

Policy Brief

Human Centric Smart Cities

Redefining the smart city

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Smart cities have traditionally been studied from a technocentric perspective. However, such technological conceptualizations of smart cities are no longer adequate in today's society. This policy brief discusses another alternative, human centric smart cities. Human centric smart cities are cities that practice smart governance, are collaborative, focused on user needs, supportive of innovation, and are ultimately oriented towards the development of wellbeing and the creation of public value for its citizens. In human centric smart cities, the use, implementation, and development of technology is guided by these foundations. The policy brief draws on insight generated from an international symposium organized for the City of Berlin on the future of smart cities. The brief itself is structured around four core aspects: human centricity, inter-sectoral collaboration, data governance, and administrative capacity. The brief ends by providing initial recommendations on how to start thinking about and implementing new human centric smart city strategies.

Key Points

- In human centric smart cities, adopting a public value or happiness oriented approach to development will be critical.
- The notion of innovation and service development inside human centric smart cities is changing, driven primarily by a shift in the structure of smart city ecosystems.
- New human centric smart city data governance strategies must be in line with the creation of public value, data sovereignty, and the maintenance of fundamental rights and freedoms such as those related to privacy and freedom of expression.
- The change towards more collaborative, open, and human centric smart cities will require new governance strategies and new administrative capacities.

1 Introduction

Urbanization and rural flight, technological development, and globalization are working together to rapidly elevate the importance of cities within our societies. Cities compete against each other for businesses and talent, must cope with increasing number of residents, must provide services, encourage development, support innovation, and, most importantly, take care of the health and wellbeing of their residents. At the same time, in the context of today's information society, technology, data, and information are playing increasingly important roles in our lives and shifting the power dynamics of society. Cities are at the forefront of this technological change. In the hopes of becoming "smart", many cities have begun to integrate technology into their governance and operations. This transition of cities to "smart" cities gave rise to a large strand of literature and practice dedicated to the topic (Angelidou, 2015; Caragliu et al., 2011; Chourabi et al., 2012; Meijer & Bolívar, 2016).

In early approaches, smart cities were often approached from highly techno-centric perspectives, with 'smartness' being the end goal. One commonly cited definition views smart cities as cities "in which ICT is merged with traditional infrastructures, coordinated, and integrated using new digital technologies" (Batty et al., 2012, p.481). Defined in this way, the idea of a "smart city" is similar to those of smart watches or smart cars; something traditionally non-technological has an innovative technological component added, inscribing the attribute of "smartness".

Yet, "smartness" is not a means unto itself. There must be a purpose behind it, and it is becoming increasingly clear that **the purpose of "smartness" should be related to the fostering and development of public value, sustainability, cooperation, transparency, interactivity, and societal wellbeing.** In this conceptualization, technology plays an important role, but is rather used and viewed as a tool to develop and improve the quality of life within the city. This idea is similar to the one proposed by Green, (2019), who puts forward the idea of *smart enough* cities: cities that choose their technologies on the basis of how well they help respond to people's needs.

Acknowledging the limitations of a technocentric approach to smart cities has given rise to a new discourse, one that is calling for a new conceptualization of smart cities – human centric smart cities. Some scholars have begun to explore smart cities from this new perspective. For example, Lara et al. (2016) define a smart city as "a community that systematically promotes the overall wellbeing for all of its members, and flexible enough to proactively and sustainably become an increasingly better place to live, work, and play" (p. 9). Similarly, Almeida et al. (2018)

speak of “humane smart cities”, that are focused on “citizens’ wishes, interests, and needs, not on technology alone” (p. 91).

In this paper, the definition below is proposed for human centric smart cities.

Human centric smart cities are cities that practice smart governance, are collaborative, focused on user needs, supportive of innovation, and are ultimately oriented towards the development of wellbeing and the creation of public value. In these human centric smart cities, the use, implementation, and development of technology is guided by these foundations.

