyze citizen participation in smart city practices we draw on institutional theory. Institutions are 'a collection of norms, rules, understandings, and […] routines' (Peters, 2012: 29–30). Institutions are both formal and informal and 'exist in every sphere of our lives, the social, the economic, and the political' (Lowndes and Roberts, 2013: 3). Scott (2008) proposed a taxonomy of three institutional 'pillars'; regulatory, normative, and cultural-cognitive. Each pillar contains institutions characterized by different form, logic, and sanction. Institutions can have both permissive and prohibitive effects; they allow or encourage certain sorts of behaviour while discouraging or proscribing others.

Raven et al. (2019) applied Scott's framework to smart urban innovation in Ningbo, Amsterdam, and Hamburg. They argue that regulative institutions in Ningbo and cultural-cognitive institutions in Amsterdam facilitated smart city development, while in Hamburg normative institutions limited citizen involvement. In a fine-grained analysis of Mexico City, Sweeting et al. (2022) found that while regulative institutions (laws, policies) tended to support citizen-oriented smart city activity, powerful normative and cultural-cognitive institutions tended to undermine it: clientelistic practices, lack of trust, corruption, and politicization were particular issues. Further, Pansera et al. (2023) found that in Mexico City a top-down bureaucratic governmental logic inhibited genuinely participative smart city innovation. These analyses of Mexico City were based on fieldwork conducted prior to the covid pandemic.

The exogenous shock of the pandemic entailed disruption in the use of digital technologies and prompted greater reliance on technology in all aspects of society (Osborne et al., 2022). In institutional terms, the pandemic created new policies (regulative), assumptions (normative), and understandings (cultural-cognitive) about the use of digital technologies. The pandemic also sharpened focus upon the way in which citizens' needs are met (Söderström, 2021). It had the potential to disrupt the established path of smart city activity and create a more fertile environment for citizens to be meaningfully involved. Did these factors come together so that state-led smart city development adopted more citizen-oriented approaches?

The institutionalist approach offers conceptual resources to examine whether the pandemic changed the institutional context to be more amenable to such involvement. Firstly, the concept of deinstitutionalisation is 'the process by which the legitimacy of an established or institutionalised organizational practice erodes or discontinues…' (Oliver, 1992: 564). Oliver notes 'random external occurrences' (1992: 579) in the operating environment might precede an abrupt process of deinstitutionalisation. Alternatively, various factors can align to eventually produce institutional extinction over a longer period (Dacin and Dacin, 2008). In the current case, the question is whether

the pandemic was a sufficiently disruptive exogenous shock to trigger the deinstitutionalisation of institutions that had hitherto impeded citizen-oriented smart city activity.

In addition to deinstitutionalisation, incremental institutional change can create new institutions. Streeck and Thelen (2005) propose five types of gradual institutional change: displacement, layering, drift, conversion, and exhaustion. Taking advantage of inconsistencies, ambiguities, and contradictions in existing arrangements, actors can 'defect' (Streeck and Thelen, 2005: 21) to an alternative set of institutions. Sufficient defectors lead, in time, to a new dominant logic displacing the old. Alternatively, layering adds to or refines existing institutional arrangements. Over time, a new set of institutional arrangements emerges incrementally alongside the existing set. Layering can ultimately lead to displacement, or, in Streeck and Thelen's terms, the old and new can 'peacefully coexist' (2005: 24).

When discussing smart urban innovation, processes of scaling up are a key concern (Van Winden and van Den Buuse, 2017). This involves institutional change and creation. Sengers et al. (2021) theorize the move beyond urban experimentation by focusing on the mechanisms of embedding. They argue that urban experiments move from their initial experimental context and embed more widely when some element of the experiment becomes mobile so that it can be generalized, move, and then be embedded elsewhere.

