The collaboration dilemma in smart city projects: Time to ask the right questions

Sara Thabit
Tallinn University of Technology, Estonia

Luca Mora (iD)
Tallinn University of Technology, Estonia
Edinburgh Napier University, UK

Abstract

This *Connexions* article links collaboration in smart city projects, a contemporary and undertheorised social challenge, with theories on assemblage thinking, organisation, and public value creation. Using this multidisciplinary lens, we critically analyse smart city theory and expose the inability of prevailing collaborative models to properly account for the complexities of real-world practices. Building on our observations, we formulate a new and more robust theoretical perspective on smart city collaboration, which helps us trigger new research questions that focus on procedural, relational and diversity factors previously ignored.

Introduction

Achieving a more sustainable urban future requires collective action (Le Pennec and Raufflet, 2018; Mervyn et al., 2019). This requirement is emphasised in the United Nations (UN) Agenda 2030, which recommends local and national governments to enhance cross-sector collaborations 'that mobilize and share knowledge, expertise, technology, and financial resources, to support the achievement of the Sustainable Development Goals' (IAEG-SDGs, 2021: 22). However, mobilising

Corresponding author:
Luca Mora, The Business School, Edinburgh Napier University, 219 Colinton Road, Edinburgh, Scotland EH14 1DJ, UK.
Emails: l.mora@napier.ac.uk; luca.mora@taltech.ee

collaborations that involve multiple sectors of society is challenging; they entail elaborate forms of governance (Armistead et al., 2007; Page et al., 2015) and various difficulties that can hinder the effective creation of public value (Hartley et al., 2019b). As a relevant example of cross-sector collaborations, where diverse stakeholders influence the creation (or depletion) of public value, smart city projects perfectly showcase this critical challenge (Neumann et al., 2019).

Smart city projects 'are cross-sector projects which aim to create the conditions needed for smart city innovations and the existing sociotechnical configuration of [urban] local practices to mutually adapt' (Mora et al., 2021: 4). They are forged to trigger a large range of public benefits such as climate change mitigation and improved public sector efficiency (Kutty et al., 2020). Over the past three decades, policymakers in the public sector, private companies, and other urban development actors have increasingly relied on smart city projects to leverage the sustainability potential of digital technology. Data released in the UN World Cities Report 2020 reveals that this interest has fuelled a growing technology market, which reached US$1 trillion in 2019 and is expected to expand to US$3.48 trillion by 2026 (Knudsen et al., 2020).

However, smart city projects do not always lead to the benefits that they are expected to create (Mora et al., 2021). On many occasions, these collaborative endeavours have generated undesired outcomes; for example, they might exacerbate existing social divides, lead to excessive outsourcing of power in favour of private-sector technology providers, and waste the already shrinking resources of public administrations (Taylor Buck and While, 2017). The primary challenge of smart city projects is twofold. First, limited information is available regarding how to organise these cross-sector partnerships towards the public good adequately (Meijer and Bolívar, 2016). Second, few studies attempt to overcome this gap, and they propose collaborative models based on configurations that do not align with the requirements of context-specific value creation processes (Shelton et al., 2015).

In this *Connexions* article, we unveil the collaboration dilemma inherent in smart city literature, together with the need for a more flexible and coherent approach to theorising cross-sector collaborations in smart city projects, which is currently missing. The remainder of this article is organised into six sections. First, we present the key limitations of the prevailing smart city collaborative models, indicating their inability to properly account for the complexities of real-world practices (Castelnovo et al., 2016). Next, building on these limitations, we introduce a new and more robust theoretical perspective on smart city collaboration, which we root in assemblage thinking. Thereafter, we elaborate on this perspective by focusing on three critical matters: the multiplicity and heterogeneity of actors rather than sectors, evolving nature of collaborations, and roles and interrelations among actors. Finally, we discuss our considerations to develop future research directions.

The theoretical perspective that we present draws upon the empirical and conceptual literature on smart city projects, assemblage theory, organisation studies, and public administration. Moreover, these sources have been complemented with data on smart city projects in which one of the authors acted as a UN strategic advisor. Between 2018 and 2021, field notes were collected through participant observation, by examining project reports, formal and informal interactions among project partners, project events, and technical discussions. In this study, we used these data as additional evidence to strengthen the main claims that shape our critical examination.

