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Informing urban governance? Boundary-spanning organisations and the ecosystem of urban data

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In urban policy there is an increasing emphasis on the management and sharing of information in and about cities. This paper focuses on external sharing practices which are facilitated by boundary-spanning organisations. Boundary-spanning organisations are hybrid structures that provide a platform to link internal networks of the city government with external actors, and in particular focus on engaging various types of stakeholders. The paper offers a preliminary assessment of a sample of boundary-spanning organisations based across six case studies (Barcelona, Chicago, London, Medellin, Mexico City and Seoul) and across three types of BSOs: living labs, innovation districts and sector-oriented BSOs. Unpacking the shape and development of BSOs, and "placing" them in urban governance, we begin to sketch a preliminary agenda geared to offer a better appreciation of the "information ecosystem" underneath policy-making in cities.

KEYWORDS
boundary-spanning organisation, information ecosystem, innovation districts, living lab, smart cities, urban governance

1 | AN "INFORMED CITIES" PARADIGM?

After a steady rise in popularity across policy and academia, "data" is very much at the heart of urban issues, if not a paradigm shift in how we conceive of urban governance. This data-driven view has become a dominant rhetoric in many local, national and international fora concerned with urban matters in both the Global South and North – as recently testified in major United Nations processes from the Habitat III summit to the UN World Data Forum. At the latter, the UN recognised in its Cape Town Global Action Plan how "quality and timely data are vital for enabling governments" to make "informed decisions" as today's global sustainable development agendas "require the collection, processing, analysis and dissemination of an unprecedented amount of data and statistics at local, national, regional and global levels and by multiple stakeholders."[1]

From the lures of the smart city to the rise of indexing and reporting about cities and the vast impact of philanthropic investments, then, what we might call an "informed cities" paradigm of data-driven urban discussions is one of the most defining discussions in urban policy-making of our time. It feeds a widespread belief in data as key ingredient to urban policy, from competitiveness, to good governance, accountability and transparency (Hordijk & Baud, 2006; Sotarauta, 2016), as well as in the "information"-intensive advantages brought about by information-intensive sectors, products and activities (Carillo, 2011). The "informed cities" paradigm seems to be more than just a fad and is likely to influence policy in the years to come. As Nigel Thrift (2014) noted, the promises of urban informatics and data-driven urbanism, whether

accomplished or partly unfulfilled, are already recasting the governmentality of cities the world over and redefining the ways in which urban dwellers perceive the city. Appreciating the (eco)system that underpins these shifts and stepping beyond specific discussions of the "smart city" in favour of a broader paradigm and spatial lens capable of describing this governmentality shift is, in our view, critical.

2 | FROM SMART CITIES TO INFORMATION ECOSYSTEMS

The idea of information-intensive cities (Hepworth, 1987) is not new: in modern human and urban geography discussions on the political-economy of information in cities can be traced back at least to the early 1980s debates on service economies, city-regional transformations and the impact of Information and Communication Technologies (ICTs) on cities (e.g., Daniels, 1985), with particular interest from planning and economic geographers alike. Yet these conversations have been somewhat narrowed to the specific dimension of the smart city, as a powerful portmanteau and as a dominant rhetoric, perhaps missing out on a broader sense of the political-economy of data-intensive urban governance that was typical of initial studies of the systems underpinning the "informed city" in the 1980s (Hepworth, 1987). More recently, this approach has re-emerged as dominant discussion in the shape of the "smart city" revolution (Barns, Cosgrave, Acuto, & Mcneill, 2017). While much of this discussion is now centred on ICTs, "big data" and digital sensing of the city, several political geographers (e.g., Kitchin, 2015) now argue that the dynamics of the smart city need to be read within the broader politics of urban data and their implications for urban governance. For instance, Andres Luque-Ayala and Marvin (2015) recently called for a more nuanced and evidence-based engagement with "why, how, for whom and with what consequences" smart urbanism is emerging in different urban contexts. While not lacking in (now extensive) literature, the "smart" paradigm of urban policy and research has tended to become increasingly self-referential (Cocchia, 2014). Taking up the challenge of "thinking *through* the politics of the smart city" (Wiig & Wyly, 2016) with closer and more critical appreciation of its undelaying politics, we could understand the "information ecosystems" underpinning urban governance as complex systems of people, technologies and institutions through which information moves and transforms in flows.[2] Here we respond to these calls for more detailed and comparative empirical assessment of the "constitution, functioning and evolution of data assemblages" (Kitchin, 2014, p. 184) at play in cities through the lenses of six international cases.