Though there is a large amount of interest in human centric smart cities, research and discourse on this topic, is still represented by a relatively under theorized and under discussed body of literature and with little real-world practice (Trencher, 2019).

This short policy brief aims to address this critical need for research on human centric smart cities. To do so, and to gather the relevant and necessary insights, the Centre for Digital Governance at the Hertie School, together with the CityLAB Berlin, and the Berlin Senate Chancellery convened an international symposium titled “Redefining the Smart City - From a technocentric towards a collaborative, value-based and human centred understanding”. The symposium collected inputs from more than 30 international experts from academia, governments and the NGO sector, and received more than 500 registrations and hundreds of participants across the different roundtable discussions.

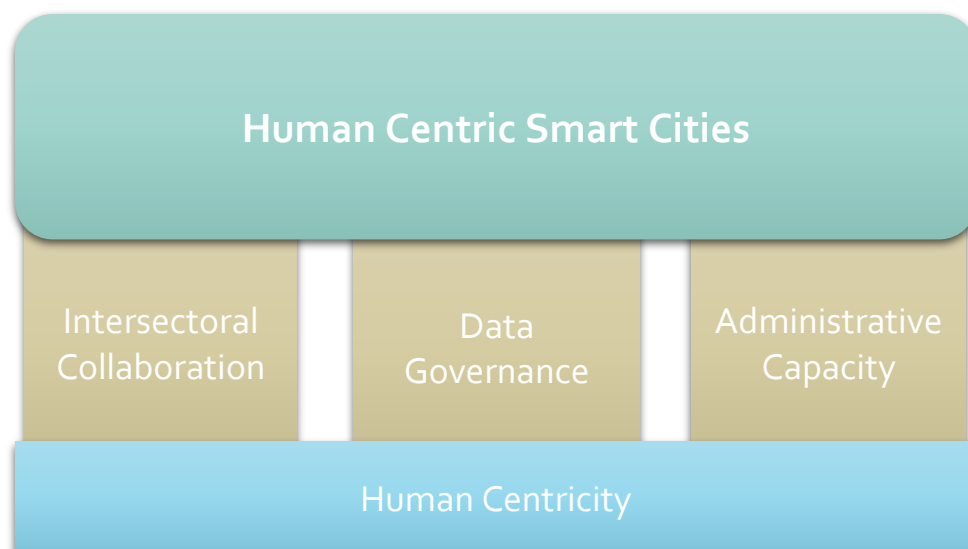


Figure 1 Foundations of Human Centric Smart Cities. Source: Authors.

Drawing on knowledge gathered as part of this symposium, this report provides initial input, recommendations, and discussion on the critically

important issue of the future of human centric smart cities. It does this by focusing on four core aspects of human centric smart cities (Figure 1): Intersectoral collaboration, data governance, administrative capacity, and human centrality. In this conceptualization, intersectoral collaboration, data governance, and administrative capacity are the foundational columns, but are all united by a cross cutting focus on human centrality. Together, they forms the foundation for the future of human centric smart cities.

2 Human Centrality

The notion of human centrality is becoming increasingly important in the current governing discourse, yet the smart city discourse has not fully taken many of these aspects into account. On the one hand, governments around the world are beginning to develop a focus on wellbeing and happiness. New Zealand has introduced a wellbeing budget, funding projects specifically focused on developing overall societal wellbeing (New Zealand Treasury, 2019). The OECD has launched the better life index, which allows for new understanding into “what drives well-being of people and nations and what needs to be done to achieve greater progress for all” (OECD, 2020). More recently, the European Union (EU) signed the Berlin Declaration on Digital Society and Value-Based Digital Government, which:

“aims to promote a human-centred, responsible and common-good oriented development” and that this “human-centred approach aims to ensure that such applications are inclusive, help solve societal challenges and do not reproduce harmful social or economic biases” (European Commission, 2020).

