# Visualising and calculating the smart city: a dialogue perspective

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## Abstract

**Purpose** – This study addresses the implications of smart city development paths (techno-centric and human-centric) by investigating the evolution of a city strategy, focusing on how different actors in a dialogue centred on strategic planning documents for Saint Petersburg, Russia, visualised the smart city and then made it calculable.

**Design/methodology/approach** – The authors conducted a case study based on a documentary analysis supported by ethnographic elements relying on the smart city conceptual proposals, the approved city strategy and the artifacts of expert discussions leading to the strategy implementation plan.

**Findings** – Through the lens of dialogue theory, the authors show how government and non-government actors in different organisational settings devised techno-centric smart city calculations, which arose despite an initial human-centric vision.

**Research limitations/implications** – While the case study allowed the study to illustrate the depth and richness of the context of the authoritarian Russian state where the role of citizens in public decision-making is rather limited, different and even contrasting results could be produced in other contexts.

**Practical implications** – There is a gap between a smart city vision and its grounding in calculations. Thus, the human-centric elements require special attention, and the organisation of the dialogue on smart city strategy must enable plurality of voices besides those of government actors.

**Originality/value** – The case suggests viewing the human-centric and techno-centric perspectives not as dichotomous, but rather emerging consecutively throughout the journey from an initial strategic vision to its implementation in the city's calculations.

**Keywords** Smart city, Visualising and calculating, Dialogue, Russia, Saint Petersburg

**Paper type** Research paper



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## Introduction

The global trend towards developing smart cities (SCs) promises to achieve urban sustainability (Yigitcanlar and Kamruzzaman, 2018; Grossi and Trunova, 2021) and enhance the quality of life of the citizens of these cities through smart technologies (Manville *et al.*, 2014). While projecting and visualising the desirable future of a city and the ways to get there (Lapsley *et al.*, 2010), public authorities adopt the "SC approach" to the problems that cities face: using information and communication technology (ICT) to monitor and manage everyday city life in an "intelligent" manner (Wirtz and Müller, 2021). Despite growing interest, the SC landscape remains fragmented due to the wide range of interpretations of the SC concept, which have resulted in a variety of conceptual development paths (Fernandez-Anez *et al.*, 2017). For instance, a city can adopt a strategy in which technology leads the way (Mora *et al.*, 2019), or it can follow a more human-centric strategy that concentrates on active roles for citizens as a priority (Tomor, 2020). Although diverse approaches to SC implementation have been discussed in the literature (Broccardo *et al.*, 2019; Karppi and Vakkuri, 2020), there are very few empirical studies which discuss how an SC can be visualised and represented by numbers, that is, how an SC becomes calculable (Argento *et al.*, 2020).

This research gap becomes even more distinct if one considers that planning and implementing SC strategies implies the involvement of multiple actors interacting in a manner akin to that found in a complex organisation (Argento *et al.*, 2020). These actors are often drawn from a range of functional sectors and include representatives of government, academia, business and non-profit organisations (Broccardo *et al.*, 2019), and it is important to capture their roles in outlining an SC strategy and devising indicators to track its implementation. Thus, our aim is to address the implications of SC development paths by investigating the evolution of a city strategy, focusing on how the dialogue among the various actors can influence the SC visualising and calculating processes.

While existing studies have primarily focused on capturing the fragmented nature of SC research in light of human-centric and techno-centric perspectives (Mora *et al.*, 2019; Grossi *et al.*, 2020), and predominantly criticise the latter approach, our study shows empirically how the techno-centric perspective actually emerges in a city's calculations. Using the case of Saint Petersburg, which has recently embarked on an SC agenda, we show how the dialogue between city officials and other actors from academia and the private sector occurs in practice, and how it frames discrete techno-centric SC calculations on the basis of an initially human-centric SC vision.

This study provides a twofold contribution to the literature. First, it advances SC research with a technological focus (Meijer and Bolívar, 2016) and suggests some implications of the techno-centric SC that are divergent from those present in the existing literature. In particular, the techno-centric perspective has been shown to emerge through the prevalent interests of private ICT companies (Mora *et al.*, 2019) which shift the accountability regime (Grossi and Pianezzi, 2017), and is related to the influence of technocratic managers and experts who dictate SC standards (Grossi *et al.*, 2020). Our findings connect the techno-centric SC perspective with the domination of a dialogue on SC strategy by government actors. Second, this paper addresses the dichotomous nature of SC research (Mora *et al.*, 2019) and proposes that techno- and human-centric development strategies should be seen not as a mutually exclusive but rather as connected and naturally consecutive: following one another throughout the evolution of an SC, visualising the SC and then representing it in numerical form in the city's strategic documents.

## Literature review

### *Smart city strategy: technology-led or human-oriented?*

The SC idea emerged as a remedy for the consequences of urbanisation: it was motivated by environmental concerns and was meant to drive social and environmental transformations (Yigitcanlar *et al.*, 2018; Grossi and Trunova, 2021). A growing body of SC research presents a rich, yet fragmented, gold mine of information (Meijer and Bolívar, 2016). However, researchers in this field are not always in agreement, and there is no universally accepted

definition of an SC (e.g. Angelidou, 2015; Fernandez-Anez *et al.*, 2017; Grossi and Pianezzi, 2017). Thus, the phenomenon remains vague (Vanolo, 2014) and is difficult to capture and categorise. In addressing this ambiguity, scholars have designed diverse typologies to reach a systematic understanding of the concepts and policies of "smartness".

Mora *et al.* (2019) suggest that one stream in the literature follows a techno-centric perspective where the development of an SC is driven by ICT, which creates a "digital skin" (Rabari and Storper, 2015) for the city. This implies "a widespread implantation of sensors into urban and household environments, together with ubiquitous mobile broadband communication technologies that can transmit both deliberate communications and automated user data" (Rabari and Storper, 2015, p. 28). Mora *et al.* (2019) refer to this perspective as a "technology-led strategy". Essentially, this approach centres technology as a core characteristic of smartness (Meijer and Bolívar, 2016). Technology can be discerned as the main driver of SC development (Xiahou *et al.*, 2020); the ICT landscape becomes the core for smart government and operations (Scholl and AlAwadhi, 2016); and the implementation of SC technologies brings forth reconfigurations of the production of space, spatiality, mobility and the governance of urban spaces (Coletta and Kitchin, 2017). In other words, a technology-centred SC strategy presupposes that a city will be transformed into "an urban environment permeated with ICTs, where all physical infrastructures are interconnected" (Mora *et al.*, 2017, p. 11).