We begin such investigation here from "the middle": much of the information exchanges shaping the urban politics of data are often forged "in between" public and private authorities. The realm of knowledge circulation within and between cities in fact implies at least four dimensions we have begun probing in our study: knowledge flows (1) within local governments (e.g., between departments), (2) within cities (e.g., between local government and other city stakeholders/actors), (3) between local government and other levels of government (e.g., central–local relations on environmental policy) and (4) between cities via trans-local exchange mechanisms (e.g., city networks but also private-sector initiatives). Within the context of growing importance of informed cities, then, we therefore suggest looking at the actors charting some of the boundaries between local government and the processes of (urban policy-relevant) knowledge production. Our analysis points specifically to an important, and underappreciated, type of institution that is emerging in cities across the world: "boundary-spanning organisations" (BSOs).[3] BSOs act as facilitators of knowledge sharing between city governments and external actors, but also help us appreciate the four dynamics of knowledge mobilisation noted above. In particular, six city case studies are examined here with the purpose of exploring "urban" BSOs and teasing out a research agenda on the information ecosystems at the basis of urban policy-making. BSOs take a variety of shapes in cities today. In the literature "living labs" and "innovation districts", but also sector-specific BSOs, have all been classed in this category.[4] These are of course not the only types of BSO, but present three useful heuristics to appreciate different political geographies of the "informed cities" paradigm: the politics of aggregation (living labs), the dynamics of opening and hybridisation between multiple entities (innovation districts) and the logics of specialisation (sector-oriented BSOs), which can of course co-exist and mesh in our case studies (Meijer & Bolívar, 2016). The BSOs identified within our case studies illustrate the varieties of organisations and information mobilisation mechanisms in place in cities – yet they also point to how BSOs' "in between" role could be key to the evolution of urban policy-making in an information age.

In order to understand BSOs within the ecosystem of the informed cities paradigm, we investigate two research questions aimed at provoking further inquiry and discussion, rather than providing a comprehensive overview of BSOs globally. First, what is the role of the BSOs? We begin by identifying what types of organisations the concept of BSO covers by considering their mandates and scope. Second, by asking where the BSOs are placed in the structure of urban politics, we shift our focus to where BSOs are located in relation to the institutional boundaries of local government. A review of city case studies was undertaken on Barcelona, Chicago, London, Medellin, Mexico City and Seoul. The findings of the

responses to the questions listed in the previous paragraph for each of the examined BSOs are set out in the Appendix. Case-study selection was based on geographical spread (with an importance given to selecting case studies from both Global North and South), availability of data on knowledge management practices within cities and language capabilities. Therefore it only presents a first attempt at offering some landscape analysis of the world of BSOs in urban policy. Eighteen BSOs were identified across these cities: eight in Barcelona, by far the largest single-city populace in our sample, three in Medellín, two in Chicago and London, and one each for Mexico City and Seoul. We are therefore not making any generalisations about specific global trends of BSOs, but are instead seeking to open up a more systematic and yet grounded discussion about the ecosystem of urban data by entering it via three different types of information-sharing entities: living labs, sector-oriented BSOs and innovation districts.

