Civil Society Involvement in Smart Cities

Citizen Participation or User Co-Creation?

Filipe Mello Rose

URBAN AND REGIONAL ECONOMICS | HAFENCITY UNIVERSITY HAMBURG

DOCTORAL DISSERTATION

SUPERVISED BY PROF. GERNOT GRABHER AND PROF. THAMY POGREBINSCHI

Acknowledgments

I am very grateful to my supervisors, Gernot Grabher and Thamy Pogrebinschi for their invaluable advice, continuous support, and patience over the past four years. I would also like to thank the current and former members of the chair of urban and regional economics, in particular Joachim Thiel and Erwin van Tuijl, for their outstanding academic and moral support throughout this project.

My appreciation also goes out to the HafenCity University Hamburg and to the German Research Foundation (DFG) for providing the perfect material conditions to carry out my research, as well as, to the Berlin Graduate School of Social Sciences that provided me with the classes to make me a better researcher.

I also strongly appreciate the comments and critical questions that I have received from my peers and seniors during the numerous conferences and colloquia which I had the chance to attend. In the same vein, I also thank the anonymous reviewers of the three journal articles composing this dissertation. It might not always have felt this way in the heat of the moment, but in general these comments and remarks have undoubtedly improved this dissertation.

Last but certainly not least, I would like to express my deepest gratitude to my wife, my parents, my siblings, and my friends who supported me during this intellectual journey. Without their tremendous understanding and encouragement over the past few years, it would be impossible for me to complete this project.

Contents

[1] The pagination of the dissertation refers to the page numbers on the bottom right of each page.

English Abstract

The concept of smart city development – understood as practices in which multiple and diverse actors collaboratively pursue technology-based urban governance – has evolved significantly over the past decades. Once linked to governance practices in which large technology companies became indispensable providers of know-how and technological devices, smart city development increasingly also involves civil society actors in variegated – and understudied – ways. In this dissertation, I argue that diverging understandings of smart city development are linked to different forms of civil society involvement. On one hand, smart city development represents a technologically-orientated instrument of urban planning. Citizens are involved in this planning instrument as democratically legitimated stakeholders whose citizenship prescribes them a say in urban planning decisions. On the other hand, smart city developments are also urban governance practices concerned with the creation and improvement of a technology-orientated entrepreneurial ecosystems. As such entrepreneurial ecosystems, smart city developments involve civil society actors as value co-creating users that provide indispensable day-to-day knowledge that improve entrepreneurial activities.

I first looked into Amsterdam's smart city development as a "most likely" critical case to test the limits of civil society involvement in these developments. I then drew on two "paradigmatic" cases – the Gebiedonline and Decidim platforms – to analyze the relational structures through which civil society actors can overcome the limits established in the preceding case study. My findings advance an understanding of smart city development as being both a planning instrument and an entrepreneurial ecosystem in which both citizen participation and value co-creation can take place. Despite efforts to highlight its participatory character; and while civil society involvement is configured around ideals enabling citizen participation and co-creating value with users; involvement in smart city development emphasizes broadening the sets of actors involved in the creation of value rather than involving more citizen as participants in political debates. This is the case for the following reasons. Firstly, civil society involvement is more selective than propagated in the official rhetoric. Secondly, the involvement of social civil society actors is limited to specific thematic areas and actor constellations. Thirdly, the pro-active engagement of social civil society actors is only enabled through intermediary actors such as local government organizations and economic civil society actors (e.g. cooperatives). This dissertation thus disentangles two notions of civil society involvement – citizen participation and user co-creation. This way, I advance the debates on how and to what extent civil society actors are involved in the instruments of digital and algorithmic urban governance that smart city development implies. Furthermore, I propose new conceptualizations for the field economic geography concerning the relational constellations in which value is co-created with users.

Deutsche Zusammenfassung

Das Konzept der Smart City Entwicklung – hier definiert als Praktiken, bei denen mehrere und diverse Akteursgruppen gemeinsam eine technologiegestützte städtische Governance anstreben – hat sich in den vergangenen Jahren dahingehend entwickelt, dass zwingend auch verschiedene zivilgesellschaftliche Akteure auf unterschiedliche – und untererforschte – Weisen einbezogen werden. Diese Dissertation zeigt auf, wie unterschiedliche Auffassungen der Smart City Entwicklung mit verschiedenen Formen von zivilgesellschaftlicher Teilnahme verknüpft sind. Auf der einen Seite stellt die Entwicklung von Smart Cities ein technologiebasiertes Instrument der Stadtplanung dar. Die Bürger:innen sind an diesem Planungsinstrument als demokratisch legitimierte Akteure beteiligt. Auf der anderen Seite beinhaltet Smart City Entwicklung aber auch städtische Governance-Praktiken, die sich mit der Schaffung und Verbesserung eines technologieorientierten unternehmerischen Ökosystems befassen. Als solche bezieht die Entwicklung von Smart Cities zivilgesellschaftliche Akteure als wertschöpfende Nutzer (vgl. engl. value *co-creating user*) mit ein, mit Alltagswissen unternehmerischen Aktivitäten unterstützen.

In dieser Dissertation untersuche ich zunächst die Smart City Entwicklung in Amsterdam als "wahrscheinlichsten" kritischen Fall, um die Grenzen der Beteiligung der Zivilgesellschaft zu testen. Im Anschluss ziehe ich zwei paradigmatische Fälle – die Plattformen Gebiedonline und Decidim – heran, um die Beziehungsstrukturen zu analysieren, durch die zivilgesellschaftliche Akteure, die in der vorangegangenen Fallstudie ermittelten Grenzen überwinden können. Meine Ergebnisse unterstützen ein zweiseitiges Verständnis der Entwicklung von Smart Cities, das diese Entwicklungen sowohl als Planungsinstrument und als auch als unternehmerisches Ökosystem erkennt. Die Entwicklung von Smart Cities stützt sich, auch wenn in unterschiedlicher Intensität, sowohl auf Bürgerbeteiligung als auch auf gemeinsame Wertschöpfung (vgl. engl. *value co-creation*). Trotz der Bemühungen, den partizipatorischen Charakter hervorzuheben; und obwohl die Beteiligung der Zivilgesellschaft auf den Idealen der Ermöglichung von Bürgerbeteiligung und der gemeinsamen Wertschöpfung mit den Nutzern beruht; fokussiert sich die zivilgesellschaftliche Teilnahme in der Smart City Entwicklung vor allem auf die Erweiterung der an der Wertschöpfung beteiligten Akteure und nicht auf größere Partizipation in politische Debatten. Dies begründet sich darin, dass die Beteiligung der Zivilgesellschaft zum einen selektiver ist als in der offiziellen Rhetorik propagiert. Darüber hinaus ist sie auf bestimmte Themenbereiche und Akteurskonstellationen beschränkt. Außerdem wird das proaktive Engagement sozialer zivilgesellschaftlicher Akteure nur mittelbar durch lokale Regierungsorganisationen oder hybride wirtschaftlich-zivilgesellschaftliche Akteure (z.B. Genossenschaften) ermöglicht. Diese Dissertation entflechtet somit zwei Begriffe der zivilgesellschaftlichen Beteiligung: Bürgerbeteiligung und gemeinsame Wertschöpfung mit dem Nutzer. Hierbei werden Debatten darüber vorangetrieben wird, wie und in welchem Ausmaß zivilgesellschaftliche Akteure an den Instrumenten der digitalen und algorithmischen urbanen Governance beteiligt sind. Ferner wird auch die wirtschaftsgeographische Konzeptualisierung der relationalen Konstellationen durch welche Nutzer an Wertschöpfung teilnehmen weiterentwickelt.

Synthesis of the cumulative doctoral dissertation

Civil Society Involvement in Smart Cities: Citizen Participation or User Co-Creation?

1. Introduction

Once portrayed by critical academics as a storytelling device for corporations seeking to enter new markets (Hollands, 2015; McNeill, 2015; Paroutis et al., 2014; Söderström et al., 2014), the idea of developing a smart city increasingly raises expectations of involving civil society actors in its development (e.g. Mancebo, 2020; Trencher, 2019). The concept of smart city development – defined here as practices in which multiple stakeholders collaboratively pursue technology-based urban governance – has evolved considerably since the concept was first coined. Smart city development was initially linked to governance practices in which large technology companies (e.g. Microsoft, Cisco, IBM) positioned themselves as indispensable providers of know-how and technological devices (Söderström et al., 2014). However, the central position of corporations as sole drivers and implementors of smart city visions has largely failed to materialize and the importance of corporations has proven to be "analytically over-determined" (McNeill, 2015: 563) for multiple reasons. First, corporate practices and imaginaries diverge considerably from the specificities that shape local governance practices. Second, cities pursue a large set of different governance practices with possibly conflicting agendas. Thirdly and crucially, other types of organizations are also involved in smart city development extending it beyond public-private partnerships. The development of smart cities is not only conducted by government organizations and corporations, but also involves research organizations and civil society actors[2] (Carayannis and Rakhmatullin, 2014; Mancebo, 2020; Mora, Deakin and Reid, 2019; Mora and Bolici, 2017). Over a decade after IBM registered "smarter city" as its trademark, the involvement of civil society actors in smart city development is increasingly established as a normative and practical imperative (Cowley et al., 2018; Dalton, 2019; Farías and Widmer, 2018; Mancebo, 2020; Trencher, 2019).

In this dissertation, I draw on existing research and new empirical material to argue that civil society actors are mainly involved in two ways in smart city development. For one, civil society actors are legitimate *co-decision-makers* (Breuer et al., 2014: 161; de Lange and de Waal, 2013; Hollands, 2008; Smigiel, 2019; Zandbergen and Uitermark, 2020). Through the notion of *citizen participation,* civil society involvement is mobilized as a way of democratizing and politicizing smart city development (Bria, 2019; e.g. Morozov and Bria, 2018). The aim of citizen participation is for civil society actors to become informed co-decision-makers by voicing opinions on issues such as data ownership or technological dependencies (Bria, 2019; e.g. Morozov and Bria, 2018). Additionally, civil society actors are involved as *prospective users* of the outcomes of smart city

[2] With the term "civil society actors" I refer to both individual civil society actors and civil society organizations

development. As users of the technological solutions, civil society actors *co-create value* by providing feedback on how to improve local smart city developments (Aquilani et al., 2020; Bogers et al., 2017; Ramaswamy and Ozcan, 2018; Ranjan and Read, 2016). Users contribute to value co-creation practices by providing day-to-day knowledge of potential improvements, alternative uses, and untapped markets of the products and services they use (Bogers et al., 2010; Grabher and Ibert, 2018; Vellera et al., 2017). In smart city development, user co-creation supports a variety of entrepreneurial activities, for instance, assessing potential consumer markets or proposing new product or service ideas.

This dissertation, therefore, seeks to inquire into the extent to which smart city developments involve civil society actors as *legitimate co-decision-makers* and as *value co-creating users*. More precisely, this research is structured around the following research question:

- To what extent does smart city development involve civil society actors in a way that their involvement can provide legitimacy as *co-decision-makers* and valuable input as *co-creating users*?

  This question is further disentangled into the following sub-questions:

  - To what extent can civil society actors be involved in strategizing and implementation processes of smart city developments?
  - To what extent does the socio-technical composition of a smart city explain the forms that civil society involvement takes?
  - What relational structures can support civil society actors in providing legitimacy as co-decision-makers and represent valuable input as co-creating users?

As I will lay out in greater detail further on in this paper, smart city development can be understood as a planning instrument and an entrepreneurial ecosystem. I argue that how civil society actors are involved is related to an underlying understanding of smart city development on the whole. In general terms, I conceptualize that an understanding of smart city development *as planning instrument* suggests that civil society involvement is operationalized as citizens participating as legitimate co-decision-makers. In contrast, when approaching smart city development as an entrepreneurial ecosystem, civil society involvement entails users co-creating value.

In conceptualizing smart city development as both planning instruments and entrepreneurial ecosystems, this doctoral dissertation draws upon and contributes to scholarly debates in two academic fields: urban governance studies and economic geography. First, I draw on *urban governance studies* for an in-depth analysis of smart city development as a planning instrument. In this way, I contribute to academic debates at the intersection of research on "digital or algorithmic governance" (e.g. Coletta and Kitchin, 2017; Kitchin and McArdle, 2017) and the field of participatory governance (e.g. Fung and Wright, 2001; Landemore, 2012; Pogrebinschi and Ryan, 2018; Swyngedouw, 2005) by addressing how and to what extent civil society actors are involved in the instruments of "digital or algorithmic governance" that smart city development implies. Second, this work

is situated within the wider field of *economic geography* because it addresses the relationships between a myriad of economic and social actors within an urban area. This is most clearly manifested in approaching smart city developments as entrepreneurial ecosystems (Autio and Thomas, 2021; Jacobides et al., 2018) and conceptualizing the involvement of civil society actors as value co-creation with users. Therefore, this dissertation contributes to ongoing debates in economic geography concerning the relational constellations linked to users engaging in value co-creation and open innovation. By using a cross-disciplinary approach, this dissertation investigates how both fields, economic geography and urban governance studies, approach smart city development from different angles and thus have vastly different understandings of civil society involvement. In this context, I contribute to a greater cross-disciplinary understanding of civil society involvement in smart city development.

This introductory chapter of my dissertation is structured as follows. I first set out the goals, research questions, and merits of this dissertation, before I disentangle the state of the art on research into civil society involvement in smart city development. Next, the types of civil society actors are conceptualized. Based on this conceptual footing, I lay out, contextualize, and discuss the methods and findings of the three published journal articles that make up this dissertation. Finally, I conclude by reviewing my contributions to urban governance studies and economic geography by highlighting future research avenues.

2. Civil society involvement in the smart city planning instrument and the smart city entrepreneurial ecosystem

Defining smart city development remains a contentious endeavor. One group of scholars depicts smart cities as a particular type of city characterized by a vanguard application of and affinity towards digital technology. Such conceptualizations regard a city's smartness as a measurable characteristic that can be ranked objectively (Akande et al., 2019; Engelbert et al., 2019; Giffinger et al., 2007). According to Giffinger et al. (2007, 11), for instance, a city's "smartness" can be measured through 31 factors spanning across six relevant topics economy, people, governance, mobility, environment, and living. However, postulating that any city can eventually be fully upgraded into a "smart" city, as long as it commits sufficient financial resources to acquire the right technology and know-how, reduces smart city development to a mere acquisition and implementation processes. Conceptualizing this development as a straightforward path toward smartness, hinders a profound analysis of the practices that smart city development entails. For these reasons, I conceptualize smart city development as affecting and consisting of urban governance practices. Instead of focusing on indicators and rankings that attest to a city's smartness, smart city development is understood as a local governance practice. More precisely, smart city development means the use of digital technology and data in order to meet the following urban governance goals: higher political efficiency; business-led promotion of urban growth; and the preservation of the natural environment (e.g. Albino et al., 2015).

I define governance by drawing on both institutional and network perspectives. On one hand, governance is the "coordination between different forms of regulation" (Le Galès, 1998: 502). These forms of regulation include laws, social norms, and discourses. On the other hand, governance also refers to arrangements "governing beyond-the-state organized as horizontal associational networks of private (market), civil society […] and state actors." (Swyngedouw, 2005: 1992). Governance thus means the coordination of diverse sets of actors through diverse forms of regulation. This coordination of actors and of forms of regulation materializes as governance arrangements, for instance as public-private partnerships or in civil society involvement in government activities (Swyngedouw, 2005).

Smart city developments are place-specific governance arrangements (Raven et al., 2019: 260). These arrangements channel the technologies, know-how, social norms, and strategies for smart city development that circulate in global "extra-territorial networks" (Shelton et al., 2015: 16; White, 2016 refers to a 'smart city global imaginary') into local governance arrangements. In this process, smart city developments become "locally inflected" (Valdez et al., 2018: 3357) and diverge from place to place to align with local agendas (Farías and Widmer, 2018; Jiang et al., 2020; Viitanen and Kingston, 2014; Wiig, 2016). Smart cities thus both shape and are shaped by governance arrangements that involve a variety of actors beyond government organizations, such as corporations, research organizations, and civil society actors. Smart city development is implemented by locally networked actors, who in turn, also influence the (possibilities for) interactions and power dynamics among organizations engaging in local governance (e.g. Raven et al., 2019). Governance through smart city development is therefore enacted by locally by mobilizing different (and occasionally conflicting) parts of global practices regarding the technologies, know-how, narratives, and strategies associated with smart city development. The local partnership networks that are necessary for this development therefore involve a variety of different actors and account for local (governance) specificities.

	The "smart city planning instrument"	**The "smart city entrepreneurial ecosystem"**
Main focus/goal	Use technology to modernize cities	Use technology to improve competitiveness of cities
Form of civil society involvement	Citizen participation	User co-creation
Motives for civil society involvement	Democratic legitimacy	Value creation
Civil society actors' main contribution	Citizen's expectations - Identify priorities for planning interventions	User's knowledge - Identify new business opportunities

Table 1: *Two understandings of smart city development*

In this dissertation, I conceptualize smart city development as being integrated into wider local/urban governance systems in two ways (table 1). First, smart city development implies urban governance practices concerned with urban planning in a particularly technologically-orientated way. As an (urban) planning instrument, smart city development aims to use digital technologies to modernize cities and their administrations. Citizens are involved in the smart city planning instrument as democratically legitimated stakeholders whose citizenship[3] guarantees them a say in governance decisions regarding smart city development (Bria, 2019; e.g. Morozov and Bria, 2018). Second, smart city developments are also urban governance practices concerned with the creation and improvement of an entrepreneurial ecosystem. As entrepreneurial ecosystem, smart city development involves diverse urban actors who collaboratively mobilize urban resources to increase the city's competitiveness through technology-orientated entrepreneurial activities. Civil society actors are involved in the smart city entrepreneurial ecosystem as value co-creating users that provide indispensable day-to-day knowledge.

2.1 Citizen participation in the smart city planning instrument

As a planning instrument, smart city development is used to govern a city through digital technologies such as algorithms and the internet of things (Coletta and Kitchin, 2017), as well as through large datasets, dashboards, and surveillance systems (Bunders and Varró, 2019; Kitchin and McArdle, 2017; Valdez et al., 2018; Zuboff, 2019). In general, this understanding defines smart city development primarily as practices in which multiple stakeholders collaboratively use technological devices to manage, "more efficiently, city resources and […] development and inclusion challenges" (Rodríguez Bolívar, 2015: 1). As a technology-based and technology-orientated planning instrument, this development introduces technology into the urban realm through the mobilization of public resources (e.g. public funds, public spaces) (Björkman and Harris, 2018; Coletta and Kitchin, 2017; Rodríguez Bolívar, 2015). In other words, smart city development aims to improve the efficiency of a variety of sectors of urban planning through digital technology and resolve conflicting imperatives of environmental sustainability, quality of life, and economic growth (Crowley et al., 2016; e.g. Frenchman et al., 2011; Trencher, 2019).

Moreover, smart city development not only is an instrument to plan (and govern) cities by digitalizing urban infrastructure (e.g. Coletta and Kitchin, 2017; Zandbergen, 2020), but also by digitalizing interaction between civil society actors and governments (Bua and Bussu, 2020; Deseriis, 2021; Falco and Kleinhans, 2018; Johnson et al., 2020). Smart city development thus creates novel expectations and opportunities for pursuing citizen participation by allowing civil society actors to deliver and evaluate public services (Calzada, 2018; Castelnovo et al., 2016; Farías and Widmer, 2018; Mancebo, 2020). This way, the smart city planning instrument is part of a wider trend toward collaborative participatory urban planning. Generally, planning instruments depend closely on interacting

[3] Citizenship is here understood in a performative way that involves individual and group rights (and to some extent obligations) to influence public decision-making (Bellamy, 2008). Citizens thus also includes residents without citizenship status.

with a broad variety of different organizations (e.g. Swyngedouw, 2005). These interactions can take place through hybrid institutional forms, such as public-private partnerships (PPPs) or call upon civil society actors to deliver and evaluate public services (Arellano-Gault et al., 2013; Kornberger et al., 2017).

Moreover, smart city development creates new possibilities for civil society actors to engage in public and political decision-making processes via different participation-enabling technologies (Anttiroiko, 2016; Bua and Bussu, 2020; Capdevila and Zarlenga, 2015; Farías and Widmer, 2018; Ferrer, 2017; Kurban et al., 2017; Mancebo, 2020). Planners in local governments engage in "democratic innovation" by using technology to reconfigure citizen participation processes to ensure that diverse groups of civil society actors participate (Pogrebinschi, 2013; Smith, 2009). Participatory platforms, for instance, afford a reduction in the costs of engaging in participatory processes and enable the participation of previously excluded citizens in urban governance processes (Borge Bravo et al., 2019; Deseriis, 2021; Jankowski et al., 2019). As Barba-Sánchez et al. (2019: 9) point out, "ICT may contribute not only by improving the efficiency of the services provided by a local government already in place, such as transport but equally importantly by enhancing the use of ICT to bolster citizen participation".

Citizen participation considers issues related to social and political justice, such as inclusiveness, popular control, considered judgment, and transparency (Smith, 2009). In practice, citizen participation can be designed in ways that grant more or less power to the participating citizens and range from full citizen control over policy outcomes to tokenistic forms of participation (Arnstein, 1969; Fung, 2006). While this distribution of power to participating citizens varies, citizen participation is generally characterized by an under-standing a that "planner's task […] becomes ensuring a diverse set of voices are involved" (Fainstein and Lubinsky, 2020: 135). However, at the same time that smart city development opens up new ways for citizens to participate in planning processes, this development also carries the risk of excluding citizens through digital divides (Van Deursen and Helsper, 2015). To achieve its goals, however, citizen participation processes must be inclusive and consider existing inequalities regarding citizens' varied capacities to engage in citizen participation processes (e.g. Gerber et al., 2018) to avoid exacerbating political inequalities (Fainstein and Lubinsky, 2020; Swyngedouw, 2005). Achieving equitable conditions for all citizens to engage in citizen participation processes is a central objective of (digital and non-digital) participatory processes (e.g. Abdullah et al., 2016; Campbell et al., 2016).

Research on the impact of citizen participation in smart city development thus remains divided. According to one group of researchers, citizen participation can and should allow civil society actors to contest dominant forms of (neoliberal) policy-making through technologically-enabled citizen participation (Farías and Widmer, 2018; Leszczynski, 2020; Morozov and Bria, 2018). Other scholars are more skeptical. Vanolo (2014, 2016) for instance, finds that the smart city planning instrument is a manifestation of a neo-liberal "good city" in which the "citizen is re-subjectified" and discourses are shifted away from central political questions. Johnson et al. (2020) and Cardullo and Kitchin (2019) argue that civil society actors are most frequently involved "transactionally" as users or consumers,

whose rights originate from (potential) market transactions (e.g. buying local real estate, using urban transportation systems). In this sense, rather than being co-decision makers in citizen participation processes, civil society actors engage in smart city development through economic interactions. In other words, to this latter group of researchers, civil society actors engage in a smart city development as value co-creating users.

2.2 Value co-creation with users in the smart city entrepreneurial ecosystem

Apart from being a planning instrument, smart city development is also an entrepreneurial ecosystem. The concept of ecosystems refers to "a group of interacting firms that depend on each other's activities" (Jacobides et al., 2018: 2256), yet "are not fully hierarchically controlled" (Jacobides et al., 2018: 2264). Smart city developments meet the four main characteristics that render ecosystems distinct from other concepts such as markets or organizational fields: a system-level outcome, heterogeneous participants, interdependencies, and mechanisms for coordination (Autio and Thomas, 2021). First, as ecosystems, smart cities have (and continuously strive for) system-level outcomes, such as successfully applying novel technology to urban governance (Crowley et al., 2016; e.g. Frenchman et al., 2011; Trencher, 2019). Second, ecosystems are understood to involve "heterogeneous communities of stakeholders that are hierarchically independent but adhere to specific roles within the ecosystem" (Autio and Thomas, 2021: 3). As ecosystems, smart city developments involve heterogeneous (sets of) participants including government organizations, corporations, research organizations, civil society actors, and hybrid organizational types (Baccarne et al., 2014; Borghys et al., 2020; Calzada and Cowie, 2017; Leydesdorff and Deakin, 2011; Mora, Deakin, Reid, et al., 2019). Third, as ecosystems, smart cities are shaped by interdependencies or multilateral "nongeneric complementarities" among diverse actors (Jacobides et al. 2018: 2264, emp. in org.). Smart city development is a "product of policies, academic leadership and corporate strategies" (Leydesdorff and Deakin, 2011: 59), in which governments, research organizations, and corporations produce "new value through co-creation rather than competition" (Tokoro, 2016: 11). Fourth, as ecosystems, smart cities have mechanisms that "coordinate interrelated organizations that have significant autonomy" (Jacobides et al., 2018: 2260). In their ambition to foster entrepreneurship, governments and their governance partners draft smart city strategies, and create partnerships and consortia with diverse sets of organizations (Bulkeley et al., 2019; Carayannis and Rakhmatullin, 2014; Noori et al., 2020; Raven et al., 2019; Sancino and Hudson, 2020).

Moreover, I find that smart city developments are *entrepreneurial* ecosystems. This type of ecosystem focusses on "entrepreneurial discovery and pursuit" (Autio et al., 2018), which I understand in a broad sense that includes all types of entrepreneurial activities. Smart city development combines innovation with entrepreneurship as "entrepreneurship is an integral part of smart cities" (Ratten, 2017: 36). For instance, smart city developments develop pilot projects whose economic potential of upscaling is tested (van Winden and van den Buuse, 2017). While many smart city projects fail in securing the benefits of scaling up, project partners typically "generate lessons and insights that might benefit ensuing projects"

(van Winden, 2016: 14). These lessons support entrepreneurship by fostering knowledge of consumer preferences, technological feasibility of novel affordances as well as creating partnership ties with governments and other types of organizations (van Winden and van den Buuse, 2017). In a "bidirectional relation between entrepreneurship and smart cities" (Kummitha, 2019: 2), smart city developments create new digital technologies that enable and foster entrepreneurship through novel business opportunities (Kummitha, 2019). Entrepreneurial ecosystems seek to use technological innovation to pursue innovation in entrepreneurial practices (Autio et al., 2018: 78). Smart city developments, therefore, can and ought to be understood as entrepreneurial ecosystems.

In the smart city entrepreneurial ecosystem, civil society involvement is a central way of mobilizing the city's (human) resources to foster entrepreneurship. The understanding that involving civil society actors supports innovation rests on concepts such as open innovation and user co-creation (Bogers et al., 2010; Grabher et al., 2008; Prahalad and Ramaswamy, 2004; von Hippel, 2001). Since the 2000s, companies increasingly shifted their value-creating processes towards greater co-creation with consumers and users (Grabher and Ibert, 2003; Prahalad and Ramaswamy, 2004). Value co-creation is understood as a process in which users "assume an active role and create value together with the firm" in direct and indirect manners (Ranjan and Read, 2016: 291). Co-creation can refer to the *co-production* of goods and services with users "as well as the context specificity of '*use*'" of such products and services (Ranjan and Read, 2016: 305). Co-creation is thus not limited to co-production – users sharing their knowledge and inventiveness with firms to improve products and services –, as it also refers to increasing the use-value of products and services by enabling users to create personalized consumption experiences (Ranjan and Read, 2016). These personalized consumption experiences can support corporations in creating more differentiated products and services that cater to untapped markets.

While co-creation originated in the private sector, it has since also become relevant for the public sector and the delivery of public services (Leino and Puumala, 2021; Lember et al., 2019; Rösler et al., 2021; Torfing et al., 2019). In this context, the notion of co-creation emphasizes "the potential impact of collaborative interaction between public and private actors on the ability to foster new and innovative solutions to intractable problems." (Torfing et al., 2019: 804). Through user co-creation, entrepreneurial ecosystems draw on a "shared knowledge base regarding 'what works'" in terms of entrepreneurial opportunities (Autio and Thomas, 2021: 5). This way, corporations and (to some extent) government organizations of a smart city entrepreneurial ecosystem aim to co-create value with end-users. Extant research provides numerous examples of how smart city entrepreneurial ecosystems co-create value with users. For instance, Pellicano et al. (2019) observe eight distinguishable practices of value co-creation in Turin's smart city development ranging from innovation to education that "increase and strengthen the level of interaction and collaboration among the various social actors involved in value generation processes" (Pellicano et al., 2019: 49–50). Mora et al. (2019) observe that civil society involvement in smart city development draws on the knowledge and skills of civil society actors for developing new digital services. More precisely, smart city entrepreneurial ecosystems

"nurture citizens' entrepreneurial creativity and digital talent" to co-create value with them in their role as users (Mora, Deakin and Reid, 2019: 15). Practices linked to smart city development, such as urban living laboratories, are conceived as co-creating with users to allow new entrepreneurial activities to be "based on testing in real-world environments" (Claudel, 2018: 37; also Steen and van Bueren, 2017).

—

Co-creation is vastly different from citizen participation. While citizen participation aims to "maximize the democratic influence of ordinary citizens" (Torfing et al., 2019: 804), co-creation focuses on "the systematic engagement of relevant public and private actors" (Torfing et al., 2019: 804). While citizen participation aims at achieving democratic goods such as inclusiveness, popular control, and transparency (Smith, 2009), user co-creation in entrepreneurial ecosystems focuses on creating new (economic) value. In contrast to the former, the latter therefore has no primary objective to be inclusive or transparent. This doesn't mean that citizen involvement through user co-creation cannot be empowering to the involved citizens. Co-creation can be empowering by allowing citizens to improve their quality of life through the creation of new or improved goods and services that cater more specifically to their individual needs. As co-creation processes are structured around identifying and creating new markets, however, pursuing goals such as inclusiveness, popular control, and transparency are only relevant as long as they serve to create new (economic) value. Citizens who lack the (cognitive, cultural, or financial) capacity to become users of certain goods and services are excluded from co-creation processes.

3. Conceptualizing social and economic civil society actors

The literature features ambivalent conceptualizations of what types of actors compose civil society. On the one hand, civil society is defined as actors pursuing social and political inclusion (e.g. Gerometta et al., 2005). On the other hand, classifications define civil society as a diverse "third sector" characterized primarily as different from government and corporate organizations (Healey, 2015; United Nations, n.d.). To disentangle different understandings of civil society actors, I draw on Cowley et al.'s (2018) four "modalities of publicness" employed in the UK's smart cities: civic, political, service-user, and entrepreneurial. The two former types of publicness are socially and politically oriented, while the latter two are economically oriented. I thus consolidate the four modalities of publicness into two types of civil society actors: social and economic.

Social civil society actors represent what Cowley et al. (2018) call political and civic publicness. *Political publicness* involves citizens in political processes of deliberation and policy-making. Political publicness involvement will typically be driven by or directed towards governments or state institutions. *Civic publicness* is less structured than political publicness. It includes "activities taking place in spaces beyond state institutions, but which are not oriented towards market activity" (Cowley et al., 2018: 66). The notion of social civil society, therefore, describes civic and political engagement by persons pursuing "societal, political, and cultural goals outside of the main institutional frameworks" (Pesch

et al., 2019: 305). Social civil society actors can act as a counterforce to a supposed vendor dominance in smart city development by evaluating technology in terms of a generated "public value" (Castelnovo et al., 2016: 735). More precisely, social civil society includes (1) organizations engaged in political activities and advocacy, such as social movements (Pesch et al., 2019: 306); (2) non-profit organizations dedicated to community building and service-provision that "fulfill society needs" (Pesch et al., 2019: 307); (3) non-governmental structures distributing funding to the two aforementioned types of organizations; (4) organizations acting as intermediaries for citizen involvement (e.g. schools, museums); and (5) (groups of) citizens directly engaged in political and civic activities (e.g. as activists, residents or voters).

Economic civil society actors embody what Cowley et al. (2018) label service-user and entrepreneurial publicness. *Service-user publicness* describes the relationship between service providers and a wider community of users. *Entrepreneurial publicness* refers to the "expectation that residents will be involved in creating services and economic values" in a smart city (Cowley et al., 2018: 64). Economic civil society thus refers to actors that fit a broader, "third sector" definition of civil society, but not the narrower definition of "traditional" social civil society. This type of actor is actively engaging in economic activities such as "running a significant business as a social enterprise, […], investing in community sustainable energy provision, regenerating a neighborhood or village center, or expanding work and training opportunities." (Healey, 2015: 12). Economic civil society includes organizations such as (1) cooperatives in which consumers or users own the majority of shares; (2) economic sector and area representatives that advance their members' interests and are somewhat independent of the organizations they represent; (3) social enterprises that pursue non-market and non-profit related goals in addition to their market activity; as well as (4) individuals that are acting as economic agents (e.g. as home-owners). Economic civil society actors are *hybrid* in that they combine elements of governments, corporations, and social civil society actors.

