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# The urban governance configuration: A conceptual framework for understanding complexity and enhancing transitions to greater sustainability in cities

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## Abstract

This article proposes a conceptual framework for analysing and comparing urban governance configurations and their dynamics in the context of sustainability transitions. Our contribution to the debates consists of drawing on a literature review to develop a conceptual framework with the dimensions necessary for understanding urban governance processes and their dynamics; an urban governance configuration framework. We argue that this framework allows us to combine important dimensions (discourses, actor networks, knowledge and material processes) shaping urban development decision-making and outcomes in their social, economic and environmental domains, in a complex world. The main advantages of this approach are: first, it enables the analysis how complex decision-making is combined in a particular time and space, generating decisions and outcomes based on a variety of knowledge; second, it allows a comparative analysis of governance configurations across different places within the same city and between cities; and third, provides lessons on how urban governance could shift to more inclusive, sustainable forms of urban development.

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**KEYWORDS**

complexity, governance configuration, knowledge management, relational approach, sustainability, transition, uncertainty, urban governance

## 1 | INTRODUCTION

Cities are currently seen as important global loci of transformational changes. They have to deal with economic globalisation, processes of climate change and rapid urban growth in a global context of rising socio-economic inequalities. They also have to face epidemic outbreaks and manage sanitary crises and their consequences, as demonstrated by the COVID-19 pandemic. Cities bring together the potential of many people, businesses and new forms of mobilisation and citizenship. Therefore, cities, as nodes of governance networks, resource flows, materialities and spaces and places, are seen as central to addressing the combination of issues concerning future urban sustainability (Revi et al., 2014). Many consider cities as critical sites for developing pro-active policies around future challenges (Barnett & Parnell, 2016; Ljungkvist, 2014), such as the New Urban Agenda and the Sustainable Development Goals (SDGs) (Pieterse, 2019; Pieterse et al., 2018). In a context where discourses increasingly emphasise current complexities and future uncertainties, conventional ways of governance and planning and the knowledge they utilise are being challenged by calls for more responsiveness and reflexivity through innovation and experimentation (Healey, 2007; Macintyre et al., 2018; Pfeffer et al., 2016; Sutherland, Sim, et al., 2015; Vigar et al., 2014).

Over the last decade, city practitioners the world over are increasingly experimenting in their development plans to ensure a more 'secure', 'resilient' and 'sustainable' city (Bulkeley et al., 2015; Bulkeley & Castan Broto, 2013; Bulkeley et al., 2016; Jordhus-Lier et al., 2019; Pelling, 2010; Peyroux et al., 2014; Scott et al., 2019; Ziervogel, 2019). Academics have also foregrounded the issue of 'responsibility' and the need for interventions concerning urgent environmental, economic and social uncertainties of our time (Hordijk et al., 2015; Latour, 2014; Satterthwaite, 2014; Sutherland, Scott, et al., 2015). Recent urban and sustainability literature is increasingly focused on the question of how we can enhance 'resilience' and 'sustainability' or produce the 'ecological city' and the transformative role of cities, relating this to issues of governance (Macintyre et al., 2018; Mutisya & Yarime, 2014).

This situation reveals three important issues; first, rethinking urban governance and developing new methods for working together with a variety of stakeholders across institutional boundaries; second, the importance of cross-sectoral linkages of domains<sup>1</sup> needed for urban sustainability; and third, the need to focus on existing knowledge and practices of city residents and practitioners, more particularly, spatial digitised knowledge (Baud, 2015, ch. 6). We defined digitised information and knowledge as information (analysed data) and knowledge (information interpreted within analytical frameworks) having a geographic dimension (spatial location), and being stored in a digital database. Geographic information systems are a prime example of such information and knowledge.<sup>2</sup> Current approaches to governance do not fully acknowledge and/or embrace such relational complexity and the importance of knowledge building and sharing to meet current urban challenges. While the diversity of actors and strategies is acknowledged, much less is known about how governance processes can link strategic domains critical for urban sustainability (health, economic growth, reducing socio-economic inequalities and making city environments more sustainable) in any given city and what types of knowledge can contribute to such processes. The main question is what combinations of strategies across domains work and what obstacles city actors face in producing transformative outcomes for the future. This is a strategic question because governance approaches and practices need to be rethought to include the issues of uncertainty in the current context of rapid social, economic, political and technological change, as well as of complexity rooted in multi-scalar processes.