Despite its prevalence in SC research (Mora *et al.*, 2017), the technology-driven view is not always looked upon favourably. In particular, technology-centred SC strategies have been criticised for their inability to solve the complex challenges of SC development and for promoting a utopian interpretation of smartness that is primarily beneficial to private technology companies (Grossi and Pianezzi, 2017; Hollands, 2015; Mora *et al.*, 2019). Kitchin (2015) indicates that when private companies convince city administrators to adopt their solutions, this "technologically rooted entrepreneurial urban development" (Kitchin, 2015, p. 132) can lead to a prioritisation of business goals over social ones (Grossi and Pianezzi, 2017), and thus a disregard for the role of citizens (Vanolo, 2016).

Hence, in opposition to the techno-centric approach, a human-centric perspective focuses on the relationships among local governments, citizens and community entities and emphasises the active role they all play in enhancing urban smartness (Argento *et al.*, 2020; Joss *et al.*, 2017; Tomor, 2020; Träskman, 2022; Vanolo, 2016). Furthermore, Grossi *et al.* (2020) highlight the various roles of other actors involved in smart transformations while using a set of technocratic, critical and emergent conceptual lenses to frame the SC strategy. The technocratic perspective views citizens largely as consumers. The authors' critiques reveals that urban elites (including experts with various backgrounds) accumulate considerable power, thereby turning citizens into victims under control of the system. The emergent perspective allows the researchers to suggest that a wide range of urban stakeholders should be key users of SC tools, or, in other words, that citizens should have an active role in contributing to SC strategies. Another perspective that opposes the technology-led strategy is the so-called holistic approach, which holds that the application of ICT should be in line with human, social, cultural, economic and environmental factors (Mora *et al.*, 2019), and thereby integrate these different components into the SC framework.

In this study, we utilise the "human-centric perspective" which embraces the human-centric, emergent and holistic understanding of an SC presented in the literature; in a similar manner, the "techno-centric perspective" covers technology-oriented approaches (technocratic, technology-led, etc.). Overall, the literature has explicitly covered both techno- and human-centric perspectives on developing SC strategies; however, there is limited understanding as to how these approaches actually emerge and frame urban policies. Moreover, while existing studies criticise the techno-centric perspective, there is limited empirically based evidence on how the techno-centric SC strategy unfolds in practice, and

which processes accompany this unfolding. Table 1 summarises the conceptual literature concerning the human-centric and techno-centric approaches to SC strategy.

While researchers and policymakers are naturally sympathetic to the human-centric SC perspective, and the techno-centric SC perspective is often criticised, the techno-centric approach nevertheless remains the dominant strategy. Hence, there is a need to analyse the very process of SC strategy implementation. The next section discusses how SC development paths can be framed in light of the inherent twin processes of visualising the future SC and making it calculable.

*Visualising the smart city and making it calculable*

Apart from their explicit reliance on ICT, cities adopt various tools of governance and management that the literature attributes to large corporations (Lapsley *et al.*, 2010) and engage in strategising and *accountingisation* (Power and Laughlin, 1992). Lapsley *et al.* (2010) conceptualise this as governing a city via twin processes – visualising the future and making the city calculable. A city thus becomes involved in diverse activities to create a desirable image and paves the way for the transformations of public management required for it to embody this image. Hence, while images express the future of a city and require commitment from the actors involved, thereby preventing or mitigating potential conflicts, they also should be compatible with reality – compatible, for example, with financial constraints within the government system and the necessity of delivering public services.

This need for compatibility generates tensions between visualisation and calculation: ambitious plans must be aligned with both operational and financial restrictions, highlighting the "paradoxical relationship between the future and the present" (Brorström, 2018, p. 18). Eventually, a city must situate its plans within calculative norms, measurements and standards (Lapsley *et al.*, 2010), which, in practice, can be a very challenging task for a city government. For example, in her study of the renovation of the Magliana district in Rome, Czarniawska (2010) documents plans for a beautiful park, to revitalise an abandoned eight-hectare plot. This project has never been properly completed. The gap between the grandiose plans announced by the government and the actual outcome was quite stark. The ambitions of the municipality had to be adapted to its organisational setting in such a manner that the existing system could accommodate them. In essence, strategic intentions are meant to be

**Table 1.** Human-centric and techno-centric SC perspectives

| Dimension | Human-centric perspective | Techno-centric perspective |
|---|---|---|
| Conceptual understanding of SC | Complex socio-technical systems in which technological development is aligned with human, social, cultural, economic and environmental factors | Technological fixes resulting from the integration of ICT solutions into urban infrastructures |
| Developing SC strategy | Result of cooperation of, and interactions with, stakeholders | Based on judgement of experts |
| SC performance measurement | Result of stakeholder interactions (variety of forms and functions) | Technology serves as a lens for better view of the city |
| Key users of SC technological solutions | Various stakeholders (managerial role can be extended to a broad group of urban stakeholders) | City technocrats (better technocratic management through better information) |
| Role of citizens | Active subjects (the city is a polis in which citizens are not only the object but also the subject of decision-making when they are included in the construction of SC) | Consumers, while technocratic managers make the city better for them |

**Source(s):** Based on Mora *et al.* (2019), Grossi *et al.* (2020)

transformed into concrete actions (Brorström, 2021), which means that numbers are crucial for strategising, even though this complex process is often presented in a rather simplistic way (Brorström, 2018).

While a city is managed through a set of connected, collective actions (Czarniawska, 2010), the formulation of a strategy implies the engagement of individuals and requires agreement among them, often forcing them to work through tensions (Brorström, 2021). In the context of an SC, which is characterised by multidimensional goals and a plurality of actors, the literature indicates that goals should be aligned with the use of performance measurement systems (Argento *et al.*, 2020) that, in turn, must be accepted by the actors involved (Brorström, 2018). We drive this argument further, addressing the visualisation of an SC in the city's strategy and calculations in its implementation plan by focusing on the dialogue of actors engaged into strategising.