When theory fails practice: The case of smart city collaboration

Prevailing models: A sector-based mentality

Collaborative dynamics are among the most relevant factors in smart city projects and strongly influence their ability to deliver public value (van Winden and van Den Buuse, 2017). Notwithstanding

this critical role, smart city scholars have raised concerns about the lack of cogent theories elucidating how cross-sector collaboration functions in smart city practices (Ruhlandt, 2018).

The existing literature flags the risk of promoting smart city projects in which technology providers and governments work in isolation from other societal actors – in a *double-helix* model (Mora and Deakin, 2019). On many occasions, this collaborative model has proven to promote techno-utopian expectations and one-size-fits-all technological solutions that prioritise private interests over public benefits (e.g. see Söderström et al., 2014). In response to this limitation, scholars have developed two dominant research streams that propose alternative collaborative models based on the active participation of additional societal sectors. Some scholars recommend relying on university-industry-government connections, which form *triple-helix* coalitions (Leydesdorff and Deakin, 2011), whereas others consider these collaborative arrangements insufficient and have emphasised the need to add civil society, moving to a *quadruple-helix* model of collaboration (Vallance et al., 2020).

However, few studies have examined the causal connections between the aforementioned collaborative models and their actual outcomes, posing a risk of confusion about the components that influence public value creation in the smart city context (Ruhlandt, 2018). In examining how neoliberal discourses can permeate in smart city projects (Hollands, 2015), critical urban scholarship has raised questions about the efficacy of triple- and quadruple-helix models to truly prevent the creation of business-led technology utopias (Grossi and Pianezzi, 2017). Empirical studies have demonstrated that the primary motivation behind the implementation of these collaborative models can be merely rhetorical (Shelton et al., 2015), and their adoption does not necessarily increase the public value of smart city projects (Wiig, 2016). Triple- and quadruple-helix collaborative processes in smart city projects can be introduced as a vehicle to convince the public that decision-making processes are developed in an inclusive and democratic manner (Nguyen et al., 2022), but in reality they are 'put at the service of technocracy and control' (Ghosh and Arora, 2022: 333).

Contextualising collaboration practices

To 'move beyond the neoliberal smart city idea' and its rhetoric (Di Feliciantonio, 2019: 107), more attention should be drawn to *how* collaborations are actually enacted rather than *what* type of actors and sectors are involved. A theorising based on predefined, sector-based collaborative models falls far from responding to the need for contextualised smart city practices. Moreover, it overlooks the longstanding theoretical considerations developed in research fields that examine the processes of organising and organisations in society. Public administration literature has already warned us about the risks of relying on one-size-fits-all models for cross-sector collaborations, advising that they 'tend to neglect the embeddedness of social processes within the larger institutional structures studied in institutional theory, as well as processes of nonlinear emergence as studied in complexity theory' (Selsky and Parker, 2005: 865). Similarly, organisation theory emphasises that cross-sector collaborations are dynamic rather than static settings that 'take different forms according to various contexts' (Audet and Roy, 2016: 879). In these collaborative arenas, actors often play changing roles in value-creation processes and are highly influenced by the social and relational processes in which they are embedded (Le Ber and Branzei, 2010b).

The engagement or non-engagement of societal sectors cannot be mainstreamed as a golden rule for assessing the quality of collaborative conditions; the inclusion of two, three, or even four societal sectors in smart city projects cannot be seen as a condition *sine qua non* to effectively manage public value creation efforts. Social, organisational, and cultural conditions influence the ability of collaborative models to create public value (Meijer et al., 2016) and call for different types of cross-sector collaborations, shaped in accordance with various factors – such as power

imbalances (Vangen and Huxham, 2003), actors compatibility (Brown et al., 2019), geographical proximity (Di Domenico et al., 2009), and material and immaterial resources (Oliver and Ebers, 1998).

For example, urban and organisation studies have exposed the many challenges that lie behind civil society participation processes aimed at enhancing public value creation (Cowley et al., 2018; Kornberger et al., 2017). While the voice of the beneficiary represents an essential asset for public value creation, participatory processes can be misused, 'in ways that deepen and reify their dependence by the dominant actors' (Le Ber and Branzei, 2010b: 607). Cases of urban development projects have revealed that using the input of citizens can be rather difficult, and in some situations, deploying such input has resulted in a reduced opportunity to positively influence intended outcomes (Källström et al., 2021).