The objective of this article is to address these issues by reviewing the current literature and its limitations, and on that basis suggest the usefulness of the conceptual framework of 'urban governance configuration', which emerged from a large comparative research project (details will be provided if the paper is accepted), both from results of empirical research and theoretical discussions (Baud, Pfeffer, et al., 2014; Baud, Scott, et al., 2014; Peyroux et al., 2014). The conceptual framework was first developed to better understand how the use of (spatial digitised) knowledge could help understand how complex urban governance arrangements deal with the entanglements of socio-economic, political and environmental processes shaping urban development. However, the conceptualisation of 'urban governance arrangements' was found to be more useful in various domains and contexts, as will be shown in the course of this article. The conceptualisation was defined as the specific combination of (1) discourses, (2) actor coalitions and their power relations, (3) (spatial digitised) knowledges and (4) material processes utilised (including both technologies and physical infrastructures) that coalesce in particular domains and places (such as megaprojects, informal settlements).

The main advantage of this approach is threefold. First, it enables us to analyse how complex decision-making is combined in a particular time and space; this combination generates particular sets of decisions and outcomes based on different types and sources of knowledge (Jordhus-Lier et al., 2019). Second, it allows us to compare approaches between governance configurations across different places within the same city and between cities (Baud, Pfeffer, et al., 2014). Third, by pointing out barriers and obstacles, it provides lessons on how urban governance could shift to more inclusive, sustainable forms of urban development (Gupta et al., 2015).

In the first section, we briefly review five sets of literature inspiring the development of our conceptual framework and overcome existing limitations. In the second section, we set out how the urban governance configuration conceptual framework, referred to as urban governance configuration concept (UGCC) was first developed during empirical research conducted in cities in the south. We show specifically how the conceptualisation was built up by focusing on the combination of issues defining an urban governance configuration (see above), as focusing only on one of the components does not provide a sufficient understanding of the complex processes of decision-making in cities. This applies particularly to questions of how the sustainable development agenda can be strategically supported at a city level, and how studying knowledge processes as a strategic tool can provide a better understanding of how city governance networks can build capacity towards more reflexive thinking on the environment, economic growth and more inclusive forms of urban development.

In the third section, we review recent research demonstrating how the UGCC has been utilised in studying city domains in the global South, showing how the conceptual framework works empirically to provide a more integrated understanding of potential transitions towards urban sustainability and their obstacles. These examples point to the limitations and constraints that cities face in building capacities around shared knowledge across domains and what governance arrangements might help reduce such barriers.

## 2 | SITUATING THE CONFIGURATION CONCEPT WITHIN CURRENT DEBATES

The UGCC draws from different bodies of literature on urban governance, such as political economy, geography, urban studies, political science and sociology, building on their strengths but also recognising their limitations and gaps. We draw specifically on recent shifts in the debates around conceptualising governance, and cities and spaces in human geography and critical urban studies. Several specific debates have helped us develop the main dimensions of the configuration conceptual framework: urban hybrid governance arrangements and interactive processes; a relational understanding of cities; the non-linearity and fluidity of governance arrangements; the role of materiality in social relations; and the politicisation of environmental sustainability.

Several of these debates link governance and sustainability, but others do not explicitly make that link, but rather help define our research position and overall conceptual framework. Sections 2.1 and 2.5 provide explicit links to the former, whereas Sections 2.2–2.4 link to the latter.

## 2.1 | Urban hybrid governance arrangements and interactive networks

The literature has shifted away from a rather static institutional perspective on governance to a more dynamic and de-centred conception of governance with an emphasis on *actor hybridity and networks* (Hajer & Wagenaar, 2003). The shift from government to governance means moving away from top-down state decision-making to including *non-state actors in decision-making* (Baud & de Wit, 2009; Colona & Jaffe, 2016; Pierre & Peters, 2000). In hybrid governance arrangements, multiple actors interact to shape the 'rules' and processes needed to manage and transform cities. Governance could then be defined as 'the sum of the many ways individuals and institutions, public and private, manage their common affairs' framed by a normative vision for the future (Commission on Global Governance, 1995, cited in Gupta et al., 2015, p. 28). This has stimulated debate around concepts of democracy and citizenship, to see how contemporary policy-making arenas and public participation approaches may better represent marginalised social groups in decision-making (Gaventa, 2006; Innes & Booher, 2004). Emerging forms of citizenship built up within social movements and civil society organisations to empower their members and engage with state institutions have been explored (e.g., Holston, 2013; Hordijk et al., 2015; Scott & Barnett, 2009).