3 | LIVING LABS

The term "living lab" is said to have been coined in 1995 by William Mitchell at MIT and gained progressive traction in policy, as testified in 2006 with the set-up of the European Network of Living Labs (ENoLL; Sauer, 2013; Schumacher & Feurstein, 2007). It has, however, remained a "'fuzzy' concept" (Van Geenhuizen, 2016, p. 81). Living labs are defined by some as open innovation networks or platforms providing the intermediary role of coordinating between partners involved in innovation (e.g., Katzy, Pawar, & Thoben, 2012), while others conceive it has a physical place with a strong involvement of users (e.g., Van Geenhuizen, 2016). Support for the idea of living labs as a BSO can be found in the literature: Bergvall-Kåreborn, Eriksson, Ståhlbröst, and Svensson (2009, p. 4) state that partners and users of living labs can help "achieve boundary spanning knowledge transfer". Living labs are far from being localised entities – there are today international, supranational, national and local living labs as well as networks of them. For example, the Living Labs Global organisation, ENoLL, France's Réseau de Living Labs et Espaces d'Innovation (RELAI), and the city-based and oriented living labs considered in this paper.

Here we have examined six BSOs that have all been explicitly termed or linked to the concept of living labs. Barcelona's BCNLab, Citilab and i2CAT are all members of ENoLL. To become a member of ENoLL, an entity has to prove its capacity as a living lab, or as an innovation service provider through the living lab methodology, or develop its operations towards living labs. i2Cat was the first Catalan and Spanish living lab recognised by ENoLL, and it both helped set up BCNLab and Citilab and helped them become members of ENoLL (Robles, Hirvikoski, Schuurman, & Stokes, 2015). Barcelona Laboratory (BCNLab) describes itself as "a *meeting place* that connects people with ideas, innovative initiatives and institutions", while Citilab and i2CAT both describe themselves as centres – the Citilab is "a *center* for social and digital innovation" and i2CAT a "non-profit research and innovation *centre*". These labs therefore subscribe to the conception of a living lab both as a milieu and an innovation centre. Mexico City's Laboratorio para la Ciudad (i.e., Laboratory for the City) also explicitly combines both conceptions. This living lab is described as a "*space* to propose, test, challenge and refine new *approaches*, ideas or hypotheses". Eskelinen, Robles, Lindy, Marsh, and Muente-Kunigami (2015) described the Laboratoria para la Ciudad as a living lab. The Barcelona Urban Lab is part of the Living Labs Global organisation, and the exception by not incorporating the milieu dimension. It describes itself as "a *tool* to facilitate the use of public spaces in the city of Barcelona", thereby adopting only the methodology conception of living labs. Finally, London's Future Cities Catapult is also included in our sample. It does not describe itself as a living lab but states that it has created five living labs across London where a range of physical parameters are measured. These data are then used by Future Cities Catapult to develop solutions, resulting in it being a living lab itself according to the definition. It incorporates both conceptions; Future Cities Catapult "bring[s] together businesses, universities and city leaders" to use data collected from the particular methodologies used in their five living labs. Key here is the appreciation of the need to situate labs as "curators" (as with the Future Cities Catapult) of urban knowledge and maintain an "arms-length" role in relation to (local) government while acting as a junction of information exchange in the city's ecosystem. This catalytic stance is geared towards articulating their logic as a "centre", "place" and mediatory "space" where the information ecosystem can be coalesced and focused to impact the city, mostly represented by local government. The Barcelona Urban Lab is the only one not explicitly identifying the municipal government as a beneficiary, but even so it is a "gateway" to the city council, and the council can arguably benefit from increased engagement with other actors. From this viewpoint, it is clear that living labs bring together a variety of actors, both internal and external, to the municipal government – each of them engage at least three different actors in each of the governance roles examined. Yet living labs remain predominantly initiated and supported by municipal government (see Table A1 in the Appendix), even though they continue to signal their presence as independent media for information exchange. Signalling and positioning therefore become core activities to communicate the placing of the lab

within the localised system of information exchange, but also indicators of a political-economy of urban information much more complex than just the often conflated "smart city" market.