In human centric smart cities, adopting a wellbeing or happiness oriented approach to development will be critical.

On the other hand, there is also a need for smart cities to engage and cooperate with their residents. It is for this reason that **co-creation and co-production are also likely to play a key role in the human centrality of any smart city initiative**. Co-creation is “the involvement of outside, non-typical, stakeholders in the initiation, design, implementation, and evaluation of a new public service”, and it is a conscious choice, whereas co-production is concerned with how value is created in public services; it is inherent to all public services (McBride, 2020, p.8). As co-creation is concerned primarily with service delivery, it is important to survey other means and methods for human centrality in smart cities.

In data governance, there are several civic led governance initiatives such as data trusts (Micheli et al., 2020) or the “mydata” movement that hands control of data back to citizens. **Human centric approaches to data**

governance will become increasingly important. Relating to the development and planning of cities, innovative methods such as participatory budgeting are becoming increasingly popular (Kersting et al., 2016; Raudla & Krenjova, 2013). Such methods give citizens control over how some percentage of a city's budget is spent, allowing them to exert more control over the city's developments. Some cities are beginning to experiment with innovation or 'living' labs, giving private sector organizations the ability to innovate and experiment with their technology inside the city's borders, fostering increasing levels of cooperation and collaboration amongst businesses and city officials, while simultaneously providing value for citizens and engaging them in the process (Bakıcı et al., 2013; Bifulco et al., 2017; Schaffers et al., 2011). Other initiatives may try to decrease barriers to communication between governing officials and citizens, providing more direct means of communication, such as through services like FixMyStreet, increasing a feeling of connection between the citizen and the city (Veloso, 2015).

These human centric approaches to smart cities are noble, but there is a large amount of academic research that questions whether or not these ideals are actively being implemented in earnest. One of the strongest examples of this criticism comes from Cardullo & Kitchin (2019) who highlight that organizations such as IBM and Cisco now market their smart city solutions as being human centric, but in reality, such solutions are a "re-branding exercise" (p.2). Thus, while smart city plans and solutions may emphasize the importance of human centricity, this is often done only in a superfluous manner. **This would point out that there is a fundamental disconnect between *doing* "human centricity" and *being* "human centric"**. Exploring this disconnect, focusing on being human centric, and reflecting often on this issue is necessary for any future human centric smart city.

3 Inter-sectoral collaboration

In human centric smart cities, inter-sectoral collaboration is key. Such collaboration goes beyond new forms of collaboration and cooperation with city residents, but extends to developing entirely new innovation ecosystems inclusive of all stakeholders. Within this context, **the notion of innovation and service development inside human centric smart cities is changing, driven primarily by a shift in the structure of smart city ecosystems.**

Barcelona provides a clear example of how these new ecosystems are emerging, where the city has created a "collaborative movement among its corporations (retail), academic institutions, government authorities, and the residents of Barcelona, aimed at becoming a reference program for economic engines and urban development" (Bakıcı et al., 2013, p.139). In

doing so, the City of Barcelona utilized its smart city strategy to transform the city into an innovation ecosystem, **taking advantage of the concentration of different sectors in the same geographic area, harnessing their knowledge, and by encouraging collaboration and cooperation amongst actors to drive innovation.** So far, the results of this effort have been promising, with increased levels of innovation and improved public service efficiency within the city (Gascó, 2016).

Human centric smart cities are also changing the nature of inter-sectoral collaboration is through the idea of “Living Labs”. These labs aim to drive innovation, increase competitiveness, and provide new forms of collaboration and cooperation within cities. They do this by “involving communities of users at an early stage of the innovation process” (Schaffers et al., 2011, p.439) and “[provide] opportunities to citizens and businesses to co-create, explore, experiment, and validate innovative scenarios” (Schaffers et al., 2011, p.433). **Living labs appear to be one of the best ways for encouraging new innovative collaborations inside smart cities** as they: provide infrastructure and business uses cases to the private sector, allow the public sector to be involved in innovation, drive economic and sector-specific development within the city, expose citizens to innovations at an earlier stage, and allow citizens and city residents to co-create and drive the creation of new city-focused solutions.