Governance arrangements between actors who coalesce around a particular urban issue, are often *relatively transient and informal* and can lead to innovative solutions (Hajer & Wagenaar, 2003).<sup>3</sup> These forms of 'hybrid governance' operate in a context of 'institutional ambiguity', are often 'unstable' and have partners from contexts operating under different rules of interaction (Bulkeley, 2005). Such hybrid arrangements are a necessary precondition to tackle urban sustainable development issues, given their complexity, uncertain trajectories and a variety of stresses. Although experimentation in urban sustainability is possible through such arrangements, more permanent institutional sustainability transformations often prove difficult (Bulkeley & Castán Broto, 2013).

The conceptualisation of how power is dispersed throughout multi-scalar governance arrangements is critically important (Swyngedouw, 1997). Views of dominant actors may prevail with the knowledge of less-powerful actors marginalised (Allen, 2011b, p. 24). The range of actors results in an often conflicting variety of discourses of urban problems and solutions, with each actor arguing for their interests in urban decision-making processes. Hajer and Versteeg (2005) propose that governance has to be 'performed' to share viewpoints and develop a joint understanding of the governance 'rules'. Pressing problems often drive actors to collaborate, realising that they need each other to work out effective solutions to problems (Driessen et al., 2012). Each city displays a different set of institutional arrangements and actor interactions in decision-making arenas because of its own unique political, economic, social and historical *context*.

These elements frame our understanding of the UGCC as follows. Understanding urban governance requires us to recognise the engagement of many actors at multiple scales with diverging perspectives, agendas and power, engaging through a range of arenas to influence development outcomes in specific contexts. We recognise the need to focus on the *combinations of issues* that governance networks do or do not include, and the extent to which spaces for more *deliberative processes* are created and utilised. This includes a focus on how the collective agency of actors is built up, the spaces within which they engage and their rules of engagement. This applies particularly to urban sustainable development, in which urban environmental, social and economic issues need to be linked in ways that promote future sustainability (Wakefield & Braun, 2014).

We add to these debates by recognising that crucial in decision-making processes is what *knowledge* is held by actors, its perceived legitimacy and the framing discourses used to argue for actors' interests (Baud, Scott, et al., 2014; Miranda Sara et al., 2016; Pfeffer et al., 2016). We recognise that various actors and actor networks have different sets of spatialised knowledge about the city, frame their discourses in various ways and acknowledge community-based knowledge to varying degrees (Chang et al., 2018). Community-based environmental knowledge is often not recognised in wider policy discussions, despite its contribution to preventing or reducing future disasters.

## 2.2 | A relational perspective in urban studies

Briefly, we discuss three issues showing how we position the UGCC generally, before turning to sustainability. This section shows how we draw on human geography and urban studies. We embrace the shift away from a territorial perspective on cities, as physical, bounded space, to a *relational perspective*, with a focus on resource flows and networks and dynamic interactions (Leitner & Sheppard, 2003; Massey, 2004, 2005, 2012).

This approach emphasises the various scales of governance processes; ranging from the global, national to the subnational level of cities and communities (Allen, 2011a; Gupta et al., 2015). The urban is emerging as a recognised arena of governance. Human geographers particularly have since the 1990s conceptualised cities as a geographical 'nexus' of exchange and connections (Castells, 1996; Cochrane, 2018; Graham & Healey, 1999; Healey, 2000; Jacobs, 2016; Jones, 2009; Massey, 2005; McCann et al., 2013; Paasi & Zimmerbauer, 2016) consisting of many actor networks both within the city and connecting the city relationally to outside networks across local and national boundaries. For instance, when building the new airport in Durban, South Africa, the models for the planners were drawn from the international 'aerotropolis' idea (Hansmann, 2019).