4 | SECTORIAL BSOS

The importance of the political economy of the information ecosystem of cities, and the central role that BSOs play in it, is perhaps even more clearly evidenced by a second type of organisations that might be identified as more explicitly "sector-oriented". These entities differ from the other two types of BSOs in that they present less experimental meeting places and are founded on a less open purpose than the often wide-reaching living labs. Barcelona's Acuerdo Ciudadano (i.e., Citizen Agreement – which is more than a written agreement despite what the name implies) focuses on social transformation; Barcelona's Centros de Innovacion Compartida (CIC) (i.e., Shared Innovation Centres) on ecology, urbanism and mobility; Barcelona's Escolab on education; Chicago's Cityworks on urban infrastructure innovation; Chicago's UI Labs on challenges of computing, big data and the Internet of Things; London's Air Pollution Research in London (APRIL) on air pollution; Medellin's Centro de Ciencia y Technologia de Antioquia (CTA) (i.e., Centre of Science and Technology of Antioquia) on water and the environment, education and productivity; Medellin's Centro de Investigación e Innovación en Energia (CIIEN) (i.e., Centre for Research and Innovation in Energy) on innovations to meet the needs of the energy market; and the Seoul Institute on social urban policies on welfare, culture, education and industries.

With their defined sectorial scope and even closer proximity to the political economy of cities, the role of the private sector in information flows becomes even more evident, then, when looking at sectorial BSOs. Critically, the private sector emerges as both a central funder and an originator of information. This presents a challenge in that it furthers an often asymmetrical relationship in data generation and mobilisation capacity, and those who (as with local government) require data for public good. Similar to living labs and innovation districts, the municipal government is involved in some way together with a variety of external actors. Most of the sector-oriented BSOs share knowledge between these actors, though in some cases they also create data or information. For example, CTA generates and transfers knowledge, CIIEN's scope includes disseminating knowledge, Escolab arranges workshops to facilitate the exchange of knowledge and the Seoul Institute has as one of its missions to "share knowledge of megacity". In contrast, the Acuerdo Ciudadano "provides information for action" and Cityworks "empowers staff at all levels to get the information they need" to perform their jobs and use resources efficiently. Sectorial BSOs, however, rarely specialise in the type(s) of data fit for their type of sector: across all BSOs in this study limited specialism was observed – rather presenting very similar and often wide offers of spatial (GIS or other), statistical and otherwise processed information to their users. This flags an information ecosystem where multiple actors offer similar types of information, although not always in agreement with each other, further reinforcing a marketplace of (processed) information and an environment that is necessarily skewed towards the more profitable forms of data.

5 | INNOVATION DISTRICTS

Less common BSOs across the city case studies were innovation districts. Innovation districts have been defined as pockets of growth in geographic areas where research institutions cluster and connect with start-ups, business incubators and accelerators (Cosgrave et al., 2013; Hanna, 2016; Katz & Wagner, 2014). The geographic proximity component is included in the definition to gain certain benefits, such as shared infrastructure, reduced transportation and transaction costs. Even though Battaglia and Tremblay (2011, p. 2) argue that innovation districts are "new models" of clustering and "technopolitan" approach, the geographic element is not new or unique to innovation districts (Clark, Huang, & Walsh, 2010; Cosgrave et al., 2013; Porter, 2004).[5] These connected clusters aim to facilitate creation and commercialisation of new ideas, and often focus on re-urbanisation projects. As with sectorial BSOs, the explicit innovation focus (and relative paucity of not for profit or higher education-driven BSOs) also surfaces quite clearly in the intersection between these types of BSOs and the political-economy of information in cities.