*Dialogue on smart city strategy*

The existing literature indicates that there is a considerable need to understand how accounting reflects, reinforces and constrains strategic attitudes towards organisation (Hopwood, 1983). In this regard, accounting has been recognised as important for the formulation of a city strategy because "calculative practices make visible and render knowable what strategy takes as its object" (Kornberger and Carter, 2010, p. 326). The process of translating qualitative values into numbers within the strategising exercise enables a city to specify desirable goals more precisely (Brorström, 2018). Hence, in the state context, numbers become the language and tool that allows policymakers to "know and represent society and the economy, assess policy choices, and, increasingly, evaluate government performance" (Lapsley *et al.*, 2010, p. 309).

The strategic plans and "visions" that a city puts forth are fundamental elements in the emerging collaborative forms of urban governance which grasp the multidimensionality and complexity of contemporary cities (Lapsley *et al.*, 2010). Inclusivity is crucial for improving the quality, efficiency and effectiveness of decisions (Linnerooth-Bayer *et al.*, 2016). However, there are many nuances to stakeholder input that should be considered by both public and private organisations when, for example, selecting the type of public participation to be used (direct or implicit), setting the goals of an endeavour, identifying and selecting stakeholders and clarifying stakeholder roles (Yosie and Herbst, 1998). The accounting literature suggests using a dialogue framework to address these and similar issues (e.g. Brown, 2009; Bebbington *et al.*, 2007).

The dialogue framework stems from the works of Mikhail Bakhtin, a Russian philosopher and literary critic. Reinvented in contemporary accounting literature and enabling the expression of public interest in a pluralist way, the dialogic approach challenges traditional monologic accounting practices and utilises democratic strategies in the engagement process (Bellucci *et al.*, 2019). However, knowledge about the challenges that accompany the organisation of such a dialogue is limited. Bebbington *et al.* (2007) draw attention to the critical dialogic approach and the potential for dialogic processes to inform relationships of accountability between stakeholders and entities, thereby contributing to theoretical debates around the engagement processes that foster emancipation. There are several requirements for successful dialogue: an institutional framework that will enable dialogue, an agreement among participants regarding the rules by which they engage in dialogue and a recognition of the need for those in power to build dialogue (Bebbington *et al.*, 2007).

That said, our research draws attention to the flip side of inclusivity and engagement: the possible risk of promoting elitism in making decisions by capturing the interest of certain groups (Shah, 2007) or by limiting the dialogic potential of participatory practices (Aleksandrov *et al.*, 2018). Moreover, recent research suggests that the external accounting

tools that frame strategic competition between cities, such as smartness or sustainability rankings, may not sustain dialogue either (Aleksandrov *et al.*, 2022). Karppi and Vakkuri (2020) suggest focusing on the role of public managers (city officials and professionals who work on strategic governance and planning documentation) to understand exactly how public professionals insert smart technology into policy in order to promote sustainable urban development. We take a step further in this direction and examine how a dialogue among various stakeholders, including experts, academics and public officials, may lead to unexpected outcomes when visualising the SC and making it calculable. For explication, we build a dialogue framework based on Brown (2009) and Bebbington *et al.* (2007). Five elements of dialogue become themes to focus on throughout the empirical data analysis (Table 2).

Thus, the aim of this study is to address the implications of SC development paths through a city strategy evolution. In order to achieve this, we investigate *how the dialogue among various actors engaged in city strategising can influence SC visualising and calculating.*

## Method and research setting

To address the implications of SC development paths empirically, we employ a case study strategy (Eisenhardt, 1989; Eisenhardt and Graebner, 2007) which gained popularity in studies of public management and public administration, thanks to its applied nature (Van Thiel, 2014). More specifically, in the accounting field, case studies have been recognised as particularly important for their ability to address challenges related to the practical relevance of accounting (Morgan and Cooper, 2008). By directing particular focus to organisation(s), events or phenomena, case studies examine the experiences and activities of those who are involved, along with the contexts where these experiences and activities emerge. In this vein, Morgan and Cooper (2008) highlighted that case studies provide "*phronesis*", or insights into "practical wisdom" – wisdom which utilises scientific or technical knowledge in a certain context to achieve a particular aim. In other words, case studies contribute to both practical and theoretical work, thereby enabling researchers "to interact with the social and economic world" (Morgan and Cooper, 2008, p. 165). In our investigation of the dialogue among various city actors framed as SC visualising and calculating, we conducted a case study to explore a two-year strategising exercise in which the SC first became a part of the long-term strategy of Saint Petersburg, and then a part of the strategy implementation plan.

**Table 2.** Analytical dialogue framework

| Element of dialogue | Meaning |
|---|---|
| Purpose | What are the actors' goals and preferences? How are the answers and goals formulated? |
| Main actors involved in the dialogue | Who are the actors involved in the dialogue? What are their perspectives? |
| Organisation (material context and power dynamics) | How is the dialogue organised? What is the context and social setting for the dialogue? |
| Outputs | What are the material results of the dialogue? |
| Outcome(s) | What was achieved through the dialogue? What was the objective of the dialogic process (agreement, rational disagreement, appreciation of the complexity of issues)? What "desired change" does the dialogue promote? |

**Source(s):** Based on Brown (2009), Bebbington *et al.* (2007)

*Research setting: Smart Saint Petersburg*

Saint Petersburg is the most northerly megapolis in the world and is home to 5.4 million people. It has federal jurisdiction and thus possesses significant autonomy in terms of public budgeting and organisation. Saint Petersburg is second only to Moscow in terms of its research and development sector and is therefore known for advanced government innovation policies. Researchers have revealed the growing interest and willingness of the city government to pursue an SC strategy: 61% of public officials expressed openness to building a dialogue with citizens on this topic through electronic communication (Vidiasova and Tensina, 2018). Furthermore, 91.4% of citizens aspired to be involved in city governance (Vidiasova and Tensina, 2018). With the stage thus set, government actors promoted the idea of public participation in an SC agenda by endorsing bottom-up city development and resource initiatives (Sovershaeva, 2019). Hence, the groundwork was laid for a human-centric SC vision to emerge in Saint Petersburg; however, as we will illustrate, the story unfolded according to its own logic.