In our analysis, we utilise a relational approach to comparing urban governance configurations in cities. We explore the interactions between different actors, as well as interactions within and between strategic domains in the city, such as economic growth strategies, social mobilisation against inequality of rights to the city and strategies dealing with water-related environmental risks and hazards in selected cities in the global South (Sutherland, Scott, et al., 2015). We then explore how the combination of key governance dimensions shape different outcomes. This has led us to realise that comparing diverse combinations of urban relations provides better insights into governance networks and their capacities than comparing more static facts and figures (see Goodfellow, 2018) or measuring 'cases' against a universal yardstick (Robinson, 2011, p. 13). This approach emphasises the relevance of exploring 'how the city works, not what the city is physically' (Barnett & Parnell, 2016, p. 91). For studying urban transitions, this is crucial as cities will take different transition pathways and their potential needs to be analysed to ascertain how different configurations work out.

## 2.3 | Assemblage thinking and its critiques

Our conceptual framework draws on assemblage thinking while accepting several critiques (Brenner et al., 2011; Buchanan, 2015; Storper & Scott, 2016). Assemblage, a currently fashionable concept in human geography with varying definitions and approaches, can be broadly defined as a fluid arrangement of different clusters of ideas, actor coalitions, spaces, materials and their relationships. Assemblage as a notion focuses on the processes by which the relations between the elements defining an assemblage are built up (McCann et al., 2013; McCann & Ward, 2012). Although this combination of dimensions is attractive, Brenner et al. (2011) have critiqued the assemblage perspective for being simply thick description and lacking an analysis of how power relations are produced.

The governance configuration concept acknowledges the dynamic nature and the continual shifting of relations between formal and informal actors across space, time, scale and boundaries (McFarlane, 2011, 2016). However, our conceptualisation of such arrangements is *attuned to power relations and pragmatic in orientation* and subscribes to a more structural approach. We recognise that historical and existing institutions, values, norms and relations influence the ways 'new combinations' of elements are assembled, rather than assuming complete fluidity. How 'all the elements come together' is the result of the persistence and endurance of political and economic institutions in cities and countries. Locally negotiated path-dependent political and economic arrangements 'frame' possible configurations.

We specify the dimensions of an urban configuration analytically and then examine particular empirical processes within sectors (see Baud, Scott, et al., 2014 and Section 3 in this paper). A configuration can be empirically

analysed once it has coalesced with its constituent dimensions holding together and producing particular outcomes (Sutherland, Sim, et al., 2015). However, we recognise that configurations are dynamic and have a 'life cycle': their elements can shift over time; there are incremental changes, but a configuration can also be disrupted by more radical changes. For instance, the economic growth governance configuration in Chennai, shifted from the dominance of the automotive sector, until a cluster of new information technology companies increasingly dominated the connections in the same geographic space.

We recognise the *materiality* in social relations; that is the importance of material objects, and technical underpinnings, and how they come together with social entities (the socio-material and socio-technical nature of cities) (Ziervogel et al., 2017). Material processes, finances and institutions set limits and constraints. The city as a nexus of powerful networks is also constrained by actors' mandates, which apply only within administrative boundaries, meaning that relations between cities and their surrounding areas are not easily integrated (Saharan et al., 2018).

## 2.4 | Urbanism in the global South

We position the governance configuration concept within the literature of *urbanism in the global South*, which argues that current and future urban growth trends are expected to concentrate on city and sustainability transformations in the global South. Scholars argue that Southern cities are exhibiting new and different urban processes and patterns compared to Northern cities, both between and within Southern cities, that require new theoretical conceptualisation (Myers, 2011; Parnell & Oldfield, 2014; Parnell & Robinson, 2012; Robinson, 2016a, 2016b; Robinson & Parnell, 2011, pp. 521–531; Roy, 2011; Watson, 2009). Such differences encompass rapid urbanisation, striking differences in governance arrangements and processes in terms of informality and the need for greater self-reliance among urban residents for sustainability (Robinson, 2006; Roy, 2009). Those distinctive features proved to be relevant in explaining the diverse ways in which national and local governments and communities react to sanitary crises and enforce (or not) prevention measures, as exemplified by the COVID-19 pandemic in early 2020. Southern cities also experience particular relationships with the Global North due to the histories of imperialism, colonialism and post-colonialism (de Satgé & Watson, 2018). We also position ourselves in the calls for expanding the site of theoretical production (Roy, 2009) by focusing on a variety of cities and their multiplicity of relations through a comparative perspective. In the interests of truly global theory, we take the position that comparisons between cities in the global South provide new theorisation opportunities for inter-urban comparison (McFarlane et al., 2017), as well as for future comparisons across South–North divides, as shown by recent work in urban political ecology (Loftus, 2019; Myers, 2018).