In human centric smart cities, a new type of stakeholder has begun to emerge: the urban entrepreneur. These entrepreneurs use “distributed innovation and collaboration to recognize and solve city issues faster than what public and private entities can do in isolation or collectively” (Muñoz & Cohen, 2016, p.78). These urban entrepreneurs have often found themselves engaged in a new form of public private partnerships, based around the “4P” model of “public, private, people, and partnerships” (Majamaa et al., 2010; Ng et al., 2013). The 4P model “encourages emergent interactions through effective processes that transform city challenges into urban entrepreneurial opportunities” (Muñoz & Cohen, 2016, p.79).

In these new human centric ecosystems, the focus and purpose of innovation is changing. In the traditional understanding of smart cities, the smart city was the thing itself that was innovated – for example, how can we use technology to build better cities? **The city was the innovation, the product, and the customer. However, in these newly developing collaborative innovation ecosystems, the smart city is the driver of innovation,** “empowering the collective intelligence and co-creation capabilities of user and citizen communities for designing innovative living and working scenarios” (Schaffers et al., 2011, p.432).

While a large number of potential benefits for such systems emerge, there are an equal number of challenges that must be understood and overcome.

These include **ensuring that collaboration does not occur at the expense of citizens' rights, creating new governance mechanisms, transforming governmental organizations to be compatible with such an ecosystem, and exploring new legislative and regulatory requirements for the changing reality.**

As collaboration continues to grow in importance for human centric smart cities, the governance strategies of such cities must also adapt and change. There are a number of different approaches currently advocated for in academia and seen in practice. Lee et al. (2014) explores the difference between top-down (government-driven and centralized) and bottom-up (platform and ecosystem driven) led governance strategies. Similar to this, Visnjic et al. (2016) present arguments that smart cities are either governed as 'extended enterprises' or as 'platform markets'. Regarding the former, extended enterprises are in line with top-down and centralized, with all activities being "aggregated and coordinated by a central entity" (Visnjic et al., 2016, p.122). The latter, meanwhile, can be understood as an "open platform where city ecosystem players interact with one another to create value, rather than supply their products to the city" (Visnjic et al., 2016, p.125).

When one reads about collaborative governance strategies for smart cities, it probably most often associated with this second structure, however, that does not necessarily mean it is the best, as there are trade-offs for both approaches. Thus, **the ideal governance strategy for smart cities likely places cooperation and the creation of public value at its core, and uses a mix of government led innovation and private sector expertise.**

4 Data governance

Smart cities, with their strong emphasis on the adoption and integration of technology into their day-to-day business practices, generate vast amounts of data on a daily basis. Inside a smart city, IoT networked devices can gather information and data in real time, which can be fed into decision making algorithms to improve their efficiency. The smart phones in our pockets can be used for a number of purposes such as to track our movements, identify popular mobility routes, identify popular areas of interest, or to identify urban mobility challenges. Government agencies adopt AI-based solutions that can automate back-office tasks or can be used to in decision making. Depending on the case, this may either directly or indirectly effect a citizen. Data can be generated and owned by citizens, by the private sector, by the public sector, and by some combination amongst the three. **The important question to ask is: how can these data be governed from a human centric perspective, respecting human centric values and an individual's rights?**

In such situations, there is a clear need for how to regulate and govern such data. **Data governance strategies are essential for any human centric smart city.** Data governance refers to how the rules are set for “who holds the decision rights and is held accountable for an organization’s decision making about its data assets” (Khatri & Brown, 2010, p.149). Extending this further, to the context of smart cities, Micheli et al. (2020) suggest that data governance is “the power relations between all the actors affected by, or having an effect on, the way data is accessed, controlled, shared and used, the various socio-technical arrangements set in place to generate value from data, and how such value is redistributed between actors” (Micheli et al., 2020, p.3). In this definition, it is less about how to manage data, but is **more focused on governing the relationships, processes, and rights within a smart city data ecosystem, giving all stakeholders and actors a voice in the governing process.**

In the current academic literature, there is a number of different approaches outlined when it comes to the actual implementation and manifestation of data governance.