Sengers et al. (2021) identify four non-mutually exclusive embedding mechanisms. The first mechanism is *replication and proliferation.* This is a mimetic process through which the experimental practice is reproduced in other locations: the essence of the experiment is conserved and variation is minimal. The second mechanism is *expansion and consolidatio*n. This is a broadening process through which an experiment grows in scope, albeit possibly with some adjustment. The third mechanism is *challenging and reframing*. This refers not to mobility of specific practices but the extraction from the experiment of a set of rules that then become mobile – new ways of approaching practice. Finally, *circulation and anchoring* is another mimetic process but rather than practices being mobile it is the enablers of practice that move. That is, knowledge, people or ideas move and influence practice elsewhere. Sengers et al. (2021) argue that the process of moving beyond experiment requires social actors to engage in institutional work. It is not their aim, however, to engage in detail with the types of institutional work required.

Institutional work is 'the purposive action of individuals and organizations aimed at creating, maintaining and disrupting institutions' (Lawrence and Suddaby, 2006: 215). It is undertaken by 'culturally competent actors with strong practical skills and sensibility who creatively navigate within their organisational fields' (Lawrence and Suddaby, 2006: 219). The creation of institutions can entail tasks including mobilizing support for courses of action (advocacy), encouraging actors to see themselves in new or different ways (constructing identities), and associating new with existing practices to facilitate their adoption (mimicry). These activities will only produce durable institutions if they attract the support of people impacted by them, or, in Suchman's (1995) terms, have institutional legitimacy.

Methods and data

To underpin the three stages of our argument this article draws on data from a larger project examining smart city innovation in Mexico City. The project examined the role of citizen participation in existing smart city activities, gathered data from actors in the smart city policy community, and undertook a small-scale process of cocreating smart city innovation with citizens and communities. It gathered data before, during and after the COVID-19 pandemic. This article draws on two waves of semi-structured qualitative interviews and feedback gathered from participants in a co-creation process. In total, 60 qualitative interviews were carried out (for profiles, see Table 1).

Table 1. Profile of the interview sample.

Type of respondent	Wave One (W1) interviews (September 2019 to January 2020)	Feedback survey (FS) (December 2021)	Wave two (W2) interviews (March to May 2022)
Member of civil society organization (technology-focused)	19		3
Member of civil society organizations (non-technology focused)	4	51	22
Government official	4		2
Political party	1		1
Non-departmental public body	2		2
Total	30	51	30

Stakeholder interviews

The first wave of interviews focused on senior representatives of organizations involved in using urban technologies or smart city innovation. Hence, we performed an initial stakeholder analysis (mapping) to identify prominent organizations, including state actors and key civil society players. The interviews took place between September 2019 and January 2020. The interviews focused upon existing uses of digital technologies to address urban problems and management, and considered institutional barriers to such use. The second wave of interviews was carried out between March and May 2022 with members of CSOs and those involved in city government or public bodies with a technology component to their role. A proportion of these interviews were with first wave interviewees, with the aim of capturing change during the intervening period. They focused on the following themes: the impact of the pandemic period on attitudes towards the use of technology; observed changes in approaches to technology use and to citizen involvement; institutional factors affecting the use of smart technologies, including recent changes or barriers to change; opinions on the co-created platform (see the next subsection) and, where appropriate, views on participation in the co-creation process; views on likely future trajectories for technology use and citizen participation in public affairs.

Interviews were carried out in Spanish, translated into English and coded using Nvivo both deductively according to specific themes (e.g. normative understandings of involvement) and inductively (e.g. the significance of the co-creation process being run by university-based researchers) to capture emerging issues.

The analysis of these stakeholder interviews underpins the discussion throughout the following two sections.

Co-creation process

The co-creation process aimed to explore the scope for genuinely collaborative, citizen-led smart city innovation. The core of the process was workshops during which representatives of CSOs worked collaboratively with designers and programmers to co-create a prototype digital innovation (Phase 3 below). The type of innovation co-created was determined within the process, guided by participants' priorities. This co-creation process was a free-standing exercise, but it linked to the interviews summarized above through gathering views on the co-creation process and its outputs

during the Wave 2 interviews. The co-creation process entailed four stages aimed at ensuring it was driven by community needs and that people were brought along with the process. It was conducted during the COVID-19 lockdown using virtual methods. It entailed the following activities:

- Phase 1: Between August 2020 and January 2021 two virtual workshops-focus groups were held in each of five areas. The workshops included participants from all 16 of Mexico City's districts, in order to explore how views and concerns differed across the city (see Table 2). In total 50 representatives of CSOs participated. The workshops sought to explore participants' use of technology and identify the key problems created by COVID-19. While the participants cannot be taken to be representative of the CSO sector as a whole, nor be seen as giving voice to all citizens, they represented CSOs addressing a diverse range of substantive urban problems. Their organizations engaged with digital technologies to differing extents, but the majority were from organizations without a strong digital focus or well-developed in-house digital capacity. Views were synthesized to identify the problem(s) which technology could help address. The majority of participants favoured developing a platform/website giving access to information they felt they lacked, thereby increasing their organization's scope and its technological capabilities.
- Phase 2: During summer 2021 ten workshops were delivered, with all Phase 1 participants invited. The topics for these workshops were determined following a thematic analysis of the Phase 1 focus groups. The workshops disseminated knowledge regarding organizational development, access to resources, and the use of technological tools.
- Phase 3: Participants in Phase 2 were invited to volunteer to participate in a co-creation process. Representatives of 15 organizations participated. Three co-creation workshops were held together with designers and programmers. The outcome of the workshops was two prototypes for a digital platform. Both included all the features identified as important by the workshop participants, but with differently configured user interfaces and site structures.
- Phase 4: During December 2021 feedback on the platform prototypes was gathered via a telephone survey of 51 representatives of CSOs. The survey included a mix of closed- and open-ended questions. For those respondents who had participated in Phase 3 additional information was gathered on their experiences of the co-creation process. This feedback was summarized quantitatively and verbatim responses analyzed thematically, with a particular focus upon the respondents' views on the value of CSO input into design. This Phase 4 feedback informs the analysis presented below in the subsection discussing *A small scale co-creation experiment*.

Mexico City and the citizen-oriented smart city

The first stage of our argument is to explore the impact of the pandemic upon the nature of smart city development processes. Prior to the pandemic, as noted above, the institutional context hindered

Table 2. Geographical allocation of focus groups.

Focus group areas	Localities from which participants were drawn
A	Gustavo A. Madero, Azcapotzalco and Venustiano Carranza
B	Miguel Hidalgo, Cuauhtémoc and Benito Juárez
C	Iztacalco, Iztapalapa and Tláhuac
D	Alvaro Obregón, Cuajimalpa and Magdalena Contreras
E	Coyoacán, Xochimilco, Tlalpan and Milpa Alta

citizen-oriented smart city development. The pandemic appears at face value to have been a 'random external occurrences' (Oliver, 1992: 579) in the operating environment that could precede abrupt deinstitutionalisation. At very short notice, widespread changes to practices enabled individuals and organizations to continue interacting and operating remotely, often via digital technology. People became more familiar with the production and consumption of tech, and in principle therefore could be more open to tech-based approaches associated with the smart city. Certainly, in Mexico City one government employee stated that the government response to the pandemic 'generated a volume of learning' that was leading to the 'loss of fears of participating digitally' (W2#01). Many other interviewees explained how their organizations had altered their ways of working ('the crisis forces us to make great leaps' (W2#15)) to operate remotely and/or digitally. These changes were responding to urgent problems, but many respondents considered they signalled longer-term shifts such that 'nothing will be like before the pandemic' (W2#14). The pandemic induced changes to normative and cultural-cognitive institutions shaping the role of digital in everyday social practices (Scott, 2008; cf. Osborne et al., 2022).

However, new ways of digital working do not necessarily entail a more conducive environment for meaningful citizen involvement in smart city development. The crisis would also need to deinstitutionalise the unhelpful institutions previously noted by Sweeting et al. (2022) and Pansera et al. (2023). Did the pandemic disrupt this context in ways that reduced these barriers? We structure our discussion according to Scott's (2008) three institutional pillars.

Regulative institutions

While the 'rapid reaction of the government' (W2#01) to the pandemic included new uses of technology, interviewees identified no specific formal policy changes in the realm of citizen participation. Indeed, the Government was seen as slow to make change: 'I think that, in this same period that we are using technology more, there the Government has stayed three worlds behind…' (W2#06). Interviewees were frustrated at governmental intransigence. One interviewee offered the following example:

> … the law … required that there had to be a citizen assembly, there was no restriction in any law that said that this citizen assembly could be virtual. However, the Mexico City Electoral Institute was not willing to venture to make them virtual. (W2#02)

Overall, the situation was summarized by a government actor: 'Honestly the regulatory framework I think does not facilitate … digital participation or participation through other modes such as co-creation' (W2#01). It was argued that embedding technologies would require change to regulative institutions: 'I am convinced that … we would have to have, the Government… impose some mandatory requirement where citizens have to continue with the use of these technologies … like the use of seat belts' (W2#04).