## 2.5 | Sustainability transitions

Finally, coming back to the relations between governance and sustainability issues, the configuration concept engages with discourses about sustainability and the paradigm of risks and uncertainty in the face of climate change and economic recession (Bulkeley, 2010; Braun, 2014; Pelling, 2010; Swilling & Annecke, 2012; Welsh, 2014). This shifts the framing of governance towards seeing it as a way to manage (environmental, social and economic) uncertainty and complexity, rather than as a way to support greater stability in society. This implies taking into account more the *contingencies* of urban conditions and the interaction and interdependency between sectors, and the dynamics of change and transitions, which require reflexive knowledge and responsiveness in governance (Jordhus-Lier et al., 2019).

Processes towards more sustainable forms of development, whatever the definition adopted, are often framed in terms of 'transition', which can be broadly defined as 'a substantial change and movement from one state to

another' (Shove & Walker, 2007, p. 763). In being 'goal-oriented' or 'purposive', they require changes in economic and political framing to allow innovations to take place, as well as a strategic reorientation of dominant economic and political actors defending existing regimes (Geels, 2011; Van Buuren & Loorbach, 2009). In line with our relational approach, we adopt a constructivist and critical perspective on sustainable development, rather than a transition approach rooted in systems thinking. We share several recently emerged critiques in these fields, particularly around issues of agency, power and politics and governance (Bulkeley et al., 2015; Frantzeskaki et al., 2017; Lawhon & Murphy, 2011; Meadowcroft, 2011; Miranda Sara et al., 2016; Shove & Walker, 2007).

Building on such critiques of transition management, our approach contributes to the thinking on socio-environmental sustainability that supports new imaginings of alternative possibilities and futures (Bulkeley et al., 2016; Swilling, 2019; Swyngedouw, 2010). First, we understand sustainability as long-term multi-dimensional and multi-scalar processes driven by socially negotiated and potentially contested visions, goals and values. Questions of sustainability must be articulated with the critical political questions about who, or what gains or does not gain from practice and policy implemented under the label of 'sustainability', and what governance arrangements and strategies are conducive to enhance the democratic content of decision-making and linked to sustainability policies (Shove & Walker, 2007; Swyngedouw, 2010). Our understanding pays particular attention to such contextual differences. Second, we challenge the binary understanding of nature and society and rather assume that nature and social dynamics are inextricably bound together (Arias-Maldonado, 2013) and should be the primary focus of sustainability and governance configurations. Third, we focus on the politics of learning and knowledge legitimacy (Pelling, 2010; Voß & Bornemann, 2011), and the need to develop reflexive knowledge-building processes in urban governance to achieve new socio-environmental understandings and relations. Finally, we focus on both the *spatial and scalar* dimensions of governance processes and their interactions, anchoring dimensions of transitions to their urban spatial context (Bulkeley et al., 2016; Hansen & Coenen, 2015; Markard et al., 2012).

### 3 | THE URBAN GOVERNANCE CONFIGURATION CONCEPTUAL FRAMEWORK

The urban governance configuration concept has been incrementally and iteratively developed during our research project, bringing together the important dimensions in urban development decision-making across social, economic and environmental domains, analysed through the lens of the knowledge produced, exchanged and used in these processes (Baud, Scott, et al., 2014; Miranda Sara & Baud, 2014; Pfeffer et al., 2016; Sutherland, Sim, et al., 2015). Initially framed through the lens of spatial knowledge management in cities, it has developed into a wider conceptual framework for analysing and comparing urban governance configurations in other sectors and their outcomes.

#### 3.1 | Spatial knowledge management and governance processes as strategic resources for supporting sustainable development

This section describes briefly how the UGC concept emerged from an EU-funded project focusing on spatial knowledge management and governance processes in several cities in the global South. It discusses the main goals and research questions of the project and shows how the conceptual framework emerged from the research and became clearly defined by combining several key dimensions.