4. Research design

My research design directly stemmed from my overarching research question regarding the extent to which smart city development involves civil society actors to both provide legitimacy and valuable input. This research question is operationalized in the following way. On one hand, I analysed the *limits* of civil society involvement in smart city development in providing legitimacy and valuable input. On the other hand, I complemented this analysis with an inquiry into ways of *overcoming* these limits.

4.1 A case study-based research design

I used an overall case study approach with mixed methods to analyse the limits of civil society involvement in smart city development and propose possible remedies to these limits. This case study methodology allowed for the detailed analysis of the ambiguous and complex relationships between normative frameworks, institutions, persons, and

organizations based on an instrumental case (e.g. Flyvbjerg, 2006; Gerring, 2006; Guetterman and Fetters, 2018). For a case study to be instrumental and – at least partially – generalizable, the studied cases need to be carefully selected in relation to a wider population of cases. In this dissertation, I drew on two types of cases: one "most-likely" critical case and on two "paradigmatic" cases.

First, I mobilized a "most-likely" critical case to assess and analyze the (general) limits of civil society involvement in smart city development. A "most likely" critical case allows "logical deductions of the type 'If this is (not) valid for this case, then it applies to all (no) cases'" (Flyvbjerg, 2006: 230). This selection strategy was primarily used for detecting and analyzing the limits of civil society involvement in smart city development. I held that Amsterdam's smart city development is one such "most-likely" critical case study as numerous scholars consider it particularly supportive of civil society involvement in comparison to other smart city developments (Angelidou, 2014; Bunders and Varró, 2019; de Falco et al., 2019; Mancebo, 2020; Mora and Bolici, 2017; Zandbergen and Uitermark, 2020; Zygiaris, 2013). Moreover, Amsterdam's smart city strategy also places a strong focus on fostering collaboration networks involving corporations, governments, research organizations, and civil society actors (Mancebo, 2020; Mora, Deakin, Reid, et al., 2019). Amsterdam's integrated smart city development strategy (Angelidou, 2014; Raven et al., 2017) that incentivizes civil society involvement and inter-organizational collaboration, offered a suitable testing ground to analyze the limits of civil society involvement.[4] In what follows, I refer to this case study as the "Amsterdam case study".

Second, I drew on two "paradigmatic" cases to analyze how civil society actors can overcome the limits they face in engaging in smart city development. Paradigmatic cases are cases that serve as "exemplars", to illustrate "more general characteristics of the societies in question" (Flyvbjerg, 2006: 230). I hold that two non-corporate local platforms, *Gebiedonline* and *Decidim,* are paradigmatic cases of how civil society actors can provide both legitimacy and valuable input to smart city development. Gebiedonline is a Dutch cooperative creating and maintaining platform technology that allows for the creation of local non-corporate platforms. The members of the cooperative use local implementation of the cooperative's platform technology for various civil society activities, such as vitalizing neighborhood life, improving public space, or conducting sustainability campaigns. Decidim is a platform-based community and open-source platform software that enables online digital collaboration notably for public participation processes. In both cases, civil

[4] However, some critical scholars who inquired into project-level smart city activities have nuanced this depiction of Amsterdam as particularly supportive of citizen involvement. Van Winden et al (2016, p. 104), for instance, argue that despite the Amsterdam smart city-Foundation's "emphasis on the involvement of citizens, communities, or end-users", "citizens were never really central and seldom an official part of the project partnership" (van Winden et al., 2016: 99). Mancebo (2020, p. 8) adds to his analysis, that while some initiatives emerge in a participatory manner, citizens frequently remain in the position of "bystanders". Zandbergen (2020, p. 154) finds that despite the rhetoric of civil society involvement in smart city's activities "real local involvement was thus implicitly and subtly discouraged". This dissertation complements these analyses of individual smart city project-activities, which appear to conflict with analyses of the wider Amsterdam's smart city governance system (Angelidou, 2014; Bunders and Varró, 2019; de Falco et al., 2019; Mancebo, 2020; Mora and Bolici, 2017; Zandbergen and Uitermark, 2020; Zygiaris, 2013).

society actors are examples in which social civil society actors create, maintain, and disseminate platform technology in collaboration with other types of actors. These two paradigmatic cases thus served to conceptualize paradigms for involving civil society actors. In what follows, I refer to these cases studies as the "Gebiedonline case study" and "Decidim case study".

4.2 A mixed-methods approach

In this study, I drew primarily on "a case study–mixed methods design" as conceptualized by Guetterman and Fetters (2018), which originated from the "embedded mixed-methods research design" proposed by Plano Clark et al. (2008). In these types of research designs, one type of method serves to support another by addressing different (sub-)research questions that are situated at different levels (Plano Clark et al., 2008: 374). All case studies were thus primarily investigated using qualitative methods, which were complemented with different quantitative analyses. In the Amsterdam case study, the quantitative analysis of project-level smart city activities complemented a qualitative analysis of Amsterdam's smart city governance. In the Gebiedonline and Decidim case studies, the quantitative data from the platform's local implementation complemented a qualitative analysis of each platform's creation, dissemination, and local implementation processes.

Apart from allowing a general contextualization of the individual cases, I used qualitative methods to carry out analysis of the Amsterdam case study and the Gebiedonline and Decidim case studies. In the Amsterdam case study, the qualitative analyses focused on the analysis of factors that limit civil society involvement in Amsterdam's smart city. In the Decidim and Gebiedonline case studies the qualitative analyses focused on ways of overcoming these limits. The qualitative methods primarily included document analyses and the analyses of semi-structured interviews. I gathered and analyzed qualitative data in the following steps. First, a document analysis drew on digital documents such as websites, annual reports, policy documents, and meeting records. For the Amsterdam case study, this included documents gathered from the website of the Amsterdam Smart City-Foundation (henceforth ASC-Foundation) and its members; including the Amsterdam municipality. For the Gebiedonline and Decidim case studies, the document analysis mobilized digital documents related platform technology, governing institutions as well, as local platforms implementation. Second, the semi-structured interview material consisted of a total of 34 interviews with 38 interview partners conducted during four interview waves (three face-to-face and one digital) between June 2018 and January 2021. For the Amsterdam case study, interview partners broadly include actors that are directly involved in the Amsterdam smart city's governance system, the smart city activities taking place in Amsterdam, and civil society actors from Amsterdam. For the Gebiedonline and Decidim case studies, I interviewed persons directly involved in the creation, dissemination, governance, and local uses of Gebiedonline and Decidim. Each interview took between 30 and 120 minutes (on average 70 minutes), leading to a total of 37 hours and 22 minutes of recorded material. Third, for each case study the gathered documents and the interview transcripts was coded and analyzed in a MaxQDA-database. In the journal articles composing this cumulative

dissertation I give more details on the interviews that I draw upon as well as on the precise approach to coding and analyzing this vast amount of qualitative material.

As a supporting method, I used quantitative methods differently across my case studies. In the Amsterdam case study, I primarily drew on quantitative methods to inquire into project-level civil society involvement. I did this by quantifying project-level collaboration between different types of organizations that form Amsterdam's smart city development based on database of all project-level activities listed on the Amsterdam Smart City online platform[5]. The database of project-level smart city activities was then analyzed with descriptive statistics, chi-square tests and logistic regressions. For the Gebiedonline and Decidim case studies, I used quantitative methods to describe non-corporate platforms that are used and disseminated inter-locally. However, the vast majority of instances in which I drew on quantitative methods were linked to the Amsterdam case study. I explain the precise steps of building quantitative databases and analyzing them in a detailed manner journal articles composing this cumulative dissertation.

5. Discussion of the main findings

This cumulative dissertation is composed of three published journal articles that are intended to be conclusive in themselves. As self-standing works, the publications do not make any explicit references to the wider dissertation and, on some rare occasions, employ diverging terminologies for the same objects or concepts. However, all publications contribute to the overarching research question regarding the extent to which smart city development involves civil society actors for legitimacy and valuable input.

—

The first publication, a journal article titled "Selective inclusion. Civil society involvement in Amsterdam's smart city ecology", published in *European Urban and Regional Studies* in May 2022, addresses the first sub-question of this dissertation: To what extent can civil society actors be involved in strategizing and implementation processes of smart city developments? The article inquires into how economically-orientated and social-orientated civil society actors are involved in strategizing and implementing Amsterdam's smart city by focusing on institutional and relational dynamics shaping civil society involvement. The article finds that non-relational *institutional* dynamics and *relational* dynamics take place simultaneously and involve diverse types of civil society actors in different ways. Non-relational *institutional* ("field-type") dynamics prescribe the involvement of civil society actors in smart city development. More precisely, the institutional dynamics of Amsterdam's smart city development are shaped by normative and cognitive pressures to involve social and economic civil society actors. Whilst economic civil society actors are at the center of agenda-setting/norm-creating processes, social civil society actors appear to be somewhat less central. Social civil society actors are involved indirectly through the brokerage of educational organizations. The relational ("network"-type) partnership

[5] amsterdamsmartcity.com (accessed on April 27th 2020)

patterns shaping project-level smart city development largely appears to avoid involving social civil society actors as partners. No such "avoidance"-patterns apply to economic civil society actors. The relational dynamics in Amsterdam's smart city development are characterized by an observable preference to involve economic civil society actors over social civil society actors. In other words, even if (social) civil society involvement is normatively institutionalized, social civil society actors are not integrated into the project-level partnerships that implement smart city strategies.

From an urban governance perspective, citizen participation represents an important normative and discursive element through which the Amsterdam smart city seeks to distinguish itself from other smart city developments. However, citizen participation is limited to an indirect involvement of social civil society actors in both strategizing and implementation processes. The implementation processes in smart city developments involved economic rather than social civil society actors, thus calling into question the supposed legitimizing character of civil society involvement in smart city development. Moreover, since value co-creation only takes place between corporations and *economic* civil society actors, the potential benefits of co-creating value with *social* civil society actors are underutilized.

—

The second publication, "*Activity types, thematic domains*, and *stakeholder constellations*: Explaining civil society involvement in Amsterdam's smart city", published in *European Planning Studies* in May 2022 in Volume 30 (Issue 6), aimed to answer the second sub-question: To what extent does the socio-technical composition of a smart city explain the forms that civil society involvement takes? The article quantitively analyzes three socio-technical factors characterizing smart city projects that could be linked to the involvement of civil society actors: (A) type of project activity (i.e. the type of intended output), (B) the normative-institutional frame in which a particular smart city project activity is situated (i.e. the thematic area), and (C) the involvement of other types of actors such as governmental actors, corporations, research organizations in the project activity. Despite Amsterdam's rhetoric of citizen participation (as outlined in publication 1), two types of factors reduce the likelihood of social civil society actors being involved: The thematic area "resources, energy, and mobility" and the actor constellations that mostly involved corporations. Both factors are predominant features of Amsterdam's smart city development. The involvement of economic civil society actors is not negatively related to these factors. In the absence of negatively influencing factors, economic civil society actors became the dominant type of civil society actor in Amsterdam's smart city development.

This second publication suggests that debates regarding citizen participation in urban governance gave insufficient attention to the contexts in which citizens participate. Inquiring into the contexts (i.e. the thematic areas and actor constellations) under which specific types of civil society actors are involved showed that Amsterdam's smart city development sets thematic priorities that render widespread citizen participation difficult. The incompatibility of project-level collaboration of social civil society actors with

corporations and governments, as observed in publication 1, is confirmed and explained in greater detail. However, what this second article also found that different thematic preferences could, to some extent, explain the avoidance of corporations and government organizations to collaborate with social civil society actors. In this way, this second publication contributes to the ongoing debates in economic geography concerning the relational constellations linked to value co-creation by highlighting the differences across different thematic areas. On one hand, value co-creation in the smart city entrepreneurial ecology not only appears to depend on whether civil society actors are economically or socially-orientated as it also depends on the thematic area in which value co-creation was supposed to take place. On the other hand, an avoidance by corporations to collaborate with social civil society actors persists regardless of different thematic preferences. As corporations and government organizations are dominant, the limited project-level involvement of social civil society actors raises questions regarding the extent to which civil society actors are involved as participating citizens in the smart city development planning instrument. From the findings of this article, it seems that in most thematic areas of smart city development civil society involvement takes the form of value co-creation with users, rather than citizen participation.

—

The third publication is titled "The Unexpected Persistence of Non-Corporate Platforms: The Role of Local and Network Embeddedness", published in *Digital Geography and Society* in September 2021. This article addresses the third sub-question of this dissertation: What relational structures can support civil society actors in providing legitimacy as co-decision-makers and represent valuable input as co-creating users? To address this research question, I used two paradigmatic case studies on Gebiedonline and Decidim to analyze how civil society actors can overcome the limits they face when becoming involved in smart city development. The two non-corporate platforms are paradigmatic cases of how civil society actors can be involved in smart city development, despite the challenges to do so described in articles 1 and 2. This article uses both cases to inquire into the processes through which civil society actors create, maintain, and improve non-corporate local platforms. This third publication finds that the strategic use of local and network embeddedness can allow (social) civil society actors to engage in smart city development, for instance, by creating local platform alternatives. Intermediaries seem to facilitate the involvement of social civil society actors. Civil society actors can thus participate in smart city development by partnering with government organizations or economic civil society actors; or becoming themselves more economically-orientated (e.g. in a cooperative).

In smart city development, partnerships between governments, economic civil society actors and social civil society actors seem to not only improve the conditions for value co-creation, but also for citizen participation. The Gebiedonline and Decidim case studies in my third publication show that government involvement or/and involving economic civil society actors as intermediaries, allows (social) civil society actors to create technologies that support citizen involvement in the smart city planning instrument (e.g., with Decidim-based platforms). At the same time, the Gebiedonline and Decidim case studies show that

value co-creation can involve social civil society actors as users or as representatives of users. Civil society actors can form (platform) cooperatives to contribute to the system level outcome of smart cities; that is successfully applying technology to urban governance. Value co-creation (i.e., creating local platforms) with social (and economic) civil society actors is thus achieved through the intermediation of supportive local governments and economic civil society actors.

6. Conclusion and avenues for future research

To what extent does smart city development involve civil society actors in a way that their involvement can both provide legitimacy as co-decision-makers and valuable input as co-creating users? To answer this question, I inquired into one "most-likely" critical case and two "paradigmatic" cases. I first looked into Amsterdam's smart city as a "most-likely" critical case to test the *limits* of civil society involvement in smart city development. I then drew on two paradigmatic cases of the Gebiedonline and Decidim platforms to grasp the relational structures through which civil society actors *could* provide both legitimacy and valuable input to smart city development, despite the limits established in the preceding "most-likely" case study.

My analysis of the smart city Amsterdam shows that smart city development includes diverging understandings of smart cities: as a planning instrument and as an entrepreneurial ecosystem. Both citizen participation for legitimacy and value co-creation with users take place in Amsterdam's smart city development. However, despite Amsterdam's smart city development being *particularly* inclined to involve civil society actors in smart city development (de Falco et al., 2019; Mancebo, 2020; Mora and Bolici, 2017; Zygiaris, 2013), I find that this involvement faces strong limits. First, civil society involvement is more selective than propagated in the official rhetoric (Mello Rose et al., 2022). Second, the involvement of social civil society actors is limited to specific thematic areas and actor constellations (Mello Rose, 2022). Third, the two paradigmatic cases of non-corporate platforms show that successful pro-active engagement of social civil society actors is enabled by intermediary actors, such as government organizations and economic civil society actors (Mello Rose, 2021).

—

Smart city development is both a planning instrument and an entrepreneurial ecosystem in which both citizen participation and value co-creation can takes place. Whereas citizen participation focuses on expanding citizenship to grant voice to previously excluded populations, value co-creation with user focuses on entrepreneurship. Citizen participation implies efforts toward equality and representativity in policy-making, even if the outcomes of these processes are not *necessarily* socially just (Fainstein and Lubinsky, 2020). Though not entirely irrelevant, equality and representativity are not central elements to value co-creation with users who are able to contribute new knowledge. Amsterdam Smart City Foundation describes its work towards creating a "people-centered smart city" as the basis of its own – supposedly *particularly* participative – "Amsterdam approach". However,

despite efforts to highlight its participatory character, civil society involvement is, rather, configured around co-creating value with those having the required (intellectual and financial) capacities to do so (see also Zandbergen and Blom, 2015). As strategic goals of Amsterdam's smart city development appear to be largely defined by corporations and government organizations, civil society involvement is more selective than propagated in the official rhetoric.

Both understandings of smart city development, and crucially, both forms of civil society involvement, are present in Amsterdam's smart city development. This is because civil society involvement takes different forms across thematic areas and actor constellations. The theme a smart city project addresses seems to predict the type of civil society actors involved (Mello Rose, 2022). Most types of actors (i.e., governments, corporations, economic civil society actors) engage in projects related to resources, energy, and mobility. Social civil society actors, however, engage mostly in projects related to digital government, capacity-building for workers, and improving the quality of public spaces. The thematic areas "digital government, economy, and people" reflect an understanding of smart city development as planning instrument: digitalizing government services (i.e. as "e-government"); creating new modes of interaction between citizens and government administrations through participation platforms; and improving transparency through open data (Anttiroiko, 2016; Borge Bravo et al., 2019; Dalton, 2019; Peña-López, 2019; Zandbergen and Uitermark, 2020). Citizen participation practices within smart city planning instruments therefore involve social civil society actors (Mello Rose, 2022) to modernize government administrations and re-shape government relations with citizens. Other thematic areas, notably the broad area of "resources, energy and mobility" (Mello Rose, 2022), seem to approach smart city development as an entrepreneurial ecosystem. In Amsterdam, this thematic area involves mostly economic civil society actors, while it lacks the involvement of social civil society actors. It seems that the involvement of civil society actors in these thematic areas is linked to a value co-creation logic rather than a citizen participation logic. In other words, smart city developments of a particular city are not limited to approaching smart city development either as a planning instrument or as an entrepreneurial ecosystem. Instead, my results from Amsterdam indicate that both approaches exist in parallel, and each approach is mobilized to different degrees across the thematic bandwidth that Amsterdam's smart city development addresses.

Even when accounting for the effect of the different thematic areas for civil society involvement, social civil society actors still face structural issues in collaborating with corporate actors. This indicates that in most instances of Amsterdam's smart city development, civil society involvement takes place in a way that is centered around the co-creation of value rather than citizen participation. Despite the dominant discourses and normative prescriptions of "citizen-centric" smart city development (see article 1 (Mello Rose et al., 2022)), directly involving civil society actors appears to require an economically-oriented "broker" or intermediary (see article 2 and article 3 (Mello Rose, 2021, 2022)). "Hybrid" forms of organizations – meaning for instance economic civil society actors that share characteristics of both corporations and social civil society actors

– seem to be central to supporting the involvement of the social civil society. Economic civil society actors, such as user and consumer cooperatives, are the main types of organizations that facilitate the involvement of socially-oriented civil society actors in smart city development.

Overall, this dissertation indicates that civil society involvement in smart city development is less guided by the goal of citizen participation than it is guided by the logics of value co-creation with users. Smart city development predominantly seems to represent entrepreneurial ecosystems in which local entrepreneurs are supported with co-creation practices. Value co-creation in smart city entrepreneurial ecosystems give greater attention to the capacities of civil society actors to contribute efficiently to (economic) value (co-)creation processes. Without a claim to participate "*as citizens*" that hold natural rights to voice their concerns and preferences, civil society actors are involved as productive value co-creators. This way, smart city development can enable civil society actors to "find their agency through ad hoc, decentralized and individual forms of engagement" (Zandbergen and Uitermark, 2020: 1744). In other words, social civil society actors involving themselves in smart city development are increasingly entrepreneurial. It seems, civil society actors must be(come) somewhat economically orientated, e.g. by forming a cooperative, to engage in smart city development.

—

My findings draw attention to a shifting role of civil society actors in smart city development (and possibly beyond), that requires greater scientific attention. Civil society involvement in smart cities emphasizes broadening the sets of actors involved in the creation of value rather than involving more participants in political debates. Civil society involvement in smart city development is thus somewhat "pragmatic" and arguably "depoliticized" (Marvin and Luque-Ayala, 2017; Shelton and Lodato, 2019). More research is necessary to determine whether, how and why civil society actors are becoming less socially orientated and more economically orientated in smart city development. This future research must seek examples, beyond the case studies analyzed here, and include cases from the global south.

This dissertation represents a starting point for further inquiries into whether this economic orientation of civil society leads to a widespread emergence of "hybrid" organizational forms, such as cooperatives or social enterprises. Future research ought to take a closer look at these processes of hybridization of "traditional" civil society actors as outlined here from only three case studies. In this sense, my research represents the starting point for further research into a possible shift in the main organizational logics of civil society actors. It raises the question of whether civil society organizations are generally shifting from being organizations engaged in political activities, advocacy, or non-profit community building, towards becoming a vastly heterogeneous "third sector" that actively engages in economic activities. The conceptualization of "economic civil society actors" as hybrids that share characteristics with "traditional" civic, political, and social civil society actors and corporations, might come useful in addressing this question.

More research is necessary to understand how technological innovation or digitalization of cities is interrelated with organizational changes of civil society actors. If such an organizational hybridization spans beyond smart city development, more research into the underlying causes of this hybridization must be conducted to inquire into a wider societal trend. More conceptual and empirical work is needed to clarify the organizational logics of these types of organizations in the context of smart city development and beyond. My thesis attempts to provide some initial conceptual building blocks for this endeavor by offering a distinction between social and economic civil society actors.

7. References

Abdullah C, Karpowitz CF and Raphael C (2016) Equality and Equity in Deliberation: Introduction to the Special Issue. *Journal of Deliberative Democracy* 12(2). DOI: 10.16997/jdd.253.

Akande A, Cabral P, Gomes P, et al. (2019) The Lisbon ranking for smart sustainable cities in Europe. *Sustainable Cities and Society* 44: 475–487. DOI: 10.1016/j.scs.2018.10.009.

Albino V, Berardi U and Dangelico RM (2015) Smart cities: Definitions, dimensions, performance, and initiatives. *Journal of Urban Technology* 22(1): 3–21.

Angelidou M (2014) Smart city policies: A spatial approach. *Cities* 41(Supplement 1). Current Research on Cities: S3–S11. DOI: 10.1016/j.cities.2014.06.007.

Anttiroiko A-V (2016) City-as-a-Platform: The Rise of Participatory Innovation Platforms in Finnish Cities. *Sustainability* 8(9): 922. DOI: 10.3390/su8090922.

Aquilani B, Piccarozzi M, Abbate T, et al. (2020) The Role of Open Innovation and Value Co-creation in the Challenging Transition from Industry 4.0 to Society 5.0: Toward a Theoretical Framework. DOI: 10.3390/su12218943.

Arellano-Gault D, Demortain D, Rouillard C, et al. (2013) Bringing Public Organization and Organizing Back In. *Organization Studies* 34(2): 145–167. DOI: 10.1177/0170840612473538.

Arnstein SR (1969) A Ladder Of Citizen Participation. *Journal of the American Institute of Planners* 35(4): 216–224. DOI: 10.1080/01944366908977225.

Autio E and Thomas LDW (2021) Researching ecosystems in innovation contexts. *Innovation & Management Review* ahead-of-print(ahead-of-print). DOI: 10.1108/INMR-08-2021-0151.

Autio E, Nambisan S, Thomas LDW, et al. (2018) Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal* 12(1): 72–95. DOI: 10.1002/sej.1266.

Baccarne B, Mechant P and Schuurman D (2014) Empowered Cities? An Analysis of the Structure and Generated Value of the Smart City Ghent. In: Dameri RP and Rosenthal-Sabroux C (eds) *Smart City: How to Create Public and Economic Value with High Technology in Urban Space*. Progress in IS. Cham: Springer International Publishing, pp. 157–182. DOI: 10.1007/978-3-319-06160-3_8.

Barba-Sánchez V, Arias-Antúnez E and Orozco-Barbosa L (2019) Smart cities as a source for entrepreneurial opportunities: Evidence for Spain. *Technological Forecasting and Social Change* 148: 119713. DOI: 10.1016/j.techfore.2019.119713.

Bellamy PR (2008) *Citizenship: A Very Short Introduction*. Illustrated Edition. Oxford ; New York: Oxford University Press.

Björkman L and Harris A (2018) Engineering Cities: Mediating Materialities, Infrastructural Imaginaries and Shifting Regimes of Urban Expertise. *International Journal of Urban and Regional Research* 42(2): 244–262. DOI: 10.1111/1468-2427.12528.

Bogers M, Afuah A and Bastian B (2010) Users as innovators: A review, critique, and future research directions. *Journal of management* 36(4): 857–875.

Bogers M, Zobel A-K, Afuah A, et al. (2017) The open innovation research landscape: established perspectives and emerging themes across different levels of analysis. *Industry and Innovation* 24(1): 8–40. DOI: 10.1080/13662716.2016.1240068.

Borge Bravo R, Balcells J and Padró-Solanet A (2019) A Model for the Analysis of Online Citizen Deliberation: Barcelona Case Study. *International Journal of Communication* 13: 5671–5695.

Borghys K, Walravens N and Van Compernolle M (2020) Multi-Stakeholder Innovation in Smart City Discourse: Quadruple Helix Thinking in the Age of "Platforms". *Frontiers in Sustainable Cities* 2. DOI: 10.3389/frsc.2020.00005.

Breuer J, Walravens N and Ballon P (2014) Beyond defining the smart city. Meeting top-down and bottom-up approaches in the middle. In: *Tema. Journal of Land Use, Mobility and Environment*, Naples, Italy, 4 June 2014.

Bria F (2019) Building digital cities from the ground up based around data sovereignty and participatory democracy: the case of barcelona. In: *Urban Futures: Alternative Models for Global Cities*. Monografías CIDOB 73. Barcelona: Barcelona Centre for International Affairs, pp. 83–91. Available at: https://www.cidob.org/en/publications/publication_series/monographs/monographs/urban_futures_alternative_models_for_global_cities.

Bua A and Bussu S (2020) Between governance-driven democratisation and democracy-driven governance: Explaining changes in participatory governance in the case of Barcelona. *European Journal of Political Research* n/a(n/a). DOI: 10.1111/1475-6765.12421.

Bulkeley H, Marvin S, Palgan YV, et al. (2019) Urban living laboratories: Conducting the experimental city? *European Urban and Regional Studies* 26(4): 317–335. DOI: 10.1177/0969776418787222.

Bunders DJ and Varró K (2019) Problematizing data-driven urban practices: Insights from five Dutch 'smart cities'. *Cities* 93: 145–152. DOI: 10.1016/j.cities.2019.05.004.

Calzada I (2018) (Smart) Citizens from Data Providers to Decision-Makers? The Case Study of Barcelona. *Sustainability* 10(9): 3252. DOI: 10.3390/su10093252.

Calzada I and Cowie P (2017) Beyond Smart and Data-Driven City-Regions? Rethinking Stakeholder-Helixes Strategies. *Regions Magazine* 308(4): 25–28. DOI: 10.1080/13673882.2017.11958675.

Campbell T, Goodrich R, Lukensmeyer CJ, et al. (2016) Promoting Inclusion, Equity and Deliberation in a National Dialogue on Mental Health. *Journal of Deliberative Democracy* 12(2). DOI: 10.16997/jdd.260.

Capdevila I and Zarlenga MI (2015) Smart city or smart citizens? The Barcelona case. *Journal of Strategy and Management* 8(3): 19.

Carayannis EG and Rakhmatullin R (2014) The Quadruple/Quintuple Innovation Helixes and Smart Specialisation Strategies for Sustainable and Inclusive Growth in Europe and Beyond. *Journal of the Knowledge Economy* 5(2): 212–239. DOI: 10.1007/s13132-014-0185-8.

Cardullo P and Kitchin R (2019) Smart urbanism and smart citizenship: The neoliberal logic of 'citizen-focused' smart cities in Europe. *Environment and Planning C: Politics and Space* 37(5): 813–830. DOI: 10.1177/0263774X18806508.
Castelnovo W, Misuraca G and Savoldelli A (2016) Smart Cities Governance: The Need for a Holistic Approach to Assessing Urban Participatory Policy Making. *Social Science Computer Review* 34(6): 724–739. DOI: 10.1177/0894439315611103.
Claudel M (2018) From Organizations to Organizational Fields: The Evolution of Civic Innovation Ecosystems. *Technology Innovation Management Review* 8(6): 34–47. DOI: 10.22215/timreview/1163.
Coletta C and Kitchin R (2017) Algorhythmic governance: Regulating the 'heartbeat' of a city using the Internet of Things. *Big Data & Society* 4(2): 205395171774241. DOI: 10.1177/2053951717742418.
Cowley R, Joss S and Dayot Y (2018) The Smart City and its Publics: Insights from across six UK Cities. *Urban Research & Practice* 11(1): 53–77. DOI: 10.1080/17535069.2017.1293150.
Crowley M, Nutter M, Wheeler C, et al. (2016) *Smart Cities for Sustainability A Sector-By-Sector Tech Review*. USDN Resource Guide. Washington, DC: Urban Sustainability Directors Network Innovation Fund.
Dalton CM (2019) Rhizomatic data assemblages: mapping new possibilities for urban housing data. *Urban Geography* 0(0): 1–19. DOI: 10.1080/02723638.2019.1645553.
de Falco S, Angelidou M and Addie J-PD (2019) From the "smart city" to the "smart metropolis"? Building resilience in the urban periphery. *European Urban and Regional Studies* 26(2): 205–223. DOI: 10.1177/0969776418783813.
de Lange M and de Waal BGM (2013) Owning the city: New media and citizen engagement in urban design. *First Monday* 18(11–4).
Deseriis M (2021) Rethinking the digital democratic affordance and its impact on political representation: Toward a new framework. *New Media & Society* 23(8): 2452–2473. DOI: 10.1177/1461444820929678.
Engelbert J, van Zoonen L and Hirzalla F (2019) Excluding citizens from the European smart city: The discourse practices of pursuing and granting smartness. *Technological Forecasting and Social Change* 142. Understanding Smart Cities: Innovation ecosystems, technological advancements, and societal challenges: 347–353. DOI: 10.1016/j.techfore.2018.08.020.
Fainstein SS and Lubinsky A (2020) The Relationship between Citizen Participation and the Just City. In: Lauria M and Schively Slotterback C (eds) *Learning from Arnstein's Ladder*. 1st ed. Routledge, pp. 129–147. DOI: 10.4324/9780429290091-12.
Falco E and Kleinhans R (2018) Beyond technology: Identifying local government challenges for using digital platforms for citizen engagement. *International Journal of Information Management* 40: 17–20. DOI: 10.1016/j.ijinfomgt.2018.01.007.
Farías I and Widmer S (2018) Ordinary Smart Cities. How Calculated Users, Professional Citizens, Technology Companies and City Administrations Engage in a More-than-digital Politics. *TECNOSCIENZA: Italian Journal of Science & Technology Studies* 8(2): 43–60.
Ferrer J-R (2017) Barcelona's Smart City vision: an opportunity for transformation. *Field Actions Science Reports. The journal of field actions* (Special Issue 16): 70–75.