Towards more dynamic and diverse collaborative approaches

It is also important to accept that different types of partnerships may be required, including double-helix collaborations, which cannot be stigmatised as opponents of public benefits. In fact, empirical studies on public value creation offer examples of public-private collaborations that have led to social outcomes in the context of smart city projects, such as the *Integreen* and *Real-time Bus* initiatives implemented in the Italian cities of Bolzano and Merano, respectively (Sancino et al., 2018).

As organisational studies emphasise, all societal sectors have public value obligations (Jørgensen and Bozeman, 2007), and business organisations can and do play prosocial roles (Di Domenico et al., 2009). Decades of research connecting organisation theory to strategic management have helped understand that assuming prosocial responsibilities 'has become an accepted operational and managerial [practice] that is widely implemented in organizations' (Gond and Nyberg, 2017: 1127), triggering debates on how this construct reconciles with market practices (Crouch, 2006). This interrelation can also be found in the smart city context; for instance, in Abidjan, Côte d'Ivoire, a large telecommunication company released 2.5 billion anonymised telephone data in 2012 (Talbot, 2013). The data were used by a multinational technology firm to identify the most frequently used bus routes. Despite being implemented by a private actor and without deliberate citizen engagement or triple-helix collaborative models, the action sustained public value creation, providing the city government with actionable information on how to improve its public transport network (Knudsen et al., 2020). However, questions remain regarding whether and how these open data habits can be effectively integrated into urban governance practices.

Another fundamental aspect that has been overlooked is collaboration among entities belonging to the same sector (e.g. public-to-public or private-to-private partnerships). Smart city research is overly focused on defining what cross-sector configurations lead to successful smart city projects. As a result, it ignores that complex collaborative processes tend to 'include both cross- and same-sector partnerships' (Gutiérrez et al., 2016: 55). Intergovernmental partnerships are recognised as exemplary cases of same-sector collaborations with a high potential for public value creation (Bryson et al., 2015). Moreover, the lack of collaboration among different tiers of the government can prevent smart city projects from occurring. For example, in Durban, South Africa, the implementation of a data management system to improve service delivery in informal settlements was undermined by the lack of data sharing practices among different municipal departments and fragmented data and information scattered across government tiers.[1] Similarly, the city of Lyon, France, has attempted to leverage private sector-owned data to enhance urban sustainability by building the MyData platform. Data sharing among industry partners has been indispensable to implementing this smart city project: the more private entities join this collaborative project, the larger the dataset and the possibility of generating public value. However, encouraging private companies to pool

their data and engage in same-sector collaborations has proven challenging, putting the project at risk (Gupta and Mora, 2021).

An assemblage-thinking perspective in smart city research

Conceiving cross-sector collaboration in smart city projects requires acknowledging the myriad of diverse collaborative models that simultaneously coexist in practice as well as the social and political processes underpinning them (Anderson and McFarlane, 2011). To advance theorising, we suggest observing smart city research from the perspective of assemblage theory, which refuses 'any fixed forms [. . .] of processes or relations' (Kamalipour and Peimani, 2015: 403) and help move towards 'a rather common sense fashion to refer to arrangements of any mix of social and material elements' (Hanseth and Rodon Modol, 2021: 12).

Unlike extant approaches to examining smart city collaborations, which mainly revolve around preconceived collaborative models, assemblage thinking helps 'remain deliberately open' (Anderson and McFarlane, 2011: 124) and appreciate the depth of smart city transformation processes. Research on smart city projects primarily focuses on what sectors constitute a collaboration, whereas we impel to address the questions of 'who and what has the capacity to assemble [smart] city' projects (McFarlane, 2011a: 668), and how smart city collaborations perform, evolve, and enact the creation of public benefits (Dovey, 2011). Assemblage thinking allows to 'demystify the power of the powerful' (McFarlane, 2011b: 734) and unveil alternative configurations 'how the city might be assembled differently' (McFarlane, 2011a: 668).

By adopting assemblage thinking, smart city researchers can create a common dialogue between loosely connected streams of research (urban, public administration, and organisation studies) that possess 'different theoretical, activist, and marginalized knowledge' (McFarlane, 2011b: 738) while being part of a common effort to theorise smart city-related phenomena.

Building on Kamalipour and Peimani's (2015) contribution to assemblage theory, this *Connexions* article introduces an assemblage-thinking perspective in the study of smart city projects. This perspective is based on procedural, relational, and diversity factors, which we consider indispensable for examining public value creation in cross-sector collaborations. Smart city projects should be understood as the result of non-static collaborative arrangements (DeLanda, 2006) that follow a 'fluid status of becoming rather than being' (Kamalipour and Peimani, 2015: 404). Multiple and heterogeneous actors from local, national, and international spheres (Dovey, 2011; Varró and Bunders, 2020) engage in collaborative ventures that evolve substantially over time in response to different project phases (Aaltonen and Kujala, 2010; Allen, 2011).