*Methods*

This study relies on qualitative methods that allow us to gain deeper perspective on the SC phenomenon and to capture organisational reality beyond textbook idealisation, synthetic numbers in economic models and the pragmatic view that is prevalent in the accounting industry (Vaivio, 2008). The case study format directs focus to context-specific in-depth knowledge, and it is especially relevant when scrutinising the interests, power and values of actors in complex situations (Morgan and Cooper, 2008), enabling researchers to capture the social dynamics that surround the studied phenomenon and to grasp a contextual understanding of the case. We thus achieved a deep comprehension of how SC emerged in the strategic agenda through the triangulation of various empirical materials; this comprehension enhances the reliability of our findings (Vaivio, 2008).

The empirical evidence that this study presents is based on a document analysis and ethnographic notes covering the period from July 2017 to December 2019. All data were collected in Russian and then summarised; some of these data has been translated into English. While the document analysis served as the main source of our findings, our inspiration arose from informal discussions among the co-authors as to how the SC appeared as a priority in the formulation of a strategy implementation plan with the engagement of an expert group, in which one of the co-authors participated.

Initially, we examined different texts, including official transcripts of relevant public discussions, budget messages, concept papers, policy documents and methodological guidelines and recommendations (see Appendix 1). Additional information was gathered from documents related to the expert discussions held from January to March 2019, in which one of the co-authors participated. This researcher was a member of the working group for the strategy implementation plan, and shared his academic knowledge and expertise when developing the relevant documents for official approval. The researcher became not only a participant-observer, that is, an insider who took part in the group's activities, but also an actor-observer, as he was involved in the decisions and actions of the group; this enabled him to gain close access to the data. The other authors adopted an outsider approach, and thus perceived this actor-observer as an informant for this study. Through this insider-outsider combination, which is especially relevant when investigating SC (Argento *et al.*, 2020), we attempted to gain a richer understanding of SC visualising and calculating in Saint Petersburg. We carefully examined the documents, then revealed missing parts and addressed them by utilising the ethnographic notes which were an output of the informal discussions among the co-authors.

The inherent flexibility of ethnography enabled its application in our case study. Since ethnography was originally rooted in anthropology, ethnographic research has, in the past, presupposed the deep involvement of a researcher in the studied communities for a long period of time (Hammersley, 2006). Nevertheless, the current understanding of ethnography in social sciences is different – researchers instead direct their focus onto certain parts of people's lives within a shorter period. Although Sanders (1999) highlighted the increasing use of ethnography in applied settings within a variety of disciplines, there are multiple tensions related to comprehending its methodological and contextual aspects (Hammersley, 2006). Several studies encourage flexibility in using this method, suggesting a "moratorium on instructional guidebooks on how to do ethnography" (Sanders, 1999, p. 671). Gobo (2008) claims that ethnography has an "increasingly polysemous" character which, at its core, emphasises observation. While observation serves as the primary source of information, it can also be utilised in an ancillary manner, allowing a researcher "to move the reader in the unfamiliar settings and reveal the activities of social actors with whom he or she might not otherwise be acquainted" (Sanders, 1999, p. 673). In other words, ethnographic elements can reach beyond documentary data to support a case study (Gobo, 2008). In our case, the ethnographic notes were used as additional materials to enrich our findings with undocumented details on the organisational elements of the dialogue, that is, on the material context and power dynamics of the actors engaged in it.

Thus, when presenting our empirical findings, we relied on documents to capture the purpose of the dialogue, the actors involved in it and its formal outputs, while ethnographic notes allowed us to unveil the organisational elements of the dialogue and its outcomes. In the next section, we present our findings as a two-phase story which illustrates the twin processes of visualising and calculating an SC (Lapsley *et al.*, 2010), as framed by the dialogue theory (Brown, 2009; Bebbington *et al.*, 2007). While the first phase focuses on the dialogue on making SC concepts visible in the long-term strategy for Saint Petersburg, the second phase concerns the inclusion of SC in the city budget through the strategy implementation plan, that is, making the SC calculable.

## Empirical findings

We begin by presenting a timeline indicating how SC was taken up by the city government in 2017, the milestones in the development of an SC vision and its inclusion in city strategic planning documents which describe the city's long-term strategy and its implementation plan. We then attribute the two phases identified above to two temporary collectives (groups) engaged in SC strategisation: the project office (PO), and the working group (WG). These groups were charged with including SC concepts in the discourse concerning the city's strategy and the strategic planning documents, respectively (see Figure 1). For each phase, we address the composition of the relevant group, its organisation, its key activities and its outputs. We also include descriptions of the dialogue outcomes observed in the city's strategy (in the case of the PO) and the strategy implementation plan indicators (in the case of the WG).

### *Phase 1: visualising a smart city*

*Purpose.* The first phase involved articulating a vision of smartness for the city. In 2017, the governor initiated the process of developing the concept by establishing close collaboration with one of the leading public IT universities (hereafter, "the University"). The University became responsible for creating a conceptual vision of an SC and thus took on the role of the initiator and coordinator of the so-called smart city project office (PO). The PO was charged with creating a "smart vision", and included individuals with a broad range of expertise from the city government, academia and business. In other words, the PO provided a platform for

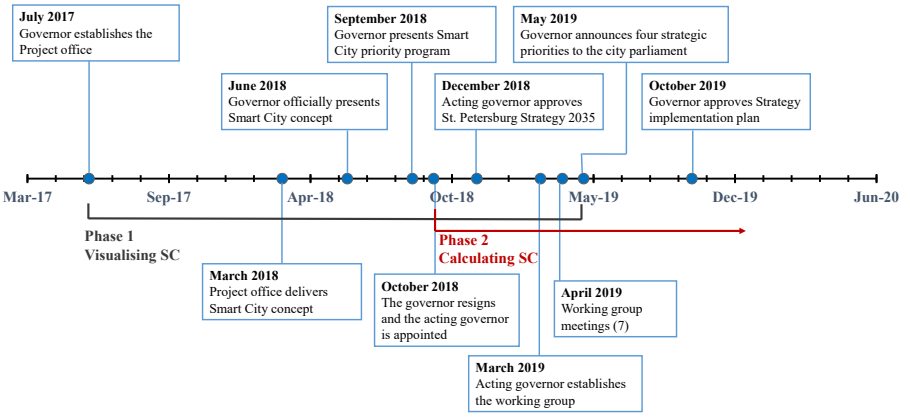


**Figure 1.**
Timeline of the development of a smart city strategy for Saint Petersburg

discussions, debates and dialogue concerning this vision. It is apparent that this group possessed a reflexive understanding (Brown, 2009) of what an SC strategy is and how to apply it.