One of the most comprehensive approaches is offered by Paskaleva et al. (2017) who develop a framework for the data governance process. This framework consists of six steps: project context, data identification, data collection, data sharing and management, and data use and legacy (Figure 2).



Figure 2. Data Governance in Smart Cities. Source: Paskaleva et. al, 2017

The authors go on to highlight that, often times, smart city scholars “underestimate the complex governance dilemmas that emerge from the availability of ‘big’ and ‘open’ data in the smart city” (Paskaleva et al., 2017, p.4). In order to handle such complexity, and to develop an understanding

of the necessary organizational aspects for a data governance strategy in smart cities, Cuno et al. (2019) present five key roles for any given data governance strategy. These roles are:

1. "Data committee – a decision body with the key role to define and coordinate directives and decisions.
2. Governance officer – part of the Data Committee [who] disseminates, promotes and monitors the policies and decisions within the organization.
3. Data owner – is essentially in charge of one or more datasets from a business perspective.
4. Data steward – bears the responsibility for implementing the requirements of the Data Owner, e.g., proper (meta-)data management
5. Technology steward – manages the technology platform in place for all the data of a stakeholder" (Cuno et al., 2019, p.20).

Though these approaches to data governance are of high relevance for the smart city context, they are not necessarily inclusive of current and ongoing debates and development on a number of key points within smart city research, especially in regard to those related to human centric smart cities.

The main point of divergence is on the importance of citizens and other stakeholders in a data governance strategy. It is now becoming clear that there is a **need and demand for increased involvement of citizens in smart city data governance strategies that are in line with the creation of public value, data sovereignty, and the maintenance of fundamental rights and freedoms such as those related to privacy and freedom of expression.**

It is for this reason that a number of non-governmental approaches and models for data governance in smart cities are starting to grow in interest. For example, Micheli et al., 2020 writes about four data governance models that can emerge from actors "such as small businesses, public bodies, and civic society": data sharing pools, data cooperatives, public data trusts, and personal data sovereignty (Micheli et al., 2020, p.1). Similar to the Micheli et al. (2020), Heeks, (2021) also highlights three primarily non-governmentally driven data governance institutions in smart cities: living labs, urban data trusts, and community data intermediaries. Barns, (2018) highlights the citizen-focused data governance structures within smart cities, but rather focuses on the interface point, arguing that data repositories, data showcases, city scores, and data marketplaces are all effective data governance mechanisms.

While such strategies are often community and citizen focused, there are negative instances where private sector companies aim to subvert such approaches for their own gain. Often times this happens via government procurement processes where new services are purchased, but adequate

attention is not paid to the actual implementation of the service or the contractual requirements. In order to prevent this, **there is a clear need to improve procurement processes placing human centric data governance approaches at their core and engage in learning and knowledge exchange with other cities to rapidly build and gain experience and competence.**

Outside of the organizational aspects of data governance, there are the technical components. There is a need to develop the relevant technologies, architecture, and infrastructure. Often there is often a debate between building up internal capacities or outsourcing and contracting out such work. While there are certainly gains when it comes to efficiency when utilizing outsourcing for the development and maintenance of your data infrastructure, **in the long run, developing and maintaining such technological solutions in house will likely lead to long term effectiveness.**

5 Administrative capacity

The steering and management of smart city projects requires smart government (Pereira et al., 2018). What is demanded from governments, however, may at times be marked by contradictory expectations. It is expected, for example, that smart city governance is decentralized, but not to the point it is fragmented; that it is agile, but not volatile; that it is responsive to specific local requests, but universal and inclusive. Many local governments are also expected to embrace an experimental mindset when transforming the city, and yet primed to invest in demonstrably successful projects only.