Normative institutions

In Mexico City citizen participation in decision making remains the ideal: 'we must start from the basis that both the authorities and society find it important that people participate in decision-making' (W2#09) and many respondents commented on the normative desirability of digital tools and hybrid formats to facilitate citizen participation. Participants were keen to push ahead with the use of technology during the pandemic, despite governmental restrictions. One civil society representative, facing regulative constraints, stated 'we held an immense amount of citizen forums, not assemblies, because I cannot convene an assembly, but we made citizen forums [and] they told

me "this is great!"… We saw incredible things during the pandemic' (W2#02). While there were dissenting voices, arguing that 'we cannot allow this type of technology to supplant citizen consultation' (W2#03), overall interviewees portrayed participation by technological means as normatively desirable.

Cultural-cognitive institutions

While citizen participation continues to be normatively valued, cultural-cognitive institutions indicated greater scepticism. Some scepticism relates specifically to technology. The greater integration of technology into daily life is uneven across the population: some 'don't know how to use the computer, and that is a very painful inequality, because… citizens cannot participate in the same way' (W2#08). One interviewee noted that 'there is enormous distrust towards technological progress', with voter fraud (W2#19) and privacy risks around e-voting and participation (W2#05) being a particular concern. However, much scepticism flowed from persistent distrust in government, which feeds the view that digital participation will be ineffective or tainted. In addition, in Mexico distrust extends beyond formal institutions to deep-seated distrust towards one another (Heras, 2010; INEGI, 2022; Morales Mena, 2015).

While technology could potentially broaden participation, there was scepticism about government inclination to deliver effective technological enhancement of participation:

> … co-creation could be a participative mechanism ... but it is not a priority of the government … there has been an increase in interaction… but if we speak of horizontality of direct participation, of nongovernmental agents, to give space to co-creation, or to establish bottom-up participation dynamics, no! (W2#01)

Views on smart city technologies have been shaped by societal institutions such as embedded corruption (Pansera et al., 2023) and this had not changed. One interviewee asserted the use of technological methods of participation: 'will be a balance of errors, corruption and … people [will] end up disgusted, fed up and annoyed and not want to know anything about anything again' (W2#03). This was illustrated through experiences with the *Mi Policia* app:

> … Mi Policia ... seeks to generate trust ... towards a deeply corrupting and corruptible sector ... Let's assume residents trust the app, they trust the technology and ... let's say half the cases... it has worked well and ... the police have come to safeguard the citizen and have exercised their powers well. In others, that is where the state fails by will, where the opposite has happened… [it has been] terrifying for the citizen rather than an experience of feeling safer… many times they have not arrived or ... the app has failed. (W2#05)

In summary, therefore, there was support for digitalization of governance practices in principle but scepticism that delivery could be successful. This scepticism was rooted in the government's orientation towards participation and the persistence of broader societal institutions militating against citizens engaging with state-led digital innovation. The exogenous shock of the pandemic had not meaningfully disrupted these factors; it had not triggered deinstitutionalisation. Consequently, there were no signs of increased citizen-orientation in dominant state-led smart city practices. We would argue therefore that if smart city activities in Mexico City are to be genuinely citizen-oriented then they cannot start from the state. Our interviewees argued that the normative desire for participation was being realized but not in state-governed spaces: 'people do participate, but not through institutional channels' (W2#01). This suggests the alternative smart city, if it is to be realized, needs to be nurtured beyond the state.

Constructing the alternative smart city in Mexico City

The analysis above indicates that existing institutions act as an impediment to citizen-oriented development and are highly resilient. Consequently, the prospect of creating a citizen-oriented smart city through their transformation is slim. We will therefore move on the second stage of our argument and explore whether the socio-political context could allow for an alternative approach. Could the citizen-oriented smart city be nurtured beyond the state? Given the prevalence in Mexico City of organizing through *colectivos* (Hevia De la Jara, 2012), the most likely alternative smart city would be rooted in CSOs.