Flyvbjerg B (2006) Five Misunderstandings About Case-Study Research. *Qualitative Inquiry* 12(2): 219–245. DOI: 10.1177/1077800405284363.
Frenchman D, Joroff M and Albericci A (2011) *Smart cities as engines of sustainable growth*. 21. Washington, DC: World Bank Institute.
Fung A (2006) Varieties of Participation in Complex Governance. *Public Administration Review* 66(s1): 66–75. DOI: 10.1111/j.1540-6210.2006.00667.x.
Fung A and Wright EO (2001) Deepening democracy: Innovations in empowered participatory governance. *Politics & Society* 29(1): 5–41.
Gerber M, Bächtiger A, Shikano S, et al. (2018) Deliberative Abilities and Influence in a Transnational Deliberative Poll (EuroPolis). *British Journal of Political Science* 48(4). Cambridge University Press: 1093–1118. DOI: 10.1017/S0007123416000144.
Gerometta J, Haussermann H and Longo G (2005) Social Innovation and Civil Society in Urban Governance: Strategies for an Inclusive City. *Urban Studies* 42(11): 2007–2021. DOI: 10.1080/00420980500279851.
Gerring J (2006) *Case Study Research: Principles and Practices*. Cambridge, UK: Cambridge university press.
Giffinger R, Fertner C, Kramar H, et al. (2007) City-ranking of European Medium-Sized Cities.: 12.
Grabher G and Ibert O (2003) Towards the Schumpeterian Customer? How Active Users shape Innovation. In: Clark GL, Feldman MP, Gertler MS, et al. (eds) *The Oxford Handbook of Economic Geography*. OUP Oxford, pp. 286–306.
Grabher G and Ibert O (2018) Schumpeterian Customers? How Active Users Co-create Innovations. In: Clark GL, Feldman MP, Gertler MS, et al. (eds) *The New Oxford Handbook of Economic Geography*. Oxford: Oxford University Press, pp. 286–304. DOI: 10.1093/oxfordhb/9780198755609.013.36.
Grabher G, Ibert O and Flohr S (2008) The neglected king: The customer in the new knowledge ecology of innovation. *Economic Geography* 84(3): 253–280.
Guetterman TC and Fetters MD (2018) Two Methodological Approaches to the Integration of Mixed Methods and Case Study Designs: A Systematic Review. *American Behavioral Scientist* 62(7): 900–918. DOI: 10.1177/0002764218772641.
Healey P (2015) Civil society enterprise and local development. *Planning Theory & Practice* 16(1): 11–27. DOI: 10.1080/14649357.2014.995212.
Hollands RG (2008) Will the real smart city please stand up? Intelligent, progressive or entrepreneurial? *City* 12(3): 303–320.
Hollands RG (2015) Critical interventions into the corporate smart city. *Cambridge Journal of Regions, Economy and Society* 8(1): 61–77. DOI: 10.1093/cjres/rsu011.
Jacobides M, Cennamo C and Gawer A (2018) Towards a Theory of Ecosystems. *Strategic Management Journal*. DOI: 10.1002/SMJ.2904.
Jankowski P, Czepkiewicz M, Młodkowski M, et al. (2019) Evaluating the scalability of public participation in urban land use planning: A comparison of Geoweb methods with face-to-face meetings. *Environment and Planning B: Urban Analytics and City Science* 46(3). SAGE Publications Ltd STM: 511–533. DOI: 10.1177/2399808317719709.
Jiang H, Geertman S and Witte P (2020) Smart urban governance: an alternative to technocratic “smartness”. *GeoJournal*. DOI: 10.1007/s10708-020-10326-w.
Johnson PA, Robinson PJ and Philpot S (2020) Type, tweet, tap, and pass: How smart city technology is creating a transactional citizen. *Government Information Quarterly* 37(1): 101414. DOI: 10.1016/j.giq.2019.101414.

Kitchin R and McArdle G (2017) Urban data and city dashboards: Six key issues. In: *Data and the City*. 1st ed. Regions and Cities 119. Abingdon, Oxon ; New York, NY: Routledge.
Kornberger M, Meyer RE, Brandtner C, et al. (2017) When Bureaucracy Meets the Crowd: Studying "Open Government" in the Vienna City Administration. *Organization Studies* 38(2): 179–200. DOI: 10.1177/0170840616655496.
Kummitha RKR (2019) Smart cities and entrepreneurship: An agenda for future research. *Technological Forecasting and Social Change* 149: 119763. DOI: 10.1016/j.techfore.2019.119763.
Kurban C, Peña-López I and Haberer M (2017) What is technopolitics? A conceptual schema for understanding politics in the digital age. *IDP Revista de Internet, Derecho y Política* 0(24). DOI: 10.7238/idp.v0i24.3061.
Landemore HE (2012) Democratic Reason. In: Landemore HE and Elster J (eds) *Collective Wisdom*. Cambridge: Cambridge University Press, pp. 251–289. DOI: 10.1017/CBO9780511846427.012.
Le Galès P (1998) Regulations and Governance in European Cities. *International Journal of Urban & Regional Research* 22(3): 482.
Leino H and Puumala E (2021) What can co-creation do for the citizens? Applying co-creation for the promotion of participation in cities. *Environment and Planning C: Politics and Space* 39(4): 781–799. DOI: 10.1177/2399654420957337.
Lember V, Brandsen T and Tõnurist P (2019) The potential impacts of digital technologies on co-production and co-creation. *Public Management Review* 21(11): 1665–1686. DOI: 10.1080/14719037.2019.1619807.
Leszczynski A (2020) Glitchy vignettes of platform urbanism. *Environment and Planning D: Society and Space* 38(2): 189–208. DOI: 10.1177/0263775819878721.
Leydesdorff L and Deakin M (2011) The Triple-Helix Model of Smart Cities: A Neo-Evolutionary Perspective. *Journal of Urban Technology* 18(2): 53–63. DOI: 10.1080/10630732.2011.601111.
Mancebo F (2020) Smart city strategies: time to involve people. Comparing Amsterdam, Barcelona and Paris. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability* 13(2): 133–152. DOI: 10.1080/17549175.2019.1649711.
Marvin S and Luque-Ayala A (2017) Urban Operating Systems: Diagramming the City. *International Journal of Urban and Regional Research* 41(1): 84–103.
McNeill D (2015) Global firms and smart technologies: IBM and the reduction of cities. *Transactions of the Institute of British Geographers* 40(4): 562–574. DOI: 10.1111/tran.12098.
Mello Rose F (2021) The unexpected persistence of non-corporate platforms: The role of local and network embeddedness. *Digital Geography and Society* 2: 100020. DOI: 10.1016/j.diggeo.2021.100020.
Mello Rose F (2022) Activity types, thematic domains, and stakeholder constellations: explaining civil society involvement in Amsterdam's smart city. *European Planning Studies* 30(6). Routledge: 975–993. DOI: 10.1080/09654313.2021.1914556.
Mello Rose F, Thiel J and Grabher G (2022) Selective inclusion: Civil society involvement in the smart city ecology of Amsterdam. *European Urban and Regional Studies* 29(3). SAGE Publications Ltd: 369–382. DOI: 10.1177/09697764221092587.

Mora L and Bolici R (2017) How to Become a Smart City: Learning from Amsterdam. In: Bisello A, Vettorato D, Stephens R, et al. (eds) *Smart and Sustainable Planning for Cities and Regions: Results of SSPCR 2015*. Cham: Springer International Publishing, pp. 251–266. DOI: 10.1007/978-3-319-44899-2_15.

Mora L, Deakin M, Reid A, et al. (2019) How to Overcome the Dichotomous Nature of Smart City Research: Proposed Methodology and Results of a Pilot Study. *Journal of Urban Technology* 26(2): 89–128. DOI: 10.1080/10630732.2018.1525265.

Mora L, Deakin M and Reid A (2019) Strategic principles for smart city development: A multiple case study analysis of European best practices. *Technological Forecasting and Social Change* 142. Understanding Smart Cities: Innovation ecosystems, technological advancements, and societal challenges: 70–97. DOI: 10.1016/j.techfore.2018.07.035.

Morozov E and Bria F (2018) Rethinking the smart city. *Democratizing Urban Technology; Rosa Luxemburg Stiftung, New York Office: New York, NY, USA*.

Noori N, Hoppe T and de Jong M (2020) Classifying Pathways for Smart City Development: Comparing Design, Governance and Implementation in Amsterdam, Barcelona, Dubai, and Abu Dhabi. *Sustainability* 12(10): 4030. DOI: 10.3390/su12104030.

Paroutis S, Bennett M and Heracleous L (2014) A strategic view on smart city technology: The case of IBM Smarter Cities during a recession. *Technological Forecasting and Social Change* 89: 262–272.

Pellicano M, Calabrese M, Loia F, et al. (2019) Value Co-Creation Practices in Smart City Ecosystem. *Journal of Service Science and Management* 12(01): 34–57. DOI: 10.4236/jssm.2019.121003.

Peña-López I (2019) *Shifting Participation into Sovereignty: The Case of Decidim. Barcelona*. 1st ed. Barcelona: Huygens Editorial.

Pesch U, Spekkink W and Quist J (2019) Local sustainability initiatives: innovation and civic engagement in societal experiments. *European Planning Studies* 27(2): 300–317. DOI: 10.1080/09654313.2018.1464549.

Plano Clark VL, Creswell JW, Green DO, et al. (2008) Mixing quantitative and qualitative approaches. In: Hesse-Biber SN and Leavy P (eds) *Handbook of Emergent Methods*. New York: Guilford Press, pp. 363–387.

Pogrebinschi T (2013) Democratic Innovations and Quality of Democracy: Do we need new and more creative recipes? In: *7th General Conference of the European Consortium of Political Research (ECPR)*, Bordeaux, France, 4 September 2013. Available at: https://www.researchgate.net/profile/Thamy_Pogrebinschi/publication/269274450_Democratic_Innovations_and_Quality_of_Democracy_Do_we_need_new_and_more_creative_recipes/links/5485733a0cf24356db60f128.pdf (accessed 26 September 2019).

Pogrebinschi T and Ryan M (2018) Moving beyond input legitimacy: When do democratic innovations affect policy making? *European Journal of Political Research* 57(1): 135–152. DOI: 10.1111/1475-6765.12219.

Prahalad CK and Ramaswamy V (2004) *The Future of Competition: Co-Creating Unique Value with Customers*. Boston, MA: Harvard Business School Press.

Ramaswamy V and Ozcan K (2018) What is co-creation? An interactional creation framework and its implications for value creation. *Journal of Business Research* 84: 196–205. DOI: 10.1016/j.jbusres.2017.11.027.

Ranjan KR and Read S (2016) Value co-creation: concept and measurement. *Journal of the Academy of Marketing Science* 44(3): 290–315. DOI: 10.1007/s11747-014-0397-2.
Ratten V (2017) *Entrepreneurship, Innovation and Smart Cities*. London: Routledge. DOI: 10.4324/9781315407463.
Raven R, Sengers F, Spaeth P, et al. (2017) Urban experimentation and institutional arrangements. *European Planning Studies* 27(2): 258–281. DOI: 10.1080/09654313.2017.1393047.
Raven R, Sengers F, Spaeth P, et al. (2019) Urban experimentation and institutional arrangements. *European Planning Studies* 27(2): 258–281. DOI: 10.1080/09654313.2017.1393047.
Rodríguez Bolívar MP (2015) *Transforming City Governments for Successful Smart Cities*. Cham: Springer.
Rösler J, Söll T, Hancock L, et al. (2021) Value Co-Creation between Public Service Organizations and the Private Sector: An Organizational Capabilities Perspective. *Administrative Sciences*. DOI: 10.3390/ADMSCI11020055.
Sancino A and Hudson L (2020) Leadership in, of, and for smart cities – case studies from Europe, America, and Australia. *Public Management Review* 22(5): 701–725. DOI: 10.1080/14719037.2020.1718189.
Shelton T and Lodato T (2019) Actually existing smart citizens. *City* 23(1): 35–52. DOI: 10.1080/13604813.2019.1575115.
Shelton T, Zook M and Wiig A (2015) The 'actually existing smart city'. *Cambridge Journal of Regions, Economy and Society* 8(1): 13–25. DOI: 10.1093/cjres/rsu026.
Smigiel C (2019) Urban political strategies in times of crisis: A multiscalar perspective on smart cities in Italy. *European Urban and Regional Studies* 26(4): 336–348. DOI: 10.1177/0969776418792049.
Smith G (2009) *Democratic Innovations: Designing Institutions for Citizen Participation*. Cambridge University Press.
Söderström O, Paasche T and Klauser F (2014) Smart cities as corporate storytelling. *City* 18(3): 307–320. DOI: 10.1080/13604813.2014.906716.
Steen K and van Bueren E (2017) The Defining Characteristics of Urban Living Labs. *Technology Innovation Management Review* 7(7): 21–33.
Swyngedouw E (2005) Governance Innovation and the Citizen: The Janus Face of Governance-beyond-the-State. *Urban Studies* 42(11): 1991–2006. DOI: 10.1080/00420980500279869.
Tokoro N (2016) *The Smart City and the Co-Creation of Value*. SpringerBriefs in Business. Tokyo: Springer Japan. DOI: 10.1007/978-4-431-55846-0.
Torfing J, Sørensen E and Røiseland A (2019) Transforming the Public Sector Into an Arena for Co-Creation: Barriers, Drivers, Benefits, and Ways Forward. *Administration & Society* 51(5). SAGE Publications Inc: 795–825. DOI: 10.1177/0095399716680057.
Trencher G (2019) Towards the smart city 2.0: Empirical evidence of using smartness as a tool for tackling social challenges. *Technological Forecasting and Social Change* 142. Understanding Smart Cities: Innovation ecosystems, technological advancements, and societal challenges: 117–128. DOI: 10.1016/j.techfore.2018.07.033.
United Nations (n.d.) Civil Society. Available at: https://www.un.org/en/sections/resources-different-audiences/civil-society/index.html (accessed 16 September 2020).

Valdez A-M, Cook M and Potter S (2018) Roadmaps to utopia: Tales of the smart city. *Urban Studies* 55(15): 3385–3403. DOI: 10.1177/0042098017747857.
Van Deursen AJ and Helsper EJ (2015) The third-level digital divide: Who benefits most from being online? In: *Communication and Information Technologies Annual*. Emerald Group Publishing Limited, pp. 29–52.
van Winden W (2016) Smart city pilot projects, scaling up or fading out?: Experiences from Amsterdam.
van Winden W and van den Buuse D (2017) Smart City Pilot Projects: Exploring the Dimensions and Conditions of Scaling Up. *Journal of Urban Technology* 24(4): 51–72. DOI: 10.1080/10630732.2017.1348884.
van Winden W, Oskam I, van den Buuse D, et al. (2016) *Organising Smart City Projects: Lessons from Amsterdam*. June. Amsterdam: Hogeschool van Amsterdam.
Vanolo A (2014) Smartmentality: The Smart City as Disciplinary Strategy. *Urban Studies* 51(5): 883–898. DOI: 10.1177/0042098013494427.
Vanolo A (2016) Is there anybody out there? The place and role of citizens in tomorrow's smart cities. *Futures* 82: 26–36. DOI: 10.1016/j.futures.2016.05.010.
Vellera C, Vernette E and Ogawa S (2017) The User Innovation Phenomenon. In: Bathelt H, Cohendet P, Henn S, et al. (eds) *The Elgar Companion to Innovation and Knowledge Creation*. Edward Elgar Publishing, pp. 372–391. Available at: https://www.elgaronline.com/view/edcoll/9781782548515/9781782548515.00032.xml.
Viitanen J and Kingston R (2014) Smart Cities and Green Growth: Outsourcing Democratic and Environmental Resilience to the Global Technology Sector. *Environment and Planning A: Economy and Space* 46(4): 803–819. DOI: 10.1068/a46242.
von Hippel E (2001) User toolkits for innovation. *Journal of Product Innovation Management* 18(4): 247–257. DOI: 10.1111/1540-5885.1840247.
White JM (2016) Anticipatory logics of the smart city's global imaginary. *Urban Geography* 37(4): 572–589. DOI: 10.1080/02723638.2016.1139879.
Wiig A (2016) The empty rhetoric of the smart city: from digital inclusion to economic promotion in Philadelphia. *Urban Geography* 37(4): 535–553. DOI: 10.1080/02723638.2015.1065686.
Zandbergen D (2020) The Unfinished Lampposts: The (anti-) Politics of the Amsterdam Smart Lighting Project. *City & Society* 32(1): 135–156. DOI: 10.1111/ciso.12251.
Zandbergen D and Blom S (2015) *Smart City – In search of the Smart Citizen*. Documentary. Available at: https://gr1p.org/en/documentary-smart-city-in-search-of-the-smart-citizen/ (accessed 10 March 2021).
Zandbergen D and Uitermark J (2020) In search of the Smart Citizen: Republican and cybernetic citizenship in the smart city. *Urban Studies* 57(8). SAGE Publications Ltd: 1733–1748. DOI: 10.1177/0042098019847410.
Zuboff S (2019) *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. First edition. New York: PublicAffairs.
Zygiaris S (2013) Smart City Reference Model: Assisting Planners to Conceptualize the Building of Smart City Innovation Ecosystems. *Journal of the Knowledge Economy* 4(2): 217–231. DOI: 10.1007/s13132-012-0089-4.

Article

EUROPEAN URBAN AND REGIONAL STUDIES

European Urban and Regional Studies
2022, Vol. 29(3) 369–382

DOI: 10.1177/09697764221092587
journals.sagepub.com/home/eur


Selective inclusion: Civil society involvement in the smart city ecology of Amsterdam

Filipe Mello Rose, Joachim Thiel and Gernot Grabher
HafenCity University Hamburg, Germany

Abstract

Although research on smart cities increasingly acknowledges the involvement of civil society actors, most studies fall short when it comes to clarifying the specific modalities of civil society involvement. By probing into the smart city ecology that has developed around the Amsterdam Smart City-Foundation, we explore not only the extent to which the civil society is part of a smart city ecology but also what role civil society actors hold within this ecology. This article draws on data gathered and analyzed through quantitative and qualitative methods. The qualitative analysis focuses on analyzing the institutional dynamics that shape civil society involvement in Amsterdam's smart city ecology. The quantitative data are used to unravel the relational dynamics by quantifying collaborative patterns between different types of organizations in Amsterdam's smart city ecology. Our findings reveal that powerful institutional dynamics, manifested through normative pressures, favor the involvement of socially oriented civil society actors. At the same time, however, relational dynamics that shape the collaborative patterns in the projects of the ecology rather exclude the socially oriented civil society at the benefit of an economically oriented civil society. In other words, while the entire ecology rhetorically adheres to an ethos of pervasive civil society involvement, politically, socially, and civically oriented civil society actors lack inter-organizational collaboration—even in the supposedly inclusive context of Amsterdam.

Keywords

Civil society involvement, collaboration networks, economic civil society, smart city ecology, smart city governance, social civil society

Introduction

Initially, smart city research primarily revolved around the crucial role of global information technology corporations like Cisco, IBM, and Siemens. Only large technology corporations, it seemed, possessed the necessary resources—capital, technology, and experience—to conceive and implement comprehensive local smart city strategies that prepare urban services and infrastructures for a digital future (e.g. Townsend, 2013; Viitanen and Kingston, 2014). More recently, however, research has nurtured doubt about whether the alleged "vendor-driven model" (Barns, 2016: 555) corresponds with the empirical realities of "the actually existing smart city" (Shelton et al., 2015). An increasing number of scholars highlight the complexity of actor constellations in smart city development (Arnkil et al., 2010; Mora et al., 2019b; Mulder, 2015; van Winden and van den Buuse, 2017). In these complex actor constellations, civil society organizations (CSOs) appear to constitute important and legitimate stakeholders

Corresponding author:
Filipe Mello Rose, Urban and Regional Economics, HafenCity University Hamburg, Überseeallee 16, 20457 Hamburg, Germany.
Email: filipe.mellorose@hcu-hamburg.de

when it comes to implementing digital technology to improve urban services and infrastructures. Ideals of "people-centered" "smart cities 2.0" (Crowley et al., 2016; Trencher, 2019) even allude to a new participatory era of smart cities succeeding the vendor-driven model. However, comprehensive empirical analyses that inquire into the position of the civil society within the smart city strategizing and implementation processes are still scarce. Existing works either probe into specific aspects, such as vested interests of "professional citizen" groups (Farías and Widmer, 2018) and learning benefits of citizens in participatory projects (van Waart et al., 2016), or is rather skeptical when it comes to the actual involvement of citizens (Cardullo and Kitchin, 2019; Shelton and Lodato, 2019). Shelton and Lodato (2019), for instance, see a crucial mismatch between a "discursive centrality of the general citizen" and actual citizen involvement in the actor constellations developing smart cities.

We locate this article within this diverse body of work on actor constellations in smart cities, framing these constellations as *smart city ecologies*. With this notion, we draw on and extend previous work on "project ecologies" (Grabher and Ibert, 2011). Smart city ecologies consist of different types of actors that participate in projects connected through an overarching smart city strategy. Conceptually, the smart city ecology comprises *institutional* (field-type) dynamics such as normative pressures (DiMaggio and Powell, 1983; Powell and DiMaggio, 2012) through which different actors elaborate and subscribe to a common strategic agenda—without necessarily engaging in actual relational interactions. Smart city ecologies, however, are also driven by *relational* (network-type) dynamics that are enacted precisely through such concrete interactions in specific projects.

Starting from the idea of smart city ecologies as a conceptual premise, the article focuses on one key aspect within these ecologies: the involvement of civil society actors. Our argument builds on critical positions concerning a people- or citizen-centered smart city (e.g. Cardullo and Kitchin, 2019; Shelton and Lodato, 2019; Vanolo, 2016). We maintain that there is in fact a mismatch in smart city ecologies.

We develop this argument in two steps. First, we distinguish different types of CSOs. Analyses of smart city development by Cardullo and Kitchin (2019) as well as by Cowley et al. (2018) elucidate that the motives and forms of civil society involvement are diverse and reflect the heterogeneity of CSOs. Drawing on different modes of "publicness" conceptualized by Cowley et al. (2018), we distinguish between two groups of actors that make up the civil society: professional CSOs that we refer to as *economic civil society*, and the more socially, civically, and politically orientated parts of the civil society that we frame as *social civil society*.

Second, we employ this distinction to empirically probe into the Amsterdam smart city ecology, which we regard as a "most likely" critical case (Flyvbjerg, 2006: 231; also Gerring, 2006: 115). By analyzing an environment that is usually regarded as more likely to involve (social) CSOs than other places, this case selection strategy allows us to generalize the *limitations* of (social) CSO involvement in smart city development. The Amsterdam smart city ecology in our view represents such a *most-likely critical* case study. Numerous scholars and practitioners describe Amsterdam as particularly prone to engage with CSOs in smart city development and producing technology in a particularly participatory manner (de Falco et al., 2019; Mancebo, 2020; Mora and Bolici, 2017; Zygiaris, 2013; Bunders and Varró, 2019; Zandbergen and Uitermark, 2020). Amsterdam's smart city strategy places a strong focus on creating a "quadruple-helix" ecology in which corporations, governments, universities, and citizens collaborate (Mancebo, 2020; Mora et al., 2019b). More recently, though, scholars examining individual smart city project activities in Amsterdam have pointed to the limitations that CSOs face when attempting to participate in the ecology's projects (Mancebo, 2020; Zandbergen, 2020). Our research complements such analyses by focusing the Amsterdam's smart city ecology rather than on individual projects.

Our study of the Amsterdam smart city ecology reveals that, on the one hand, strong *institutional* (field-type) dynamics, mostly manifested through normative pressures, favor social civil society involvement in smart city development (de Falco et al., 2019; Mancebo, 2020; Mora and Bolici, 2017). On the other hand, *relational* (network-type) dynamics that shape actual collaborations both in the governance structures of the ecology and at the project level rather exclude social civic society at the benefit of economic civil society.

Building on these findings, this article contributes conceptually to the literature on the role of CSOs in smart city development. Rather than starting from normative postulates (e.g. Hollands, 2008) and conceptions like the "people-centered smart city" (Saunders and Baeck, 2015), we particularly intend to advance an analytical conception of how CSOs are involved. We also contribute to the literature on actor constellations in smart city development more broadly. Besides corroborating the general critique of the private-public pattern inherent in the "vendor-driven model" (Barns, 2016: 555), we also offer a more comprehensive understanding of collaborative structures in smart cities that reaches beyond stylized conceptions such as "triple-helix" (Leydesdorff and Deakin, 2011) or "quadruple-helix" (Mora et al., 2019b). Moreover, in methodological terms, the article offers a systematic categorization of collaboration patterns in the Amsterdam smart city ecology by retrieving and purposefully deploying data from the online digital registry of the Amsterdam Smart City (ASC)-Foundation.[1] As this registry, which also functions as a platform, comprises all projects and participating stakeholders in the entire ecology, and offers a valuable data source for the proposed analytical strategy.

This article consists of the following sections. Following this introduction section, a literature review conceptually frames our approach to the smart city ecology and the involved CSOs. Then, we set out our research design, including the selected data sources and methods. This is followed by a presentation of the findings regarding the institutional and relational dynamics shaping the ecology. Finally, we discuss the results and their implications for theory building and further research.

Theoretical framework: smart city ecologies and types of CSOs

Smart city ecologies: a conjunction of institutional and relational dynamics

The development of smart cities unfolds in projects that embrace different types of actors (e.g. Coletta et al., 2019; Raven et al., 2019; Vanolo, 2016; Viitanen and Kingston, 2014). Such inter-organizational constellations often implicate "extra-territorial networks of key actors" (Shelton et al., 2015: 16), for example, those global technology corporations that are emblematic for the "vendor-driven model" (Barns, 2016: 555). However, smart city development usually does not materialize as a juxtaposition of isolated temporary networks of local and non-local players but is embedded in a wider local context of other projects and other players. We refer to the conjunction of smart city projects and this wider local context as *smart city ecology*, building on extant work on institutional and relational dynamics that shape smart city development.

Inquiring into the institutional context that influences smart city development, Raven et al. (2019: 260), for instance, emphasize the role of "place-specific institutional arrangements" that affect both who is involved and what agendas the involved organizations pursue in smart city development. Institutional arrangements engender the "regulatory," "normative," and "cognitive" (Scott, 2013) dynamics that frame smart city developments. Furthermore, institutional dynamics generate differences across cities by locally "inflecting" (Valdez et al., 2018: 3357) the global standard "visions of data-driven smart cities" (Shelton et al., 2015: 17) that circulate in "extra-territorial networks" (Shelton et al., 2015: 16). According to this literature, place-specific institutional arrangements lie at the heart of place-specific actor constellations and agendas in which smart cities actually materialize (Farías and Widmer, 2018; Viitanen and Kingston, 2014; Wiig, 2016).

In the literature on the underlying relational dynamics shaping the smart city ecology, the inter-organizational make-up of smart city development is usually framed as "innovation system" (Leydesdorff and Deakin, 2011) or "innovation ecosystem" (Claudel, 2018; Snow et al., 2016). These systems mobilize various types of actors and facilitate the transfer of knowledge and ideas and the pooling of resources. Respective authors tend to equate actor constellations in smart city innovation systems with a "triple helix" pattern of "university-industry-government-relations" (Leydesdorff and Etzkowitz, 2003: 57), plus the civil society as a fourth organizational type in the helix structure (Arnkil et al., 2010; Mora et al., 2019b; Vallance et al., 2020; van Winden and van den Buuse, 2017). Smart city developments thus build on networks of different groups of actors to

allow for the implementation of digital innovation and the digitalization of urban (infrastructure) systems.

Our conceptualization of a smart city ecology both combines and specifies institution-based and network-based approaches to understanding the inter-organizational constellation developing smart cities. We hold, thus, that the inter-organizational make-up of smart cities comprises both institutional dynamics (i.e. joint normative, cognitive, and regulatory frames) and relational dynamics (i.e. patterns of cooperation). The institutional dynamics are conveyed through a (strategic) context in which "existing initiatives are corralled into the semblance of an overarching, coordinated, strategic and branded narrative" (Coletta et al., 2019: 350). The relational dynamics, in contrast, are observable in concrete cooperation arrangements in actually existing smart city projects. For this purpose, we draw on and adapt the notion of "project ecology" (Grabher and Ibert, 2011) that conceptualizes the intricate interplay between (permanent) relational and institutional contexts and (temporary) projects. While a project ecology typically unfolds around one project, the smart city ecology embraces various projects joined together in a common (institutional) strategic agenda. The joint commitment to the common strategic agenda is the source of institutional (field-type) dynamics, while the cooperation on projects enacts relational ("network-type") dynamics.

It remains unclear how both dynamics interact. Institutionalist literature on organizational fields suggests a primacy of institutional or field dynamics since normative pressures favor aligning to a joint agenda (DiMaggio and Powell, 1983). Research focused on network analysis elucidates that both dynamics tend to unfold concurrently, or even reinforce each other mutually (Hollway et al., 2017; Kenis and Knoke, 2002).

CSOs: social or economic orientation

While the inclusion of CSOs in smart city research and political practice has turned into a widespread imperative, the actual conceptualization of civil society involvement is a non-trivial challenge. Since CSOs constitute a diffuse and diverse sphere whose activity cannot be narrowed down to mean only collective action (Leydesdorff and Etzkowitz, 2003: 57), we find that framing the role of civil society in smart city ecologies requires a concise systematization of the type CSOs that engage in smart city development.

With the CSOs' diverging role in smart city development in mind, we sort the CSOs that participate in smart city development into two sub-types: *social civil society organizations* and *economic civil society organizations*. This conceptualization of two types of CSOs is based on and condenses Cowley et al.'s (2018) framework of four "modalities of publicness" that are relevant in smart city contexts. We find that Cowley et al.'s (2018: 72) framework exemplifies the divide between a more "civic and political" idea of the smart city and a more "service-user and entrepreneurial" idea of the smart city. For the following analysis of the Amsterdam smart city ecology we, therefore, propose a classification of two different types of organizations that participate in smart city development as *civil society*. These types also exemplify different understandings of a smart city and the role of CSOs within it.

1. Social CSOs consist of political and civic non-state and non-corporate organizations. Social CSOs notably include political advocacy and non-profit community-service organizations.
2. Economic CSOs consist of economically oriented non-state and non-corporate organizations. This includes industry associations and representations, as well as chambers of commerce and consumer cooperatives.

Each type of CSO reveals a particular focus of a smart city ecology and of a particular mode of civil society involvement. Social CSOs are mainly aimed at affording the democratic legitimation of smart city development and at assuring the public goods-character and the "public value" of digitalized urban services and infrastructures (i.e. their "net benefit" in terms of "important civic and democratic principles"; Castelnovo et al., 2016: 735). When involving social CSOs as representatives of a wider citizenry, smart city development draws on what Cowley et al. (2018: 72) call civic and political publicness. By engaging with social CSOs, smart city projects frequently support activities

toward participatory planning (Clark, 2020: 164) and foster (data-based) transparency in decision- and claim-making (Dalton, 2019).

Economic CSOs, in contrast, exemplify the "service-user and entrepreneurial" dimension of the smart city. In a sense, economic CSOs provide added (economic) value to the development of digitalized urban infrastructures in two ways. For one, they facilitate the mobilization of users as co-creators of innovation (Baccarne et al., 2014: 162; Carayannis and Rakhmatullin, 2014). Users are supposed to provide three forms of knowledge that cannot be mobilized in the professional realm of the "triple helix" (Mora et al., 2019b): (1) *everyday knowledge* that helps to test novel technologies; (2) *problem knowledge* that is instrumental for detecting novel areas of application; and (3) *solution knowledge* through which citizens might even co-produce actual problem-solving tools. For another, economically oriented CSOs themselves provide specific assets (e.g. access to sources of funding or specific knowledge) that contribute to the economic utility and viability of smart city development.

Research design: a "most-likely" case study based on mixed-methods

We draw on a mixed-methods approach, which offers "two sorts of advantages compared to mono-methods: confirmation and complementarity" (Spillman, 2014: 197). The qualitative analysis focuses on the institutional dynamics, such as the regulatory, cognitive, and normative dynamics that shape CSO involvement in Amsterdam's smart city ecology. The quantitative data are used to unravel the relational dynamics by quantifying project-level collaboration between different types of organizations that form Amsterdam's smart city ecology. Both methods were carried out independently in parallel data collection and analysis processes.

Qualitative sources and methods

The qualitative analysis is based on document analysis and semi-structured interviews. The *document analysis* draws on digital documents from the website of the ASC-Foundation and the websites of members of the ASC-Foundation. We searched the websites for English and Dutch keywords, such as "smart city" and "slimme stad," and added search results to a document database. The *interview material* consists of 24 interviews with 25 interview partners that were conducted between June 2018 and December 2020. We selected interview partners based on whether they were part of at least one of the three following groups. First, we interviewed key organizations from Amsterdam's smart city ecology, notably the ASC-Foundation to understand the normative, cognitive, and regulatory dynamics structuring the smart city ecology and CSO involvement within it. Second, we interviewed a variety of organizations engaged in the smart city ecology to understand how they responded to the dynamics structuring the smart city ecology by collaborating (or not) with CSOs. At this stage, the interview partner selection strategy aims to reflect the diversity of organizational types participating in Amsterdam's smart city ecology. Third, we interviewed social and economic CSOs that focus on similar issues as the ASC-Foundation but are not part of the Amsterdam smart city ecology. This latter group of interviews mainly elucidated the perceived barriers for CSO involvement in the ecology.