There is no easy way around the issue of building capacities under uncertainty. But managing possibly contradictory forces and deciding on the adequate levels of change that can be supported is perhaps one of the most important pillars of aligning existing capacities with the implementation of innovative projects.

A number of analytical, as well as actionable frameworks currently exist on how to build better public sector capacity in order to engage in value creation and novelty diffusion (Andrews et al., 2017; Lodge & Wegrich, 2014; Pablo et al., 2007; Wu et al., 2018). Of these, that of Andrews et al. (2017) focuses on the importance of escaping '*capability traps*' by transitioning from agenda-conforming and compliance-oriented ecosystems towards '*positive deviances*' in terms of actual performance.

In that sense, limitations often emerge whenever global agendas displace local priorities. Many times, global solutions (often technical) prevail over bottom-up processes of problem definition, the equivalent of placing the

cart before the horse. When local administrations are not sufficiently involved in the approach taken, they risk feeling marginalized and disengaging from these global agendas (Andrews et al. 2017). Addressing local needs as a starting point to innovation is in fact a key tenet of human-centric smart city paradigms (Trencher 2019), enabling the move away from techno-centric objectives and into public value-driven strategies (Heeks & Shekhar, 2019; Soe & Drechsler, 2018).

Once broad consensus exists on the problems that smart city strategies should address, three important pillars of governmental capacity will determine the feasibility of the project: the extent to which an **authorizing environment** will enable innovation, the specific **abilities** necessary for effective implementation (including infrastructure, resources and talent), and the **acceptance** of these innovations by the very subjects of the smart city policies (Andrews et al. 2017).

The authorizing environment refers to the heterogenous landscape of stakeholders and legal conditions that define the probabilities that a smart city project will be blocked after its ideational phase. Local governments should situate themselves within these networks and assess how truly authoritative they are to enact change. The fluidity and closeness of stakeholder relations in the local context can operate as an enabler of collaborative authorizing environments.

This is relevant across sectors -as posited in theme 2 above- but also within administrations themselves. **Avoiding siloed processes and fostering good inter-departmental coordination mechanisms can give momentum to project implementation.** In most administrations, larger and more traditional sectors must coexist with often smaller, younger and more innovation-oriented organizations. A virtuous complementarity between the two, -with the latter triggering innovation and the former enabling its scaling-up and sustainability- can lead to a desirable mix of 'agile stability' (Drechsler & Kattel, 2020; McBride et al., 2021; Meijer & Thaens, 2018; Soe & Drechsler, 2017). And while the pressure for some cities to compete globally may exert enormous time pressures, this may also operate as a way to align interests faster.

One barrier may arise in the authorizing environment whenever smart city policies are embraced on the sole basis of reputational or electoral grounds around local politics. Such a scenario bears the double risk of creating paralysis in the administrative cadres implementing these policies, and the impossibility for the citizenry to develop a sense of ownership. Political aspects such as the levels of citizen mobilization and politicization can have important implications for the nature and sustainability of smart city projects (Drapalova & Wegrich, 2020).

At the same time, local governments offer an ecosystem where experimentation is more likely to flourish in comparison with the national or regional levels. **Embracing a mindset that is tolerant of experimentation -and its possible setbacks- is critical when trying new concepts for the city** (Raven et al., 2019). This tolerance of experimentation is also more likely to attract cross-sectoral alliances willing to cooperate. The empirical evidence shows that public-private collaborations are key for experimental projects being sustained in time (Cingolani 2021). Insightful communication about the value and parameters of experimentation within stakeholders can increase the chances of success.