Our research project engaged with academic debates about the changing mandates of city governments, how they deal with social inequalities, the shifting focus towards middle-class requirements and how knowledge travels in policy mobility (McCann & Ward, 2012). The rapid expansion of digitisation and geographic information systems was seen as an opportunity to extend knowledge construction, circulation and management both for building city



government capacities and increasing the participation and citizenship of urban residents (McCall & Dunn, 2012; Pfeffer et al., 2013). The debates around these issues were fragmented, and theorisation was mainly based on research results in the global North (cf. Baud, Scott, et al., 2014; Parnell & Oldfield, 2014; Robinson, 2006).

Specifically, our research project studied how digitised and spatialised knowledge influenced strategic urban domains, focusing on selected medium-sized fast-growing cities in mainly BRICS countries. Our main question concerned how to build urban capacities to help urban governance processes transition towards greater capacity to deal with future uncertainties and complexities towards more sustainable development.

Cities combine activities around several domains: economic, social and environmental. Therefore, three sectors and their intersections were investigated: megaprojects for economic development, the reduction of social inequality in substandard settlements and water-related risks and governance. Our main starting point was that the goals of transitioning towards sustainability could be more readily addressed at city levels when development decisions in different domains are included in the research, to examine their interactions and effects on sustainability. For instance, national policies that mandate cities to become more entrepreneurial may shift local policy away from a focus on sustainable environmental services, and towards building economic infrastructure, which can increase social inequality and environmental vulnerability (Kennedy, 2015). The ways city actors and institutions combined these three strategic domains in their development strategies, the types of knowledge they included in governance processes involved, including digitisation and spatialisation of knowledge and how they shaped outcomes were the main relations compared between cities. In this way, sustainability pathways could be discerned.

In our understanding, *building capacities* means the ability of actor coalitions/networks to combine different types of knowledge, utilise resources and reflect on inclusion and exclusion of people and knowledge, while taking structural constraints into account. This reflects the current interest in the participatory experiments that many cities are undertaking to build up their knowledge to incorporate new knowledge from various sources. However, these experiments remain limited because existing regulatory frameworks keep these more inclusive processes outside mainstream administrative processes (Bulkeley & Castán Broto, 2013; Castán Broto, 2017; Colenbrander, 2019; Colenbrander & Bavink, 2017).

In our research, we distinguished different sources of knowledge and considered the extent to which they were acknowledged and utilised in urban governance processes. 'Expert' knowledge from consultants working with local governments are often perceived as more legitimate than the practice-based or community-based knowledge. Thus, the obstacles to integrating knowledge from different actors, utilising different rationalities and with varying degrees of legitimacy, needed to be recognised and dealt with to build adaptive capacity for sustainable urban development (Scott & Barnett, 2009; van Ewijk & Baud, 2009; Watson, 2014). Including different types of knowledge from different actors can increase the democratic quality of decision-making through more inclusive processes (Colona & Jaffe, 2016; Kompridis, 2011; Pfeffer et al., 2013; Torfing et al., 2012).

Digitising and spatialising information and knowledge contributes to a better understanding of the distribution of existing inequalities within cities, how sectors interact with each other in specific spaces and places, and potentially can enable more targeted implementation of urban interventions (Baud et al., 2009; Martínez, 2009; McFarlane, 2016; Pfeffer, 2018; Pfeffer et al., 2015; Pfeffer & Verrest, 2016)<sup>4</sup>. Mapping of poverty dimensions in cities, for instance, shows that the assumption that poverty is concentrated in slums is not valid. Similarly, red lines drawn by real estate agents against particular neighbourhoods exclude residents there who could hold mortgages, hence limited their social and spatial mobility.

'Building capacity' also focuses on the abilities of urban actor coalitions to reflexively respond to external challenges, where sustainable outcomes are difficult to pin down as priorities and events are dynamic. This aligns with the new open-ended approach to sustainability in the context of the Anthropocene (Arias-Maldonado, 2013; Castán Broto, 2017; Castán Broto & Westman, 2017; Truelove, 2019). Interactive governance creates institutional mechanisms, which allow more room for incremental adaptation and flexibility. In that sense, 'interactive' means that goals do not remain rigid and negotiated incremental adaptations are possible. In dealing with community-based water risks, interactive discussions with residents can surface, which risks are recognised (Sutherland,

Scott, et al., 2015). Finally, the methodologies of producing spatial information and knowledge can make visible the information on the underlying assumptions made and discourses that frame the issues, knowledge sources and classifications used. Therefore, the actor networks and coalitions driving transition processes are a strategic focus in understanding how capacity is built.