*Key actors in the dialogue.* Two groups of experts, the key actors in the dialogue, were involved in developing the SC vision. The governor approved a core team of 31 members, while the extended group comprised 97 external members plus the core team (see list of PO members in Appendix 3). Most PO members were government officials (22 on the core team and 51 in the extended group). It is evident that academics, public officials, politicians and businesspeople provided different perspectives of what an SC could be, thus constructing a wide-ranging dialogue (Brown, 2009) and a comprehension of SC informed by appeals to foreign experience – including, among others, smart initiatives in Amsterdam, Barcelona, Copenhagen, Dubai, Masdar, New York, Singapore and Songdo.

*Organisation.* In phase 1, the key actors were mainly the appointed representatives of the University who established the PO. The rector of the University headed the PO, and the meetings of the group were held entirely on the University's campus. Thus, all interactions among the participants took place directly at the University. This outline illustrates the organisation of the process, reflecting "the context within which meaning is produced" (Bebbington *et al.*, p. 367) for the analysis. In general, the PO placed a considerable emphasis on collaborative efforts to create and implement the SC, highlighting that "SC presents a result of cooperative work of all participants of the city development" ("The Concept of Smart Saint Petersburg", hereafter "the Concept"). In addition, the PO organised a set of presentations by the representatives of private consulting and telecommunication companies, gathered feedback from the city government regarding the content of the SC framework and conducted a series of surveys of citizens.

*Outputs.* Ultimately, the outputs of the PO's collaborative work – the results produced by a consensus among experts (Brown, 2009) – were delivered in spring 2018. The Concept was introduced first. Then came the so-called Priority Program Smart Saint Petersburg (hereafter "the Programme"), which indicated more precisely which direction SC development would follow. Further implementation of the Concept was assigned to the PO as well; thus, several working groups were organised to provide coordination and organisational, methodological and project assistance.

When presenting the Concept, the PO office representative referred extensively to the importance of citizens' voices and their active participation in bringing up "problems, expectations, and suggestions" when defining the SC (citizens were asked to evaluate the

smart initiatives to be put forward for implementation), while the experts were responsible for providing "perspectives" and the representatives from business were to share "problems and suggestions". Therefore, while directing focus to the best practices and current trends in SC globally, the PO was nevertheless oriented towards meeting the expectations of citizens, evaluating the effects of future SC implementation and attempting to adapt the existing models of SC to the needs of Saint Petersburg by maintaining a constant interaction with citizens, private organisations and the city government.

However, in October 2018, the city's governor unexpectedly resigned, and a new acting governor was appointed by the Kremlin. Although the acting governor supported the previous efforts and SC remained a strategic priority, the Concept and the Programme's ambitious plans were shelved. Nevertheless, in December 2018, the acting governor approved a comprehensive long-term city strategy that was to remain operational until 2035 (Strategy 2035, 2018). This strategy had been mostly developed by his predecessor. It set the priorities, goals and indicators for three primary strategic directions ("City of Innovations", "Comfortable City" and "Open City" – Strategy 2035, 2018, p. 57), encompassed all areas of city governance and management and included SC elements in several areas. It emphasised "increasing the number of citizens participating in the decision-making process regarding the urban environment, stimulating activity and engagement of people and organisations in relevant projects, [and] creating tools for project co-financing by citizens" (Strategy 2035, 2018, p. 85). Thus, a special emphasis was placed on the need for public discussions and the need to ensure public control of city projects.

*Outcome – SC vision.* The SC vision was formulated as a comprehensive framework of components to address citizens' needs, and included such items as ecological improvements, a comfortable urban environment, healthcare, evidence-based city governance, a reduction in traffic congestion and citizens' engagement in developing the city (PO: Current Results of Activity, 2017–2018). There was a clear focus on citizens and the mechanisms by which they could be engaged. Located as it was at the core of SC and listed as a "desired change', this dialogic process was eventually promoted and enabled polyphony, or a plurality of the voices of multiple actors (Brown, 2009). The Programme outlined one of the key indicators to be achieved in 2020 as "Share of citizens positively evaluating projects selected and enacted to realization – not less than 50%" (the Programme, 2018, p. 4). Ultimately, this clearly human-centric SC vision was partially integrated into Strategy 2035 (2018), and thus became official.

*Phase 2. making the smart city calculable*

*Purpose.* In 2019, the acting governor initiated a revision of the city's budget programmes and the development of the strategy implementation plan with the aim of "explaining the main directions of the prospective city development to the citizens using simple and understandable language" (Ethnographic Note 1, hereafter EN1). Specifically, the governor established a WG of experts to implement the strategy through the revision of budget programmes. The purpose was to articulate the SC idea to citizens using a comprehensive approach and simple language and to connect it with budget programmes using bureaucratic language, so that this technical answer to a predetermined goal was perceived as "exogenous and given" (Brown, 2009). While the strategy approved in 2018 mentioned the SC agenda, the new ambition was to make it a top strategic and political priority:

> The idea to implement SC in the strategy emerged when it became clear that the acting governor would go for the elections. To deliver the complex strategic document [the strategy implementation plan] to the citizens, the strategy was framed in four blocks: *smart city, comfortable city, open city, and social city*, and for these four blocks, strategy indicators, activities, and, probably, programs were assigned. (EN1)

Thus, SC became one of the four major priorities in the new strategic vision, along with the promotion of an open, social and comfortable city (TASS Information Agency, 2019). The open city priority was clearly oriented towards engaging citizens and empowering them to develop particular areas of urban life. The social city priority pertained mainly to public services and healthcare, while the comfortable city priority was focused on safety and infrastructure: transport, roads and public places.