Each interview took between 30 and 120 minutes (on average 57 minutes), leading to a total of 22 hours and 45 minutes of recorded material. The document database and the transcribed recordings were coded in MaxQDA. Whenever the empirical material concerned the involvement of CSOs in the smart city ecology, we coded for (1) the institutional and relational dynamics at hand and (2) for the type of CSOs (i.e. outlined social or economic) that the material referred to. In addition, we also coded statements made by CSOs regarding their perception of their role in the ecology.

Quantitative sources and methods

The quantitative analysis relies on a database of all project activities listed on an online registry managed by the ASC-Foundation.[2] The online registry supports the goal of the ASC-Foundation to become an intermediary that connects innovation-oriented actors in Amsterdam. The projects and organizations composing the database are vastly diverse in terms of thematic focus, size, and stakeholder constellations (see

Table 1. Overview of interview partners.

Interviewee's organizations	Interviewee anonymization	Recording
Amsterdam Smart City-Foundation (PPP)	ASC1; ASC2; ASC3; ASC4	02:54:14
Amsterdam municipal administration		
Chief technological office	Gov1; Gov2; Gov3	02:05:53
Civil servants in digital participation processes	Gov4; Gov5	02:04:39
Corporations and start-ups	Corp1; Corp 2; Corp 3; Corp 4	03:08:04
Public–private partnerships	PPP1; PPP2	01:03:16
Universities / Research institutes	Res1; Res2	01:56:06
Social CSOs		
that are part of the smart city ecology	Soc1; Soc2	01:25:40
that are marginally related to the ASC ecology	Soc3, Soc4, Soc5	04:36:54
Economic CSOs		
that are part of the smart city ecology	Econ1	01:13:55
that are marginally related to the ASC ecology	Econ2, Econ3	02:16:04

Mello Rose, 2021; Putra and van der Knaap, 2018; Sengers et al., 2018). While imperfect, we hold that the project registry of the online platform[3] is an accurate and extensive representation of the smart city activities taking place in Amsterdam.

Our quantitative analysis was carried out in the following steps (see Table 2 for more detail). In a first step, the database was cleaned.[4] In a second step, we categorized all 759 organizations that are part of the ecology into organizational types. In a third step, we created an overview of the involvement of different types of organizations in Amsterdam's smart city ecology based on descriptive statistics. In a fourth step, we assessed to what extent the dominant types of organizations of the ecology (i.e. government organizations and corporations) avoid engaging with social and economic CSOs. For this, we carried out cross-tabulations and calculated chi-square-values that assess whether there is a statistical avoidance of collaborating with either type of CSO.

Findings I: institutional dynamics of civil society involvement

Smart city development in Amsterdam began in 2008 with a public–private partnership (PPP) between the municipal administration, the grid operator Alliander, and KPN, a telecom company (Mora and Bolici, 2017). In the following year, the ASC-foundation was established to assure a greater corporate involvement in smart city development (Raven et al., 2019: 265). The ASC-Foundation is financed and supported by a 3-year-renewable membership of key organizations and public administrations of the Amsterdam Metropolitan Region. The periodic membership renewals allowed the ASC-Foundation to move from being PPP-based to following a business-led (Noori et al., 2020) quadruple-helix concept (ASC4) (Arnkil et al., 2010; Carayannis and Campbell, 2009). As prescribed by this concept, the ASC-foundation now involves organizations from the research sector (Amsterdam University of Applied Sciences and the Amsterdam Institute for Advanced Metropolitan Solutions) and various social and economic CSOs. The social CSOs—NEMO Kennislink; Pakhuis de Zwijger; the Waag Society—are all organizations that focus on providing education to a wider public by organizing events, workshops, and in the case of Waag Society, also by hosting a "smart citizens lab" (Nesti, 2020). The economic CSOs include Metabolic, a social enterprise, and BTG, the Dutch industry association for ICT and telecommunications.

With a permanent secretariat, the ASC-Foundation is a "trusted third party" (van Winden et al., 2016: 13) and an "innovation intermediary" (Claudel, 2018; also in Raven et al., 2019). In this role, the ASC-Foundation has reduced its direct involvement in smart city projects. Instead, the ASC-Foundation influences the

Table 2. Overview of the steps of the quantitative analysis.

Step	Step description
1	Database cleaning by removing the following erroneous entries: 14 project entries not related to Amsterdam Metropolitan Region 54 project entries that are not collaborative 31 project entries that not match our definition of smart city development: that is, entries are neither linked to the use, dissemination, or creation of digital services and infrastructures; nor address issues related to urban development and inclusion with digital technology
2	Listing and categorizing/coding of 759 organizations involved in the projects of the ecology based on the self-descriptions of organizations and company registers such as Bloomberg or Dimble.nl
3	Analysis of the overall involvement in the ecology of each organizational type
4	Analysis of direct collaboration patterns between social and economic CSOs and government organizations and corporations based on cross-tables and chi-square-tests

CSOs: civil society organizations.

institutional dynamics of the Amsterdam smart city ecology in two main ways. First, the ASC-Foundation manages an online platform on which Amsterdam's smart city activities are registered (Mello Rose, 2021; Nesti, 2020; Putra and van der Knaap, 2018; Raven et al., 2019; Sancino and Hudson, 2020; ASC2). Through this registry of smart city projects, the ASC-Foundation aims to support the creation of inter-organizational project partnerships (ASC2; ASC4). This online platform puts organizations and persons who are aligned with the foundation's strategic goals on CSO involvement in contact with each other (ASC2; ASC4) and, hence, leverages cognitive dynamics in institutionalizing CSO involvement.

Second, in a "steering committee" member organizations of the ASC-Foundation collectively define the strategic goals of Amsterdam's smart city development. Even if formally dependent on the Amsterdam Economic Board—an economic CSO similar to a chamber of commerce—the ASC-Foundation is collaboratively governed by its members in a "steering committee" (ASC1; ASC2). All ASC-Foundation members have the same formal status in this steering committee. Interviewees and researchers, however, describe the Amsterdam Economic Board, the public utility company Alliander, and the municipality of Amsterdam as being more influential than other members of the ASC-Foundation (ASC 1; ASC 2; Corp1) (Claudel, 2018; Nesti, 2020; Raven et al., 2019). These three most influential member organizations frequently highlight the importance of civil society involvement as both normative and practical necessities. For example, an employee of the Amsterdam Economic Board (2020), who has been seconded to the ASC-Foundation, claims that the "Amsterdam Smart City [. . .] developed a way to mobilize this power of society [and] bring these companies, public institutions and residents to shape the cities of the future." In a similar vein, Alliander maintains that the company's Virtual Power Plant project has won awards, "because it puts citizens at the heart of ICT innovation, enabling them to improve their own quality of life through technology" (Alliander, 2018, own translation). The municipality of Amsterdam asserts that in Amsterdam's smart city ecology "collaboration between the municipality, knowledge institutions, the market and residents is unique" because it fosters a "learning environment (. . .) in which new initiatives can be developed, applied and improved." (Gemeente Amsterdam et al., 2018).

In this sense, the move of the ASC-Foundation away from a PPP-model toward pursuing a quadruple-helix approach (Mora et al., 2019a) was accompanied by the emergence of a normative framing that civil society involvement is a highly useful, if not essential, part of smart city development. Other members of the ASC-Foundation, including corporations and knowledge institutions, align to such a norm-driven institutionalization of CSO involvement. Arcadis (2021), an engineering company, argues on its website that "smart cities are about people, not technology." Eurofiber (n.d.), a digital infrastructure supplier, calls to "involve residents in the

Table 3. Distribution of organizations by type.

Type of stakeholder	Share among stakeholders	Share among engagements	Average # of part. p. stakeholder	Share of projects involving type
Government organizations	17.52%	24.91%	2.19	70.91%
Corporations	42.56%	33.30%	1.20	72.73%
Research organizations	15.02%	17.04%	1.75	49.09%
Civil society organizations	17.52%	17.29%	1.52	52.12%
. . . incl. social CSOs	8.56%	7.53%	1.35	30.30%
. . . incl. economic CSOs	8.96%	9.76%	1.68	36.97%
Hybrids / other org.	3.69%	5.05%	2.11	29.70%
Missing	3.69%	2.40%	1.00	7.88%
Grand Total	759	1168	1.54	

development of the smart city [. . .] by being open to their concerns and handling their viewpoints carefully" (p. 8; own translation).

Moreover, the narrative of a participatory approach to smart city development is leveraged as a key source of differentiation and legitimation by the ASC-Foundation. A report on the activities of 2019 of the Amsterdam Economic Board (2019) quotes the program director of the ASC-Foundation stating that "for more than 10 years, Amsterdam Smart City has distinguished itself by putting people first, [. . .] and connecting governments, the business community, knowledge, and social institutions, citizens and start-ups" (own translation). One corporate interviewee explained that their membership in the ASC-Foundation was justified internally by the fact that the it provides "access to the civil servants of the municipality and, together with the Waag Society and Pakhuis de Zwijger, [. . .], helps to get a deep understanding of the wishes of the citizens" (Corp2).

However, while CSO involvement is institutionalized through normative and cognitive dynamics, corporate interaction with citizens and CSOs within the ASC-Foundation mostly takes place indirectly. More precisely, specific knowledge-focused social CSOs, economic CSOs, universities, and hybrid organizations (i.e. formalized PPPs), are tasked with involving citizens and social CSOs in general (Nesti, 2020; Raven et al., 2019) (ASC1; ASC2; Corp2; Res1). Multiple interviewees criticized that this practice also leads to the exclusive participation of elites endowed with significant cultural capital (Res1; Econ1; Econ3) (see also Zandbergen and Uitermark, 2020). An interviewee from the ASC-Foundation counters that the ASC-Foundation's task is not to "reach all citizens [as] that is more a task for the government than for us as a foundation" (ASC2). A member of a social CSO working on the digitalization of urban areas criticizes the ASC-Foundation for being "focused on the decision-makers, scientists and innovative entrepreneurs [and that] it's not for the people of Amsterdam" (Soc3). Despite a strong "people-centered" rhetoric, hence, it seems that the institutional dynamics of Amsterdam's smart city ecology rather lead to bypassing or merely indirectly engaging with social civil society actors.

Findings II: relational dynamics of civil society involvement in the smart city ecology

The first step of our quantitative analysis of civil society involvement in the projects of the ecology (Table 1) confirms past results that Amsterdam's smart city ecology involves multiple types of organizations, including CSOs (Mora and Bolici, 2017; Mora et al., 2019b). Corporations make up the largest group of organizational types involved in Amsterdam's smart city ecology (42.6%). In all, 17.5 percent of all organizations in the ecology are governmental organizations, while 15 percent of the ASC ecology's organizations are research-related organizations. CSOs, including economic and social sub-categories, account for 17.5 percent of all organizations of the ecology of which a slight minority of 8.6 percent are social CSOs and a majority of 9 percent economic CSOs.

Table 4. Project-level collaboration of governments and corporations with CSOs.

All projects						
Count of smart city projects	Government involvement			Corporate involvement		
	Yes	No	p(H0)/OR	Yes	No	p(H0)/OR
Social civil society inv. (Yes)	34	16		32	18	
No social civil society inv. (No)	83	32		88	27	
p(H0) of Pearson's chi-square test			0.587			0.097
Estimated effect [odds ratio; OR]			0.819			0.545
Economic civil society inv. (Yes)	47	14		48	13	
No economic civil society inv. (No)	70	34		72	32	
p(H0) of Pearson's chi-square test			0.184			0.188
Estimated effect [odds ratio; OR]			1.631			1.641
Projects involving 10 or less organizations						
Count of smart city projects	Government involvement			Corporate involvement		
	Yes	No	p(H0)/OR	Yes	No	p(H0)/OR
Social civil society inv. (Yes)	18	15		16	17	
No social civil society inv. (No)	73	31		79	25	
p(H0) of Pearson's chi-square test			0.097			0.003
Estimated effect [odds ratio; OR]			0.510			0.298
Economic civil society inv. (Yes)	27	13		29	11	
No economic civil society inv. (No)	64	33		66	31	
p(H0) of Pearson's chi-square test			0.864			0.607
Estimated effect [odds ratio; OR]			1.071			1.238

While on average corporations participate mostly in a single project only, governmental organizations are typically involved in more than two projects (see Table 3). As some types of organizations typically participate in more projects than others, we focus on project participations rather than on the count of organizations present in the ecology. With this consideration, we find that corporations are significantly less dominant. When accounting for the repeated involvement in the ecology by some organizations, social and economic CSOs, respectively, make up 7.5 and 9.8 percent of all of the ecology's stakeholders. Taken together, economic and social CSOs account for a similar share of organizations and project participations as universities. While CSOs therefore clearly participate in the ecology, a majority of the ecology's CSOs and CSO-related project participations are linked to the involvement of economic CSOs. Civil society at large (including both sub-types) is involved in about half of all of the ecology's projects (52.1%), while government organizations and corporations are part of more than two-thirds of all projects (70.9% and 72.7% respectively). When analyzed separately, however, social and economic CSOs are each part of only about a third of all projects (30.3% for social and 37% for economic CSOs, respectively). In Amsterdam's smart city ecology, 86 projects engage at least one type of civil society stakeholder. Social CSOs participate in 50 projects, while 61 projects involve economic CSOs; 25 projects include both.

To understand to which extent CSOs are not only part of Amsterdam's smart city ecology, but actually participate in projects in which government organizations and corporations innovate, we cross-tabulated variables that display the involvement of each organizational type (Table 4). We find that despite the institutionalized norms of (social) civil society involvement,

direct collaboration with CSOs in the projects of the smart city ecology is related to whether the CSO is economically or socially oriented. In Amsterdam's smart city projects, a government or corporate presence in a given project typically reduces the likelihood of involving a social CSO. While government involvement only slightly (and not statistically significantly) reduces the odds of social CSOs participating in a project, corporate participation in a project significantly reduces the odds of social CSOs being involved in the same project by half (odds ratio (OR)=.545; $p<.1$). At the same time, government and/or corporate involvement slightly (though not statistically significantly) increases the odds of economic CSOs being involved in the same project roughly by a factor of 1.6 (see Table 2).

Naturally, the likelihood of involving any type of organization increases when a project is larger and involves more organizations (i.e. in large project partnerships). In this sense, we find that once more than 10 organizations[5] are involved, analyzing collaboration patterns becomes futile, as government organizations and corporations are part of almost all large projects partnerships (respectively 26 and 25 of 28 large projects). The near-ubiquitous presence of government organizations and corporations in large project partnerships, which typically involve more than four different types of organizations, means that this subset of the ecology provides little information regarding collaboration patterns. In excluding 28 large outliers and focusing on smaller, possibly more selective project partnerships, we find that the involvement of government organizations and corporations leads to even stronger decreases in social CSO involvement (Table 2). In this subset of projects, a government and corporate project involvement significantly ($p<.1$ and $p<.01$) reduce the odds of a social CSO participating by a factor of .51 and .298 respectively. For economic CSOs, we did not observe such a reduction of the likelihood of participation in projects whenever other types of organizations were also involved.

Discussion and conclusion: unexpected selectivities

A starting point of our analysis of civil society involvement in smart city development was an analytical distinction between different sub-types of civil society: social civil society and economic civil society. This distinction echoes different ideas of the smart city as either a "civic and political" or a "service-user and entrepreneurial" project (Cowley et al., 2018). Social CSOs are understood to provide legitimacy to "smart" developments in the public realm. This ideal is based on the expectation that smart city development can enable citizen empowerment (Clark, 2020: 164). In contrast, economic CSOs mostly contribute to the technological innovation for digitalized urban infrastructure systems, by representing the users of these systems and affording a more voiceful and active role for these users.

Our evidence suggests that this differentiation of two types of CSOs has been useful and provides discriminating results. Employing this distinction, we find that both when it comes to governance and strategic decision-making, and concerning project-level implementation, civil society involvement in smart city development predominantly translates into participation of economic CSOs. Social CSOs are, if at all, mostly involved indirectly. While the rhetoric of civil society involvement is pervasive and citizen participation has a distinct tradition in the city, economic CSOs play a key role in mediating between a variety of organizational types—governments, corporations, and social civil society. The representatives of the social civil society are less (directly) involved at the governance level. At the level of actual project collaborations, we find an even clearer overrepresentation of the economic civil society and an underrepresentation of the social civil society whenever government organizations or corporations are involved. That is, the "classic" civic and political segment of the civil society does not participate in projects involving corporations and governments to an extent that would reflect its presence in the overall ecology. These findings expand on Shelton and Lodato's conclusion, that a "discursive centrality of the general citizen" does not correspond with actual citizen involvement in strategizing processes (Shelton and Lodato, 2019). Not only is the "general citizen," as Shelton and Lodato call it, only indirectly involved in strategy development; social CSOs, it seems, are even actively avoided by corporations and by government organizations when it comes to concrete collaborations at the project level.

What can we conclude from this evidence? Our results might provide a starting point for further lines of inquiry in two different areas. The first area relates to the key empirical point that the article makes: There is a lower importance of the "civic and political" as compared with the "service-user and entrepreneurial" idea of smart cities. This insight, on the one hand, affirms the critical assessments of the people-centered smart city, culminating in Cowley et al.'s (2018) argument that in actual implementations of smart city development the civic and political aspect of urban futures is downplayed. On the other hand, the results also point to a more comprehensive understanding of smart city development as being a civic and political *and* a service-user and entrepreneurial project. Smart cities comprise both the governance of public goods *and* the advancement of corporate technology projects. Smart cities, then, generate new hybrid governance arrangements (Brandtner et al., 2017) in which civil society players apparently are involved both as co-creating users and as political activists. This result resonates with research on a generally changing role of users in today's society and economy, from passive recipients to more voiceful and (partially) collectively organized actors (e.g. Grabher and Ibert, 2018). Users, in fact, seem to gain also political weight compared with the "classic" civil society. It might thus be worthwhile to dig deeper into the double role that citizen-users play in smart city development.

The second area concerns the conceptual premises of this article and the interaction between field dynamics and network dynamics in the smart city ecology. On the one hand, the legitimacy of Amsterdam's smart city strategy originates from cognitive dynamics (i.e. as the recognition as part of the ecology that is based on a shared understanding of smart city development as *collaborative* endeavor) and normative dynamics (i.e. that citizens and CSOs are legitimate stakeholders). These dynamics favor a "citizen-centric" smart city development. On the other hand, the actual involvement of "citizen-centric" CSOs does not materialize with regard to both strategic orientation and actual implementation. Our findings, hence, neither corroborate an expected primacy of institutional dynamics (DiMaggio and Powell, 1983) nor are they in line with the assumption that field and network dynamics develop in a parallel or mutually reinforcing fashion (Hollway et al., 2017; Kenis and Knoke, 2002). In our case, the relational dynamics that favor specific cooperation patterns seem to outperform the institutional dynamics generated by the strategic smart city agenda. It seems that normative pressures in the context of strategic programs are not comparable with the homogenizing field dynamics that pertinent research has identified when it comes to the gradual evolution of "classic" organizational fields (DiMaggio and Powell, 1983). Further work is also needed to unravel the dynamics within organizational ecologies that join projects under a common strategic agenda.

Taken together, we have provided an initial step to unravel the complex actor ecologies in which the development and implementation of smart city-related projects occur—in particular with regard to the role of CSOs in such ecologies. While based on just a single case study, our findings might be generalizable to some extent. When even in the "most-likely case" of Amsterdam the involvement of CSOs is largely restricted to those organizations that underpin a service-user and entrepreneurial idea of smart cities, this tendency should hold all the more for places that exhibit a less participatory governance tradition.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the German Research Foundation (Deutsche Forschungsgemeinschaft - DFG): grant number GR1913/14-1.

Notes

1. www.amsterdamsmartcity.com (accessed 30 May 2020).
2. amsterdamsmartcity.com (accessed 11 January 2022)
3. We use the term platform here in a generic sense, that is, in the sense of a database that is fed by a

decentralized registration process and structured by a centrally provided template. The role of the platform for our research is therefore not conceptual; the ASC-platform serves simply as a (useful and robust) data source. The ASC-platform is briefly further described in section "Findings I: institutional dynamics of civil society involvement." However, we refer to existing literature on this platform for further details on the platform's operations and the therein listed projects (Mello Rose, 2021; Noori et al., 2020; Putra and van der Knaap, 2018; Raven et al., 2019; Sancino and Hudson, 2020).

4. We find that all relevant projects are listed in the database, even if not all projects in the database conform to our definition of Amsterdam's smart city ecology leading to the necessity of filtering erroneous entries.
5. We classify projects with more than 10 involved organizations as large outliers because any project involving at least 10 organizations can involve all five analyzed types of organization twice. We hold that in large project consortia, the significance of involving CSOs is significantly reduced.

ORCID iD

Filipe Mello Rose https://orcid.org/0000-0002-8348-5028

References

Alliander NV (2018) Award voor virtual power plant. Available at: https://www.alliander.com/nl/nieuws/award-voor-virtual-power-plant/ (accessed 12 July 2021).

Amsterdam Economic Board (2019) Werken aan een slimme, groene en gezonde Metropool: Highlights 2019—Vooruitblik 2020. Available at: https://amsterdameconomicboard.com/app/uploads/2020/03/BOARD_Highlight2019-Vooruitblik2020.pdf

Amsterdam Economic Board (2020) How the new ASC platform contributes to better streets, neighbourhoods and cities. *Amsterdam Economic Board*. Available at: https://amsterdameconomicboard.com/en/nieuws/how-the-new-asc-platform-contributes-to-better-streets-neighbourhoods-and-cities (accessed 12 July 2021).

Arcadis (2021) Why Smart Cities Are about People Not Technology. Available at: https://www.arcadis.com/en/knowledge-hub/blog/global/jamye-harrison/2020/why-smart-cities-are-about-people-not-technology (accessed 12 July 2021).

Arnkil R, Järvensivu A, Koski P and Piirainen T (2010) *Exploring quadruple helix: outlining user-oriented innovation models*. Quadruple Helix Research for the CLIQ project 85/2010, Final Report. Tampere: Työelämän tutkimuskeskus, Tampereen yliopisto.

Baccarne B, Mechant P and Schuurman D (2014) Empowered cities? An analysis of the structure and generated value of the smart city Ghent. In: Dameri RP and Rosenthal-Sabroux C (eds) *Smart City: How to Create Public and Economic Value with High Technology in Urban Space* (Progress in IS). Cham: Springer, pp. 157–182.

Barns S (2016) Mine your data: open data, digital strategies and entrepreneurial governance by code. *Urban Geography* 37(4): 554–571.

Brandtner C, Höllerer MA, Meyer RE and Kornberger M (2017) Enacting governance through strategy: a comparative study of governance configurations in Sydney and Vienna. *Urban Studies* 54(5): 1075–1091.

Bunders DJ and Varró K (2019) Problematizing data-driven urban practices: insights from five Dutch "smart cities." *Cities* 93(1): 145–152.

Carayannis EG and Campbell DFJ (2009) "Mode 3" and 'Quadruple Helix': toward a 21st century fractal innovation ecosystem. *International Journal of Technology Management* 46(3–4): 201.

Carayannis EG and Rakhmatullin R (2014) The quadruple/quintuple innovation helixes and smart specialisation strategies for sustainable and inclusive growth in Europe and beyond. *Journal of the Knowledge Economy* 5(2): 212–239.

Cardullo P and Kitchin R (2019) Being a "citizen" in the smart city: up and down the scaffold of smart citizen participation in Dublin, Ireland. *GeoJournal* 84(1): 1–13.

Castelnovo W, Misuraca G and Savoldelli A (2016) Smart cities governance: the need for a holistic approach to assessing urban participatory policy making. *Social Science Computer Review* 34(6): 724–739.

Clark J (2020) *Uneven Innovation*. Columbia University Press. Available at: https://www.degruyter.com/document/doi/10.7312/clar18496/html (accessed 9 March 2021).

Claudel M (2018) From organizations to organizational fields: the evolution of civic innovation ecosystems. *Technology Innovation Management Review* 8(6): 34–47.

Coletta C, Heaphy L and Kitchin R (2019) From the accidental to articulated smart city: the creation and work

of "Smart Dublin." *European Urban and Regional Studies* 26(4): 349–364.

Cowley R, Joss S and Dayot Y (2018) The smart city and its publics: insights from across six UK cities. *Urban Research & Practice* 11(1): 53–77.

Crowley M, Nutter M, Wheeler C, chuetz N, Lamberg R and Bent E (2016) *Smart Cities for Sustainability A Sector-by-Sector Tech Review* (USDN Resource Guide). Washington, DC: Urban Sustainability Directors Network Innovation Fund.

Dalton CM (2019) Rhizomatic data assemblages: mapping new possibilities for urban housing data. *Urban Geography* 41(8): 1090–1108.

de Falco S, Angelidou M and Addie J-PD (2019) From the "smart city" to the "smart metropolis"? Building resilience in the urban periphery. *European Urban and Regional Studies* 26(2): 205–223.

DiMaggio PJ and Powell WW (1983) The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. *American Sociological Review* 48(2): 147–160.

Eurofiber (n.d.) *Smart cities: Make IT and Work Lifeline*. Maarssen: Eurofiber.

Farías I and Widmer S (2018) Ordinary smart cities. How calculated users, professional citizens, technology companies and city administrations engage in a more-than-digital politics. *TECNOSCIENZA: Italian Journal of Science & Technology Studies* 8(2): 43–60.

Flyvbjerg B (2006) Five misunderstandings about case-study research. *Qualitative Inquiry* 12(2): 219–245.

Gemeente Amsterdam, Circle Economy and Copper8 (2018) Amsterdam circulair: evaluatie en handelingsperspectieven. Available at: https://openresearch.amsterdam/nl/page/35514/amsterdam-circulair-evaluatie

Gerring J (2006) *Case Study Research: Principles and Practices*. Cambridge: Cambridge University Press.

Grabher G and Ibert O (2011) Project ecologies: a contextual view on temporary organizations. In: Morris PWG, Pinto JK and Söderlund J (eds) *The Oxford Handbook of Project Management*. Oxford: Oxford University Press, pp. 175–200.

Grabher G and Ibert O (2018) Schumpeterian customers? How active users co-create innovations. In: Clark GL, Feldman MP, Gertler MS and Wójcik D (eds) *The New Oxford Handbook of Economic Geography*. Oxford: Oxford University Press, pp. 286–304.

Hollands RG (2008) Will the real smart city please stand up? Intelligent, progressive or entrepreneurial? *City* 12(3): 303–320.

Hollway J, Lomi A, Pallotti F and Stadtfeld C (2017) Multilevel social spaces: the network dynamics of organizational fields. *Network Science* 5(2): 187–212.

Kenis P and Knoke D (2002) How organizational field networks shape interorganizational tie-formation rates. *Academy of Management Review* 27(2): 275–293.

Leydesdorff L and Deakin M (2011) The Triple-Helix model of smart cities: a neo-evolutionary perspective. *Journal of Urban Technology* 18(2): 53–63.

Leydesdorff L and Etzkowitz H (2003) Can "the public" be considered as a fourth helix in university-industry-government relations? Report on the Fourth Triple Helix Conference, 2002. *Science and Public Policy* 30(1): 55–61.

Mancebo F (2020) Smart city strategies: time to involve people. Comparing Amsterdam, Barcelona and Paris. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability* 13(2): 133–152.

Mello Rose F (2021) Activity types, thematic domains, and stakeholder constellations: explaining civil society involvement in Amsterdam's smart city. *European Planning Studies*. Epub ahead of print 23 October.

Mora L and Bolici R (2017) How to become a smart city: learning from Amsterdam. In: Bisello A, Vettorato D, Stephens R and Elisei P (eds) *Smart and Sustainable Planning for Cities and Regions: Results of SSPCR 2015*. Cham: Springer International Publishing, pp. 251–266.

Mora L, Deakin M and Reid A (2019a) Strategic principles for smart city development: a multiple case study analysis of European best practices. *Technological Forecasting and Social Change* 142(1): 70–97.

Mora L, Deakin M, Reid A and Angelidou M (2019b) How to overcome the dichotomous nature of smart city research: proposed methodology and results of a pilot study. *Journal of Urban Technology* 26(2): 89–128.

Mulder I (2015) Opening up: towards a sociable smart city. In: Foth M, Brynskov M and Ojala T (eds) *Citizen's Right to the Digital City: Urban Interfaces, Activism, and Placemaking*. Singapore: Springer, pp. 161–173.

Nesti G (2020) Defining and assessing the transformational nature of smart city governance: insights from four European cases. *International Review of Administrative Sciences* 86(1): 20–37.

Noori N, Hoppe T and de Jong M (2020) Classifying pathways for smart city development: comparing design, governance and implementation in Amsterdam, Barcelona, Dubai, and Abu Dhabi. *Sustainability* 12(10): 4030.

Powell WW and DiMaggio PJ (2012) *The New Institutionalism in Organizational Analysis*. Chicago, IL: University of Chicago Press.

Putra ZDW and van der Knaap WG (2018) Urban innovation system and the role of an open web-based platform: the case of Amsterdam smart city. *Journal of Regional and City Planning* 29(3): 234–249.

Raven R, Sengers F, Spaeth P, Xie L, Cheshmehzangi A and de Jong M (2019) Urban experimentation and institutional arrangements. *European Planning Studies* 27(2): 258–281.

Sancino A and Hudson L (2020) Leadership in, of, and for smart cities—case studies from Europe, America, and Australia. *Public Management Review* 22(5): 701–725.

Saunders T and Baeck P (2015) *Rethinking Smart Cities from the Ground Up*. London: Nesta.

Scott WR (2013) *Institutions and Organizations: Ideas, Interests, and Identities*. Revised 4th ed. Los Angeles, CA: SAGE.

Sengers F, Späth P and Raven R (2018) Smart city construction: towards an analytical framework for smart urban living labs. In: Marvin S, Bulkeley H, Mai Q, McCormick K and Voytenko Y (eds) *Urban Living Labs*. London: Routledge, pp. 74–88.

Shelton T and Lodato T (2019) Actually existing smart citizens. *City* 23(1): 35–52.

Shelton T, Zook M and Wiig A (2015) The "actually existing smart city." *Cambridge Journal of Regions, Economy and Society* 8(1): 13–25.

Snow CC, Håkonsson DD and Obel B (2016) A smart city is a collaborative community: lessons from smart Aarhus. *California Management Review* 59(1): 92–108.

Spillman L (2014) Mixed methods and the logic of qualitative inference. *Qualitative Sociology* 37(2): 189–205.

Townsend AM (2013) *Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia*. New York: W.W. Norton.

Trencher G (2019) Towards the smart city 2.0: empirical evidence of using smartness as a tool for tackling social challenges. *Technological Forecasting and Social Change* 142(1): 117–128.

Valdez A-M, Cook M and Potter S (2018) Roadmaps to Utopia: tales of the smart city. *Urban Studies* 55(15): 3385–3403.

Vallance P, Tewdwr-Jones M and Kempton L (2020) Building collaborative platforms for urban innovation: Newcastle City Futures as a quadruple helix intermediary. *European Urban and Regional Studies* 27(4): 325–341.

van Waart P, Mulder I and de Bont C (2016) A participatory approach for envisioning a smart city. *Social Science Computer Review* 34(6): 708–723.

van Winden W and van den Buuse D (2017) Smart city pilot projects: exploring the dimensions and conditions of scaling up. *Journal of Urban Technology* 24(4): 51–72.

van Winden W, Oskam I, van den Buuse D and van Dijck EJ (2016) *Organising Smart City Projects: Lessons from Amsterdam*. Amsterdam: Hogeschool van Amsterdam.

Vanolo A (2016) Is there anybody out there? The place and role of citizens in tomorrow's smart cities. *Futures* 82(1): 26–36.

Viitanen J and Kingston R (2014) Smart cities and green growth: outsourcing democratic and environmental resilience to the global technology sector. *Environment and Planning A: Economy and Space* 46(4): 803–819.

Wiig A (2016) The empty rhetoric of the smart city: from digital inclusion to economic promotion in Philadelphia. *Urban Geography* 37(4): 535–553.

Zandbergen D (2020) The unfinished lampposts: the (anti-)politics of the Amsterdam smart lighting project. *City & Society* 32(1): 135–156.

Zandbergen D and Uitermark J (2020) In search of the Smart Citizen: republican and cybernetic citizenship in the smart city. *Urban Studies* 57(8): 1733–1748.

Zygiaris S (2013) Smart city reference model: assisting planners to conceptualize the building of smart city innovation ecosystems. *Journal of the Knowledge Economy* 4(2): 217–231.