Two innovation districts emerged in our case studies: 22@Barcelona and Ruta N. 22@Barcelona have transformed formerly brownfield land into a "district offering modern spaces for the strategic concentration of intensive-knowledge based activities". One of its aims particularly relevant within the context of BSOs is to provide up-to-date information to citizens (Angelidou, 2014; Bakici, Almirall, & Wareham, 2012; Komninos, Pallot, & Schaffers, 2013). Ruta N in Medellin, inspired by 22@Barcelona, is a cooperation between the city government and private companies to facilitate an economic evolution of the city towards harbouring more science, technology and innovation intensive businesses. It has generated 24 projects

as a result of three ICT programmes involving 12,000 citizens, eight private companies, nine universities, four government agencies and nine NGOs, as well as developed Red de Capital Inteligente, which connects 11 entities with four investment mechanisms and has made more than £50 million available for investment in new projects. Some of these projects can themselves be considered innovation districts, such as the Distrito de Innovación de Medellín (i.e., Medellin Innovation District) and the Medellínovation District.

In contrast to the diverse participation in innovation district projects, there is not much diversity in the governance of innovation district themselves. The districts are mostly initiated, funded and managed by the local municipality and their own dedicated staff. Central here is an appreciation of how districts, perhaps even more clearly than labs and sectorial BSOs, aim at localising the benefits and growth potential of a city's information ecosystem. There is, however, more contact in those participating in the innovation districts, for example through occupying physical space within the districts, including civil society, private sector and universities.

6 | BSOS AND URBAN GOVERNANCE: ENGAGEMENT, MANDATES AND IMPACT

Our preliminary scoping exercise has confirmed how understanding the implications of "geographies of information" (Fard & Meshkani, 2015; Graham, De Sabbata, & Zook, 2015) for urban governance requires coming to grips with the contextual political geography of the information ecosystems underpinning urban governance. What emerges as a key question from a focus on some of the linchpins of this geography is whether the growing centrality of this "informed cities" paradigm has also resulted in more "permeable" cities where data, information and knowledge flows both "within and between" cities (a complex reality, as we flag below) through engagement with both internal and external actors to city government through different formats. Or, in short, are the boundaries of urban policy-making being recast in the information age? This, we would argue, is a key question of urban governance and a consideration that necessarily puts a spotlight on the information ecosystem of urban policy.

BSOs emerge clearly as important linchpins in these ecosystems, but further research is required into areas including the assessment of the actual macroeconomic benefits of BSOs, the evaluation of the efficiency and effectiveness of the methodologies and approaches adopted by BSOs to achieve their mandates, and a consideration of the competitive dimensions of multi-business collaborations in the BSOs. Understanding how the BSOs are positioned in relation to local government is also a critical step in understanding their positioning in urban governance. Municipal authorities are a key initiator, funder, manager and participant across all BSOs, all central elements of governance (Barnett & Panell, 2016; Chaskin & Garg, 1997; Esty, 2006; Weiss, 2000; Woods & Narlika, 2001). Importantly, all BSOs involve other stakeholders in some or all of these governance roles – innovation districts have the least diverse stakeholders, but still have at least one other funder and three other participating stakeholder types in addition to the municipal government. This multi-stakeholder involvement in governance is important in these organisations supporting the generation, analysis and dissemination of knowledge, as values of actors involved affect production of knowledge for policy (Jones, Jones, Shaxson, & Walker, 2013; Meuleman & in 't Veld, 2009). The range of actors involved in the governance of BSOs therefore avoids a one-dimensional view of urban knowledge, and corroborates the increasingly recognised need of co-production of information production for effective policies (e.g., Frantzeskaki & Kabisch, 2016; Polk, 2015). Equally, it highlights a politics of presence and a coexistence in a busy landscape, where the business of advice to cities and of information for urban development is certainly highly lucrative, a powerful influencer and yet very much in the hands of those that can muster substantial resources.