   We develop the argument in three stages. First, we consider whether Mexico City presents a fertile environment in terms of active CSOs. We then focus on existing CSOs that work with urban technology. Finally, we summarize a small-scale co-creation exercise that demonstrated the potential to overcome some of the institutional barriers to genuinely citizen-oriented smart city innovation. We argue that Mexico City's history, context, and social infrastructure mean it is possible to envisage a citizen-oriented smart city emerging from beyond the state. The argument is prospective: we are not claiming that a CSO-led smart city yet exists. We are arguing that the context offers a plausible route to an alternative citizen-oriented smart city. We discuss relevant conditions for realizing this potential in the next section.

Civil society organization in Mexico City

Over the last forty years Mexico City has seen a dramatic increase in the number of CSOs. Three key factors explain this: the 1982 economic crisis, the 1985 earthquake, and the contested presidential elections of 1988 (Castañeda Morales, 2013; González Ulloa et al., 2015; López Zamarripa, 2005). In Mexico City CSOs have played a vital role in historic moments. The prime example is the aftermath of the 1985 earthquake which: 'proved that the civil community was ready to get involved in those problems affecting their city' (Safa Barraza, 1997: 246). Civil society was also active in promoting local democratic practices. In 1997 citizens won the right to elect the city's mayor and members of the Legislative Assembly. The Citizen Participation Legislation included participatory schemes, and initiatives to increase local authority transparency and accountability were introduced the following year (Flores, 2016; Lara Caballero, 2018). By 2010 over 1800 neighbourhoods participated in decision-making regarding spending a proportion of the fiscal budget (Flores, 2016).

   Mexico City has been innovative in regulating and promoting CSOs through a registry of associations and public policies to promote civil society activities (Chávez Becker and González Ulloa, 2018). It has 66.2 CSOs per 100,000 inhabitants, the highest rate of any state in the country. Over the last 20 years the number of CSOs has continued to grow in absolute terms, although after 2014 the growth rate slowed sharply (Romero Pérez, 2022). The growth is related to a political transition: the hegemonic party (PRI) lost power after 70 years and civil society began to emerge with greater freedom. It is also due to the passing of the 2004 Federal Law for the Promotion of Activities Carried Out by Civil Society Organizations. At the federal level, however, a more recent political administration consistently attacked and disqualified CSOs, impacting their development in Mexico City (Unidad de Investigación Aplicada, 2021).

The promotion of urban technology in Mexico City

The Registry of Civil Organizations of Mexico City indicates that 274 of the 2907 registered organizations in the first semester 2022-2023 have their constitution, purposes, or activities related to technology (Gobierno De la Ciudad De México, 2023). A key example of civil society using technology to respond to urban problems is the 2017 earthquake, when innovation starting from 'a

WhatsApp group chat between friends looking for ways to help those affected by the quake' (Sandra Patargo, cited in Hernández Reyna, 2017). Those participating in the initiative were members of civil society with diverse backgrounds (Ahued-Ortega, 2018) who began to organize online. Some focused on creating a digital map of physical characteristics of affected areas, while others elaborated a detailed database on the needs and risks at each location, gathering information from social media. Citizens organized to respond to the tragedy in the face of 'trust failures': the wariness towards the government experienced by the citizens of Mexico City. As Sandra Patargo explained, '[w]e knew it wasn't our responsibility to keep citizens informed about the earthquake, but we had to fill a gap left by a slow-responding government'. This network, combined with innovative technology use, became a means for fighting misinformation that might otherwise have impeded urgent rescue efforts (Hernández Reyna, 2017).

CSOs in Mexico City that promote digital technologies include SocialTIC, Supercivicos, and Fundar. SocialTIC has promoted open data and strategic use of digital technologies in the face of secretive policies endorsed by governments throughout Mexico and Latin America (Socialtic, 2023). Supercivicos developed an app to draw attention to neighbourhood and public infrastructure problems in Mexico City (WSA, 2018). Fundar is dedicated to promoting transparency and ac-countability (Fundar, 2023). In Burns and Welker's (2023) terms these can be classified as inside interstitial organizations.