In smart cities, the innovative use of technologies to solve problems -as defined by their urban dwellers- takes on a fundamental role (Meijer & Thaens, 2016). This means that most smart city implementations are technically demanding and require the best abilities and resources, the second aspect of capacity building.

Fortunately, vibrant cities can often attract the right talent and benefit from the local innovation scene. As was posited in theme 3, developing in-house expertise in data infrastructures is fundamental in the longer term, even when outsourced solutions might bring better short-term solutions. As contractual and procurement expertise on data management is accumulated in the hands of local governments, these can decide on what is the most optimal combination and use of sensitive administrative data, commercially available data, and open data (Cuno et al., 2019). Sustainable investments in ICT infrastructures and good data governance are needed for information to be safe, adaptive and inter-operable (Ladley, 2019), leading to a fluid transactional environment between citizens and administrations (Johnson et al., 2020). The local administration should be able to prioritize those transactions that are most important and worth pursuing. **Transactional data should in that sense not represent 'passive waste' but be purposefully designed to enrich citizen wellbeing.**

Finally, **when smart city strategies are human-centred, they are likely to harvest high overall acceptance.** Anticipating these acceptance levels through participative and urban auditing mechanisms (Grossi et al., 2020) may help consolidate and institutionalize inclusive approaches. A granular, systematic and continuous understanding of which interventions are well-regarded versus those that are not – as opposed to using anecdotal evidence – will enable a more reliable scaling-up of urban innovations (Breaugh et al., 2021). Whenever demonstrated acceptance and good performance exist, the scaling up can happen in multiple ways. It can be *quantitative* (more organizations or sectors adopting the innovation), *functional* (more activities performed under the new modality), *political* (more support is built and mandates broadened), and *organizational* (more organizational resources allocated to build capacity) (Andrews et al. 2017).

This enables a broad array of possibilities when moving forward in transformative processes, making sure that innovations represent credible improvements and not mere change (Hartley, 2005).

6 Building a Human Centric Smart City – Summary and Recommendations

It is clear that there is an increasing shift away from a technocentric understanding of smart cities. **Smart cities are not just about technology, but about making the lives of their residents better.** This requires a fundamental shift in our way of thinking about smart cities and their governance. This policy brief has presented the concept of human centric smart cities and outlined this conceptualization on four core aspects: human centricity, inter-sectoral collaboration, data governance, and administrative capacity. A short overview of this conceptualization and core thoughts related to each is presented below as Figure 3.

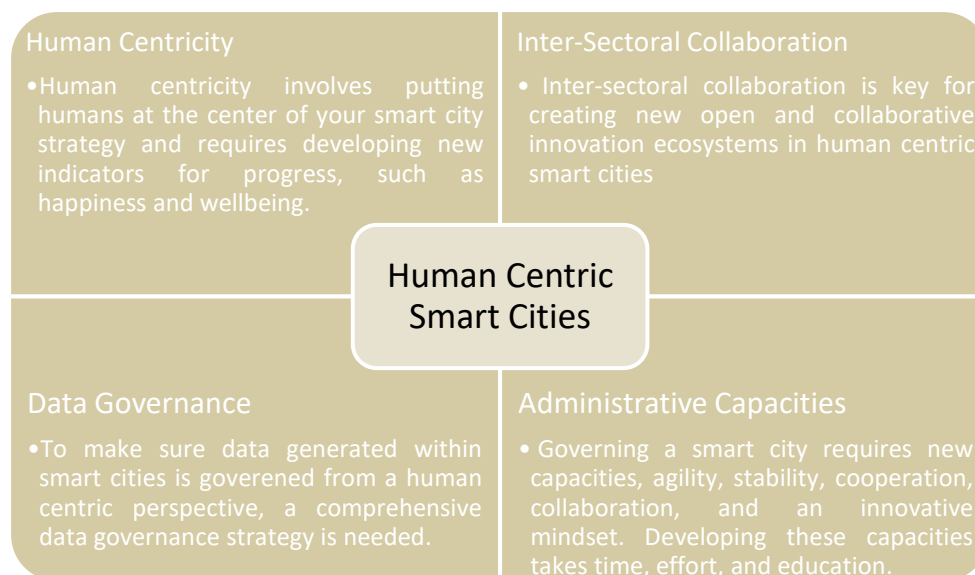


Figure 3. Human Centric Smart City Dimensions. Source: Authors.