*Key actors.* The WG included individuals with a wide range of backgrounds (see Appendix 3). Like the earlier PO, this WG consisted of two teams: the core team (14 members) and the external experts (82 members) (see Appendix 3). Essentially, the main actors were government representatives who invited experts from different fields to participate on the basis of their sectoral backgrounds and research interests, potentially adding valuable perspectives (Brown, 2009) and a multiplicity of views to the discussion which would help to avoid it being dominated by privately owned ICT corporations (Grossi and Pianezzi, 2017):

> Experts were invited from academia and industries. Why were there no experts who presented the interests of corporations? Because in that case, they would be lobbyists. For us it was important that a person did not belong to a particular corporate domain; even representatives from non-profit organizations were selected carefully. (EN4)

In total, 18 expert subgroups (commissions) were created according to their particular areas of expertise: tourism, industry, public administration, entrepreneurship, fast-moving consumer goods market, ecological and environmental protection.

*Organisation.* By means of city government decree, two vice-governors became co-leaders of the WG (see Appendix 3). Because the WG was set up as a special purpose body to discuss and analyse the alignment of the four strategic priorities with the budget, it was requested to suggest changes in the content and indicators of the budget programmes and the strategy implementation plan. WG members were authorised to request and analyse documents from institutions and public bodies at the local and regional levels and to engage other members of scientific and expert communities or other public organisations to participate in discussions. One of the vice-governors took the role of a manager or a coordinator, with responsibility for planning and controlling the group's activities and setting the agendas for meetings. The experts became the subordinates in this hierarchy, reflecting the power dynamics that were in effect (Bebbington *et al.*, 2007). Nevertheless, all decisions were to be made collegially, through majority voting. While a dialogic essence emphasising the plurality of expert knowledge (Brown, 2009) and discussion (Bebbington *et al.*, 2007) was formally in place, in practice it was a monologue organised within restricted government circles to produce an SC strategy that was relevant to the government actors.

> The discussions looked like this: about 60 participants were gathered – vice-governors, chairmen of key committees and municipality leaders as well as experts from universities. Afterwards they were split into four subgroups and worked with documents such as budget program charters with targets and indicators, the presidential decree [on national goals], where targets were also defined, and based on this there was an attempt, let's say, to assess what an Open, Smart, Comfortable and Social city actually is. The subgroups were led by two people, most often vice-governors or committee chairmen, sometimes experts or municipal leaders. And then the governor came, and every subgroup reported on how they see the implementation of their directions. (EN 5)

In terms of organisation and context (Brown, 2009), the experts' meetings and discussions initially took place in a city government office. Later, some of these meetings were held at various experts' offices: "... after they (the experts) defined who will be doing what – everyone was organising meetings at his/her own place" (EN 15). Finally, they moved back to the government office, to avoid "wasting time organising everyone, driving somewhere and interrupting the working process" (EN 15).

*Output*. The WG was established in March 2019 and initiated discussions among participants in April 2019. Experts were assigned to commissions or thematic groups to align the goals, expected results and relevant indicators for specific areas. Public sector representatives joined the discussions to help the commissions deal with complex budget programmes:

> . . .together with them, we discussed the content of the government program, performance indicators, and the extent to which they were satisfied with the way this program was being implemented – the experts were asking questions and then these conclusions were sent to them (government representatives), and they corrected these documents in terms of texture. . . but not in terms of conclusions. (EN 15)

Eventually, the WG presented an overview of their detailed suggestions in May 2019, proposing amendments to the budget programmes and the content of the strategy implementation plan. The draft of the strategy implementation plan, together with the four priorities, was presented to the city parliament. The final expert suggestions had to be examined and then integrated into the strategy implementation plan by the committee on economic policy and strategic planning, which had been assigned to update the budget programmes and compile the draft strategy implementation plan. In October 2019, the acting governor approved the strategy implementation plan, which included a wide set of indicators under the umbrella of the SC framework, such as:

(1) The share of public healthcare organisations using information systems for organisation and providing healthcare services shall be: 40% in 2019, and 100% by 2024;

(2) The number of virtual concert hall units (cumulative total) created shall be: none in 2019, 1 in 2020 and 3 in 2035;

(3) The coverage of the urban area with an automated air monitoring system (percent) shall be: 100% in 2019;

(4) The number of traffic lights included in the automated traffic management system (items per year) shall be: 4 in 2019, with a gradual increase to 663 in 2035;

(5) The share of apartment buildings that are fitted with commercial heat metering based on remote data transfer (percent) shall be: 65% in 2019, and 80% in 2035;

(6) The share of digitalised public services out of the total number of public services subject to digitalisation (percent) shall be: 68.5% in 2019, and 73.3% in 2035.

Following the logic of this list of indicators, it seems clear that the SC was given a technology-oriented focus involving the widespread implementation of ICT in different areas of city life (Mora *et al.*, 2019). In this case, the essence of smartness was primarily limited to the digitalisation of transport and utility services, environmental monitoring and public services in the areas of healthcare, culture and governance, and thereby focused on enhancing the so-called digital skin of the city (Rabari and Storper, 2015). Here, technology was seen as a better lens for viewing and managing the city, while the role of citizens was generally narrowed to that of "consumers" of this advanced digitalisation.

Moreover, the human-centric elements were substantially reduced to the engagement of citizens in urban environmental projects and the approval of government initiatives, as illustrated by the following indicators:

(1) The share of citizens who participate in discussions on the development of the urban environment (percent) shall be: 9% in 2019, and 41% in 2035.

(2) The share of residents who are willing to participate in online discussions related to the government initiatives through online voting (percent) shall be: none in 2019, 75% in 2021 and 85% in 2035.

Although the latter indicator actually supported citizens' engagement, it was an exception.