This theoretical understanding of smart city projects is further elaborated in the following sections of this article, where we focus on three critical matters: the multiplicity and heterogeneity of actors rather than sectors, the evolving nature of collaborations, and the roles and interrelations among actors.

Multiplicity and heterogeneity of actors rather than sectors

Cross-sector assemblages cannot be defined by the aggregate properties of the societal sectors involved; rather, they are structured upon the multiplicity of resources that individual actors pool in collaboration (Kamalipour and Peimani, 2015). Therefore, a focus on actor abilities, rather than sectors, is key to unveiling how organisations respond to and engage with social problems. Moreover, this focus in instrumental in understanding what collaborative dynamics regulate smart city project development.

Societal sectors are complex wholes comprising a multiplicity of actors with diverse abilities, interests, and objectives. For example, the UN advises to not consider 'the private sector [as a] homogeneous entity' (Stibbe and Prescott, 2020: 20), because it includes a broad 'range of commercial entities, from smallholder farmers, through small and medium-sized businesses to vast multinational companies' (p. 20). Additionally, hybrid organisations are increasingly emerging at the intersection between sectors, where 'spillovers of concerns for social needs have led to a blurring of the traditional roles and functions of the [public, private, and non-profit] sectors' (Selsky and Parker, 2011: 23).

Belonging to the societal sector is a relevant characteristic of actors collaborating in smart city projects; however, it is not sufficient to fully define them. As organisation studies highlight, actors from the same sector can be influenced differently by political and economic authority and may have diverse legal statuses (Bozeman, 2013). These aspects influence the readiness of individual organisations to create public value through smart city projects. Taylor Buck and While (2017), for example, noted that local governments in major cities in the United Kingdom possess greater policy and investment capacities than in smaller urban contexts. The analysis has revealed that larger cities are more prepared to orchestrate urban digital innovations in collaboration with private sector partners, whereas smaller urban entities have reported conflicts that undermine their track-record of local-government-led smart city projects. Similarly, comparative studies in Hungary and the Netherlands have indicated that various levels of government centralisation can lead to diverse collaborative configurations in smart city projects. Moreover, they can affect how national governments contribute to sustaining or hindering smart city development at the local level (Varró and Bunders, 2020).

In addition to the economic and political aspects, the functionality of a collaborative ecosystem is dependent upon its multilevel configuration. The practices of collaborating actors reproduce scales of action (Varró and Bunders, 2020) that move 'in both vertical and horizontal directions across international, transnational, [. . .] national, regional, and local levels' (Ehnert et al., 2018: 2). Actors possess different types of knowledge that materialise during collaboration, and this knowledge is directly connected with their scales of action; the knowledge of an organisation operating at the city level, for example, is different from the knowledge of individuals who only engage with an urban neighbourhood (Durose et al., 2022). Smart city projects require connecting these knowledge types in a multi-level process where 'grand visions in city hall need to go hand in hand with practices in local neighbourhoos' (Meijer et al., 2016: 653), and where transnational practices flourish beyond a 'one-city [or] one-country game' (Soe and Drechsler, 2018: 331).

Place-specific smart city projects are indispensable to ensure that digital technology is directed towards the service of public value creation and urban sustainability enhancement (Taylor Buck and While, 2017). Therefore, the presence of local actors who possess such knowledge represents a key element of smart city collaborative ecosystems (Ehnert et al., 2018). Smart city initiatives can become ineffective and inhibit public value creation if the collaborative ecosystem is dominated by international actors and prevents local actors from contributing to project development (Mukhtar-Landgren, 2021). Considering that developments in smart city technologies are driven primarily by powerful global corporations having strong financial and technical resources, local-level knowledge tends to be overshadowed, and research on smart cities overlooks this challenge.

How and to what extent the combination of abilities of local and international actors should be balanced in smart city projects remains largely underexplored. Further research is required to inform the design of collaborative models that respond to a balanced assemblage of economic, political, and knowledge potentials of collaborating actors. However, these matters cannot be investigated using the static and sector-driven models that the current research builds on. A stronger focus on the multiplicity and heterogeneity of actors rather than sectors is required, as well as a

more in-depth understanding of how these actors' abilities respond to the evolving collaborative dynamics that arise from each phase of a smart city project.