No BSO relies only on municipal government actors. Rather, interventions from the "outside" are a regularity if not a must, with academia, industry and civil society engaged in CIC; BCNLab engaging the private-sector university and civil society; and Laboratorio para la Ciudad engaging civil societies and private companies. Similarly, despite Cityworks being primarily focused on engaging actors external to the municipal government, this BSO still engages the municipal government actors as participants. This is not an unexpected finding because BSOs are described as facilitating the collaboration between several stakeholders. Yet there are also cases, like 22@Barcelona and Ruta N., where the BSO is in fact entirely out of governmental realms. To date there have been relatively limited efforts to understand the linkage between the types of founding agents and mandates, and the types of information that is produced, mobilised and transferred across these entities. Equally, little knowledge is available today as to their respective interaction in more crowded ecosystems like that of Barcelona, which has eight BSOs. Variety is also an important characteristic. Externally-driven bodies like CitiLab and the Barcelona Urban Lab co-exist with BCNLab or Acuerdo Ciudadano within government, offering not just a vast variety of knowledge mobilisation hubs, but also variety in their mandate and key stakeholders too (Figure 1).

As some of the evidence gathered above confirms, BSOs are still emerging and developing in cities, so their particular contribution to cities needs to be further, and more important systematically, assessed. Issues about public–private cooperation are central, but the role of research and education institutions, and universities first of all, cannot be underplayed (Addie, 2017). Functional questions also arise. On one hand, the issue of local government funding, which is generally (at least in our six cities) connected to municipal assistance in managing BSOs, also encourages us to look deeper into considerations as to both the accountability and the value of investing in boundary-spanning activities – something which the discussion above is only scratching the surface. On the other hand, the grey zone of independence of most of these bodies from government or private-sector investment (which very few of our cases have) raises issues as to their capacity to offer critical advice but also to provide explicit (and affordable?) services for the common good of urban dwellers. What also seems to emerge even more clearly for us is the issue of impact of BSOs. Many of the organisations above are not simply a meeting "place" for information-sharing: they are also producers (as with the Future Cities Catapult, 22@Barcelona or the Seoul Institute) of information and translators in their own right. Yet, as well understood in the study of translation (Apter, 2006), this mediator role is all but neutral: BSOs therefore play an interested and potentially powerful role as key gateways for knowledge mobilisation and their politics should be scrutinised carefully. In this sense much of the discussion above on their uniqueness tends, in the public at least, to focus on their novelty and value added, but it is clear that few of the examples above, with their governmental and private management affiliations, have put much emphasis on radical and disruptive knowledge mobilisation – an element that in our mind deserves much more systematic attention. Practically, this then charts an agenda which requires both more granular detail on the operations of BSOs and more comparative detail of cases of BSOs around the world. Yet, these initial observations also begin to chart a number of questions on the political geography of the information ecosystems that underpin urban governance which, in our view, call for a "informed cities" *research* paradigm.