*Outcomes.* Essentially, the WG did not change the content of the strategy, but rather implemented corrections according to ". . .the precise list of criteria: is it aligned to the federal government decree *N* 172 or not? Does it correspond to the goals of the strategy (Strategy 2035, 2018) or not? Does it correspond to the main directions of the regional projects or not?" (EN 16). Thus, "The strategic vision of the city was not re-defined, it was refined. Refined in terms of correspondence with the decrees of the president and the four priorities – smart, comfortable, open and social city" (EN 7). The human-centric perspective conveyed in the Concept was packed into the "open city" priority: "The smart city is just a tool. Citizens' engagement occurs in the 'open city'" (EN 3). The open city activities were mainly dedicated to establishing feedback mechanisms relating to particular urban environment issues. However, when the initial holistic SC vision was divided between the "smart" and "open city" concepts, its human-centric elements were further reduced to limits imposed by bureaucrats, who were mainly seeking enhanced feedback:

> According to the perceptions of the bureaucrats, first of all, it was extending the possibilities for feedback. That is to say, it started from the public service system and wider engagement of citizens and provision of these services, and second, this kind of feedback emerged, where it was possible for citizens to express their complaints via an electronic platform. (EN 9)

Despite the human-centric SC vision of the PO, citizens were given a rather limited role in the WG reports. They addressed SC only when this was directly required by the federal guidelines, or when smart technologies could be helpful to achieve federal targets; for example, one of the experts suggested "using modern communication tools and technologies available within the Smart City project to motivate citizens to engage in sport and fitness activities" (Expert Report on Physical Activity and Sport). Other examples reveal purely technology-oriented suggestions, such as the introduction of a sub-programme to the budget programme on city transport development to finance "smart bus stops" (Expert Report on Development of Transport System). Furthermore, citizen engagement was brought up primarily in terms of digitalisation: "engagement, it is again based on technological solutions, because simply engaging is like 'go to the street and shout – who will be louder than others?' Here, it is through social networks, websites, electronic resources, public services, and so on" (EN 10).

## Concluding discussion

SC is recognised as an ambiguous concept in the literature (Fernandez-Anez *et al.*, 2017), and can be interpreted in multiple ways according to its adoption in a certain empirical setting. Following the conceptual literature on SC (Mora *et al.*, 2017, 2019; Grossi *et al.*, 2020; Meijer and Bolivar, 2016), we distinguished "techno-centric" and "human-centric" SC perspectives. Although both have been investigated extensively in the SC literature, the techno-centric perspective has become a subject of criticism for prioritising the promotion of the profit-oriented interests of technology vendors (e.g. Grossi and Pianezzi, 2017; Hollands, 2015) and neglecting citizens' needs (Vanolo, 2016). However, there remains a lack of understanding as to how these perspectives actually emerge in practice (Mora *et al.*, 2017).

Thus, the aim of this study is to address the implications of smart city development paths (techno-centric or human-centric) by analysing the evolution of a city strategy. In order to achieve this, we investigated how the dialogue among various actors engaged in the city's strategy influenced SC visualising and calculating in Saint Petersburg. A case study

approach (Eisenhardt, 1989; Eisenhardt and Graebner, 2007) enabled us to unveil and illustrate empirically how the initial human-centric vision transformed into techno-centric calculations which were introduced into the city's strategic planning documents, namely, the long-term city strategy and the consequent strategy implementation plan. Our case therefore suggests viewing these two perspectives not as dichotomous (Mora *et al.*, 2019), but rather as connected, and emerging consecutively throughout the journey from an initial strategic vision to actual implementation in the city's calculations.

The chain of events and activities that accompanied the creation of these strategic planning documents were framed as visualising and calculating processes that were "intrinsically linked and increasingly prominent in the multitude of representations of contemporary cities" (Lapsley *et al.*, 2010, p. 309), or as human-centric and techno-centric representations of SC in the story of Saint Petersburg. We supported our documentary analysis with ethnographic elements (Gobo, 2008) that enabled us to unveil the dynamics of these processes and to trace how the dialogue on SC strategy unfolded and the outcomes it created. Below, we discuss three points our study makes with reference to the reviewed literature.

### *There is a gap between smart city vision and calculations*

Numbers can emphasise or de-emphasise particular aspects of a city's context, ultimately becoming an illustrative tool for connecting the present city and its problems to the future city visualised by the actors involved (Brorström, 2018). However, there may be a "gap between plans and declarations and their visible results" (Czarniawska, 2010, p. 435).

In our case, the significant attention paid to citizens and their active role in developing the SC vision in phase 1 made them both objects and subjects of decision-making (Grossi *et al.*, 2020), thereby clearly reflecting the human-centric SC perspective. Nevertheless, this ambitious human-centric vision was not implemented, even after being officially presented, because it had to come "into close contact with the materiality of operational and financial constraints" (Lapsley *et al.*, 2010, p. 308) in phase 2. However, it was also not entirely forgotten; rather, it was divided among four separate priorities in the strategy implementation plan. Thus, a possible way to inscribe SC into the city's calculations was to split it into different strategic priorities, connect smart technologies with the federal agenda and address essential city governance problems such as gathering feedback from citizens.

As a result, the act of making SC "calculable" led to the grounding of initial ambitions (Czarniawska, 2010) and ultimately transformed the human-centric SC strategy into a techno-centric one. Hence, citizens, who were no longer viewed as active subjects, became SC consumers, while managers (experts led by the government, together with public officials) were to make the city a better place for them (Grossi *et al.*, 2020). At the same time, the calculable SC "located within a chain of calculations and aspirations" (Lapsley *et al.*, 2010, p. 310) became controllable and could eventually be managed within established city governance routines such as the strategy implementation plan and budget programmes.

### *Organisation of dialogue can be critical in smart city strategising*

Conceptual literature suggests that the SC idea presupposes the involvement of actors from both the public and private sectors (Argento *et al.*, 2020; Broccardo *et al.*, 2019). However, stakeholder roles and interactions can vary dramatically, which is why the SC literature produces diverse and sometimes contrasting conclusions (Grossi *et al.*, 2020). The case of Saint Petersburg shows that many different actors (academics, businesses and government) were involved in discussing SC, and that their representation in the temporary collectives (groups) engaged in SC strategising was the same in both phases. However, we have revealed that the way in which the dialogue between the actors is organised appears to be crucial for

SC strategy: this pattern of organisation includes how roles are distributed, how hierarchies are established, who leads the discussion and sets the agenda and so forth.

We applied a theoretical framework of dialogue (Brown, 2009; Bebbington *et al.*, 2007) to capture these distinctions and the interactions within the two groups (PO in phase 1, and WG in phase 2), the outcomes of which ultimately led to the emergence of the human-centric SC vision during phase 1, and then to techno-centric SC calculations as an outcome of phase 2. Thus, placing the PO outside formal government structures, along with the delegation of leadership to the rector of the University (making vice-governors and other actors subordinate to him), enabled the PO to learn from international experiences and to bring human-oriented ideas to the Concept and the Program, and furthermore to Strategy 2035 (2018), thus maintaining a diversity and plurality of visions (Bebbington *et al.*, 2007). On the other hand, the dialogue within the WG in phase 2 was "secured" by the leadership of the top city government officials, leading to a one-sided monologue (Brown, 2009). As a result, only those SC elements that contributed to federal priorities and city government agendas "survived" in the strategy implementation plan.