This is an Accepted Manuscript of an article published online by Taylor & Francis in *Journal "European Planning Studies"* on *15 Apr 2021*, available online: https://www.tandfonline.com/doi/abs/10.1080/09654313.2021.1914556

Activity types, *thematic domains,* and *stakeholder constellations*: Explaining civil society involvement in Amsterdam's smart city

Filipe Mello Rose*

Urban and Regional Economics, HafenCity University Hamburg, Germany

* Corresponding author

Überseeallee 16, 20457 Hamburg, Germany,

filipe.mellorose@hcu-hamburg.de

Abstract

Smart city development increasingly involves civil society stakeholders (CSS) because they constitute legitimate stakeholders concerning digitalized urban public goods. As users, however, CSS are involved because they improve smart city activities by providing tacit day-to-day knowledge. Distinguishing between socially and economically orientated CSS allows us to compare the involvement of legitimate stakeholders to user involvement and to unravel the factors influencing the involvement of CSS in smart city activities. For this, we build a framework that not only discerns between socially- and economically-orientated CSS but also distinguishes between three types of socio-technical factors that either limit or increase civil society involvement in smart city activities: (1) the activity's type (2) the activity's thematic domain, and (3) stakeholder constellations linked to the activity. Using chi-square-tests and logistic regressions we inquire into how the socio-technical factors defined in our framework influence the involvement of social and economic CSS in Amsterdam's smart city activities. Our results show that the dominant thematic domains and the most common stakeholder constellations that characterize in Amsterdam's smart city activities limit the involvement of social CSS. CSS involvement in smart city activities thus mainly entails the involvement of economically-orientated CSS.

Keywords

Social civil society; economic civil society; smart city; socio-technical systems; Amsterdam

Introduction

Over the past decade, the involvement of citizens or stakeholders from the civil society has become a discursive and practical imperative for smart city development (Cowley, Joss, & Dayot, 2018; Dalton, 2019; Farías & Widmer, 2018; Mancebo, 2020). Civil society involvement in smart city development is framed as necessary, or at least beneficial, in two ways. On one side, civil society stakeholders (CSS) constitute legitimate stakeholders concerning the future operation and control of digitalized urban public goods (Breuer, Walravens, & Ballon, 2014, p. 161; de Lange & de Waal, 2013; Hollands, 2008; Morozov & Bria, 2018; Smigiel, 2019; Zandbergen & Uitermark, 2020). On the other side, CSS are involved as future users and consumers of urban digital affordances (e.g. Bogers et al., 2017, p. 21). Numerous studies, that have inquired into the role of citizens and CSS in specific smart city projects, have outlined the varying roles that they are expected to fulfill (e.g. Cowley et al., 2018; Farías & Widmer, 2018; Wiig, 2016; Zandbergen & Uitermark, 2020). According to Cowley et al. (2018, p. 72, also Wiig, 2016), CSS are often involved as service-users and potential entrepreneurs, while they are more rarely involved as civic or political "publics". Within smart city ecologies, socially-orientated CSS typically remain in a subaltern position (Datta, 2015; Vanolo, 2016), while economically-orientated types of CSS are frequently involved in smart city activities (e.g. Cardullo & Kitchin, 2019; Cowley et al., 2018). While the role of CSS in smart city development has been the object of smart city research, to date there are only a few systematic analyses of the degree of civil society involvement in the totality of a city's smart city efforts. Moreover, those that have conducted systematic analyses of CSS involvement in smart city activities (e.g. Mora, Deakin, & Reid, 2019) did not differentiate between the different roles of citizens hold in smart city projects (i.e. users, voters, taxpayers, clients), and left factors limiting or increasing their involvement unanalyzed.

As a primary objective, this paper seeks to use a systematic approach to understand and explain the involvement of different types of CSS in smart city development. This way, this paper seeks to fill the research gap left by the absence of systematic ecology-wide activity-level research on CSS involvement in smart city development. This objective is pursued by distinguishing between two types of CSS in a systematic analysis of a smart city ecology: the socially-orientated CSS, which are involved as legitimate urban stakeholders (i.e. as citizen, voter, taxpayer), and economically-orientated CSS, which are involved as co-creating users, entrepreneurs and consumers. As a secondary objective, this study aims to highlight that civil society participation in smart city activities is not a political choice taken by dominant stakeholders at once, but is rather linked to limiting and increasing factors, which require greater scientific attention.

In the pursuit of the two objectives, we rely on a distinction between social and economic CSS. We are aware that such a dichotomous categorization of CSS undoubtedly represents a strong simplification of reality. However, only such a simplification allows us to systematically

understand the patterns of civil society involvement. Furthermore, we operationalize both objectives by drawing on socio-technical studies (STS), because, as Karvonen (2020, p. 2) puts it, "the combination of STS and urban studies allows for the interpretation of cities as messy sociotechnical achievements that are simultaneously discursive, material, […] and infused with power dynamics" between a variety of stakeholders. We define smart city activities as socio-technically embedded practices in which multiple stakeholders collaboratively use technological devices to manage, "more efficiently, city resources and addressing development and inclusion challenges" (Rodríguez Bolívar, 2015, p. 1). Geels' (2004, p. 903) three interrelated analytical dimensions of socio-technical systems—artifacts and practices, institutional frames, and involved stakeholders —allow us to disentangle factors that compose the socio-technical embedding of smart city activities. Drawing on STS allows us to grasp the "complex interactions between technology and social structure" (Meijer & Rodríguez Bolívar, 2016, p. 404), which is needed for a systematic ecology-wide activity-level approach. In this paper, we adapt Geels' socio-technical framework (2004) to conceptualize smart city activities as (1) embedded into the development of artifacts and practices, which are grouped as *activity types*, (2) addressing institutionally framed societal challenges, which are grouped as *thematic domains*, and (3) implemented in specific *stakeholder constellations*.[1] To conduct a systematic analysis, we operationalize these three factors embedding smart city activities into variables based on a review of the literature on smart city development. We condense our research goals into the following research questions:

Q_1: To what extent do socio-technical factors embedding smart city activities limit or increase the involvement of civil society stakeholders in Amsterdam's smart city?

Q_2: What outcome do these limiting and increasing factors have on the patterns of civil society involvement in Amsterdam's smart city development?

This article feeds into the literature on collaborative stakeholder constellations in smart cities (e.g. Raven et al., 2019), where it offers a more comprehensive explanation of constellations reaching beyond stylized conceptions such as "triple-helix" (Leydesdorff & Deakin, 2011) or "quadruple-helix" convergences of stakeholders (Arnkil, Järvensivu, Koski, & Piirainen, 2010; Carayannis & Rakhmatullin, 2014; Mora, Deakin, Reid, & Angelidou, 2019). More precisely, this article contributes to debates on whether "quadruple helix" smart cities—meaning a smart city innovation system that involves governments, corporations, universities, and CSS—lead to a democratization of innovation processes (Baccarne, Mechant, & Schuurman, 2014, p. 176; Capdevila & Zarlenga, 2015, p. 278; Castelnovo, Misuraca, & Savoldelli, 2016, p. 735). In this

[1] Dameri (2017) proposes a similar approach that disentangles technological, institutional, and human factors that shape smart city development. However, particularly the "technological factors" do not fit our understanding of *artifacts and practices* which go beyond the description of technological tools and rather look into the overall type of output an activity aims to produce.

debate, however, we side with those that argue that "quadruple helix" smart cities development mainly strengthens existing hierarchies and "depoliticizes civil society engagement" (Crivello, 2015, p. 919; March & Ribera-Fumaz, 2016, p. 826). In a broader sense, this paper thus also feeds into urban governance debates about the effects of (digital) civil society involvement on political equality (e.g. Hastings & Matthews, 2015; Sylvester & McGlynn, 2010).

Empirically, we investigate Amsterdam's smart city ecology, which we define as the totality of smart city activities in Amsterdam's metropolitan region and the therein involved stakeholders. Amsterdam's smart city ecology represents an emblematic case (Flyvbjerg, 2006, p. 231; also Gerring, 2006, p. 115) of participatory smart city development due to its strong focus on inclusion (de Falco, Angelidou, & Addie, 2019; Mancebo, 2020; Mora & Bolici, 2017; Zygiaris, 2013). The ecology is structured around an online platform, which is maintained and moderated by the Amsterdam Smart City-Foundation (henceforth ASC), a public-private foundation (Raven et al., 2019).

Amsterdam's smart city ecology has already been the subject of studies assessing its focus on forming bottom-up collaboration networks for sustainability (Angelidou, 2016; Zygiaris, 2013) and participative production of technology (Bunders & Varró, 2019; Zandbergen & Uitermark, 2020). Already in 2013, de Lange & de Waal (2013) presented various smart city activities in Amsterdam's ecology and argued that citizens and CSS use technology and data to directly act on collective issues. However, based on an analysis of 12 smart city activities, van Winden et al (2016, p. 104) argue that despite ASC's "emphasis on the involvement of citizens, communities, or end-users", "citizens were never really central and seldom an official part of the project partnership" (ibid. p.99). Mancebo (2020, p. 8) adds to this, that while some initiatives emerge in a bottom-up manner, citizens generally remain in the position of "bystanders". Furthermore, Zandbergen (2020, p. 154) argues that despite the rhetoric of CSS participation and citizen involvement in smart city activities "real local involvement was thus implicitly and subtly discouraged". We complement these analyses of individual smart city activities, which appear to conflict with analyses of Amsterdam's smart city ecology (e.g. Mora, Deakin, & Reid, 2019), by discussing the patterns of CSS involvement in Amsterdam using a quantitative approach.

For this quantitative approach, we use data collected from the ASC online platform (ASC-platform), which is complemented with additional openly available information on smart city activities and the therein involved stakeholders. The ASC-platform was established to provide a wider framework connecting and loosely structuring all activities operating under the Amsterdam Smart City umbrella (Raven et al., 2019). It was created in 2016 "to facilitate the rapid growing number of interested people to collaborate within ASC" (Putra & van der Knaap, 2018, p. 242). We scrutinized each of the listed activities on whether they are part of Amsterdam's smart city ecology. For this, we coded the variables set out in the theoretical framework manually for each activity by drawing on digital documents on the ASC-platform,

the activity's websites, the stakeholders' websites, and stakeholders' self-classification on digital media sites. The precise proceedings of the preparation of the dataset containing all activities of the Amsterdam smart city are further detailed in the research design section of this paper. For our analysis, we use contingency tables, chi-square tests, and logistic regressions to analyze the relationship between the involvement of each of the two types of CSS in smart city activities and the socio-technical factors embedding the activity.

This article is structured as follows. First, in the next section, we define the theoretical framework and operationalize the different types of CSS and the aforementioned three socio-technical dimensions of interest: the activity's type, the thematic domain in which the activity is situated, and the stakeholder constellations involved in the activity. Then, we describe the research design. Next, a findings section follows. Last, this paper discusses the findings before concluding by outlining this study's limitations and providing suggestions for further research.

Theoretical framework

Our theoretical framework is composed of two main parts. First, it distinguishes between two types of dependent variables: social civil society involvement and economic civil society involvement. Second, it discerns three types of independent variables that theoretically influence civil society involvement: (1) activity types, (2) thematic domains of activities, and (3) stakeholder constellations.

Dependent variables: Defining civil society

This conceptualization of civil society draws on accounts of civil society involvement in smart city development, as well as, on debates on how to define civil society in general. The latter is based on two conflicting conceptualizations of CSS. While one common classification defines *civil society* by distinguishing it from government and market organizations, as a diverse "third sector" composed of stakeholders that hold legitimate claims (Healey, 2015; United Nations, n.d.), other definitions focus on the efforts to locally improve social and political inclusion (e.g. Gerometta, Haussermann, & Longo, 2005). If civil society involvement is to improve the smart city development, as researchers have claimed it to be (Breuer et al., 2014, p. 161; de Lange & de Waal, 2013; Hollands, 2008; Morozov & Bria, 2018; Smigiel, 2019; Zandbergen & Uitermark, 2020), then the precise make-up of this civil society in smart city development requires further analysis. Yet in the literature investigating smart city development, such distinctions are rare. Mora et al. (2018) broadly classify all nongovernmental organizations that are neither profit-oriented nor universities as belonging to the "fourth helix" in their quadruple-helix model. Carayannis & Campbell (2009, p. 206) operationalize the "fourth helix" as a "media-based and culture-based public", involving 'creative industries', 'culture', 'values', and 'art'", thereby focusing on elements that contribute to "innovation culture". These variegated conceptualizations of civil society—in general, and in the context of smart cities—create a necessity for a more differentiated conceptualization. Our conceptual framework is

based on Cowley et al.'s (2018) four "modalities of publicness" that are relevant in smart city activities.

First, *political publicness* involves citizens in political processes of deliberation and policy-making. Involvement with the political publicness will typically be driven by or directed towards governments or state institutions. Second, *civic publicness* is less structured than political publicness. It includes "activities taking place in spaces beyond state institutions, but which are not orientated towards market activity" (Cowley et al., 2018, p. 66). Third, *service-user publicness* describes the relationship between service providers and a wider community of users. Fourth, the authors use the term *entrepreneurial publicness* to refer to the "expectation that residents will be involved in creating services and economic values" in smart city development (Cowley et al., 2018, p. 64). The first two types of publicness focus on social and political activities, while the two latter types are orientated towards economic activities. We condense this elaborated conceptualization of the different existing forms of publicness into two facets of civil society. This means that our theoretical framework distinguishes between the social civil society; which is mainly comprised of Cowley et al.'s (2018) two former types of publicness—civic and political publicness—and economic civil society that is structured around the two latter types—entrepreneurial and user-publicness.

We use the notion of *social* civil society to describe civic and political engagement through which stakeholders pursue "societal, political, and cultural goals outside of the main institutional frameworks" (Pesch, Spekkink, & Quist, 2019, p. 305). We consider social CSS above all as a counterforce to a vendor-driven in smart city development (Barns, 2016) by creating the necessity to evaluate technology in terms of the generated public value (Castelnovo et al., 2016, p. 735). Social civil society refers to (1) organizations engaged in political activities, advocacy, and sharing characteristics of social movements (Pesch et al., 2019, p. 306), (2) non-profit organizations dedicated to community building and service-provision that "fulfill society needs" left unattended by a declining welfare state (Pesch et al., 2019, p. 307), (3) non-governmental organizations distributing funding to the two aforementioned types of organizations, (4) organizations acting as intermediaries to involve citizens (e.g. schools, museums) and (5) directly involved groups of citizens that are engaged in political and civic activities (e.g. as citizen, voter, taxpayer).

Economic CSS are stakeholders that fit a broader, "third sector" definition of civil society, but not the narrower definition of social civil society. This type of stakeholder actively engages in economic activities such as "running a significant business as a social enterprise, […], invests in community sustainable energy provision, regenerates a neighborhood or village center, or expands work and training opportunities." (Healey, 2015, p. 12). In our framework, economic civil society refers to (1) cooperatives in which consumers or users own the majority of shares, (2) economic sector and area representatives that advance their members' interests and are somewhat independent of organizations they represent (3) social enterprises that pursue a non-

market and non-profit related goals in addition to their market activity and (4) individuals that are acting as economic agents (e.g. as home-owners).

Independent variables: smart city development involves three socio-technical dimensions

To establish the factors that compose the socio-technical embedding of smart city activities, we draw on Geels' (2004, p. 903) three interrelated analytical dimensions that characterize socio-technical systems (illustration 1): (1) socio-technical artifacts and practices, (2) institutional frames, and (3) involved stakeholders. Our framework operationalizes Geels' dimensions into factors—each composed of independent variables—that allow us to investigate the limiting and increasing factors linked to each type of CSS involvement in smart city development. The first set of variables describes different *activity types* that entail specific socio-technical artifacts and practices which are created and applied to urban spaces. The second set of variables describes the *thematic domains* of smart city activities which are governed by theme-specific institutional frames. The third set of variables describes the *stakeholder constellations*—each "embedded in social groups which share certain characteristics" (Geels, 2004, p. 900)—that are involved in smart city activities.

Activity types

Smart city development entails a variety of different activities. Our framework classifies these activities of smart city development by adapting Mora et al.'s (2018) classification to the Amsterdam context. The activity type **"***infrastructure and community building***"** refers to smart city activities that seek to support subsequent innovation by creating the necessary "open and collaborative" environment for innovation (Mora, Deakin, Reid, et al., 2019) and by providing the physical requirements for digital innovation. This includes activities aimed to support the creation of new technology through capacity-building of citizens through programming and coding training programs (e.g. Baccarne et al., 2014; Shelton, Zook, & Wiig, 2015) as well as

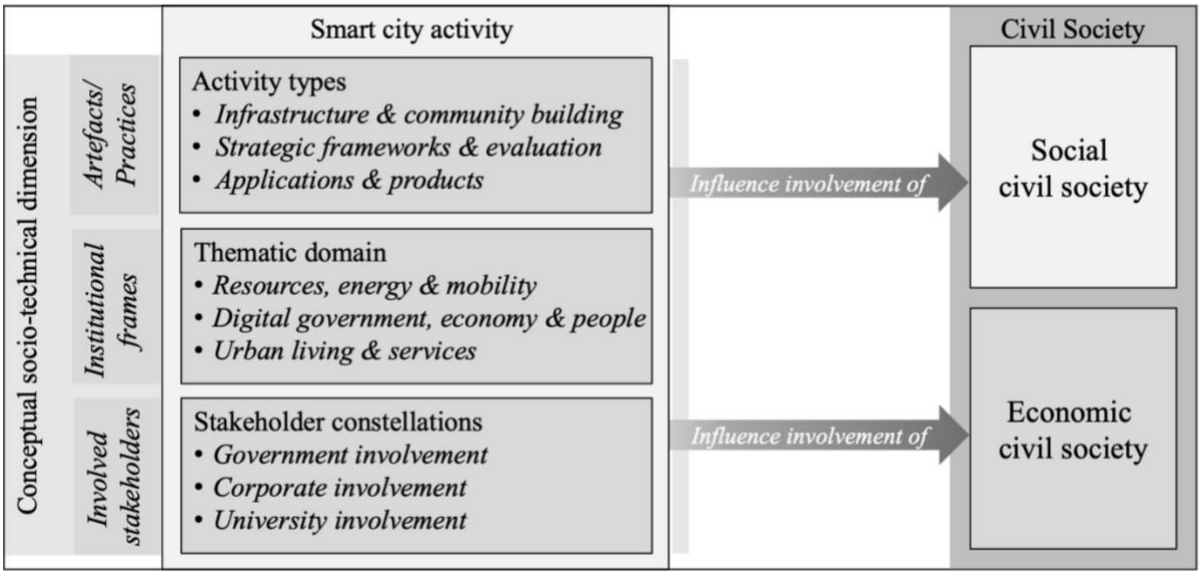

Figure 1. Visualization of the theoretical framework – Author's creation.

open data portals that seek to enable innovation through the provision of data (Calzada, 2018; Capdevila & Zarlenga, 2015; Castelnovo et al., 2016; Cowley et al., 2018). Activities of this type might also aim to provide widespread and free internet access (Albino, Berardi, & Dangelico, 2015) or create living labs and test zones enabling co-creation between corporations and citizens (Cugurullo, 2018). Next, the activity type "*strategic frameworks and evaluation*" refers to processes of structuring smart city development through strategic documents (Brandtner, Höllerer, Meyer, & Kornberger, 2017; Kornberger, Meyer, Brandtner, & Höllerer, 2017; Smigiel, 2019, p. 345), central organizing and planning organizations (Raven et al., 2019), as well as, the evaluation of the outcome of a given smart city strategy and the assessment possible avenues for improvement (Mora, Deakin, Reid, et al., 2019, p. 10). This activity type thus assembles all strategic planning and evaluation activities. Finally, the activity type "*applications and products*" refers to any sort of tangible output, including use cases, pilots, and prototypes that are created by using the physical, social and economic infrastructure of a locality (see type **"**infrastructure and community building**"**) and are situated within the smart city's strategic framework (see type "strategic frameworks and evaluation"). The bandwidth of applications and products ranges from technologically-sophisticated combinations of proprietary software and hardware (e.g. "city brain" in Songdo (Albino et al., 2015) IBM's operations center (Goodspeed, 2014)) to self-made open-source-based sensors (e.g. Balestrini et al., 2017)).

Thematic domains

As Geels (2004, p.902) points out, "actors are not entirely free to act as they want. Their perceptions and activities are coordinated (but not determined) by institutions". Smart city development cuts across a variety of institutional contexts. These institutional contexts include more than governmental administrative organizations and include practices, cultures, and identities that are mobilized through frames of reference (Healey, 2007). Stakeholders conduct activities within pre-determined institutional frames (Geels, 2004), within which norms and rules shape the way stakeholders create and use technology. Numerous taxonomies exist that classify the diverse institutional frames in which smart city development takes place as a range of themes (e.g. Giffinger, Fertner, Kramar, & Meijers, 2007; Meier & Portmann, 2016; Neirotti, De Marco, Cagliano, Mangano, & Scorrano, 2014). This article draws on the taxonomy of smart city themes by Neirotti et al. (2014) and adapts the categories to Amsterdam's smart city activities. We grouped the themes outlined in the taxonomies into three thematic domains:

In the first thematic domain "resources, energy, and mobility", activities aim to use technology to reduce the ecological footprint of Amsterdam with new systems of renewable energy production and by improving the efficiency of present energy, transportation, waste, and mobility systems. This thematic domain typically relies heavily on ICT systems as key enabling technologies (Neirotti et al., 2014, p. 9). In this paper, this thematic domain is constituted by the following sub-domains: Green/renewable energies, public lighting, smart grids, waste

management, water management, city logistics, general transportation technology, people mobility.

The second thematic domain we identify from the literature is "digital government, economy and people". Activities in this thematic domain focus on strengthening and mobilizing "the knowledge, creativity and intellectual capital of the populace" (Angelidou, 2014, p. 5). This thematic domain also includes activities that aim to improve a city's capacity for innovation by introducing information technology to government services and democratic processes. This domain consists of the following sub-domains: digital education; innovation and entrepreneurship; social inclusion; human resources management; innovation testbeds, data security; e-democracy; e-government; procurement, and public safety.

Third, the thematic domain "urban living and services" represents activities that directly integrate information technology to a variety of fields of application but that also aim to improve the environment for innovation. While the first thematic domain broadly represents what Neirotti et al. (2014), Angelidou (2014), and Mancebo (2020) refer to as "hard domains", and the second thematic domain represents what the same authors call "soft domains". The domain "Urban living and services" is a hybrid form of both. This thematic domain is composed of the following sub-domains: building services and housing quality; healthcare; pollution control and public spaces management.

Stakeholder constellations

As socio-technical innovations, smart city activities are implemented by actors that are embedded into social structures (Carvalho, 2014; Shelton et al., 2015). Researchers on smart city development understand these social structures as a constellation of public, semi-public, and private service providers whose interactions are orchestrated by a common regulatory framework (Walser & Haller, 2016, p. 22). In other words, smart city development takes place in collaborative activities involving diverse sets of stakeholders. Frequently technology corporations have been portrayed as the only actors (Goodspeed, 2014; e.g. Townsend, 2013; Vanolo, 2014) within a smart city project ecology that are capable of delivering the promises of the smart city concept (Frenchman, Joroff, & Albericci, 2011; Söderström, Paasche, & Klauser, 2014). Critics of smart city development point to the public-private make-up of smart city (Hollands, 2015; Söderström et al., 2014; Townsend, 2013) while other scholars point to the importance of discussing the role of universities and civil society organizations in smart city development (Arnkil et al., 2010; Calzada, 2018; Leydesdorff & Deakin, 2011; Mora, Deakin, Reid, et al., 2019; van Winden & van den Buuse, 2017). A "triple helix" smart city is a joint "product of the policies, academic leadership, and corporate strategies" (Leydesdorff & Deakin, 2011, p. 59). In "quadruple helix" smart cities, however, citizens can be co-creators of innovation (Baccarne et al., 2014, p. 162) and CSS involvement is the "fourth pillar of the Quadruple Helix blueprint [that] represents bottom-up actions" (Carayannis & Rakhmatullin, 2014, p. 220). Based on the literature discussing the stakeholder that drive smart city

development, certain constellations are more likely to involve CSS than others as specific stakeholder types co-create with specific types of publicness (Cowley et al., 2018). Yet, little research has been conducted on the precise nature of the relationship between the "helices" within such "quadruple helix" smart city development. To explain how stakeholder constellations are part of the socio-technical embedding that affects the involvement of social and economic CSS, this paper analyses the effect that the involvement of *government* organizations, *corporations,* and *universities* have on the likelihood of social or economic CSS engaging in the same activity.

Research design

The quantitative analysis relies on a database that is mainly derived from the "project" activities listed on the ASC-platform[2]. The online platform connects potential stakeholders in smart city development and acts as a site for information exchange, through which the platform "becomes a digital marketer for any posted smart city project." (Putra & van der Knaap, 2018, p. 246). Representatives of smart city activities upload information about the activity's goals, their status of implementation, the involved stakeholders as well as referring to external links with more substantial material. ASC works to ensure the quality of the data through questionnaires, regular updates, and by delimiting the range of activities that can be part of Amsterdam's smart city ecology (Raven et al., 2019)[3].

In building the database, we found that whilst all relevant activities in Amsterdam that we defined as smart city projects were part of the database—either added by the ASC employees or the activity's participants—not all projects in the database fulfilled our definition of being part of Amsterdam's smart city ecology, nor contributed to our research question. To focus only on the projects that contribute to our research question and that fit our definition of smart city activities, we filtered the list of smart city activities in three steps. All steps were based on a document analysis of the ASC-platform's "project page" of the activity, the activity's websites (when available), and other documents listed on the ASC-Platform. First, to maintain this study's focus on Amsterdam's smart city ecology, we removed 14 activities that were not related to Amsterdam Metropolitan Area.

In a second step, we removed 54 activities that only involved one stakeholder, because we define smart city activities as practices in which multiple stakeholders collaborate. In a third step, all remaining activities were subject to scrutiny concerning our definition of smart city development. We kept entries if the activities are linked to the use, dissemination, or creation of digital services and infrastructures; address urban development and inclusion challenges with digital tools; or increase the efficiency of a city's resource use with digital technology.

[2] amsterdamsmartcity.com (accessed on October 12th 2020).
[3] Also based on interview data with members of the ASC.

Table 1: List of variables

Variable	Description	Mean
Dependent variables		
D_Soc	Dummy variable describing social CSS involvement in the activity [0=No involvement;1=Involvement]	0.303
D_Econ	Dummy variable describing economic CSS involvement in the activity [0=No involvement;1=Involvement]	0.370
Independent variables describing the activity's type		
Activity_type	Categorical variable describing the type of activity 1="Infrastructure provision and community building"; 2="Strategy and evaluation"; 3="Applications and products"]	
D_Infra_Com	Dummy variable of Activity_type=1 (Type is "Infrastructure provision and community building")	0.218
D_Strat_Eval	Dummy variable of Activity_type=2 (Type is "Strategy and evaluation")	0.218
D_Product_Apps	Dummy variable of Activity_type=3 (Type is "Applications and products")	0.564
Independent variables describing the activity's domain		
Activity_domain	Categorical variable describing the activity's domain: [1="Resources; energy & mobility"; 2="Digital government; economy & people"; 3="Urban living & services"]	
D_ResEner	Dummy variable of Activity_domain=1 (Domain is "Resources; energy & mobility")	0.594
D_DigGov	Dummy variable of Activity_domain=2 (Domain is "Digital government; economy & people")	0.279
D_LivServ	Dummy variable of Activity_domain=3 (Domain is "Urban living & services")	0.127
Independent variables describing the presence of other types of stakeholders in the activity		
D_Gov	Dummy variable describing governmental involvement in the activity [0=No involvement;1=Involvement]	0.709
D_Corp	Dummy variable describing corporate involvement in the activity [0=No involvement;1=Involvement]	0.727
D_Uni	Dummy variable describing university involvement in the activity [0=No involvement;1=Involvement]	0.491
Control variable		
Stakeholder_Count	Continuous variable number of involved stakeholders (Min=2; Max=50)	7.079

31 entries in the database did not meet these criteria. The filtering reduced the number of Amsterdam's smart city activities in the database from 264 to 165.[4]

We used the analysis of the documents mentioned above to code the variables on activity types and thematic domains. The variables regarding the stakeholder's constellation of each activity were coded in a separate process in which 977 stakeholders were grouped into one subtype, which was then grouped into one stakeholder type, as set out in the theoretical framework. This

[4] Mora et al. (2018) use a similar approach in a comparative case study of four smart city initiatives and suggest that Amsterdam has 97 smart city projects. Recently added activities, as well as, the treatment of projects of large project consortia as individual activities, to increase inter-activity comparability, explain the difference between Mora et al's 97 and our 165 smart city activities.

coding process of the stakeholders relied on stakeholder's self-descriptions on platforms and databases such a Bloomberg, LinkedIn, or Dimble.nl.[5] Table 1 lists the variables that were coded manually through online document analysis.

We conducted our analysis in the following methodological steps. We cross-tabulated the variables composing each socio-technical factor with the involvement of each type of CSS and conducted chi-square tests. After assessing the individual relationship between each factor, we calculated logistic regressions in which we integrate all independent variables into one model for each CSS type. Next, we controlled for the total number of stakeholders involved in activities to account for the fact that certain activity types and certain thematic domains typically involve more stakeholders than other activity types and thematic domains.

Findings

In Amsterdam, social CSS take part in 50 of 165 smart city activities (30.3%), while economic CSS are involved more frequently in 61 activities (37.0%). More than half of all activities (79 activities, 47.9%) do not involve any type of CSS, indicating that CSS involvement, regardless whether socially or economically-orientated, is not self-evident in Amsterdam's smart city ecology. 25 activities (15.2%) involve both types of organizations, while 36 (21.8%) involve only economic CSS and 25 (15.2%) involve only social CSS. These statistics on the overall involvement in the smart city ecology show that the involvement of CSS is skewed towards economically CSS, even if—at first sight—the difference appears to be limited.

Activity types and CSS involvement

More than half of the all smart city activities in Amsterdam aim to create *applications and products* (93 activities of 165; 56.4%), while fewer activities are concerned with elaborating or evaluating smart city strategies (36 activities; 21.8%) or providing the necessary social and physical infrastructure for smart city development (36 activities; 21.8%). Both types of CSS engage over proportionally in the latter type of smart city activities that accounts for less than a quarter of all smart city activities. Nevertheless, we find that the three activity types—as a whole—are not significantly linked to social CSS involvement (see table 2). However, when comparing only the involvement of activities that aim at providing and building communities to all other types of activities, we find that social civil society stakeholders do significantly engage more with this type of project (odds ratio (henceforth OR) =2.24; $p<.05$). Comparing activity type to other factors, and controlling for the number of involved stakeholders, in a regression confirms that an activity's type is unrelated to social CSS engagement (Table 4).

[5] 33 of 977 stakeholders could not be identified or not be coded due to insufficient data. This means that in the case of 9 smart city activities, this missing data could cause one variable describing the stakeholder constellations to be incorrect. We simulated different scenarios of what missing data could be and found that the missing categorization does not affect the findings.

Table 2: Descriptive statistics and chi-square tests for **D_Soc** (social CSS involvement) and independent variables

Variable	Observed overlaps (1/1)	Expected overlaps (1/1)	Chi^2	df	p	Odds ratio
Activity_Type			4.408	2	0.110	
D_Infra	16	10.9	4.360	1	0.037	2.235
D_Framework	10	10.9	0.139	1	0.709	0.856
D_Product	24	28.2	2.040	1	0.153	0.615
Activity_domain			16.279	2	0.000	
D_ResEner	18	29.7	16.279	1	0.000	0.246
D_DigGov	22	13.9	9.273	1	0.002	2.979
D_LivServ	10	6.4	3.416	1	0.065	2.364
D_Gov	34	35.5	0.294	1	0.587	0.819
D_Corp	32	36.4	2.755	1	0.097	0.545
D_Uni	25	24.5	0.024	1	0.878	1.054

In contrast to this, results show that the type of an activity influences the involvement of economic CSS ($p<.05$; see table 3). Economic CSS are twice (OR=2.00; $p<.1$) as likely to engage in activities related to the provision of infrastructure and the creation of communities than in any other type of activity. In contrast to social CSS, the economic CSS *significantly* participate less in activities aimed at producing smart city applications and products (OR=.46; $p<.05$). The regression models (table 4) confirm that the lower involvement of economic CSS in activities creating *applications and products* compared to their involvement in the construction of infrastructure and communities is not explained by the differences in the number of involved stakeholders or by other socio-technical factors ($p<.05$).