Evolving nature of collaborations

Organisation theory suggests interpreting cross-sector collaborations as dynamic processes whose configuration changes over time (Audet and Roy, 2016). Accordingly, smart city projects cannot be interpreted as static arenas; they should be considered as endeavours where collaborations form and dissolve in response to the needs that emerge during the different stages of a project lifecycle (McFarlane, 2011b). However, smart city research has paid minimal attention to these evolving collaborative dynamics (Ooms et al., 2020).

The common phases of smart city projects (i.e. design, implementation, and maintenance) have different characteristics (Aaltonen and Kujala, 2010). Therefore, the configurations of collaborating actors are expected to align with the varying requirements emerging from each project activity. For example, developing the project specifications of a smart mobility system for the city of Iskandar, Malaysia required a cooperation between regional government agencies, international donors, UN agencies, non-profit professional groups, and academic partners. This collaborative configuration changed during the implementation phase, when a private-sector consortium became the central actor responsible for developing the smart mobility system, whereas the academic partners left the project and citizens became involved in periodic consultations (see Note 1).

Instead of embracing a project lifecycle perspective, research examining smart city projects primarily focuses on design and implementation, leaving unexplored obstacles that often arise in the post-implementation stages (Castelnovo et al., 2016). In the Iskandar project, for instance, the adoption phase of the smart mobility system was identified as a challenge considering the many different parties and jurisdictions that had to be involved. The complexity of these new collaborations was not initially addressed, undermining the data-sharing and integration requirements necessary to ensure the functioning of the system.

The experience of Iskandar emphasises the importance of aligning actor configurations with the requirements of different project phases and activities, which is pivotal to maximising public value creation in smart city projects (Le Ber and Branzei, 2010b). This condition calls for adaptations in collaborative configurations, a requirement that becomes evident when examining the tension between the piloting and scaling stages (Bundgaard and Borrás, 2021). Activities related to the piloting of smart city solutions should prioritise adaptive abilities, agility, openness, and experimental mindsets (Soe and Drechsler, 2018), whereas scale-up operations require a different set of abilities related to large-scale production, replication, and exploitation (van Winden and van Den Buuse, 2017). Research reveals that small and local technology companies (like startups) often struggle to effectively scale up smart city solutions, although they have the agility required to sustain niche innovation and fuel many smart city developments (Sarma and Sunny, 2017). Conversely, multinational companies and international service providers, whose rigid structures may inhibit niche innovation efforts, are able to combine their local presence in various cities and more easily replicate possible smart city solutions, while achieving economies of scale faster than their smaller competitors (van Winden and van Den Buuse, 2017).

Roles and interrelations between actors

Smart city project development requires 'a set of interconnected actors', who interact formally and informally (Sarma and Sunny, 2017: 6). These interactions are shaped by the diverse roles each actor plays during the collaborative process (Hanseth and Rodon Modol, 2021). Citizens and

organisations can assume various roles across different smart city projects and within the same project. These roles represent a tool for obtaining access to cultural, social, and material resources as well as power (Wittmayer et al., 2017), and they affect the ability of actors to influence public value creation (Borrás and Edler, 2020).

Studies on roles and interrelations among actors belong to a longstanding line of enquiry in organisation studies (see Armistead et al., 2007; Oliver and Ebers, 1998), which has also increased in relevance to the public value creation literature (Hartley et al., 2019a) and research on cross-sector collaborations (Selsky and Parker, 2011). Current theorising stresses the importance of examining 'what role different actors, often from different sectors, can and do play in the processes of value production' (Bryson et al., 2017: 642).

Smart city research has accorded limited consideration to the varying roles that organisations play in smart city projects (Ruhlandt, 2018), with a major gap in the examination of the relationship between actor-role configurations and public value creation. To the best of our knowledge, only a few exceptions exist, like the study by Neumann et al. (2019). By examining a sample of Swiss smart city projects, they concluded that smart city collaborations are more likely to produce public value when local governments play a stewardship rather than a bureaucratic role. However, no additional studies have been conducted to generalise these findings.