*The techno-centric smart city may appear not only because of the prevalence of corporate interests, but also because of government actors' domination of the dialogue on SC strategy*

Techno-centric SC strategies are known to be primarily beneficial to private technology companies (Grossi and Pianezzi, 2017; Hollands, 2015; Mora *et al.*, 2019). Kitchin (2015) indicates that when private companies convince city administrators to adopt their solutions, this can lead to the prioritisation of business goals over social goals (Grossi and Pianezzi, 2017), and a consequent disregard for the role of citizens (Vanolo, 2016).

Our study suggests a novel view on the origins of a techno-centric SC strategy that is not based on corporate interests. We claim that an alternative path for the emergence of a techno-centric SC may be connected to the organisation of dialogue around an SC strategy. Specifically, when government actors dominate the dialogue on SC strategy, it may turn into a monologue put forth by public officials, which can then lead to the inscription of a techno-centric SC perspective in the city's strategic planning documents. In our case study of Saint Petersburg, we witnessed how government actors dominated the dialogue within the WG, isolated human-centric SC elements within the "open city" strategic priority and effectively reduced the SC concept to technological advancements in transport, utility management and healthcare, as well as to feedback mechanisms and the digitalisation of public services.

*Implications for researchers and practitioners*

Our study suggests the following implications for researchers and practitioners. The next steps in researching the implications for a techno-centric SC can be taken in other contexts. Furthermore, comparative studies may help in finding other features that are important for organising dialogues on SC visualisation and making the SC calculable. The implications for policymakers and public sector practitioners stem from the theoretical frame through which we view SC evolution: there is a natural gap between a human-centric SC vision and the real capacity to ground this vision in a city's calculations. Two types of arrangements may address this gap. First, we suggest emphasising and securing the human-oriented elements in SC strategy, so that the vision remains holistic and citizen-focused throughout the calculating process. Second, when engaging experts in policy evaluation, in addition to selecting participants based on their expertise and attitudes towards smart city models, it is also important to arrange their dialogue so that plurality of voices, besides those of government actors, is achieved.

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## Appendix 1

**Table A1.** Main sources of empirical data

| | |
|---|---|
| Documents | 1. Concept smart Saint Petersburg<br>2. Strategy of Saint Petersburg<br>3. Strategy implementation plan<br>4. Regional projects (41 items)<br>5. Experts in the PO (short and extended lists)<br>6. Experts in the strategy working group (short and extended lists)<br>7. Expert reports<br>— Development of healthcare sector in Saint Petersburg<br>— Development of education sector in Saint Petersburg<br>— Social support for citizens in Saint Petersburg<br>— Development of physical activity and sport in Saint Petersburg<br>— Development of transport system in Saint Petersburg<br>— Ensuring legacy, rule of law and security in Saint Petersburg<br>— Complex development of systems for the utility sector, energy and energy savings<br>— Development of cultural sector in Saint Petersburg<br>— Ensuring affordable housing and utility sector services for citizens of Saint Petersburg<br>— Landscaping and environmental protection in Saint Petersburg<br>— Economic development and the knowledge economy in Saint Petersburg<br>— Development of industry, innovation, and the agricultural sector in Saint Petersburg<br>— Promotion of citizen employment in Saint Petersburg<br>— Development of entrepreneurship and the consumer market in Saint Petersburg<br>— Increasing the effectiveness of public governance in Saint Petersburg<br>— Economic and social development of territories in Saint Petersburg<br>— Creating conditions for ensuring social consensus in Saint Petersburg (two items)<br>— Development of the tourism sector in Saint Petersburg |
| Ethnographic notes | Recorded sessions with the co-author who was an expert in one of the strategy working groups (19 items) |

## Appendix 2

**Table A2.** Short descriptions of ethnographic notes

| Ethnographic note | Abbreviation | Content |
|---|---|---|
| Ethnographic note 1 | EN1 | How the SC story was initiated |
| Ethnographic note 2 | EN2 | Connection of the SC concept with other programmes |
| Ethnographic note 3 | EN3 | Four priorities |
| Ethnographic note 4 | EN4 | Neutral position of experts |
| Ethnographic note 5 | EN5 | Expert discussions concerning the SC |
| Ethnographic note 6 | EN6 | Strategy and target indicators |
| Ethnographic note 7 | EN7 | Timing of discussions |
| Ethnographic note 8 | EN8 | Strategy and integration of four priorities |
| Ethnographic note 9 | EN9 | Meaning of SC for experts |
| Ethnographic note 10 | EN10 | Citizen engagement with the SC vision |
| Ethnographic note 11 | EN11 | Refinement of the strategy |
| Ethnographic note 12 | EN12 | Influence of the federal agenda |
| Ethnographic note 13 | EN13 | The role of city government representatives |
| Ethnographic note 14 | EN14 | Appointment of a head of the expert group |
| Ethnographic note 15 | EN15 | Difficulties during discussions |
| Ethnographic note 16 | EN16 | Corrections provided by heads of working groups |
| Ethnographic note 17 | EN17 | Selection of experts for a working group |
| Ethnographic note 18 | EN18 | Expert knowledge of budgets as a criterion |
| Ethnographic note 19 | EN19 | Corrections to expert recommendations |

## Appendix 3

**Table A3.** Composition of project office (phase 1) and working group (phase 2)

| Phase 1 Smart city project office | | Experts | | Phase 2 Strategy working group | | Experts | |
|---|---|---|---|---|---|---|---|
| Government | 22 | Government | 51 | Government | 6 | Government | 5 |
| Academia | 3 | Academia | 30 | Academia | 6 | Academia | 47 |
| Business | 5 | Business | 46 | Business | 2 | Business | 9 |
| Media | 1 | Media | 1 | Media | 0 | Media | 0 |
| NGO | 0 | NGO | 0 | NGO | 0 | NGO | 20 |
| Politicians | 0 | Politicians | 0 | Politicians | 0 | Politicians | 1 |
| *Total* | *31* | *Total* | *128* | *Total* | *14* | *Total* | *82* |


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