Much of their work is oriented towards the needs or demands of citizens. As one interviewee summarized:

> We [seek] to enable and empower social groups in the strategic and safe use of technology and information. That basically translates into three areas: one that has more to do with technology for participation, activism, social advocacy…; another that has to do with data, and there what we seek is the openness, strategic use of data, … from governments, civil society, journalists and other strategic groups; and the third area has to do with digital security. There, we seek to identify risks in terms of digital security …. (W1#13)

A key aim is to share technological knowledge with citizens, CSOs and public institutions with the aim of ensuring they 'know, believe and collaborate better around technology' (W1#13). There is emphasis on working with diverse actors to build capacity. The organizations are engaged in institutional work (Lawrence and Suddaby, 2006), such as running programmes of free workshops, to propagate clearer technical understandings (W1#21). The CSOs adopt a critical stance towards digital innovation, which resonates with arguments for an alternative smart city that decentre digital:

> ... it is not only about technology but about a slightly more comprehensive approach, right? ... groups seeking citizen participation have to have a perspective of... 'ah, possibly yes or no, I need a platform, a website, an app', but integrally, other elements must be sought and promoted. (W1#28)

In summary, in Mexico City there exist CSOs engaging with urban technologies and adopting a critical stance towards digital innovation. They see citizens and their needs as central to the process. Such organizations represent the seeds from which an alternative smart city could develop. However, current practices are not sufficient to realize an alternative smart city; further ingredients are required.

A small scale co-creation experiment

In a context where scepticism about state-led smart city development is rooted in distrust (Sweeting et al., 2022), a small-scale co-creation experiment, as explained in the methods section, was conducted to explore the scope for fostering new collaborations between CSO representatives.

Pooling 'collective intelligence' is integral to forging the alterative smart city (McFarlane and Söderström, 2017) so this type of collaboration is foundational.

The co-creation process was driven by needs identified by the CSO representatives. Priorities focused on organizational survival in an increasingly harsh financial environment. The co-creation process developed a relatively simply web platform to provide information and support on key topics. Participant feedback indicated that the co-created platform aligned with CSO participants' requirements. Three quarters of participants agreed that their preferred prototype met their needs. Furthermore, nine in ten were interested in using the platform because they felt they would benefit from the information provided. Participants also had ideas for further services that could be collaboratively developed and integrated into the platform, such as a digital system for matching projects with volunteers.

Participants perceived the role of civil society as highly relevant in developing smart city applications when compared to the role of the state. Half of participants thought CSOs played a key role in developing technological tools because they really know the needs to be covered and can propose effective solutions that focus on their specific target audience. If they are not included, any development could be meaningless. These points contrasted with views on the state's role: for example, one interviewee noted that 'whenever authorities intervene, there will be a possible deviation of objectives and a lack of interest' (W2#20).

Equally important was the feedback regarding the co-creation process itself. Three quarters of participants felt empowered during the co-creation process. This was contrasted with conventional approaches: 'we are never considered in the process of creating public policies' (W2#27). Moreover, organizational learning occurred during the co-creative process. Participants highlighted three main aspects: finding out about how other organizations work allowed them to reflect and question the performance of their own organization; participation helped them rethink strategies to improve the scope of their organizations; and participation facilitated rethinking the use of digital technologies to improve their operations.

Participants stated they were proud to participate; they highlighted the significance of the co-creation process not being state-led: 'we felt honoured after being part of a co-creative project where the state did not take part, but where academic institutions did participate' (FS#35). Some participants viewed the fact that the project was an international – rather than domestic – research collaboration as lending it further legitimacy. The interviewee continued: 'we felt taken into account because we rarely participate in projects for the benefit of organizations in general' (FS#11). This indicates a willingness to contribute to collective solutions if appropriate opportunities are available. Others were more explicit about the importance of organizing beyond the state: 'Listen, I only went because it was based in the University' (W2#03).

This co-creation exercise demonstrated that CSO representatives will collaborate when there is trust in the organization acting as the broker – the university in this instance – and they were pooling their collective intelligence to produce a solution tailored to their common needs. The key point is about process. Explicitly CSO-oriented digital innovation can be collaboratively produced even in a context of generalized distrust, if the process involves confidence building and genuine engagement.