Thematic domains and CSS involvement

The thematic domains are significantly linked to the involvement of social CSS both as across all categories ($p<.01$) and individually. The likelihood of engagement of social CSS in activities related to *resources, energy, and mobility* is one quarter of the likelihood of engagement activities of one of the two other thematic domains (OR=.246, $p<.01$). In contrast, the activities related to *digital government, economy, and people* are almost three times as likely (OR=2.98; $p<.01$) as the other domain's activities to involve social CSS. The few activities related the "urban living and services" are more than twice as likely as the rest to involve social CSS (OR=2.36; $p<.1$). The regression models consistently confirm these patterns of social CSS involvement. Using the largest category, *resources, energy, and mobility* as a base category, we note that social CSS are more than three times more likely to engage in activities related to *digital government, economy, and people*, (OR=3.32; $p<.01$) and almost four times more likely to be involved in *urban living and services* (OR=3.93; $p<.01$) than in activities related to *resources, energy, and mobility*. This pattern persists, even if to a lesser extent, when accounting for the total stakeholder count (OR=2.36; $p<.1$ and OR=3.50; $p<.05$ respectively). Because most of Amsterdam's smart city activities are situated in the domain of *resources, energy, and mobility,* (57.6% of all activities), which is negatively related to social CSS

Table 3: Descriptive statistics and chi-square tests for **D_Econ** (economic CSS involvement) and independent variables

Variable	Observed overlaps (1/1)	Expected overlaps (1/1)	Chi^2	df	$p(H_0)$	Odds ratio
Activity_Type			6.001	2	0.050	
D_Infra	18	13.3	3.355	1	0.067	2.000
D_Framework	16	13.3	1.104	1	0.293	1.493
D_Product	27	34.4	5.762	1	0.016	0.457
Activity_domain			0.773	2	0.680	
D_ResEner	38	36.2	0.338	1	0.561	1.212
D_DigGov	17	17.0	0.000	1	0.998	0.999
D_LivServ	6	7.8	0.728	1	0.393	0.647
D_Gov	47	43.3	1.769	1	0.184	1.631
D_Corp	48	44.4	1.734	1	0.188	1.641
D_Uni	36	29.9	3.815	1	0.051	1.888

involvement, the distribution of themes seems to limit social CSS involvement. A minority of activities are situated in thematic domains which are linked to higher social CSS engagement.

Economically-orientated CSS show no significant relationship to any thematic domain in a direct comparison. Only once we control for the number of involved stakeholders in activities in the regression, we find that economic CSS significantly engage less in activities of the thematic domain *digital government, economy, and people* (OR=.36; p<.1). However, since only 46 activities (28.8%) are situated in this particular thematic domain—which is negatively related to economic CSS involvement—thematic domains only have a limited impact on the overall involvement of economic CSS.

Stakeholder constellations and CSS involvement

Stakeholder constellations are relevant to social civil society involvement. Activities that involve corporations (OR=.55; p<.1) significantly reduce the likelihood of social CSS being part of smart city activities. When accounting for the number of stakeholders involved in an activity in the regression analysis, we find that activities involving corporations have between a third and a quarter (OR=2.29; p<.05) of the odds of involving social CSS compared to activities without corporate involvement. As corporations are involved in large two-thirds of the ecology's activities (72.7%) a negative relationship to their presence limits widespread involvement of social CSS. When controlling for the number of involved stakeholders in an activity, government and university involvement is also negatively related to the involvement of social CSS (D_Gov: OR=.40; p<.1 and D_Uni: OR=.28; p<.05), pointing to an isolated position of social CSS within smart city development.

While corporate involvement negatively impacts the chances for social CSS involvement in activities, it does not significantly affect the odds of economic CSS engagement. University involvement is linked to significantly higher odds of an economic CSS engaging an activity (OR1.89; p <.1). The regression models show that the typically higher number of involved stakeholders in activities involving universities accounts for the positive impact of university

Table 4: Results from the logistic regressions[6]

Dependent variables:	Social civil society (D_Soc)				Economic civil society (D_Econ)			
Independent variables	Exp(B)		Exp(B)		Exp(B)		Exp(B)	
D_Infra_Com	1.470		1.471		2.977	**	3.489	**
D_Strat_Eval	1.102		.750		1.806		1.541	
D_DigGov	3.317	***	2.355	*	.692		.362	*
D_LivServ	3.933	***	3.495	**	.724		.408	
D_Gov	.975		.402	*	1.627		.783	
D_Corp	.778		.290	**	1.759		.791	
D_Uni	.912		.286	**	1.635		.664	
Stakeholder_Count			1.267	***			1.247	***
Constant	.274		.401		.166	***	.224	**
Model summary								
Pseudo R-Square:								
Cox & Snell	.100		.255		.080		.224	
Nagelkerke	.141		.360		.109		.305	
Classification tables	*(% of correct estimations)*							
Null prediction	69.7		69.7		63.0		63.0	
Model prediction	70.9		78.2		67.9		70.9	

** p<.1; ** p<.05; *** p<.01*

involvement on the engagement of economic CSS. Universities are involved in about half of all activities (81 activities, 49.1%). University presence appears to be contributing to the uneven distribution between social and economic CSS in Amsterdam's smart city activities.

Discussion

We find that two of three socio-technical factors embedding smart city activities limit or increase the involvement of social CSS in Amsterdam's smart city. First, the involvement of social CSS is not limited to certain types of activities. This finding supports research that social CSS can be involved in all types of activities; from community building to the production of applications to strategizing smart city policies (e.g. de Lange & de Waal, 2013; Morozov & Bria, 2018). Second, the involvement of social CSS is limited to certain thematic domains of smart city development. The embeddedness of smart city activities into institutional frames (Cowley et al., 2018, p. 72) is linked to varying levels and different forms of civil society engagement. These patters across institutional frames indicate that the mobilization of legitimacy through civil society involvement (Smigiel, 2019; Zandbergen & Uitermark, 2020) is likely to be more relevant in the thematic domain "digital government, economy and people"

[6] To ensure the reliability of the coefficients, multicollinearity tests were conducted. The lowest detected tolerance value for multicollinearity between any pair of independent variables is .675, far from the .2 or .1 considered problematic for calculating coefficients in a logistic regression (Midi, Sarkar, & Rana, 2010).

that addresses digital education, innovation, and entrepreneurship, social inclusion, than in the thematic domain "resources, energy and mobility". Third, our results indicate that not all stakeholders of smart city activities seek to involve social CSS. While the official discourse of the ASC-platform, claims the smart city development be the fruit of a "Public-Private-People-Partnership"[7], corporations and social CSS systematically engage in different activities.

In this sense, we find that a strong corporate presence a smart city ecology is at odds with aims to include social CSS legitimate stakeholders in the creation of digitalized urban public goods, as suggested by other researchers (Breuer et al., 2014, p. 161; de Lange & de Waal, 2013; Morozov & Bria, 2018; Smigiel, 2019; Zandbergen & Uitermark, 2020). Even in the discursively participatory smart city ecology in Amsterdam—which according to its self-description discourse involves diverse CSS and is not dominated by corporations—a large majority of activities involve corporations (McNeill, 2015; Söderström et al., 2014). The avoidance of social CSS and corporations to engage in the same activities recalls Vanolo's (2016) argument that social CSS are discursively involved in smart city visions, but remain in a subaltern position.

At the same time, economic CSS are linked to activities aiming at providing infrastructures and building communities of stakeholders that intend to engage in the smart city ecology. This pattern of engagement in smart city activities is coherent with the tasks of economic CSS, for instance, professional representatives or chambers of commerce. Moreover, in contrast to social CSS, the involvement of economic CSS is not systematically linked to specific thematic domains or stakeholder constellations. Our findings thus question whether extending triple-helix partnerships to involve CSS as a fourth helix entails co-creation with CSS that embody "bottom-up" actions, as Carayannis & Rakhmatullin (2014, p. 220) suggest. In Amsterdam's supposedly participatory smart city development (Mancebo, 2020; Raven et al., 2019) less than a third of all smart city activities receive an evaluation "in terms of public value", which—according to Castelnovo et al., (2016, p. 735)—stems from social CSS involvement. Instead, it seems that such a quadruple helix smart city development mainly involves (economic) CSSs as service-users and potential entrepreneurs (Cowley et al., 2018, p. 72; also Wiig, 2016).

Conclusion and limitations

Most of the studies analyzing Amsterdam's smart city development have inquired into the roles CSS hold in particular activities (e.g. Bunders & Varró, 2019; Zandbergen & Uitermark, 2020) or have discussed the overall governance of the Amsterdam smart city foundation and platform (e.g. Putra & van der Knaap, 2018; Raven et al., 2019). In this study we have conducted a systematic analysis of the relationship between the socio-technical embedding of smart city activities and involvement of social and economic CSS. Our systematic analysis is based on

[7] https://amsterdamsmartcity.com/p/faq (accessed April 20th 2020).

establishing socio-technical factors (based on Geels 2004) from the literature impact embed smart city activities and thus possibly shape the involvement of social and economic CSS (activity types based on Mora et al. 2018; thematic domains are based on Neirotti 2014; stakeholder constellations are based on Carayannis & Rakhmatullin, 2014 and Cowley 2018).

Distinguishing between social and economic CSS (based on Cowley et al. 2018) allows to show that, regardless of discuses of involving "the people", civil society involvement in smart city development *in practice* primarily entails involving economic CSS. In this article, we explain this with the minor role that specific socio-technical factors, which are linked to social CSS involvement, have accorded in a smart city ecology. Smart city development is approached through the institutional frames linked to *resources, energy and mobility* and more than two-thirds of activities involve corporations. Both features of Amsterdam's smart city ecology are linked to lower social CSS involvement. The socio-technical embedding of Amsterdam's smart city activities predominantly represents an environment in which social CSS involvement is limited.

Only such a quantitative approach allows us systematically analyze the uneven patterns of civil society involvement in a smart city ecology. However, this systematic quantitative approach requires a significant degree of simplifying data. It is an inherent limitation to such an approach that the resulting schematization struggles depict the complexity and hybridity of many activities and stakeholders linked to smart city development. This limitation to this study could be addressed by qualitative analyses of hybrid cases and of activities involving (social) CSS, which according to this study are unlikely to do so. Also, using social network analysis, the relationship between different between CSS involvement and activity types, thematic domains, and stakeholder constellations can be analyzed in a more granular manner.

References

Albino, V., Berardi, U., & Dangelico, R. M. (2015). Smart cities: Definitions, dimensions, performance, and initiatives. *Journal of Urban Technology*, *22*, 3–21.

Angelidou, M. (2016). Four European Smart City Strategies. *International Journal of Social Science Studies*, *4*. https://doi.org/10.11114/ijsss.v4i4.1364

Arnkil, R., Järvensivu, A., Koski, P., & Piirainen, T. (2010). *Exploring quadruple helix: Outlining user-oriented innovation models* (Final Report No. 85/2010; p. 131). Tampere, Finland: Työelämän tutkimuskeskus, Tampereen yliopisto.

Baccarne, B., Mechant, P., & Schuurman, D. (2014). Empowered Cities? An Analysis of the Structure and Generated Value of the Smart City Ghent. In R. P. Dameri & C. Rosenthal-Sabroux (Eds.), *Smart City: How to Create Public and Economic Value with High Technology in Urban Space* (pp. 157–182). Cham: Springer International Publishing.

Balestrini, M., Collada, P., Bianchi, M., Diez, T., Espelt, R., Garriga, M., … Rato, S. D. (2017). *The Ecosystem of an Open Democracy*. LuzAzul ediciones.

Barns, S. (2016). Mine your data: open data, digital strategies and entrepreneurial governance by code. *Urban Geography*, *37*, 554–571.

Bogers, M., Zobel, A.-K., Afuah, A., Almirall, E., Brunswicker, S., Dahlander, L., … Ter Wal, A. L. J. (2017). The open innovation research landscape: established perspectives and emerging themes across different levels of analysis. *Industry and Innovation*, *24*, 8–40.

Brandtner, C., Höllerer, M. A., Meyer, R. E., & Kornberger, M. (2017). Enacting governance through strategy: A comparative study of governance configurations in Sydney and Vienna. *Urban Studies*, *54*, 1075–1091.

Breuer, J., Walravens, N., & Ballon, P. (2014). Beyond defining the smart city. Meeting top-down and bottom-up approaches in the middle. *Tema. Journal of Land Use, Mobility and Environment*. Presented at the Eighth International Conference INPUT, Naples, Italy.

Bunders, D. J., & Varró, K. (2019). Problematizing data-driven urban practices: Insights from five Dutch 'smart cities.' *Cities*, *93*, 145–152.

Calzada, I. (2018). (Smart) Citizens from Data Providers to Decision-Makers? The Case Study of Barcelona. *Sustainability*, *10*, 3252.

Capdevila, I., & Zarlenga, M. I. (2015). Smart city or smart citizens? The Barcelona case. *Journal of Strategy and Management*, *8*, 19.

Carayannis, E. G., & Campbell, D. F. J. (2009). "Mode 3" and "Quadruple Helix": toward a 21st century fractal innovation ecosystem. *International Journal of Technology Management*, *46*, 201.

Carayannis, E. G., & Rakhmatullin, R. (2014). The Quadruple/Quintuple Innovation Helixes and Smart Specialisation Strategies for Sustainable and Inclusive Growth in Europe and Beyond. *Journal of the Knowledge Economy*, *5*, 212–239.

Cardullo, P., & Kitchin, R. (2019). Smart urbanism and smart citizenship: The neoliberal logic of 'citizen-focused' smart cities in Europe. *Environment and Planning C: Politics and Space*, *37*, 813–830.

Carvalho, L. (2014). Smart cities from scratch? A socio-technical perspective. *Cambridge Journal of Regions, Economy and Society*, *8*, 43–60.

Castelnovo, W., Misuraca, G., & Savoldelli, A. (2016). Smart Cities Governance: The Need for a Holistic Approach to Assessing Urban Participatory Policy Making. *Social Science Computer Review*, *34*, 724–739.

Cowley, R., Joss, S., & Dayot, Y. (2018). The smart city and its publics: insights from across six UK cities. *Urban Research & Practice*, *11*, 53–77.

Crivello, S. (2015). Urban Policy Mobilities: The Case of Turin as a Smart City. *European Planning Studies*, *23*, 909–921.

Cugurullo, F. (2018). Exposing smart cities and eco-cities: Frankenstein urbanism and the sustainability challenges of the experimental city. *Environment and Planning A: Economy and Space*, *50*, 73–92.

Dalton, C. M. (2019). Rhizomatic data assemblages: mapping new possibilities for urban housing data. *Urban Geography*, *0*, 1–19.

Dameri, R. P. (2017). The Conceptual Idea of Smart City: University, Industry, and Government Vision. In R. P. Dameri, *Smart City Implementation* (pp. 23–43). Cham: Springer International Publishing.

Datta, A. (2015). New urban utopias of postcolonial India: 'Entrepreneurial urbanization' in Dholera smart city, Gujarat. *Dialogues in Human Geography*, *5*, 3–22.

de Falco, S., Angelidou, M., & Addie, J.-P. D. (2019). From the "smart city" to the "smart metropolis"? Building resilience in the urban periphery. *European Urban and Regional Studies*, *26*, 205–223.

de Lange, M., & de Waal, B. G. M. (2013). Owning the city: New media and citizen engagement in urban design. *First Monday*, *18*.

Farías, I., & Widmer, S. (2018). Ordinary Smart Cities. How Calculated Users, Professional Citizens, Technology Companies and City Administrations Engage in a More-than-digital Politics. *TECNOSCIENZA: Italian Journal of Science & Technology Studies*, *8*, 43–60.

Flyvbjerg, B. (2006). Five Misunderstandings About Case-Study Research. *Qualitative Inquiry*, *12*, 219–245.

Frenchman, D., Joroff, M., & Albericci, A. (2011). *Smart cities as engines of sustainable growth* (No. 21; p. 23). Washington, DC: World Bank Institute.

Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems. *Research Policy*, *33*, 897–920.

Gerometta, J., Haussermann, H., & Longo, G. (2005). Social Innovation and Civil Society in Urban Governance: Strategies for an Inclusive City. *Urban Studies*, *42*, 2007–2021.

Gerring, J. (2006). *Case study research: Principles and practices*. Cambridge university press.

Giffinger, R., Fertner, C., Kramar, H., & Meijers, E. (2007). *City-ranking of European Medium-Sized Cities*. 12.

Goodspeed, R. (2014). Smart cities: moving beyond urban cybernetics to tackle wicked problems. *Cambridge Journal of Regions, Economy and Society*, *8*, 79–92.

Hastings, A., & Matthews, P. (2015). Bourdieu and the Big Society: empowering the powerful in public service provision? *Policy & Politics*, *43*, 545–560.

Healey, P. (2007). The new institutionalism and the transformative goals of planning. In N. Verma (Ed.), *Institutions and planning* (pp. 61–87). Amsterdam: Elsevier.

Healey, P. (2015). Civil society enterprise and local development. *Planning Theory & Practice*, *16*, 11–27.

Hollands, R. G. (2008). Will the real smart city please stand up? Intelligent, progressive or entrepreneurial? *City*, *12*, 303–320.

Hollands, R. G. (2015). Critical interventions into the corporate smart city. *Cambridge Journal of Regions, Economy and Society*, *8*, 61–77.

Karvonen, A. (2020). Urban Techno-Politics: Knowing, Governing, and Imagining the City. *Science as Culture*, *0*, 1–8.

Kornberger, M., Meyer, R. E., Brandtner, C., & Höllerer, M. A. (2017). When Bureaucracy Meets the Crowd: Studying "Open Government" in the Vienna City Administration. *Organization Studies*, *38*, 179–200.

Leydesdorff, L., & Deakin, M. (2011). The triple-helix model of smart cities: A neo-evolutionary perspective. *Journal of Urban Technology*, *18*, 53–63.

Mancebo, F. (2020). Smart city strategies: time to involve people. Comparing Amsterdam, Barcelona and Paris. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability*, *13*, 133–152.

March, H., & Ribera-Fumaz, R. (2016). Smart contradictions: The politics of making Barcelona a Self-sufficient city. *European Urban and Regional Studies*, *23*, 816–830.

McNeill, D. (2015). Global firms and smart technologies: IBM and the reduction of cities. *Transactions of the Institute of British Geographers*, *40*, 562–574.

Meier, A., & Portmann, E. (Eds.). (2016). *Smart City: Strategie, Governance und Projekte*. Wiesbaden: Springer Vieweg.

Meijer, A., & Rodríguez Bolívar, M. P. (2016). Governing the smart city: a review of the literature on smart urban governance. *International Review of Administrative Sciences*, *82*, 392–408.

Mora, L., & Bolici, R. (2017). How to Become a Smart City: Learning from Amsterdam. In A. Bisello, D. Vettorato, R. Stephens, & P. Elisei (Eds.), *Smart and Sustainable Planning for Cities and Regions: Results of SSPCR 2015* (pp. 251–266). Cham: Springer International Publishing.

Mora, L., Deakin, M., & Reid, A. (2019). Strategic principles for smart city development: A multiple case study analysis of European best practices. *Technological Forecasting and Social Change*, *142*, 70–97.

Mora, L., Deakin, M., Reid, A., & Angelidou, M. (2019). How to Overcome the Dichotomous Nature of Smart City Research: Proposed Methodology and Results of a Pilot Study. *Journal of Urban Technology*, *26*, 89–128.

Morozov, E., & Bria, F. (2018). Rethinking the smart city. *Democratizing Urban Technology; Rosa Luxemburg Stiftung, New York Office: New York, NY, USA*.

Neirotti, P., De Marco, A., Cagliano, A. C., Mangano, G., & Scorrano, F. (2014). Current trends in Smart City initiatives: Some stylised facts. *Cities*, *38*, 25–36.

Pesch, U., Spekkink, W., & Quist, J. (2019). Local sustainability initiatives: innovation and civic engagement in societal experiments. *European Planning Studies*, *27*, 300–317.

Putra, Z. D. W., & van der Knaap, W. G. (2018). Urban Innovation System and the Role of an Open Web-based Platform: The Case of Amsterdam Smart City. *Journal of Regional and City Planning*, *29*, 234–249.

Raven, R., Sengers, F., Spaeth, P., Xie, L., Cheshmehzangi, A., & Jong, M. de. (2019). Urban experimentation and institutional arrangements. *European Planning Studies*, *27*, 258–281.

Rodríguez Bolívar, M. P. (2015). *Transforming city governments for successful smart cities*. Cham: Springer.

Shelton, T., Zook, M., & Wiig, A. (2015). The 'actually existing smart city.' *Cambridge Journal of Regions, Economy and Society*, *8*, 13–25.

Smigiel, C. (2019). Urban political strategies in times of crisis: A multiscalar perspective on smart cities in Italy. *European Urban and Regional Studies*, *26*, 336–348.

Söderström, O., Paasche, T., & Klauser, F. (2014). Smart cities as corporate storytelling. *City*, *18*, 307–320.

Sylvester, D. E., & McGlynn, A. J. (2010). The digital divide, political participation, and place. *Social Science Computer Review*, *28*, 64–74.

Townsend, A. M. (2013). *Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia*. W. W. Norton & Company.

United Nations. (n.d.). Civil Society. Retrieved September 16, 2020, from https://www.un.org/en/sections/resources-different-audiences/civil-society/index.html

van Winden, W., & van den Buuse, D. (2017). Smart City Pilot Projects: Exploring the Dimensions and Conditions of Scaling Up. *Journal of Urban Technology*, *24*, 51–72.

Vanolo, A. (2014). Smartmentality: The Smart City as Disciplinary Strategy. *Urban Studies*, *51*, 883–898.

Vanolo, A. (2016). Is there anybody out there? The place and role of citizens in tomorrow's smart cities. *Futures*, *82*, 26–36.

Walser, K., & Haller, S. (2016). Smart Governance in Smart Cities. In A. Meier & E. Portmann (Eds.), *Smart City: Strategie, Governance und Projekte* (pp. 19–46). Wiesbaden: Springer Vieweg.

Wiig, A. (2016). The empty rhetoric of the smart city: from digital inclusion to economic promotion in Philadelphia. *Urban Geography*, *37*, 535–553.

Zandbergen, D. (2020). The Unfinished Lampposts: The (anti-) Politics of the Amsterdam Smart Lighting Project. *City & Society*, *32*, 135–156.

Zandbergen, D., & Uitermark, J. (2020). In search of the Smart Citizen: Republican and cybernetic citizenship in the smart city. *Urban Studies*, *57*, 1733–1748.

Zygiaris, S. (2013). Smart City Reference Model: Assisting Planners to Conceptualize the Building of Smart City Innovation Ecosystems. *Journal of the Knowledge Economy*, *4*, 217–231.

Digital Geography 2 (2021) 100020

Contents lists available at ScienceDirect

Digital Geography and Society

journal homepage: www.sciencedirect.com/journal/digital-geography-and-society

The unexpected persistence of non-corporate platforms: The role of local and network embeddedness

Filipe Mello Rose

Urban and Regional Economics, HafenCity University Hamburg, Überseeallee 16, 20457 Hamburg, Germany

ARTICLE INFO

Keywords:
Platform urbanism
Non-corporate platforms
Local embedding
Neighborhood platforms
Platform cooperativism
Free/libre open-source software

ABSTRACT

The Covid19-pandemic has accelerated processes in which digital platforms, privileged by their critical size, become central instances of urban life. While most scholars associate platform urbanism with transnational platform corporations, such as Amazon or Facebook, local non-corporate platforms unexpectedly persist despite lacking critical size. This article analyzes processes through which non-corporate platforms are created, maintained, disseminated, and locally implemented; given this type of platform's absence of critical size. We explain the persistence of local non-corporate platforms by drawing on the concept of embeddedness. Embeddedness accounts for non-market-based, i.e. socially and culturally influenced behavior, that shapes economic interactions. We distinguish between network embeddedness, in which organizations maintain permanent and exclusive relationships with one another, and local embeddedness, which combines Hess' (2004) notions of societal embeddedness and territorial embeddedness. This article is empirically grounded on an analysis of two *most different* ways of creating and maintaining, disseminating, and locally implementing non-corporate platforms: Platform cooperativism and free/libre open-source software-based platforms (FLOSS-based platforms). Two empirical case studies of collaboratively governed Western-European non-corporate platforms, *Gebiedonline* and *Decidim*, respectively inform the analysis of platform cooperativism and FLOSS-based platforms. *Gebiedonline* is a platform cooperative through which neighborhood and theme-specific platforms are created. *Decidim* is a FLOSS-based platform that is mainly used for civic and political participation processes. We find that governments and civil society stakeholders create non-corporate platform technology by disentangling processes related to the creation, maintenance, and dissemination of platform technology from platform implementation processes. Following platform creation, platform maintenance is embedded in a network. Non-corporate platforms pool cost-intensive technology maintenance, while platform implementation necessarily takes place in a locally embedded manner.

1. Introduction

Since early 2020, the Covid19-pandemic accelerated the transition towards platform urbanism, a process in which ubiquitous digital platforms reshape "urban conditions, institutions, and actors" (Barns, 2020, 19). Lockdowns forced restaurants and retailers to review their business models and turn towards transnational corporate platforms (e.g. Amazon, Facebook, Uber) to interact with end-users staying at home. Regardless of the overall economic downturn, transnational platform corporations saw their revenues skyrocket (Lee, 2020; Murphy, 2021). "The 'winner takes it all' nature of platforms" (Barns, 2019, 7) leads to dominant, often monopolistic, platform corporations (Langley & Leyshon, 2017; Srnicek, 2016) that rely on their critical size to consolidate themselves by reaching into new economic areas (Grabher, 2020; Pais & Provasi, 2020). Most scholars, therefore, associate platform urbanism only with transnational platform corporations, even if locally-created and governed non-corporate platforms persist (e.g. Priester & Niederer, 2014; Husain et al., 2019; Leszczynski, 2020; Chiappini, 2020). While local non-corporate platforms can aim to counter the excesses of transnational platform urbanism (Chiappini, 2020; Graham, 2020; Leszczynski, 2020), this type of platform arguably entails completely renouncing the use of "network effects", meaning renouncing to reap the benefits of large scale technology development and roll-out (Barns, 2020; Stallkamp & Schotter, 2021; van Dijck et al., 2018). Yet, if the power of platforms lies in their scale and global reach in which the "winner takes it all," the persistence of local non-corporate platforms is puzzling.

We adapt Ansell and Miura's (2020, 264) definition of governance

E-mail address: filipe.mellorose@hcu-hamburg.de.

https://doi.org/10.1016/j.diggeo.2021.100020
Received 31 March 2021; Received in revised form 8 July 2021; Accepted 22 September 2021
Available online 27 September 2021

platforms to define *local non-corporate platforms* as webpages that use their "architecture to leverage, catalyze, and harness distributed social action". Like digital participatory platforms, we understand local non-corporate platforms as a "specific type of civic technology explicitly built for participatory, engagement and collaboration purpose" (Falco & Kleinhans, 2018). By being largely independent of corporate activities, local non-corporate platforms are "glitches" in platform capitalism – errors and corrections in the "hegemonic configuration" of society – "which belie hegemonic overdeterminations of the total and complete capitalist take-over of cities" (Leszczynski, 2020, 197). Scholarly research on local non-corporate platforms has mostly focused on the utilization of platforms as an urban governance tool, using an e-governance perspective (e.g. Anttiroiko, 2016; Royo et al., 2020; Gil et al., 2019) and concentrating on the relationship between governments and citizens (e.g. Falco & Kleinhans, 2018). To date, only limited research (e.g. Farías & Widmer, 2018; Leszczynski, 2020; Schneider, 2018) has inquired into the reasons why non-corporate platforms persist without focusing solely on specific (e-)governance tools. This article, in contrast, attempts to grasp the conditions under which non-corporate platforms persist not only as institutionalized governance tools (e.g. Royo et al., 2020) but rather as alternatives to transnational platform corporations. More precisely, this article addresses the question through which processes non-corporate platforms are (1) created and maintained, (2) disseminated, and (3) locally implemented given this type of platform's absence of critical size.

This paper explains this (seemingly) puzzling persistence of local non-corporate platforms by drawing on the concept of embeddedness. Taken from entrepreneurship research and economic geography, the embeddedness concept allows to account for non-market-based – i.e. socially and culturally – influenced behavior that shapes economic interactions (Granovetter, 1985; Grabher, 1993; McKeever et al., 2014; Hess, 2004; Uzzi, 1996). The concept of *embeddedness* focuses on "the natural everyday settings in which entrepreneurship" takes place (McKeever et al., 2014, 230). Granovetter (1985) coined the concept of embeddedness to explain the persistence of small and medium enterprises despite their disadvantages in a capitalist economy. Wood, Graham, Lehdonvirta, and Hjorth (2019) use the embeddedness concept to explain processes of (de-)commodification of labor and goods in platform capitalism. Here, we draw on the concept of embeddedness – outside the concept's typical focus on firms (e.g. Grabher, 1993; Hess, 2004; McKeever et al., 2014) – to explain the persistence of non-corporate platforms despite their absence of critical size. To this end, we distinguish between network and local embeddedness. We define *network embeddedness* as organizations maintaining "ongoing and exclusive relationships with one another" (Uzzi, 1996, 676) which are based on trust and problem-solving arrangements rather than market-based transactions (Hess, 2004; Uzzi, 1996; Wood et al., 2019). We define *local embeddedness* as a combination of Hess' (2004) notions of societal embeddedness – meaning an organizations' attention to its immediate cultural, political, normative, and institutional environment – and territorial embeddedness – which involves being "'anchored' in particular territories or places".

Empirically, this paper is based on a *most different* case selection (Flyvbjerg, 2006; Gerring, 2006; Mill, 1869). This approach suggests focusing on similarities of two vastly different cases of non-corporate platforms to cautiously draw broader conclusions on the reasons for the persistence of non-corporate platforms despite their absence of critical size. We investigate two vastly different ways of creating and maintaining, disseminating, and locally implementing non-corporate platforms for structural similarities: Platform cooperativism (Schneider, 2018; Scholz, 2016) and free/libre open-source software-based platforms (henceforth FLOSS-based platforms) (Birkinbine, 2018; Graham & De Sabbata, 2020). The conceptualization of platform cooperativism and FLOSS-based platforms is paradigmatically informed by two empirical case studies of collaboratively governed Western-European non-corporate platforms: *Gebiedonline* and *Decidim*. We selected the specific cases because of their strong differences and their respective representativeness of platform cooperativism and FLOSS-based platforms. Gebiedonline is an Amsterdam-based formalized platform cooperative that owns the technology to create local non-corporate platforms for various civil society activities. These activities include vitalizing neighborhood life, improving public space, conducting sustainability campaigns, and small commercial interactions. Decidim is a FLOSS-based platform that was first created by Barcelona's municipal government to carry out political participation processes and is now largely managed by an open community of supporters. The geographical focus on two Western-European cases somewhat limits the scope of this article. Also, as the focus of this paper lies in examining commonalities across different types of non-corporate platforms that explain their persistence despite lacking critical size, findings regarding platform cooperativism and FLOSS-based platforms are somewhat less generalizable.

In broad terms, this paper contributes to the field of digital geography by mobilizing concepts of local and network embeddedness to explain the persistence of non-corporate platforms despite their absence of critical size. The key contribution to digital geography – as defined and extensively reviewed by Zook, Dodge, Aoyama, and Townsend (2004), and by Ash et al., (2018) – is that the geography of non-corporate platforms differs substantially from the geography of corporate platforms due to different forms of the platforms' network and local embeddedness. In more precise terms, this article contributes to the literature on non-corporate manifestations of platform urbanism (e.g. Graham, 2020; Chiappini, 2020; Certomà et al., 2020; Leszczynski, 2020). By drawing on platform cooperativism and FLOSS-based platforms, this article also relates to wider debates on grassroots and "hacking" urbanism (e.g. Balestrini et al., 2017; de Waal & de Lange, 2019; Morozov & Bria, 2018).

We find that governments and civil society stakeholders create non-corporate platform technology by disentangling processes related to the creation, maintenance, and dissemination of platform technology from local platform implementation processes. The creation and maintenance of technology are embedded in a collaboration network of locally embedded organizations. Non-corporate platforms pool cost-intensive technology maintenance, while platform implementation necessarily takes place in a locally embedded manner.