### 3.2 | Linking dimensions of the urban configuration concept

The choices outlined above formed the basis for integrating the dimensions of the urban configuration concept, which would provide sufficient insights into who, how and with what resources city governance arrangements could be understood in terms of their capacities to work towards sustainable development.

We saw that actors come together within particular urban policy domains (economic, social and environmental), to define the main issues, and to deal with them, utilising technologies, financial and physical resources, and various forms of digitised and spatial knowledge. Processes of learning, both interactive and iterative, accompany initiatives in any sector. These processes bring together framings and discourses, actor coalitions and processes of intervention and knowledge building and their outcomes. Together they form the main dimensions of a configuration to be used as an analytical tool (Baud, Scott, et al., 2014). Based on the results of the empirical research, the following dimensions outlining the conceptual framework of urban configuration were developed.

An urban governance configuration consists of the following.

1. The discourses or framings concerning issues, together with legislation and policy.
2. The actor coalitions, their knowledge, resources and their power relations.
3. The main material processes involved; including technologies, products and infrastructure produced and utilised for urban development processes; the physical, material context of each city and the physical infrastructure.
4. Outcomes that result from the combination of discourses, knowledge, coalitions and material processes and are place specific and situation dependent.

The configuration conceptual framework can be used to understand the governance arrangements of a specific urban domain, such as water, or a combination of domains as they are constituted within a particular city. The concept can also be used as an analytical tool for a relational comparison between cities, as we will see in the examples reviewed in Section 4.

## 4 | REVIEW OF RESEARCH APPLYING THE URBAN GOVERNANCE CONFIGURATION CONCEPTUAL FRAMEWORK

This final section reviews four examples of how the conceptual framework of an urban governance configuration has been applied, mainly drawn from recent work of the authors and their networks.

The urban governance configuration concept has been used by the authors (Baud, Scott, et al., 2014) to analyse the introduction of digitised information, electronic platforms and GIS-based systems into departments of local governments in selected cities in Peru (Callao), South Africa (Durban, Cape Town), Brazil (Guarulhos) and India (Kalyan Dombivili, Chennai). This study showed that in most cities a dominant discourse around urban economic development co-existed with an emerging less-powerful discourse on urban environmental issues (basic services and risk/disaster framings); such discourses were pushed by different economic and environmental networks within existing political and economic arrangements, conflicting in spatial areas where their concerns overlapped. Spatial digital knowledge was unevenly built up across sectors, and its use was mainly for basic description and not for supporting decision-making and policy choices for transitions. Comparing different cities we found a varied use of

digitised spatial knowledge for controlling complex urban development processes. In post-apartheid South Africa, public discourses promoted a social transformative agenda for addressing inequalities. The establishment and redrawing of municipal boundaries were used to smooth existing spatial inequalities as part of strategic development planning. GIS was also used for mapping poverty and deprivations to rationalise the allocation of budgets in South Africa. In India, it was used for greater state control, with slum mapping in pilot projects, and for defining property rights more clearly (as pre-runner to an urban cadastre). In Peru, GIS-based systems have been used for developing ecological micro-zoning and spatial management plans, bringing together regional and local municipal networks to combine and exchange information on plans at different scale levels in an interactive process; a mandatory legal framework for such processes provides support and removes barriers to more interaction (Baud, Pfeffer, et al., 2014).

The second example compares the introduction of ICT-GIS-based knowledge management in India and South Africa to develop large-scale urban development projects in regional hubs (the IT Corridor to the south of Chennai) and the Northern Urban Development Corridor in Durban (Jameson et al., 2021). The analysis shows how discourses vary from national to local scale, the strong societal discourse about democracy and citizen participation in both South Africa and India giving way to technical and managerial approach to governance at the municipal level. Participation appears more consultative than deliberative or substantive. Prominence to engineering-based, scientific knowledge is given over community-based knowledge. Besides, in both cities, the private real estate sector plays a key role in expanding digital spatialised knowledge for establishing land values and supporting strategic investment. Urban materiality, in particular how informality is entangled with urban megaprojects plays out in different ways in Chennai and Durban.