Roles have also been explored in relation to civil society engagement, where smart city research has only recently started to highlight that citizens can have different roles (Mello Rose, 2022), indicating the need to move beyond one-size-fits-all and generic interpretations of citizen participation. For instance, Cowley et al. (2018) suggested some of the roles that citizens can play during smart city initiatives (e.g. consumers, entrepreneurs, civic agents, or political actors) and their correlation with actual project outcomes. The findings of their multiple-case study reveal that in some smart city projects, citizens act as decision-makers, enhance democratic outcomes, and help managers to place smart city technology at the service of public interests (Royo et al., 2020). However, in many situations, public and private project partners associate citizen engagement with entrepreneurial roles, in which citizens only become creators of applications and services (Kornberger et al., 2017). Consequently, they are deprived of the decision-making power required to ensure that smart city projects would deliver truly democratic outcomes (Cowley et al., 2018).

The aforementioned studies demonstrate that roles and interrelations influence the level of decision-making power that actors can exert in smart city projects and their ability to influence collaboration outcomes. Enhancing the processes of public value co-creation in smart city projects implies improved evidence based on how to (re)calibrate roles (Le Ber and Branzei, 2010a). To advance theorising, a deeper understanding is required of the combination of roles and abilities – in the form of resources, skills, and competences (Crosby et al., 2017) – that are most appropriate for coping with the requirements of each project-related situation. This is a context-specific matter rather than the result of a standardised scheme (Meijer et al., 2016).

Conclusions

Smart city projects have become a global phenomenon, and their enactment requires place-specific collaborative processes involving multiple actors who operate in multiple sectors and scales (Audet and Roy, 2016; Varró and Bunders, 2020), where diverse and often contested values come into play (Neumann et al., 2019). In this *Connexions* article, we linked smart city development, a contemporary and under-theorised social challenge, with theories on assemblage thinking, organisation, and public value creation. By using this multi-disciplinary lens, we examined collaboration in smart city projects and formulated a new theoretical perspective that expands the academic debate initiated by critical smart city studies. This perspective introduces neglected lines of

enquiry that focus on relevant factors previously overlooked – processes, multiplicities, interrelations, and how they relate to the conceptualisation of power in a pluralistic form (Anderson and McFarlane, 2011; Parks, 2019).

Our arguments prove that more research is required to determine how collaborative conditions influence public value creation in smart city projects. Central to this research efforts is the need for adopting a more flexible and dynamic approach to investigate smart city collaboration. Based on our analysis, we recommend prioritising the following research questions:

1. *What abilities characterise the multiplicity of collaborating actors in smart city projects?* Future research should investigate the types of competencies, skills, and resources that enact public value co-creation, beyond and within sector boundaries.
2. *How do collaborative configurations change and adapt to the different phases of a smart city project lifecycle?* More research is required to understand how collaborations succeed in overcoming temporal barriers, creating long-term value, and adapting to the changing requirements of the project phases and contextual conditions.
3. *How do actor-role configurations influence the capacity of individual actors to perform in the collaborative arenas of smart city projects?* We also call for further research on the distribution of roles and responsibilities among collaborating actors, and the interdependence between their scales of action. This knowledge can help better understand power imbalances, alternative assemblages, and public value creation processes.

These questions are important for exploring smart city development by examining the value frames within and across organisational and sectoral boundaries, the non-linear and multi-scalar processes of public value creation, and the heterogeneous ecosystems of actors to materialise public value outcomes by leveraging joint capacities.

By proposing these questions, we provide a means for untangling the intricacies of the collaborative puzzle in smart city projects. They imply a more realistic approach to theorising smart city collaboration, and they can help articulate alternative models for governing public value co-creation in urban communities. However, this contribution represents an onset, which is not sufficient to ensure a proper response to a complex challenge facing societies in sustainable urban development. Advancing theory and informing practice require smart city scholars to change their mindset towards a more flexible and context-specific understanding of collaborative spaces (Schreyögg and Sydow, 2010). Equally important is the need to raise awareness among practitioners of the risk of interpreting smart city collaborations as static and pre-defined models, which can leave unequal power games and neoliberal logics hidden in rhetorical rather than factual academic debates.

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ORCID iD

Luca Mora ⬇️ https://orcid.org/0000-0003-4680-6985

Note

1. This data was sourced from participant observation. Please see the introduction section for more details.

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Author biographies

Sara Thabit is a doctoral student at Tallinn University of Technology, where she is affiliated with the Academy of Architecture and Urban Studies and the FinEst Centre for Smart Cities.

Luca Mora is Professor of Urban Innovation at the Business School of Edinburgh Napier University and at the Academy of Architecture and Urban Studies of Tallinn University of Technology.