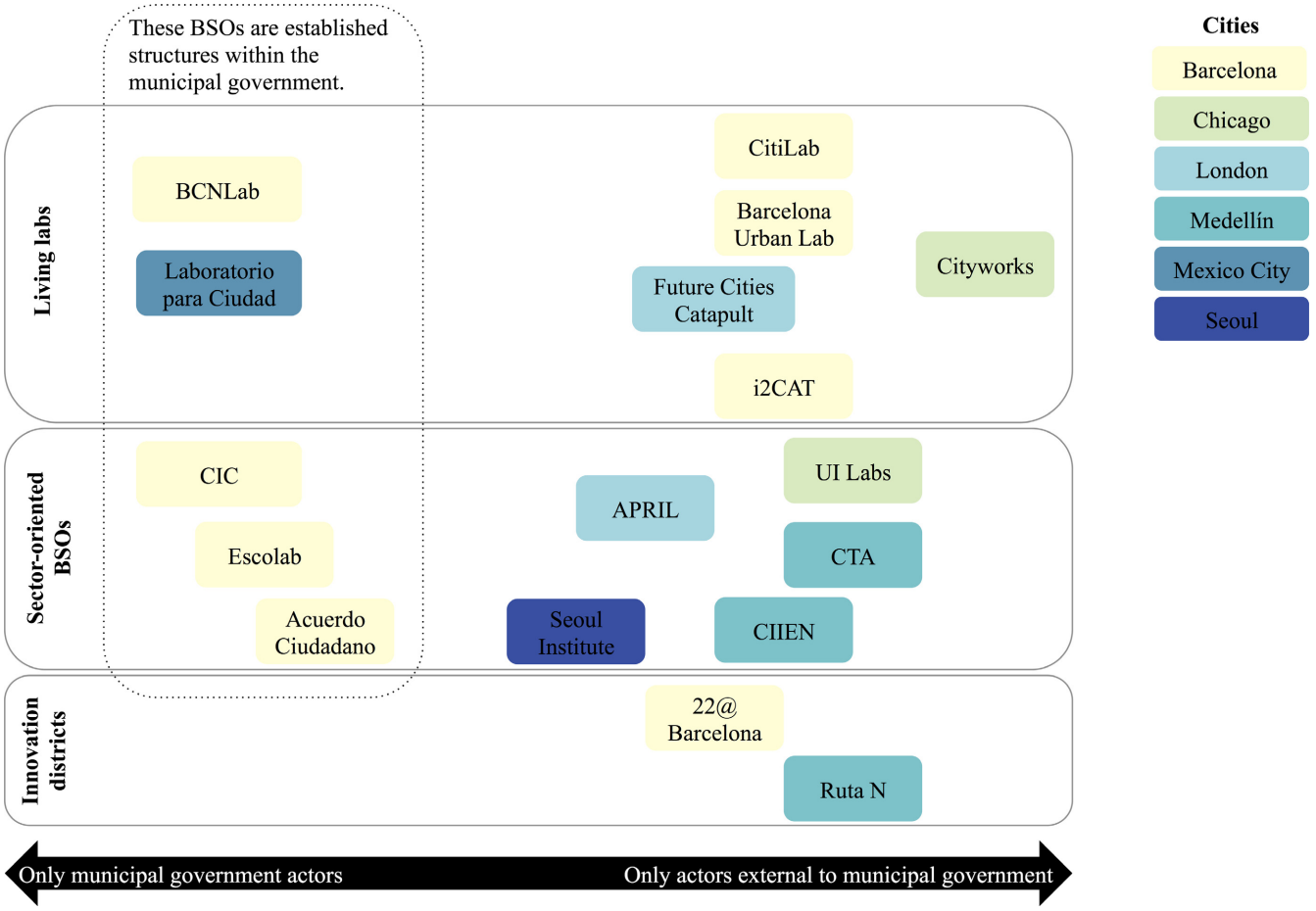

FIGURE 1 Positioning of BSOs in relation to local government

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ENDNOTES

[1] *Cape Town Global Action Plan for Sustainable Development Data*. Cape Town, South Africa, 15 January 2017, available at: https://undatafo rum.org/WorldDataForum/wp-content/uploads/2017/01/Cape-Town-Action-Plan-For-Data-Jan2017.pdf (accessed 2 October 2017).

[2] We draw this definition from the Rockefeller Foundation-funded project "Embracing Change: The Critical Role of Information", run by Internews and Rutgers University. See http://mpii.rutgers.edu/embracing-change-the-critical-role-of-information/ (accessed 2 October 2017).

[3] The concept of BSOs is not new, with some scholars providing examples of such emerging structures during the Second World War (Rao & Sivakumar, 1999). While precise definitions vary, the underlying concept of actors from different entities communicating across boundaries remains the same (Guston, 2001; Lidskog, 2014).

[4] The key distinction identified by Cosgrave, Arbuthnot, and Tryfonas (2013) between innovation districts and living labs that is relevant in the context of informed cities is that living labs create and use data to drive innovation, while innovation districts develop and use information to drive innovation. Sector-specific BSOs do this within a well-defined economic sector.

[5] For example, eco-industrial parks are based on geographic proximity (see Côté & Hall, 1995).