This article is structured in the following way. First, in the next section, we discuss the literature on platform urbanism, platforms cooperativism, and FLOSS-based platforms. Then we briefly describe our methods. Next, we extensively analyze the two case studies, *Gebiedonline* and *Decidim*. Finally, this paper discusses the findings of the case studies comparatively before concluding with suggestions for further research.

2. Platform governance and beyond transnational platform corporations

In times of social distancing, numerous digital platforms have become of even greater importance as an infrastructure of (the remaining) economic, political, and social interactions (van Doorn et al., 2021). In platform urbanism, platforms are not only "content intermediaries" (Gillespie, 2010, 348), but also govern urban spaces, as they are "re-encoding […] urban socio-spatial relationships into territories for platform intermediation" (Barns, 2019, 7). Platforms represent a new structure for social and economic interaction (Grabher & König, 2020; Langley & Leyshon, 2017) and platforms become central intermediaries that structure interactions between citizens, businesses, and government organizations in most domains of urban life (e.g. van Doorn, 2020; van Doorn et al., 2021). Platform urbanism "addresses the layers of governance relationships that structure interactions between different platform participants, which increasingly extend to urban institutions and citizens, as much as 'traditional' platform users like online users, advertisers, media organizations and software providers." (Barns, 2020, 19). In urban areas, for instance, platforms create new markets or

mobilize – supposedly unused – capacities by integrating them into urban markets (Barns, 2019, 5; van Doorn, 2020). However, platforms are structured as interdependent networks or even as network-market hybrids and platform urbanism represents wider changes than the mere reformulations of particular markets (Haveri & Anttiroiko, 2021). As transnational platform corporations mediate work or housing, they commodify goods by dis-embedding them from local geographies and disregard local legislation by referring to their transnational scale (Graham, 2020; van Doorn, 2020; van Doorn et al., 2021).

Transnational platform corporations present themselves as a type of organization that challenges the dominance of traditional "Fordist" corporations but are in fact, mere corporations that restructure markets by removing conventional worker's and industrial sector's protections (Frenken & Fuenfschilling, 2020; Srnicek, 2016). In contrast to the traditional "Fordist" corporations, transnational platform corporations are "asset-light" and their value-creating processes depend on their technology-enabled matchmaking potential (Grabher & van Tuijl, 2020) which becomes the means of production in the economy of the 21st century (Schneider, 2018). This matchmaking potential rests on a corporate-owned platform technology that is *created and maintained* (and constantly improved) most efficiently at a trans-local scale by mobilizing massive amounts of data gathered on platform participants (i.e. "users") (Srnicek, 2016). Once a platform reaches critical size, the large quantities of gathered data reinforce a "winner takes it all"-effect (Barns, 2019; Langley & Leyshon, 2017). This effect allows transnational platform corporations to use the gathered data to strategically *disseminate* their platform technology into new economic and geographical areas (i.e. markets) (Grabher, 2020; Pais & Provasi, 2020; Stallkamp & Schotter, 2021). The strategic dissemination into new markets generates new data-based feedback that allows to improve platform technology, which in turn further consolidates the critical size and the advantaged position of transnational platform corporations (Fig. 1).

Local implementations of transnational platform corporations' technology differ little across localities leading to a limited local embedding of transnational platforms (e.g. Graham, 2020). Following their implementation in local markets, transnational platform corporations exert subtle and untransparent forms of algorithmic control over citizens and raise privacy and surveillance concerns (Törnberg & Uitermark, 2020). Platform corporations thus re-frame institutional frameworks in which social and economic interactions take place to make globally standardized business models work (Grabher & van Tuijl, 2020). In refusing to provide local accountability (Graham, 2020) – including with regards to the use of platform participant's data – and to embed themselves in the site in which platforms are locally implemented, transnational platform corporations impede more socially sustainable form of platform urbanism (Graham, 2020; Leszczynski, 2020).

Based on the distinction between creation and maintenance, dissemination, and local implementation we turn to two distinct ways of governing non-corporate platforms: Platform cooperativism and FLOSS-based platforms. Whilst not mutually exclusive (e.g. Pazaitis et al., 2017 Bauwens & Kostakis, 2014) each concept suggests its own processes of overcoming the non-corporate platforms' lack of critical size, which calls for a distinct analysis of platform cooperativism and FLOSS-based platforms.

2.1. Platform cooperativism

Platform cooperativism is a platform ownership model that mobilizes the potential of cooperatives – which draws on a centuries-old tradition of the provision of housing and other basic services – for the governance of platforms (Schneider, 2018; Scholz, 2016). Cooperatives seek to combine activism and business enterprises (Sandoval, 2020) "in ways that serve needs unmet by investor-owned businesses" (Schneider, 2018, 322). The International Cooperatives Alliance defines cooperatives as "an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise." (International Cooperative Alliance, 2021). Cooperatives are typically controlled by a general meeting of members and subject to internally elaborated statutes that define the conditions of recruiting new members, relationships between members, and the cooperative's goals and ambitions (Stryjan, 1994).

Platform cooperatives, then, aim to combine the benefits of platforms as efficient matchmakers with the benefits of a cooperative ownership model (Pentzien, 2020; Sandoval, 2020; Schneider, 2018; Scholz, 2016). Platform cooperativism aims at replicating the platforms of transnational platform corporations with democratically owned and governed organizations (Sandoval, 2020). Like cooperatives in general, which can be owned by consumers (e.g. housing) or producers (e.g. agriculture), ownership of platform cooperatives cuts across different social groups, sectors, and localities. The concept of platform cooperativism "embraces the technology but wants to put it to work with a different ownership model, adhering to democratic values" (Scholz, 2016, 14). Trebor Scholz's (2016) elaboration of the concept and the works of Schneider (2018), and Sandoval (2020), focus on the potential to improve working conditions associated with the gig economy and of platform capitalism. According to the scholars, local cooperatives can overcome the atomization and alienation of (allegedly self-employed) workers by turning them into co-owners of urban platforms, who then collectively decide on the platforms' workings (Sandoval, 2020).

By "erasing the distinction between workers and owners" (Sandoval, 2020, 805) the cooperatives are a contentious object. On one hand, cooperatives allow "collective ownership by the people who generate the revenue" (ibid., 804) but on the other hand, booster coopetition, entrepreneurialism, and commercialization. Moreover, Sandoval (2020) argues that because of the latter, platform cooperatives still serve the interests of their members, which do not necessarily overlap with the wider interests of society.

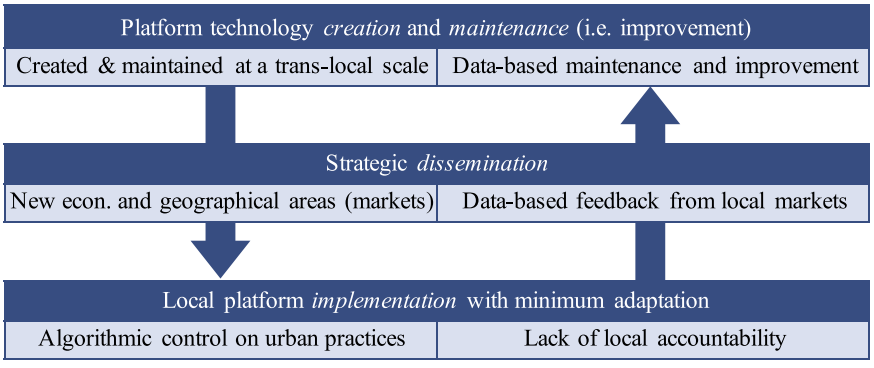

Fig. 1. Illustration summarizing this article's understanding of the literature on platform creation and maintenance, dissemination, and local implementation by transnational platform corporations.

2.2. FLOSS-based platforms

Free/libre open-source software-based (FLOSS-based) platforms are the application of the FLOSS concept, "which allows [software] users to freely study, use, copy, modify, adapt, or distribute the software" (Birkinbine, 2018, 292) to platform technology and its dissemination. The FLOSS concept emerged in the 1980s as a reaction to software companies ceasing to share software source codes with software users and developers (Stallman, 2002). Essentially, FLOSS combines notions of open innovation (e.g. Bogers et al., 2017), such as peer production and knowledge and technology crowdsourcing with questions of collective ownership and freedom of usage (Stallman, 2002). Benkler and Nissenbaum (2006, 369) situate the movement towards FLOSS as an "instance of a more general phenomenon of commons-based peer production".

The processes of commons-based FLOSS peer production are safeguarded by social contracts, notably through licensing and intellectual property regulations. These licensing and intellectual property regulations, such as the "GNU General Public License" (henceforth GPL), enable, foster, and safeguard commons-based peer production. The GPL further ensures that "derived works of the software would be released under the same license and that everyone who received the software would have a chance to get the source code" (Stallman, 2002, 170). As business models involving FLOSS cannot rely on revenue from software licenses, revenue originates from other sources, notably from the sale of hardware using FLOSS (e.g. sale of Linux-based hardware) and, more frequently, from offering FLOSS-based services and technological support (Stallman, 2002). The social contracts underlying FLOSS can go beyond the GPL in permitting usage, distribution, and modification only to certain types of organizations. These more restrictive licensing (social) contracts aim to avoid FLOSS becoming "incorporated" or co-opted into capital-producing activities (Birkinbine, 2020; Sandoval, 2020). In contrast to platform cooperativism, to date, a variety of large-scale and globally-used platforms rely on FLOSS technology and/or open peer production. One of the most visible examples is Wikipedia, which is based on a global community of peer producers who collectively write, edit, and review the world's largest digital encyclopedia (Lovink & Tkacz, 2011).

Whilst portrayed as based on bottom-up communities, FLOSS projects are strongly embedded into the global software production (e.g. Microsoft, Oracle) (Birkinbine, 2020). The FLOSS communities and their peer production processes are not necessarily based on democratic processes, nor are they representative of any wider population. Also do contributors to FLOSS concentrate in the global north, possibly leading to geographical disparities and new forms of digital divides (Graham & De Sabbata, 2020).

3. Methods

This paper is based on qualitative methods. We base our empirical research on semi-structured interviews with persons directly involved in the creation and maintenance, dissemination, and local implementation of Gebiedonline and Decidim. We also draw on additional analyses of digital documents related to the Gebiedonline and Decidim platform technologies and the platforms' direct environment (Table 1). Interviews were conducted in two steps. First, we conducted face-to-face interviews during two research trips to Amsterdam (June 2018; January 2019) and one to Barcelona (October 2019). Second, we conducted online video-call interviews from November to December 2020. Table 1 lists the paper's sources in detail.

All 25 interviewees gave their informed consent to a recorded interview and to a semi-anonymized use of their statements. The recordings' length varies from 0:23 (as part of a group interview) to 2:25, averaging at 1:12 (median at 1:04). Following the interview phase, interview recordings were transcribed. We then coded and analyzed interview transcripts and documents in MaxQDA with the following coding categories and empirically-grounded subcategories:

(1) *Platform technology creation and maintenance* including (1a) the motives for the initial platform creation, (1b) the processes of the initial platform creation, and (1c) the processes behind the platform technology's maintenance.
(2) *Platform technology dissemination* including (2a) the motives and ideals guiding platform dissemination, (2b) the governance structures behind the dissemination processes, and (2c) the

Table 1
Summary of the mobilized empirical material.

Analytical steps	*Sources*
Preliminary interviews with persons related to the platform urbanism ecology in Amsterdam and Barcelona	For the **Gebiedonline** case study interviews were conducted with the following persons: head of programme at Waag Society; program maker in urban development and social innovation at Pakhuis de Zwijger; community manager at Amsterdam Smart City Foundation; strategy advisor at Amsterdam Smart City; Urban Innovator at Amsterdam municipality **[references anonymized as CA1-5]** For the **Decidim** case study interviews were conducted with the following persons: director at Xarxa d'Ateneus de Fabricació; project manager at i.labs; culture commissioner at Barcelona municipality; partner at Ideas for Change **[references anonymized as CB1-4]**
Interviews with persons involved in the creation and maintenance, dissemination, or local implementation of Gebiedonline and Decidim	Interviews for the **Gebiedonline** case study were conducted with the following persons: founder of Hallo IJburg; president of the Gebiedonline Cooperative; treasurer of the Gebiedonline Cooperative; process director at Amsterdam East district government; co-initiator of stadmakersonline.nl; former project leader of NieuwlandSamen; coordinator of Buurtgroen020; co-founder of 02025.nl **[references anonymized as G1-8]** Interviews for the **Decidim** case study were conducted with the following persons: general director of Citizen Participation and Electoral Processes at the Government of Catalunya; researcher at the Institute of Government and Public Policy (IGOP); former councilwoman at the Barcelona municipality; chief technology officer at Alabs; participation technician at SOM Energia SCCL; director of democratic innovation at Barcelona municipality; consultant at Open Source Politics; project leader public participation at Angers municipality [references anonymized as D1-8]
Document analysis	For the **Gebiedonline** case study the analysis included documents and webpages referenced on the websites of the Gebiedonline cooperative and its platform implementations, as well as press coverage on Gebiedonline and its local implementations. For the **Decidim** case study the analysis of included documents and webpages retrieved from Decidim.org, Meta-Decidim, Decidim's Git-Hub pages, legal documents, including codes of conduct and contracts, as well as, the Decidim's local implementations

interaction between stakeholders to provide feedback for technical maintenance.

(3) *Local platform implementation* including (3a) information on local implementers, (3b) local platform users, (3c) goals of local platforms, and (3d) interactions taking place on local platforms.

(4) Views on *platform urbanism and platform capitalism* including (4a) perceived problems and (4b) ideas, proposals, and concepts on how to overcome these problems.

We elaborated the interview guidelines in a way to allow the interviewees to address all coding categories, without pressuring them to touch upon issues they were unfamiliar with.

4. Gebiedonline: non-corporate platforms as cooperatives

4.1. Collective creation and maintenance of platform technology

Hallo IJburg, a non-corporate neighborhood platform, was programmed in 2012 by a resident of IJburg, a newly-built suburb of Amsterdam (G1; G2; G3; G6 [see Table 1 for anonymization key]). The founder of the neighborhood platform aimed to "develop a communication website for the citizens to work together better to share information and to allow working together with the government, with companies, and with other parties in the neighborhood" (G1). Growing criticism of global platforms, particularly following the publications made by whistle-blower Edward Snowden in 2013, highlighted the risks of transnational platform corporations and urged for local independent non-corporate alternatives (G1; G3).

By 2016 persons and civil society groups, who were looking for alternatives to transnational platform corporations, contacted the founder of *Hallo IJburg* and sought to replicate the neighborhood platform (G2; G3; G6) (also Gerritsen et al., 2020, 14). As Hallo IJburg became recognized as a non-corporate alternative to transnational platform corporations on which communication and social networking could take place, persons from IJburg, Amersfoort Nieuwland, and Gouda – all but one without a in software development – founded the Gebiedonline cooperative which from then onwards owned *Hallo IJburg's* platform technology (G1; G3).

All interviewed members of the cooperative share the ambition to improve social relations between citizens but were suspicious of transnational platform corporations. To them, platform cooperativism represents a suitable alternative to avoid the pitfalls of platform capitalism while nevertheless having a local platform to improve social relations between citizens (G1; G2; G6). More precisely, our interview partners describe platform cooperativism as an appealing alternative to transnational platform corporations because of two main reasons.

First, platform cooperativism allows locally embedded civil society organizations to embed themselves in a network of like-minded organizations to co-create platform technology with their preferred technology supplier. The Gebiedonline cooperative delegates the maintenance and improvement of the technology to CrossmarX, a technology company in Amsterdam, which is owned by the founder of Hallo IJburg. CrossmarX acts as a service provider to the cooperative and could theoretically be replaced by any other technology company (G1; G2; G3). A (spatially) close relationship to the provider of technology allows local civil society groups to directly participate in platform maintenance. The close interaction with CrossmarX allows cooperative members to discuss the platform's design, data collection practices (G6; G7), and accessibility "by different people with different digital skills" (G7).

Second, platform cooperativism allows to collectively create non-monetary value from platform urbanism. This non-commercial character of Gebiedonline stands in contrast to local sub-platforms on transnational platform corporations, such as a local "group" on Facebook. For instance, in Gouda, a small city about 50 km from Amsterdam, a local community stopped using the US-based commercial platform provider Ning, a Platform-as-a-service provider, as it became "too commercial" (G3). In the cooperative "value is [created] when users own the platform themselves" (G3) and technological collaboration takes place with a local developer who "shares the same values of building communities from the bottom-up" (G2). Hallo IJburg's founder argues that in contrast to global platforms, which "take all the money to Silicon Valley", platform cooperativism allows "to own the platform yourself as neighbors, citizens or neighborhoods and make your own decisions about all financial aspects" (G1).

4.2. Governance of platform dissemination

As of mid-2021, 39 publicly accessible platform implementations have been set up within the Gebiedonline cooperative. 30 of these implementations are area-based communities, dedicated to specific neighborhoods, districts, or cities (i.e. platforms with "neighborhood as issue" Priester & Niederer, 2014). 9 implementations are orientated around themes such as urban gardening, social work in cities (i.e. city making), energy transition, or sustainable development. A majority of local platform implementations are linked to areas near Amsterdam, with exceptions located elsewhere in the Netherlands or directed at national themes.

To implement a Gebiedonline-based platform, an organization (i.e. a civil society organization or a local government) must become a member of the platform cooperative. In other words, the cooperative's members are necessarily embedded into a network that grounds itself on like-mindedness and trust. The individual or the organization willing to create a new platform with Gebiedonline requires the approval of the existing members and needs to contribute financially (G3, G6, G2). In principle, new members can join for one year (G3). However, since the cost of the first year of membership, in which a local platform implementation is created, is higher than the following years, a one-year membership is somewhat unlikely and members tend to form long-term relationships (G3). The membership fee means any local platform implementation must be formally supported by a legal entity that guarantees the fee's annual payment. According to the founder of Hallo IJburg, this is not problematic as in "most neighborhoods there is at least one legal entity that represents the citizens and which is financed by the government." (G1). None of the interview partners regarded the absence of such a legal entity in an area as a structural barrier to the platform's dissemination, as financial support to civic life by various levels of government is widespread in Dutch neighborhoods (G3; G6).

Local and regional governments thus, at least indirectly, finance the Gebiedonline cooperative by funding neighborhood organizations that are members of the cooperative. According to the cooperative's treasurer, about three-quarters of all neighborhood-orientated platform implementations are financed – either directly or indirectly – by government entities (G3). By indirectly supporting the cooperative, local governments deliberately delegate their decision-making power regarding the platform's maintenance and dissemination to civil society organizations that hold the membership status (G2; G3). This way any local platform implementation is locally embedded into (political) structures but also embedded into a network of local platform organizers (i.e. the cooperative's members). Only in a few newly-built neighborhoods, where no organized civil society structures exist, local governments directly become members of the cooperative. This way the Amsterdam municipality is a member of Gebiedonline but is still considerably less involved in the cooperative's governance of technology than other members (G1; G4). A minority of theme-specific platforms rely on more varied sources of funding to finance their membership. The energy transition platform 02025, for instance, is formally part of an energy cooperative, which also mobilizes public and private funds to maintain their membership in the Gebiedonline cooperative (G8).

4.3. Local platform implementation

Due to the pooling of common resources and the modular replication of the platform technology the maintenance of platform technology is cost-efficient. Being embedded into a network (i.e. a member of the Gebiedonline platform cooperative) enables local organizations without technological know-how to create a local platform according to local priorities and needs at a low cost. The pooled production of platform technology is effective as the implementation fees paid to the cooperative by local organizations wishing to create a local platform become dwindling small when compared to custom-made platforms (G3; G7). The network embedding of local organizations aiming to create a local platform simplifies the local implementation. Such "turn-key" development of local platforms limits the possibilities for local adaptation to several pre-set modules. Nevertheless, the selections of available modules used on a local platform implementations shape the interactions that are likely to result from the platform's use (Gillespie, 2018; Törnberg & Uitermark, 2020). Gebiedonline's platform implementation can draw on a variety of features. Whilst the main features are similar across all of the local platform implementations run by members of the Gebiedonline cooperative, the arrangement and prominence of particular modules are defined locally.

The main aim of Gebiedonline's local platform implementations is to support area or theme-specific community-building. In this aim, local platform implementations serve as registries of local stakeholders. Like transnational platform corporations, local non-corporate platforms build on what Grabher and van Tuijl (2020) call "matchmaking potential". For instance, 38 of the 39 local platforms feature a registry of persons and local projects, 37 include lists of organizations, and 35 list places. Across all local platforms, a total of 24,928 persons, 5226 organizations, 4530 projects, and 1845 places are registered online.[1]

For the time being, direct private messaging is not possible on Gebiedonline. The local platforms serve as a site for intermediation; allowing locals to find each other (G5; G7; G8), while "most of the knowledge is shared by just calling each other or mailing each other" (G7). On 31 of 39 platform implementations, participants can write reports or express wishes on how to improve the area. This way until mid-2021, 15,649 reports (on average 401 per local platform implementation) and 302 wishes for improvement (on average 12 per platform using the "wishes"-module) were shared by participants on all of the cooperative's platform implementations. The reports and "wishes" section allow other platform participants to react with a commentary, or signal support and/or willingness to help by clicking on a dedicated button. This way local platform implementations are used for civic interactions, meaning the collective pursuit of "societal, political, and cultural goals outside of the main institutional frameworks" (Pesch et al., 2019, 305). Local embeddedness protects the numerous platform participants from trolling or hate speech – problems that transnational corporate platforms face – because a real-name policy and incentives to display profile pictures turn anonymous platform users into recognizable neighbors (G3). Gebiedonline-based platforms also automatically generate newsletters based on participant-generated content, which interviewees described as a key way of engaging with a broader set of (less active) participants. (G2; G7).

Politically-orientated interactions, in which governments and civil society interact on digital platforms (as described by Falco & Kleinhans, 2018), take place on five of Gebiedonline's local platform implementations. The district government of Amsterdam-East, for instance, implemented a participatory budgeting scheme with Hallo IJburg and later created its Gebiedonline-based platform implementation[2] for participatory processes liked to Amsterdam-East's area plan (G1; G3; G4). In other areas, Gebiedonline based platforms are used to organize parts of participatory budgeting schemes (G3; G4). However, political interactions are used in an experimental way and it is unlikely that local governments will use Gebiedonline as the main platform technology for participatory policy-making (G1; G4). Like the politically orientated interactions on area-based implementations, theme-orientated platform implementations also indicate that the transformative power of platforms (Barns, 2019) is used to "co-creatively start designing solutions" with citizens and civil society (G5 also G1; G4). An agenda module is used to coordinate face-to-face activities of local civil society initiatives online via the local platform implementations. This way local platforms structure a plethora of local activities linked to the specific themes defined by a local member of the cooperative.

Economic interactions also take place on Gebiedonline's local platform implementations (G3). On 34 platform implementations, businesses can create a profile in the "organizations" registry and announce their services on a "marketplace". On these 34 platforms the "marketplace", on average, consists of 25 announcements of new services, 14 postings of persons searching for service providers, volunteers, or project partners, and 9 classified advertisements by local persons comparable to platforms such as eBay or craigslist (G4).

On rare occasions, additional features are requested by individual members of the cooperative. In these cases, extra technology can be developed, if the cooperative member desiring the technology is able and willing to pay for the technology's development (G1; G3).

5. Decidim: non-corporate platforms as FLOSS commons

5.1. Collective creation and maintenance of platform technology

Decidim is one of the long-term outputs of the social and political 15 M movement (D6, also Bua & Bussu, 2020) that originated in 2011 during social unrests caused by the economic downturn which followed the 2008 great recession (Castells, 2012). Part of the 15 M movement institutionalized into the party Barcelona en Comú [Barcelona in Common in Catalan, henceforth BenC] (D2; D3; CB3), which won Barcelona's municipal elections in 2015. Having won the election with a proposal of implementing a participatory government (Barcelona En Comú, 2015), BenC created Decidim's platform technology in the first months of its mandate to elaborate the municipal action plan[3] in a participatory manner. The first creation of Decidim's platform technology involved non-profit knowledge institutions (i.e. universities, fab labs, knowledge networks) and European small and medium enterprises[4] (D4). Avoidance of partnering with transnational platform and technology corporations exhibited a clear ideological shift from the technology policy of the previous municipal government (de Hoop et al., 2018). From its first creation, Decidim enabled the participatory elaboration of public policies by creating discussion boards, digital voting mechanisms, and organizing proposals made in face-to-face meetings (Solà, 2018). To date, Decidim's platform technology offers an even broader set of tools that can be implemented locally by local stakeholders such as direct messaging, creation of petitions, and calls for participation(Decidim Docs; Peña-López, 2019).

The creation processes of Decidim's technology were ideologically guided by the techno-politics concept which "assume[s] the primacy of technological change and the contingency it creates in terms of political power" (Kurban et al., 2017, 8) and hacker ethics (Bua & Bussu, 2020, 10). Techno-politics and hacker ethics highlight the potential of locally embedding platform technology by building on decentralized FLOSS-

[1] It is important to consider the registering on multiple local platforms is common.

[2] https://onsgebied.nl/ (accesses on July 7th 2021)

[3] The municipal government defines the municipal action plan as "the city's roadmap for this period, the cornerstone of the political strategy and main goals for the City Council's current term of office" https://ajuntament.barcelona.cat/seguretatiprevencio/en/municipal-action-plan (accessed March 14th 2021)

[4] https://decidim.org/partners/ (accessed March 14th 2021)

based technology which aims to ensure widespread technology access and the capacity of modifying the platform's source code (D3) (also in Kurban et al., 2017; Smith & Martín, 2020). Bua & Bussu, 2020 describe Decidim as part of democracy-driven governance, which is an "attempt by social movements to 'move into the state' and radicalize participatory governance as part of their strategy for change". In this sense, while the government lies at the start of the formal platform creation process, the conceptual, political, and social basis of Decidim's platform technology was created in a social and political movement outside of government.

Relying on a FLOSS-based platform technology was one strategy to safeguard the longevity of Decidim (D1) as FLOSS is necessarily embedded into networks of co-creators; the Decidim-community (D4; D6).

> Decidim is a democratic community. Since we're building a software project for democracy, it was an essential requirement that the process of elaboration of this code and this platform also be done in a democratic and participatory way. Since the beginning, we have built and promoted a community […] that reflects, makes proposals and contributes to the code and the platform. (D6).

The Decidim-community is based on two platforms: First, Meta-Decidim[5] is a specific Decidim-platform dedicated to discussing the platform's design, technology, and governance. On Meta-Decidim, persons, collectives, organizations, and governments who use a Decidim-based platform suggest new functionalities to Decidim's technology and discuss technical issues. Meta-Decidim is based on Decidim's platform technology and thus shares many characteristics with all Decidim-based platform implementations. This meta-platform mobilizes decentralized crowd intelligence to improve technopolitical processes (Kurban et al., 2017). As of March 2021, 201 participants have made 599 proposals for improvement[6] and 109 participants have reported 433 technical issues.[7] Second, the Decidim-community uses a dedicated GitHub-page[8] to collectively address proposals for improvement and technical issues raised on Meta-Decidim. GitHub is the globally leading platform that structures decentralized and collaborative FLOSS development (Graham & De Sabbata, 2020). Decidim's GitHub page is openly accessible and a community of software developers collaboratively implements new functionalities and fixes technical issues signaled on Meta-Decidim (D4).

The openness in the Meta-Decidim and GitHub communities has limits "in terms of cultural capital" (D7; also D1). Not every citizen can (effectively) submit a proposal, because "it is necessary to know the codes for a proposal to be accepted on Meta-Decidim" (D7). Participation on GitHub is also unevenly spread: Of the 99 persons who contributed to the Decidim software on GitHub until March 2021 the ten most active contributors account for over 75% of all software contributions.[9] One person involved in the creation of Decidim admits "that 99.99% of Barcelona's citizens do not know and do not care that the digital processes of the City Council are on GitHub and can be commented upon" (D1). However, he argues, that the shift from proprietary platform technology towards FLOSS is nevertheless ground-breaking because it enables the formation of a growing community. Decidim's software is different from the participatory platforms developed by "major consultancies with a proprietary code" (D1) because Meta-Decidim is not only used to maintain the platform technology, but also to reflect on the platform's social outcomes (Peña-López, 2019). The Meta-Decidim enables the network to maintain the platform's technology to establish a social contract and to discuss the values associated with the platform's use.

The Meta-Decidim and GitHub communities are autonomous, but Barcelona's municipal administration nevertheless holds a key role in the Decidim's technology creation and maintenance. Most contributors on Meta-Decidim and Decidim's GitHub have some relations to Barcelona's municipal government and the municipal government also finances running the Meta-Decidim platform and seconds employees to improve Decidim's code on GitHub. In this sense, the maintenance of Decidim FLOSS depends on the sponsorship of the municipal government, even if the creation of the Free Software Foundation Decidim[10] in 2019 and a subsequent collaboration agreement grants the community of Decidim's developers greater autonomy.

5.2. Governance of platform dissemination

About 70 cities, regional authorities, civil society organizations, and corporations have adopted Decidim (Borge et al., 2018). Since Decidim is based on FLOSS, at first sight there seem to be only limited legal or ownership-related barriers to its dissemination, apart from its social contract and the GPL. However, the technological complexity of the implementation of the software represents a major hurdle to the dissemination of Decidim, as neither the Free Software Association Decidim nor the Barcelona municipality has the capacity to creating local platform implementations. Since a vast majority of organizations implementing a Decidim platform lack the know-how to modify Decidim to their needs, whenever necessary, requests are posted on Meta-Decidim. This way, demands for technological adaptation become coupled with a new "governmentality through code" (Klauser et al., 2014) based on openness and participatory processes, which differ significantly from the governmentality imposed by transnational platform corporations.

Most organizations desiring to implement a Decidim-based platform require considerable support, which is provided by intermediate organizations. Two notable organizations that act as intermediaries are Localred, a network of Catalan municipalities, and Open Source Politics, a consultancy start-up specialized in managing participatory processes with Decidim.

Localred has played a key role in disseminating Decidim in Catalan municipalities. In a collaboration agreement with the municipality of Barcelona and the Free Software Association Decidim, Localred is tasked with supporting "city councils in the implementation of the platform and offer technical advice for the development of participatory spaces using the Decidim platform" Collaboration Agreement, 2019). Localred thus coordinates the knowledge transfer to smaller municipalities and provides structured feedback on possible improvements of the platform technology (D4). The role of Localred in strengthening the dissemination in Catalonia led to Decidim's adoption in 13 municipalities (in addition to Barcelona), two provinces, and by the Catalan regional government (17 of 43 government-managed implementations of Decidim are in Catalonia).

[5] https://meta.decidim.org/ (accessed March 14th 2021)

[6] https://meta.decidim.org/processes/roadmap/all-metrics (accessed March 14th 2021)

[7] https://meta.decidim.org/processes/bug-report (accessed March 14th 2021)

[8] https://github.com/decidim/decidim (accessed March 14th 2021)

[9] https://github.com/decidim/decidim/graphs/contributors (accessed March 14th 2021)

[10] To grant the Decidim community more autonomy, in February 2019, the Free Software Association Decidim was created. Persons and organizations "interested in the development, growth and improvement of the democratic infrastructure of digital participation based on free software Decidim.org" can become members of this independent foundation (Associació de Software Lliure Decidim, 2021). The main task of the foundation is to be "the instrument of governance of the Decidim community" (Associació de Software Lliure Decidim, 2021). This move aims to provide the Decidim community greater autonomy, by reducing the direct role of government organizations in the platform and algorithmic governance. However, the government of Barcelona is still involved by seconding one employee, supporting the Free Software Association Decidim economically and hosting the Meta-Decidim community online.

Open source politics (OSP) is a French start-up that consults governments, NGOs, and corporations on improving or creating their digital participation platforms (D7). OSP offers turnkey solutions for participatory processes and embeds digital platforms into (face-to-face) participatory policy-making processes (D7; D8). All of the 17 Decidim-based implementations in France mention OSP in their imprint as the platform's creator. The services of OSP range from the provision of technical support to use Decidim-technology to the delivery of entire participatory processes with a customized Decidim-based platform implementation (D7). If OSP creates additional features for Decidim-based platforms, per GPL and FLOSS standards, the newly created code must be made available to the entire Decidim-community. The FLOSS nature of Decidims technology makes it possible for companies to base their business model on disseminating and improving Decidim. The GPL license allows commercial activity involving FLOSS as long as all derivative software is shared with the community (Birkinbine, 2020; Stallman, 2002). Scholars have criticized this position of FLOSS "between capital and commons" as it allows corporate stakeholders to "commercially exploit collaborative production […] communities" (Birkinbine, 2020, 3).