Bringing the alternative smart city into being

Mexico City possesses a vibrant civil society sector and CSOs with a mission to promote the use of digital technology to address urban problems. The co-creation exercise demonstrates that we can overcome – albeit on a small scale – distrust, the key institutional barrier. This suggests that the institutional environment possesses the ingredients needed to build the alternative smart city. But this process needs to be catalysed. The third stage of our argument is to consider how the

institutional environment would need to change to nurture genuinely citizen-oriented smart city innovation.

In Sengers et al.'s (2021) terms, what needs to be mobile and what needs to be generalized? Scaling up smart city pilots often entails *expansion and consolidation*. However, in the current case the aim is not to scale up the co-created platform specifically. Rather, it is the underlying philosophy and process that needs to be made mobile. That is, knowledge and a set of ideas need to be mobilized to give innovation processes greater legitimacy through greater citizen-orientation, and to highlight that this can, as our co-creation process demonstrated, be done successfully. This indicates the need for embedding through the *circulation and anchoring* mechanism (Sengers et al., 2021).

The CSOs involved in our co-creation exercise were marginally interstitial organizations (Burns and Welker, 2023). They would not typically have considered a greater role for digital technologies in addressing the challenges they faced. Feedback indicated that participants shifted their views on the potential value of digital technologies; there was a greater preparedness to consider their use in future. This indicates that this type of activity can initiate the normative and cultural-cognitive institutions needed to reshape smart city practices. But institutional creation and maintenance work is necessary for such institutions to become embedded (Lawrence and Suddaby, 2006). This work would seek to generalize normative and cultural-cognitive institutions that emphasize starting innovation processes from citizens' needs, involving citizens centrally in design, and deploying digital only to the extent that is beneficial. The institutional work of educating would be needed: demonstrating the superiority of a smart city based in the CSO sector rather than the governmental sector and emphasizing the absence of the politicisation endemic in the state sector, in contrast to the collaborative co-creation spaces offered by *colectivos*. This would need to be reinforced by repeated demonstrations of the practical value offered by smart activities. Such institutional work is characterized as *valorizing and demonizing* and *embedding and routinizing* respectively: it creates new normative associations and constructs new normative networks (Lawrence et al., 2009; Lawrence and Suddaby 2006).

While this offers indications of a route towards an alternative smart city, two key challenges remain: social agency and financial resources. Dominant approaches to smart city development typically rely on a public sector or commercial organization as the actor(s) responsible for moving projects forward, including scaling up. Where knowledge and ideas about inclusive bottom-up approaches need to be mobilized and circulated, the social actor responsible for doing so is less well defined. In Mexico City the existing NGOs seeking to nurture alternative smart city practices have limited reach. A social agent needs to assume a generative, system leadership role (Senge et al., 2015; Sotarauta, 2016). The nature of the institutional barriers to citizen-oriented smart city development means that in Mexico City the state cannot play this role. If it were to attempt to do so then the process would founder. The social actor performing this type of orchestrating work needs to be seen as disinterested and trustworthy. In our co-creation experiment higher education institutions fulfilled that role, but such leadership could originate elsewhere in civil society.

The second issue is financial resources. This is an ever-present concern for CSOs but it is particularly pertinent for institution- and capacity-building activities. How will system leadership be sustained? The co-creation process reported above was underpinned by academic research council funding. In Mexico City, the financing of CSOs engaged with urban technologies has primarily been through international organizations, including big tech firms and global north governments. Whether sufficient funding to underpin genuinely citywide system leadership for transformation could be obtained from these sources is unknown. It might be more feasible initially to seek funding to allow a full business case for doing so to be developed.

Finally, the institutional work needed to embed an alternative smart city will be incremental and require sustained effort over an extended period. But the task does not begin *ab initio*: rather it can build upon nascent activities making greater use of digital to meaningfully address citizens'

challenges, facilitating their mobility and generalization (Sengers et al., 2021): 'The pandemic has changed life in a very important way ... Our complete move towards that digital path will surely take years, but I think that there is already at least a faint light that allows us to favour this path ... some small sectors, entities, spaces might use traditional ways, but I think it is already seen everywhere, in all senses' (W2#07).