Based on the overview provided within this brief, it is also possible to offer some initial recommendations for all who are interested in this ongoing redefinition of smart cities towards a more human centric future.

Human Centricity

- For new smart city strategies, prioritize human wellbeing and happiness. Develop and implement new indicators that allow for these to be measured, monitored, and evaluated within
- In human centric smart cities, new ways of engaging with stakeholders (such as co-creation or participatory budgeting are key. Begin to develop strategies, guidelines, and approaches for these new methods.
- Special attention must be paid to how to involve citizens within the participatory processes of the smart city, how governance strategies can foster human centricity, and on how new strategies may inhibit or harm human centricity.

Inter-Sectoral Collaboration

- Cities bring together a number of different actors into the same location. Take advantage of this and create new opportunities for collaboration between these stakeholder groups to drive innovation.
- Experiment with introducing Living Labs into your smart city and the “4P” innovation model, paying attention to new urban entrepreneurs, civic leaders, and city minded NGOs and businesses.
- Though private sector companies play a key role in smart city initiatives, government involvement is always necessary. Ensuring high level governmental support for new smart city projects and cooperation is imperative for their success.

Data Governance

- For any new human centric smart city data governance strategies are necessary and must incorporate citizen involvement.
- Data governance strategies must take into account the need for citizen control and ownership of their data. Strategies such as data trusts or policies oriented towards citizen data ownership or data sovereignty are necessary.
- New data governance initiatives must be accompanied by the appropriate policy, regulatory, and organizational changes. This includes the creation of new roles focused specifically on data management issues, especially including those related to data privacy.
- ICT solutions are often procured for smart cities without adequate attention being paid to data governance issues. There is a clear need to change procurement processes and develop the necessary competence to procure new ICT solutions correctly.

Administrative Capabilities

- Different smart city models will require the development of different implementation capacities. The inherent uncertainty involved in public sector innovation processes means there is no guarantee those capacity investments will always pay off as anticipated.

- Local governments will often face contradictory expectations around the smart city. Comprehensive bottom-up processes of problem definition can help mitigate these contradictory demands.
- The accumulation of public sector in-house expertise on data infrastructures and data management pays off in the longer term, without excluding the importance of short-term, contractually solid third-party solutions.
- For collaboration to fully take root in smart cities, there is a need to rethink how such cities are governed. Thus, organizational design and governance strategies and processes must be redesigned in such a way that they are able to work agilely, adaptively, and collaboratively.

The above mentioned list, and the content held within this policy brief, provides a strong initial foundation for anyone interested in the concept of human centric smart cities. However, it must also be fully acknowledged that there is still a large amount of work to be done. For academics and those interested in research on the topic, there is clear need for researching answering questions such as: How can smart cities truly involve citizens within smart, participatory, and collaborative governance processes within smart cities? What is the role of a human centric smart city in fostering and driving collaborative and public value driven innovation? What does data governance for human centric smart cities entail? Exploring such questions both empirically and theoretically can help to improve the future trajectory and development of human centric smart cities.

From a practitioner perspective, it is important to recognize that **there is no perfect recipe for developing a human centric smart city. Context is important.** This policy brief provides some starting points for how to approach creating a new human centric smart city, but what is required is to approach the task honestly and be willing to trial, experiment, learn, and engage in constructive dialogue with others. Ultimately it will be this shared dialogue that helps to further drive and improve the world's smart cities by making them more human centric.

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