5.3. Local platform implementation

Decidim's platforms are primarily used for participatory policy-making and most of the processes that take place in Decidim are temporarily bounded processes that aim to elaborate, amend or evaluate a particular set of public policies (D1, D3; D6; D7). Decidim's platforms are generally directly implemented by governments that ensure the local platform's embeddedness into a wider institutional framework. To this end, Decidim's platform technology offers a variety of modules, which can be applied accordingly to embed the local platform implementation into local policy processes:

> We have participatory processes, assemblies, citizen initiatives, consultations. […] For instance, in a process, you can have proposals, meetings, a blog, or assemblies. If you like, you could have only proposals and their results. You have a big administration panel, and then you can configure for your needs. Now, like, we think that democracy, it's always really different from a place to another, like maybe on details (D4).

Decidim's most central innovation, however, is the technology's focus of integrating online and face-to-face instances of public participation (e.g. Smith & Martín, 2020, 17; Peña-López, 2019). It serves as a platform in which deliberation takes place, but also, on which the deliberation that takes place in face-to-face assemblies is uploaded and is commented upon by those unable to attend face-to-face events.

The interviewees involved in Decidim's creation were skeptical of "clicktivism" which characterizes interactions on platforms of the likes of Facebook and Twitter (D1, D3). Instead, they worked to design the platform in a way that fosters deliberation between citizens and allows processes and debates to be transparent (e.g. Aragón et al., 2017). A former high-ranking member of the municipal government summarizes: "Decidim is not about you giving out "likes" but about generating collective debates in a traceable digital space." (D3).

Direct citizen-to-citizen interaction is encouraged by platform design. In contrast to Gebiedonline, Decidim allows citizens participating online to interact via private messages. In rarer instances, local stakeholders use virtual spaces to directly organize civil society activities. This is the case for neighborhood assemblies and representatives using Decidim for internal debates (D6). Some organizations such as the International Observatory on Participatory Democracy and the Catalan Federation of Scouting and Guiding have a Decidim-based platform with restricted access for internal use only. In the French city of Angers, citizens have used Decidim's "communities"-function to mobilize volunteers to support those hit hardest by Covid19-related social isolation (D8).[11]

6. Discussion

In this paper, we inquired into the processes in which non-corporate platforms are created and maintained, disseminated, and locally implemented. We found that in two vastly different approaches to local non-corporate platforms – platform cooperativism and FLOSS-based platforms – numerous similarities explain the persistence of non-corporate platforms despite their lack of critical size. In both cases, platform technology creation begins with a locally embedded pilot. However, the maintenance and dissemination of platform technology, then, is embedded in a network that allows stakeholders to participate in technology governance as suggested by concepts such as "hacking urbanism" (e.g. de Waal & de Lange, 2019) and techno-politics (Kurban et al., 2017; Smith & Martín, 2020). Being embedded in a network allows local civil society organizations and governments to share the costs of technology maintenance. The networked technology maintenance shows that non-corporate organizations (i.e. civil society organizations and local governments), like businesses (e.g. Echols & Tsai, 2005; Uzzi, 1996) can benefit from network embeddedness. While platform technology is maintained in a network-embedded way, platforms are implemented in a locally embedded manner. Local platform implementation accounts for what McKeever et al., (2014, 230) call "the natural everyday settings" in which a particular (economic) endeavor – in this case, the local non-corporate platform implementation – is "framed against a backcloth of prevailing circumstances and situational constraints" (McKeever et al.,2014, 231).

It is very unlikely that local platforms, such as cooperatives or FLOSS-based platforms, can effectively compete with the "'winner takes it all' nature of platforms" (Barns, 2019, 7; also Srnicek, 2016; Langley & Leyshon, 2017; Pais & Provasi, 2020) to become more than "glitches" (Leszczynski, 2020). Nevertheless, our cases show that combining network embeddedness (i.e. like-minded organizations that share technological resources) with a local embedding (to collect financial and technical support) allows non-corporate platforms to persist. The processes governing the dissemination of platform technology and the systems in which stakeholder feedback is incorporated also differ between platform cooperativism and FLOSS-based platforms (see Fig. 2). In platform cooperativism, network embedding means putting greater attention on technology ownership (Kenney & Zysman, 2016) and sharing ownership with like-minded organizations (Schneider, 2018; Scholz, 2016). In FLOSS-based platforms, a loose community of committed stakeholders takes care of software commons (Benkler & Nissenbaum, 2006; Birkinbine, 2018).

Non-corporate platforms, particularly FLOSS-based platforms, highlight the openness of their technology and the possibilities to locally adapt platform technology software to create strongly embedded local implementations. This openness only extends to organizations that *can* adopt the FLOSS technology or join a cooperative. The entry requirements of the Gebiedonline cooperative are formalized barriers while the necessary knowledge and technology to use Decidim are fuzzy and context-dependent. Nevertheless, both case studies that emblematically represent two distinct types of local non-corporate platforms avoid the centralization of technological power by creating mechanisms for participatory platform technology creation (van Dijck, Poell, & de Waal, 2018; Birkinbine, 2018).

To be successful, however, in both platform cooperativism and

[11] https://ecrivons.angers.fr/assemblies/ENTRAIDE (accessed March 14th 2021)

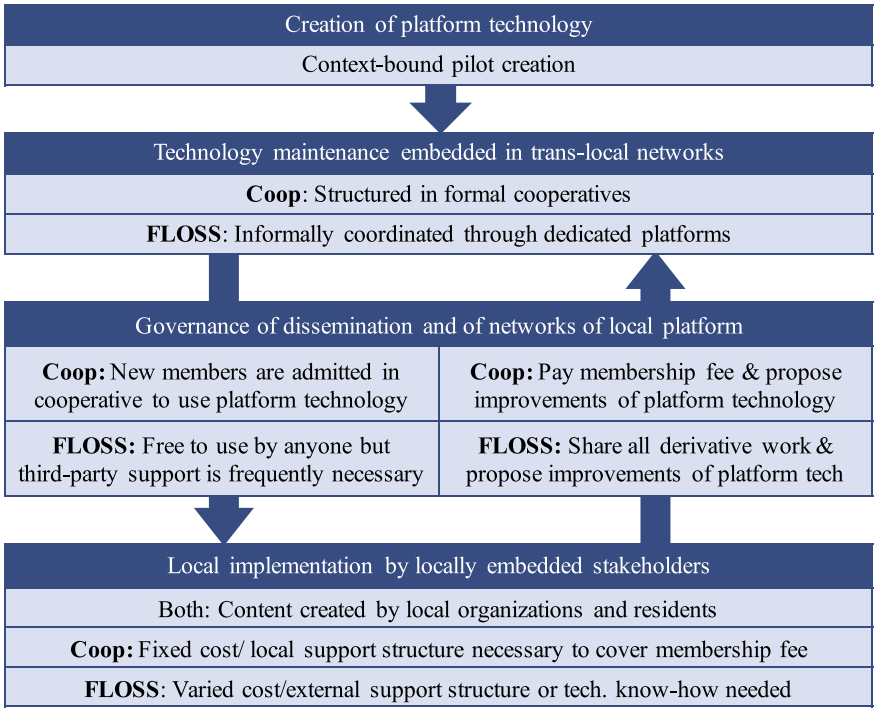

Fig. 2. Illustration summarizing this paper's findings on platform creation and maintenance, dissemination, and local implementation by cooperative and FLOSS-based non-corporate platforms.

FLOSS-based platforms, local implementation of platform technology is dependent on at least some degree of support of local governments and local civil society. This means that non-corporate platforms are not only dependent on being embedded into inter-local networks to create and maintain platform technology but are dependent on embedding themselves locally into government and civil society structures. Notably, the necessity for government support, but also the necessary civil society structures indicate that the implementation of local non-corporate platforms, such as Gebiedonline and Decidim, is limited to regions in which governments and civil society organizations have sufficient financial and infrastructural capacities to do so. These results hint that non-corporate platforms might be liked to *territorial* digital divides (see Pearce & Rice, 2017; also Graham & De Sabbata, 2020; Haveri & Anttiroiko, 2021). This highlights the relevance of Zook et al.'s (2004, 156) argument that the "way in which places and people become 'wired' (or remain 'unwired') still depends upon historically layered patterns of financial constraint and cultural and social variation." In other words, as the persistence of non-corporate platforms is bound to specific geographical contexts, non-corporate platforms are also a reflection of spatially pronounced digital divides.

To combat territorial digital divides at least at a regional scale, organizations such as Localred and OSP provide support to implement Decidim platform technology, while the Gebiedonline cooperative directly provides set-up services. Nevertheless, Sandoval (2020) and Schneider (2018) point to the processes of using FLOSS for profit-making as a form of co-optation of technological commons. The existence of (and dependence upon) an ecology of intermediaries providing FLOSS-related services to governments, civil society stakeholders, companies, and universities is a common and intended feature of successful FLOSS projects (e.g. Stallman, 2002). Regarded from a larger scale, however, the uneven dissemination of locally embedded platforms is likely to strengthen gaps in the social infrastructure of areas. Like their corporate counterparts, non-corporate platforms also (re-)produce digital inequalities (for another example see Graham & De Sabbata, 2020), even if these inequalities differ significantly from those produced by corporate platform urbanism (Barns, 2020; Langley & Leyshon, 2017; Srnicek, 2016).

The Covid19-pandemic impacted local social and economic structures (at least temporally) questioning the ordinariness of face-to-face interactions. While on many occasions the pandemic has led to an increased significance of virtual tools (e.g. Zoom), it destabilized the local social networks into which local non-corporate platforms are embedded. For Gebiedonline's implementations, for instance, the lack of events and accessible physical spaces in the neighborhoods negatively impacted the relevance of neighborhood platforms as local content was lacking (D8, D7). The same applies to Decidim-based platform implementations, where digital participative processes could no longer be embedded into face-to-face participatory processes. Without the possibility to embed the digital citizen participation to face-to-face participatory processes the entire participatory processes risk excluding citizens that lack access to the platform (e.g. Anttiroiko, 2016; Scheerder et al., 2017). Digital public engagement is motivated by public engagement and not by digitalization and digital innovation (Cho, Mossberger, Swindell, & Selby, 2020), meaning that if digital (political or social) interactions are dis-embedded from the face-to-face public realm the advantages of local non-corporate platforms vanish. Even if some interactions such as digital social support and self-help networks, were maintained or intensified thanks to the existence of local non-corporate platforms, the lack of face-to-face interactions during the pandemic reduced the relevance of local non-corporate platforms.

7. Conclusion

This paper discussed the question of how non-corporate platforms are created and maintained, disseminated, and locally implemented, given their absence of critical size. To address this question, we analyzed two vastly different manifestations of non-corporate platforms as platform cooperativism and FLOSS-based platforms with paradigmatic two case studies: Gebiedonline and Decidim. We conceptualized network and local embedding to argue that local non-corporate platforms persist because they disentangle network-embedded platform technology creation and maintenance, from locally embedded platform

implementation. Crucially, we find that the persistence of non-corporate platforms is possible because the dimensions of creation and maintenance, dissemination, and local implementation are disentangled and either embedded locally or into networks.

First, the creation of the initial platform technology takes place as a pilot which is embedded in a specific local context. The maintenance of platform technology, then, harnesses the benefits of embedding cost-intensive technological developments in a network. Collaborative platform technology maintenances take place in delimited (as is the case in platform cooperatives) or open communities (as in FLOSS-based platforms) which include, formal or informal, feedback loops.

Second, the network-embedded platform technology creation and maintenance, and locally embedded platform implementation are mediated by a governed platform dissemination, which establishes the conditions for platform technology use and the channels for technology improvement. Platform cooperativism and FLOSS-based platforms are approaches to govern platform dissemination and interact with a plethora of locally embedded implementations either in a formalized, delimited; or in an informal, open way.

Third, while dis-embedded local implementations of transnational platforms corporations follow decisions from distant headquarters, we find that non-corporate platforms depend on local support structures (e.g. mostly functioning local governments and civil society) to exist. This dependency on the local support emphasizes that non-corporate platforms are, by necessity, locally embedded. Moreover, due to their local embedding, the modularity of platform technology and the interaction with technology developers (through formal cooperatives or informal FLOSS-communities) platform implementors locally set up platform technology in a way that accounts for local needs and specificities. In this sense, local embeddedness not only explains the persistence of small enterprises (Granovetter, 1985), but also the persistence of non-corporate platforms in the light of their structural disadvantage compared to transnational platform corporations.

While local embedding explains the persistence of non-corporate platforms, the (technical) possibilities for local embedding are, in turn, conditioned by a network in which the local platform implementors are embedded. By building a network of local applications, non-corporate platforms capitalize on the advantages of scaling up cost-intensive technology creation, maintenance, and improvement, while at the same time representing geographically rooted alternatives to prevailing embodiments of platform capitalism.

The article contributes to the literature on "glitches" in platform capitalism (Graham, 2020; Srnicek, 2016; Leszczynski, 2020; Chiappini, 2020; Certomà et al., 2020) by introducing the concepts of (local and network) embeddedness to explain the persistence of non-corporate platforms. Our conceptual findings contribute to digital geography in asserting that the spatial configurations of non-corporate platforms differ substantially from the geography of transnational platform corporations. By drawing on platform cooperativism and FLOSS, this paper also interacts with wider debates on grassroots "hacking" urbanism and "bottom-up" smart cities (e.g. Balestrini et al., 2017; de Waal & de Lange, 2019; Morozov & Bria, 2018).

Naturally, this study has multiple limits. First, the operationalization of non-corporate platforms into platform cooperativism and FLOSS-based platforms with only two case studies means that our conclusions require additional empirical confirmation. Findings that are attributed to platform cooperativism or a FLOSS-commons approach might be the consequence of local specificities, not of the platforming approach. Second, the possibilities to combine both concepts of alternative platform urbanism are ignored for the sake of analytical clarity. Third, the study lacks a direct comparison between local non-corporate platforms and corporate platforms that seek to embed themselves locally by creating geographically restricted access and strongly adapting their intermediation and platform architecture to local institutions (e.g. Nextdoor). Future research should directly disentangle the elements which the study focuses on – network and local embeddedness of platforms and on non-corporate platforms as platform type– from each other by analyzing locally embedded corporate platforms and transnational non-corporate platforms as cases. Future inquiries into the persistence of non-corporate platforms need to expand on the methods used here by engaging in digital ethnography and social network analysis.

Finally, the continuous growth of both Gebiedonline and Decidim as successful local non-corporate platforms highlights the importance of inquiring into the platformization processes that take place outside and in parallel to the dominant processes of platform capitalism (Farías & Widmer, 2018; Leszczynski, 2020). This study should therefore be understood as a point of departure for further research on both local and non-corporate platformization processes.

Declaration of Competing Interest

There are no competing interests to declare for this submission.

Acknowledgements

This research was made possible thanks to the financial support of the German Research Foundation (Deutsche Forschungsgemeinschaft [grant number GR1913/14-1]). Gernot Grabher, Joachim Thiel and Erwin van Tuijl supported the Gebiedonline case study and provided guidance without which this article would not have been possible. Similarly, Thamy Pogrebinschi and Fátima Ávila Acosta made the study on Decidim possible. Nevertheless, all responsibility for the content of this article lies with the author alone.

References

Ansell, C., & Miura, S. (2020). Can the power of platforms be harnessed for governance? *Public Administration, 98*(1), 261–276. https://doi.org/10.1111/padm.12636

Anttiroiko, A.-V. (2016). City-as-a-platform: The rise of participatory innovation platforms in Finnish Cities. *Sustainability, 8*(9), 922. https://doi.org/10.3390/su8090922

Aragón, P., Kaltenbrunner, A., Calleja-López, A., Pereira, A., Monterde, A., Barandiaran, X. E., & Gómez, V. (2017). Deliberative platform design: The case study of the online discussions in Decidim Barcelona. In G. L. Ciampaglia, A. Mashhadi, & T. Yasseri (Eds.), *10540. Social informatics* (pp. 277–287). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-67256-4_22.

Ash, J., Kitchin, R., & Leszczynski, A. (2018). Digital turn, digital geographies? *Progress in Human Geography, 42*(1), 25–43. https://doi.org/10.1177/0309132516664800

Associació de Software Lliure Decidim. (2019). Estatuts de l'Associació de Software Lliure Decidim. https://ajbcn-meta-decidim.s3.amazonaws.com/uploads/decidim/attachment/file/2334/ESTATUTS_ASSOC_SOFTWARE_LLIURE_DECIDIM.pdf.

Balestrini, M., Collada, P., Bianchi, M., Diez, T., Espelt, R., Garriga, M., Gutiérrez, B., et al. (2017). *The ecosystem of an open democracy*. Barcelona: LuzAzul ediciones.

Barcelona En Comú. (2015). Programa electoral municipals 2015. https://barcelonaencomu.cat/programa.

Barns, S. (2019). Negotiating the platform pivot: From participatory digital ecosystems to infrastructures of everyday life. *Geography Compass, 13*(9). https://doi.org/10.1111/gec3.12464. e12464.

Barns, S. (2020). *Platform urbanism: Negotiating platform ecosystems in connected cities*. Geographies of Media. Palgrave Macmillan. https://doi.org/10.1007/978-981-32-9725-8.

Bauwens, M., & Kostakis, V. (2014). From the communism of capital to capital for the commons: Towards an open co-operativism. *TripleC: Communication, Capitalism & Critique. Open Access Journal for a Global Sustainable Information Society, 12*(1), 356–361. https://doi.org/10.31269/triplec.v12i1.561

Benkler, Y., & Nissenbaum, H. (2006). Commons-based peer production and virtue. *Journal of Political Philosophy, 14*(4), 394–419. https://doi.org/10.1111/j.1467-9760.2006.00235.x

Birkinbine, B. J. (2018). Commons praxis: Toward a critical political economy of the digital commons. *TripleC: Communication, Capitalism & Critique. Open Access Journal for a Global Sustainable Information Society, 16*(1), 290–305. https://doi.org/10.31269/triplec.v16i1.929

Birkinbine, B. J. (2020). *Incorporating the digital commons*. University of Westminster Press. https://doi.org/10.16997/book39

Bogers, M., Zobel, A.-K., Afuah, A., Almirall, E., Brunswicker, S., Dahlander, L., Frederiksen, L., et al. (2017). The open innovation research landscape: Established perspectives and emerging themes across different levels of analysis. *Industry and Innovation, 24*(1), 8–40. https://doi.org/10.1080/13662716.2016.1240068

Borge, R., Balcells, J., Padró-Solanet, A., Batlle, A., Orte, A., & Serra, R. (2018). 2018 September 24).La participación política a través de la plataforma Decidim: análisis de 11 municipios catalanes.. In *IX Congreso Internacional en Gobierno, Administración y Políticas Públicas GIGAPP*.

Bua, A., & Bussu, S. (2020). Between governance-driven democratisation and democracy-driven governance: Explaining changes in participatory governance in the case of Barcelona. *European Journal of Political Research.* https://doi.org/10.1111/1475-6765.12421

Castells, M. (2012). *Networks of outrage and hope: Social movements in the internet age* (1 ed., p. 328). Cambridge, UK ; Malden, MA: Polity. ISBN 978-0745695761.

Certomà, C., Frey, M., & Corsini, F. (2020). Hyperconnected, receptive and do-it-yourself city. An investigation into the European "imaginary" of crowdsourcing for urban governance. *Technology in Society, 61*(May), 101229. https://doi.org/10.1016/j.techsoc.2020.101229

Chiappini, L. (2020). The urban digital platform: Instances from Milan and Amsterdam. *Urban Planning, 5*(4), 277–288. https://doi.org/10.17645/up.v5i4.3417

Cho, S., Mossberger, K., Swindell, D., & Selby, J. D. (2020). Experimenting with public engagement platforms in local government. *Urban Affairs Review, 57*(3), 763–793. https://doi.org/10.1177/1078087419897821

Collaboration Agreement. (2019). https://ajbcn-meta-decidim.s3.amazonaws.com/uploads/decidim/attachment/file/2335/Conveni_Ajuntament_Localret_Decidim_ENGLISH_VERSION.pdf.

de Waal, M., & de Lange, M. (2019). Introduction—The Hacker, the city and their institutions: From grassroots urbanism to systemic change. In M. de Lange, & M. de Waal (Eds.), *The Hackable city* (pp. 1–22). Singapore: Springer Singapore. ISBN 978-981-13-2694-3.

van Dijck, J., Poell, T., & de Waal, M. (2018). *The platform society: Public values in a connective world* (p. 400). Oxford, United States: Oxford University Press USA. ISBN-13: 9780190889760.

van Doorn, N. (2020). A New institution on the block: On platform urbanism and Airbnb citizenship. *New Media & Society, 22*(10), 1808–1826. https://doi.org/10.1177/1461444819884377

Echols, A., & Tsai, W. (2005). Niche and performance: The moderating role of network embeddedness. *Strategic Management Journal, 26*(3), 219–238. https://doi.org/10.1002/smj.443

Falco, E., & Kleinhans, R. (2018). Digital participatory platforms for co-production in urban development: A systematic review. *International Journal of E-Planning Research, 7*(3), 52–79. https://doi.org/10.4018/IJEPR.2018070105

Farías, I., & Widmer, S. (2018). Ordinary smart cities. How calculated users, professional citizens, technology companies and city administrations engage in a more-than-digital politics. *TECNOSCIENZA: Italian Journal of Science & Technology Studies, 8*(2), 43–60.

Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry, 12*(2), 219–245. https://doi.org/10.1177/1077800405284363

Frenken, K., & Fuenfschilling, L. (2020). The rise of online platforms and the triumph of the corporation. *Sociologica, 14*(3), 101–113. https://doi.org/10.6092/issn.1971-8853/11715

Gerring, J. (2006). *Case study research: Principles and practices* (p. 278). Cambridge, UK: Cambridge University Press. ISBN 978-0521859288.

Gerritsen, M., Savini, F., & Revilla, B. P. (2020). The social appraisal of techno-experiments: Whirlpools and mosaics of smart urbanism. *Journal of Urban Technology, 0*(0), 1–22. https://doi.org/10.1080/10630732.2020.1777812

Gil, O., Cortés-Cediel, M. E., & Cantador, I. (2019). Citizen participation and the rise of digital media platforms in smart governance and smart cities. *International Journal of E-Planning Research (IJEPR), 8*(1), 19–34. https://doi.org/10.4018/IJEPR.2019010102

Gillespie, T. (2010). The politics of "platforms.". *New Media & Society, 12*(3), 347–364. https://doi.org/10.1177/1461444809342738

Gillespie, T. (2018). Governance of and by platforms. In J. Burgess, A. Marwick, & T. Poell (Eds.), *SAGE handbook of social media* (pp. 254–278). SAGE Publications Ltd. https://doi.org/10.4135/9781473984066.n15.

Grabher, G. (1993). *The embedded firm: On the socioeconomics of industrial networks.* London ; New York: Cengage Learning EMEA. ISBN: 9780415073745.

Grabher, G. (2020). Enclosure 4.0: Seizing data, selling predictions, scaling platforms. *Sociologica, 14*(3), 241–265. https://doi.org/10.6092/issn.1971-8853/12107

Grabher, G., & König, J. (2020). Disruption, embedded. A Polanyian framing of the platform economy. *Sociologica, 14*(1), 95–118. https://doi.org/10.6092/issn.1971-8853/10443

Grabher, G., & van Tuijl, E. (2020). Uber-production: From global networks to digital platforms. *Environment and Planning A: Economy and Space, 52*(5), 1005–1016. https://doi.org/10.1177/0308518X20916507

Graham, M. (2020). Regulate, replicate, and resist – the conjunctural geographies of platform urbanism. *Urban Geography, 41*(3), 453–457. https://doi.org/10.1080/02723638.2020.1717028

Graham, M., & De Sabbata, S. (2020). The geographic contours of openness. In M. L. Smith, & R. K. Seward (Eds.), *Making open development inclusive: Lessons from IDRC Research.* Cambridge, Massachusetts: The MIT Press.

Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology, 91*(3), 481–510. https://doi.org/10.1086/228311

Haveri, A., & Anttiroiko, A.-V. (2021). Urban platforms as a mode of governance. *International Review of Administrative Sciences*, (April)https://doi.org/10.1177/00208523211005855

Hess, M. (2004). "Spatial" relationships? Towards a reconceptualization of embedded ness. *Progress in Human Geography, 28*(2), 165–186. https://doi.org/10.1191/0309132504ph479oa

de Hoop, E., Smith, A., Boon, W., Macrorie, R., Marvin, S., & Raven, R. (2018). 3 Smart urbanism in Barcelona. In P. Spaeth, M. Cashmore, & J. S. Jensen (Eds.), *The politics of urban sustainability transitions: Knowledge, power and governance.* Routledge.

Husain, S. O., Franklin, A., & Roep, D. (2019). Decentralising geographies of political action: Civic tech and place- based municipalism. *Journal of Peer Production, 13*, 1–22. ISSN 2213-5316.

International Cooperative Alliance. (2021). Cooperative identity, values & principles | ICA. https://www.ica.coop/en/cooperatives/cooperative-identity. (Accessed 18 February 2021).

Kenney, M., & Zysman, J. (2016). The rise of the platform economy. *Issues in Science and Technology, 32*(3), 61.

Klauser, F., Paasche, T., & Söderström, O. (2014). Michel Foucault and the smart city: Power dynamics inherent in contemporary governing through code. *Environment and Planning D: Society and Space, 32*(5), 869–885. https://doi.org/10.1068/d13041p

Kurban, C., Peña-López, I., & Haberer, M. (2017). What is technopolitics? A conceptual schema for understanding politics in the digital age. *IDP Revista de Internet, Derecho y Política, 0*(24). https://doi.org/10.7238/idp.v0i24.3061

Langley, P., & Leyshon, A. (2017). Platform capitalism: The intermediation and capitalization of digital economic circulation. *Finance and Society, 3*(1), 11–31. https://doi.org/10.2218/finsoc.v3i1.1936

Lee, D. (2020). Amazon's advertising business booms in pandemic. December 29, 2020 https://www.ft.com/content/095d73d5-a7a6-4acc-9dcc-9ee3e3d1fff4.

Leszczynski, A. (2020). Glitchy vignettes of platform urbanism. *Environment and Planning D: Society and Space, 38*(2), 189–208. https://doi.org/10.1177/0263775819878721

Lovink, G., & Tkacz, N. (Eds.). (2011). *Critical point of view: A Wikipedia reader.* Amsterdam: Inst. of Network Cultures. INC Reader 7.

McKeever, E., Anderson, A., & Jack, S. (2014). Social embeddedness in entrepreneurship research: The importance of context and community. In *Handbook of research on small business and entrepreneurship*. March.

Mill, J. S. (1869). *A system of logic, ratiocinative and inductive: Being a connected view of the principles of evidence and the methods of scientific investigation.* Harper and brothers.

Morozov, E., & Bria, F. (2018). Rethinking the smart city. In *Democratizing urban technology; Rosa Luxemburg Stiftung.* New York, NY, USA: New York Office.

Murphy, H. (2021). Facebook revenue lifted by ecommerce push during pandemic. *January, 28*, 2021. https://www.ft.com/content/8d4f14d0-a30e-43e5-a8fc-e680d15e3261.

Pais, I., & Provasi, G. (2020). Share vs platform economy. *Sociologica, 14*(3), 217–226. https://doi.org/10.6092/issn.1971-8853/11540

Pazaitis, A., Kostakis, V., & Bauwens, M. (2017). Digital economy and the rise of open cooperativism: The case of the enspiral network. *Transfer: European Review of Labour and Research, 23*(2), 177–192. https://doi.org/10.1177/1024258916683865

Pearce, K. E., & Rice, R. E. (2017). Somewhat separate and unequal: Digital divides, social networking sites, and capital-enhancing activities. *Social Media+ Society, 3*(2). https://doi.org/10.1177/2056305117716272

Peña-López, I. (2019). *Convirtiendo participación en soberanía: el caso de decidim.barcelona* (p. 120). Barcelona: Huygens Editorial. ISBN 978-84-17580-06-3.

Pentzien, J. (2020). *The politics of platform cooperatism.* Institute for Digital Cooperative Economy (ICDE).

Pesch, U., Spekkink, W., & Quist, J. (2019). Local sustainability initiatives: Innovation and civic engagement in societal experiments. *European Planning Studies, 27*(2), 300–317. https://doi.org/10.1080/09654313.2018.1464549

Priester, R., & Niederer, S. (2014). *Analyse van citizen empowerment tools in Amsterdam.* Citizen Data Lab - University of Applied Science Amsterdam. https://pure.hva.nl/ws/files/4264730/Citizen_Empowerment_Tools_regular.pdf.

Royo, S., Pina, V., & Garcia-Rayado, J. (2020). Decide Madrid: A critical analysis of an award-winning e-participation initiative. *Sustainability, 12*(4), 1674. https://doi.org/10.3390/su12041674

Sandoval, M. (2020). Entrepreneurial activism? Platform cooperativism between subversion and co-optation. *Critical Sociology, 46*(6), 801–817. https://doi.org/10.1177/0896920519870577

Scheerder, A., van Deursen, A., & van Dijk, J. (2017). Determinants of internet skills, uses and outcomes. A systematic review of the second-and third-level digital divide. *Telematics and Informatics, 34*(8), 1607–1624. https://doi.org/10.1016/j.tele.2017.07.007

Schneider, N. (2018). An internet of ownership: Democratic design for the online economy. *The Sociological Review, 66*(2), 320–340. https://doi.org/10.1177/0038026118758533

Scholz, T. (2016). Platform cooperativism. In *Challenging the corporate sharing economy.* New York, NY: Rosa Luxemburg Foundation.

Smith, A., & Martín, P. P. (2020). Going beyond the smart city? Implementing technopolitical platforms for urban democracy in Madrid and Barcelona. *Journal of Urban Technology, 0*(0), 1–20. https://doi.org/10.1080/10630732.2020.1786337

Solà, J. (2018). *How are decisions made in Decidim.Barcelona?*. Master Thesis. Barcelona: Universitat Pompeu Fabra.

Srnicek, N. (2016). *Platform capitalism* (1. ed., p. 80). Cambridge, UK ; Malden, MA: Polity. ISBN 978-1509504879.

Stallkamp, M., & Schotter, A. P. J. (2021). Platforms without borders? The international strategies of digital platform firms. *Global Strategy Journal, 11*(1), 58–80. https://doi.org/10.1002/gsj.1336

Stallman, R. (2002). *Free software, free society: Selected essays of Richard M. Stallman* (p. 220). Boston, MA: Free Software Foundation. ISBN 978-0-9831592-6-1.

Stryjan, Y. (1994). Understanding cooperatives: The reproduction perspective. *Annals of Public and Cooperative Economics, 65*(1), 59–80. https://doi.org/10.1111/j.1467-8292.1994.tb01506.x

Törnberg, P., & Uitermark, J. (2020). Complex control and the governmentality of digital platforms. *Frontiers in Sustainable Cities, 2*. https://doi.org/10.3389/frsc.2020.00006

Uzzi, B. (1996). The sources and consequences of embeddedness for the economic performance of organizations: The network effect. *American Sociological Review, 61*(4), 674–698. https://doi.org/10.2307/2096399

van Doorn, N., Mos, E., & Bosma, J. (2021). 10. Disrupting "Business as Usual": Covid-19 and platform labour. In S. Milan, E. Treré, & S. Masiero (Eds.), *Theory on Demand: 40. COVID-19 from the Margins. Pandemic invisibilities, policies and resistance in the Datafied Society* (pp. 79–83). Amsterdam: Institute of Network Cultures.

Wood, A. J., Graham, M., Lehdonvirta, V., & Hjorth, I. (2019). Networked but commodified: The (dis)embeddedness of digital labour in the gig economy. *Sociology, 53*(5), 931–950. https://doi.org/10.1177/0038038519828906

Zook, M., Dodge, M., Aoyama, Y., & Townsend, A. (2004). New digital geographies: Information, communication, and place. In S. D. Brunn, S. L. Cutter, & J. W. Harrington (Eds.), *Geography and Technology* (pp. 155–176). Dordrecht: Springer Netherlands. https://doi.org/10.1007/978-1-4020-2353-8_7.

Decidim: a brief overview. (Accessed 26 February 2021).