Drawing on the experience of the co-creation exercise, a strategic focus should be on fostering genuine partnerships between CSOs and technology innovators. Such alliances can spread citizen-centric smart city concepts, expanding the outreach of digital innovations that prioritize community needs. Additionally, there is a need for educational programs, workshops and resources that can effectively articulate the benefits of citizen-oriented urban technologies to a wider audience, including local governments and private sector entities. These initiatives would aim to articulate, diffuse and embed new institutions: they would demystify the technological aspects and emphasize the practical, societal benefits of such innovations, thereby strengthening the normative and cultural-cognitive support for these alternative models (Scott, 2008).

Conclusion

The global policy discourse regarding the normative desirability of citizen participation in smart city innovation is in tension with diverse evidence of limited citizen participation in practice. This paper has examined whether social institutions that impede participation are highly resilient, with the prospects of creating a citizen-oriented smart city through their transformation appearing slim. Where this is the case then the most productive route to the citizen-oriented smart city lies in an alternative 'beyond the state'. The paper addressed this issue in three stages using the example of smart city activities in Mexico City, a context in which established socio-political institutions were not conducive to citizen-oriented innovation.

The paper has argued, firstly, that the profound exogenous shock of the covid pandemic did not disrupt regulative, normative or cultural-cognitive institutions sufficiently to result in state-led smart city development moving towards greater citizen-orientation. The barriers presented by current socio-political institutions mean it is difficult to envisage their transformation – either endogenous or exogenous – in the desired direction. The route to more citizen-oriented digital innovation therefore lies elsewhere.

We argue, secondly, that key ingredients for constructing a more participatory alternative smart city, that harnesses collective intelligence and diverse perspectives, exist within Mexico City. In particular, the co-creation exercise indicates that, under appropriate conditions, the more profound institutional barriers, including embedded levels of distrust and fears about corruption, can be addressed to create a greater sense of empowerment in digital innovation among representatives of marginally interstitial CSOs.

Thirdly, while a route to an alternative smart city can be envisaged, challenges remain. In part these flow from the type of institutional embedding required. It is primarily knowledge and ideas that need to be made mobile and generalized in a process of *circulation & anchoring* (Sengers et al., 2021). The key challenges relate to social agency and financial resources. When the state cannot orchestrate the process, precisely because its stance is a key barrier to change, then which social actor(s) can provide system leadership? Securing funding for the institutional work of circulating the knowledge and ideas to underpin an alternative paradigm can be challenging. The outcomes of such work may be transformative but they can be difficult to demonstrate to the satisfaction of philanthropic funders. At the same time, the fragility of the trust upon which an alternative smart city is founded means that funding models which rely upon, for example, monetizing user data are unlikely to be practical: they would undermine the project from the start. How to catalyse the institutional work needed to forge alternative institutions at city scale is a key question for future work.

Advocacy for alternatives to the top-down smart city is well-established. But bottom-up alternatives can often rely on the state playing an orchestrating role. Moving beyond the state in search of the alternative smart city will likely necessitate a long-term process of gradual, incremental change (Streeck and Thelen, 2005). A CSO-led smart city would not directly displace state- or corporate-led smart city practices in the short term. Yet a process of layering, entailing the growth of a CSO-oriented smart city, and its existence alongside top-down smart city arrangements, is feasible. Through the processes identified by Sengers et al. (2021), the CSO-led smart city could eventually grow organically. Mechanisms to diffuse the learning from these alternative approaches could sustain the momentum of new citizen-oriented institutional arrangements and, over time, lead to their broader adoption and embedding.

The institutional characteristics of Mexico City are distinctive, but communities across the globe face analogous institutional challenges in moving away from top-down approaches to smart city innovation and shaping a more citizen-oriented smart city. Responding to Lynch's (2000) observation regarding a lack of detailed thinking about alternative smart cities and Burns and Welker's (2023) argument for a more nuanced understanding of the 'bottom' in bottom-up approaches, this paper has begun to delineate a route to realizing such an alternative in an unfavourable institutional context. A route to achieving an alternative can be identified, but challenges in navigating that route remain to be overcome.

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