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APPENDIX

OVERVIEW OF THE "URBAN" BSOS ACROSS THE SIX CASE STUDIES

TABLE A1 (A) INITIATORS OF BSOS; (B) FUNDERS OF BSOS; (C) MANAGERS OF BSOS; (D) PARTICIPANTS OF BSOS

(a)

Type	City	BSO	Municipality	National	Private	Other
Living labs	Barcelona	Barcelona Urban Lab				✓
		BCNLab	✓			
		Citilab	✓		✓	
		i2CAT	*Not known*			
	London	Future Cities Catapult		✓		
	Mexico City	Laboratorio para la Ciudad	✓			
Innovation districts	Barcelona	22@Barcelona	✓			
	Medellin	Ruta N	✓			✓
Sector-oriented BSOs	Barcelona	Acuerdo Ciudadano	✓			
		CIC	✓			
		Escolab	✓			
	Chicago	Cityworks			✓	✓
		UI Labs	*Not known*			
	London	APRIL	✓			
	Medellin	CTA	✓		✓	✓
		CIIEN				✓
	Seoul	Seoul Institute	✓			

(b)

Type	City	BSO	Municipality	National	Private	Self-generated	Academia	Other
Living labs	Barcelona	Barcelona Urban Lab	✓		✓			
		BCNLab	✓					
		Citilab	✓			✓		
		i2CAT	✓		✓	✓		
	London	Future Cities Catapult		✓	✓			
	Mexico City	Laboratorio para la Ciudad	✓					
Innovation districts	Barcelona	22@Barcelona	✓		✓			
	Medellin	Ruta N	✓		✓			✓
Sector-oriented BSOs	Barcelona	Acuerdo Ciudadano	✓					
		CIC	✓					
		Escolab		✓				
	Chicago	Cityworks			✓		✓	
		UI Labs		✓				
	London	APRIL		✓	✓			
	Medellin	CTA	*Not known*					
		CIIEN						✓
	Seoul	Seoul Institute	*Not known*					

(c)

Type	City	BSO	Municipality	National	Private	Civil society	Academia	Own staff	Other
Living labs	Barcelona	Barcelona Urban Lab							✓
		BCNLab	*Not known*						
		Citilab	✓		✓	✓		✓	
		i2CAT	✓				✓		
	London	Future Cities Catapult		✓				✓	
	Mexico City	Laboratorio para la Ciudad	✓						
Innovation districts	Barcelona	22@Barcelona						✓	
	Medellin	Ruta N						✓	
Sector-oriented BSOs	Barcelona	Acuerdo Ciudadano	✓						
		CIC	✓						
		Escolab	✓						
	Chicago	Cityworks							✓
		UI Labs			✓		✓	✓	
	London	APRIL		✓			✓		
	Medellin	CTA						✓	
		CIIEN					✓		✓
	Seoul	Seoul Institute						✓	

(d)

Type	City	BSO	Government	Private	Civil society	Academia	Public sector	NGO
Living labs	Barcelona	Barcelona Urban Lab		✓	✓	✓	✓	
		BCNLab	✓	✓	✓	✓		
		Citilab	✓	✓	✓	✓		
		i2CAT	✓	✓		✓		
	London	Future Cities Catapult	✓	✓		✓		
	Mexico City	Laboratorio para la Ciudad	✓	✓	✓			✓
Innovation districts	Barcelona	22@Barcelona	✓	✓	✓	✓		
	Medellin	Ruta N		✓	✓			✓
Sector-oriented BSOs	Barcelona	Acuerdo Ciudadano	✓	✓	✓	✓	✓	
		CIC		✓	✓	✓	✓	
		Escolab		✓		✓		
	Chicago	Cityworks	✓	✓		✓	✓	
		UI Labs	✓	✓	✓	✓		
	London	APRIL	✓		✓	✓		
	Medellin	CTA	✓	✓	✓	✓		
		CIIEN			✓		✓	
	Seoul	Seoul Institute	✓					