The third example illustrates how collective capacities can be built within multi-scalar actor networks to address water management issues. An urban water governance configuration framing is used by Sutherland, Scott, et al. (2015) in analysing the processes that control and manage the supply and distribution of water in the city of Durban. This refers to a particular set of processes that are occurring to achieve both environmental and social goals. This approach contributes to debates on the social and political dimension of water within a political ecology approach. The article analyses how formal and informal practices of the municipality and ordinary citizens come together to produce the 'hydro-social' cycle of the city. The article understands 'waterscape' 'as the outcome of the interaction of the multi-scalar actor coalitions and their power relations, discourses and knowledges, technologies and infrastructures, embedded in multiple spaces that come together simultaneously' (Sutherland, Scott, et al., 2015, p. 488). The analysis considers the spatiality of water governance as a critical outcome of the governance configuration, pointing to existing inequalities and the lack of inclusivity in water policy.

Finally, the fourth example shows how the UGCC can be used at the city level, to understand outcomes and identify barriers to the circulation of knowledge. Jameson and Baud (2016) used this framing to trace knowledge processes and power dynamics across the fragmented water sector in Chennai, India. Comparing the different actors involved in drinking water management and the drainage system management revealed an environmentally destructive fragmentation between sectors that led to both water scarcity and high flood risks. By mapping the flow of knowledge and information about both modern and traditional drainage systems, key points of blockage emerge that prevent the linking of multiple knowledges that would mutually reinforce both drinking water and flood management. Instead, knowledge is isolated in institutionally constituted silos. The current fragmented system also weakens the position of various informal settlements, whose needs are not recognised. The configuration thus reveals the possibility of different more sustainable strategies.

## 5 | CONCLUSION

This article has reviewed how the UGCC was developed from the literature and recent research, and its advantages for analysing complex urban governance processes and their outcomes in a context of sustainability transition. The integration of the approaches reviewed in Section 2 contributes to building a medium-range

conceptual framework that overcomes some of the limitations in current research. The UGCC complements urban governance approaches by recognising the role of the social construction of knowledge in addressing issues of urban sustainability. It expands the relational perspective across domains and scales and shows how they interact and connect relationally, thereby contributing to current debates on the spatial dimension of transitions. This helps to consider both the complex arrangements of actors and the dynamic interplay of social, economic, political and environmental processes that shape urban development in a context of multi-scalar change characterised by uncertainty. Although our concept recognises the informality of governance arrangements that coalesce around specific issues within and across urban domains, it acknowledges the role of enduring socio-spatial legacies and structures, thereby taking forward the critiques of assemblage thinking. It also takes into account the socio-materiality and socio-technical nature of cities by drawing attention to how technologies and infrastructure shape political practices in specific ways. By understanding the particular ensemble of elements in a city in its particular context at a moment in time this concept can critically uncover those elements of the institutional arrangements, which are not sustainable and propose the development of capacities to support sustainable urban development pathways.

The notion of an urban governance configuration further allows relational comparison between cities; across scales, and over time. This approach opens up a perspective for developing a comparison between cities, as well as intra-urban comparisons as a way to enrich the theorisation of urban diversity in the field of comparative urbanism (McFarlane & Robinson, 2012) through the lens of urban infrastructures (McFarlane, 2016; McFarlane et al., 2017). Such comparisons have shown how cities, urban politics and everyday life are shaped by diverse, often overlapping urbanisms and the multiple materialities across different parts of the city (Jaglin, 2014). We believe that drawing on a review of cross-disciplinary literature, developing the urban configuration conceptual framework and showing examples of its application provide a strategic approach that can contribute to a future framework for contributing to more sustainable urban development. Renewing urban governance approaches is all the more crucial in a context whereby cities are under tremendous pressure and communities throughout the world call for more sustainable, alternative futures.

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## ENDNOTES

<sup>1</sup> Social, environmental and economic domains.

<sup>2</sup> We use digitised rather than digital, because we mainly focused on information and knowledge, which may originally not have been digital (e.g., data that were originally collected on paper but later converted to digital databases). When the EU project was carried out, in the cities in the global South studied, the generation of machine-generated data by smart phones and 'things' was much less extensive than now, and where in existence, almost exclusively confined to elites in mega-cities.

<sup>3</sup> Such arrangements take many forms, such as partnerships, alliances, coalitions and networks.

<sup>4</sup> The current, extensive discussions on the digitisation of information (smart/big data) should be informed by an understanding of how 'data' need classifications with meanings to produce knowledge for underpinning urban interventions (Martínez, 2009).

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