Smart City Collaboration

Collaboration is problematic in the public sector, yet many smart city theorists advocate relationships fully dependent upon collaboration to address the intense complexity encountered by city governments and achieve city objectives of quality of life, efficiency, effectiveness, and economic and environmental sustainability.

1. Introduction

Cities worldwide, responding to massive challenges driven by population growth and climate change, have adopted smart city strategies, many of which are underpinned by conceptualizations that prescribe collaborations [1][2][3][4][5]. Collaboration was found by Meijer and Bolívar [6] to be the dominant strategy in models of governance proposed in smart city literature. Smart city conceptualizations of collaboration focus on entire city ecosystems, relationships between city government and organizations from all sectors, and relationships between government and citizens. Even the relationship between units within a city administration is said to be more effective with smart city collaboration [7][8]. The wider public management literature [9][10][11] has chronicled examples of the term collaboration being used interchangeably with cooperation and coordination, misleading stakeholders and exemplifying government rhetoric [9]. Is smart city collaboration rhetoric or, can smart city theory extend public management theory?

2. Theory—Smart City Collaboration

2.1. Why We Collaborate

Collaboration involving multiple actors from all sectors is utilized by governments when faced with a problem that has not been resolved through traditional hierarchical relationships [12] because collaboration enhances problem-solving capacity and achieves efficiency and effectiveness [13][14]. Yet, governments are circumspect as to involvement in cross-sector collaborations because the collaborations take decisions beyond the view of elected officials and are not accountable to the voters [14]. Further, the word collaboration has been used interchangeably with other integration terms, namely communication [10], coordination, and cooperation [9], causing confusion as to intentions.

2.2. What Is Collaboration?

A hierarchy of levels of relationships between governments, service providers, and citizens was formed by Konrad [10], commencing with independent operations, moving upwards to information sharing and communication, then cooperation, coordination, collaboration, and, finally, consolidation, where the organizations merge into a new, single entity. Keast et al. [9] found substantial undifferentiated use of the words cooperation, coordination, and collaboration in the human services sector, and that 40% of government informants experienced dissonance between their personal understanding of the terms and the way in which the terms were used by governments. Precisely 86% of community sector representatives identified a disconnect between government policy statements involving the term collaboration and actual practice and community expectations [9]. The continuation of undifferentiated usage was judged by Keast et al. [9] to be motivated by a need by government informants to comply with then-current themes within the public sector, "The use of rhetoric over meaning by government […]". The informants advised that despite the assertions of governments that they wanted collaboration, it was mostly coordination that governments wanted [9].

Our conundrum revolves around whether rhetoric is in play in smart city theory or whether smart city theorists and city governments are using the term collaboration authentically and can contribute to forming effective collaboration. To assess whether authentic collaboration is intended or has taken place, we applied the attributes of collaboration identified by Keast et al. [9]:

- Long-term perspective to the relationship;

- Purpose to create an outcome not previously achievable;

- Substantial integration achieving synergy between organizations;

- Systems have been changed;

- Tight links between actors;

- Actors move outside traditional functional areas, possibly a new entity;

- Highly interdependent, sharing of power.

The smart city literature has increasingly moved from a technology-led supply push to prescribing collaboration as a remedy to the complexity inherent in smart city challenges [1][2][3][4][5]. After reviewing the literature, Nam and Pardo [15] identified four criteria for smart government of smart cities, namely efficiency, effectiveness, transparency, and collaboration. Collaboration was conceptualized as involving the city government in intraorganizational collaboration, intersectorial interorganizational collaboration, and citizen–government collaboration [15].

Smart city theorists [1] adopt the definition of collaboration established by Harrison et al. [16], in the context of e-government projects, namely: "collaboration—frequency or duration of activities in which more than one set of stakeholders share responsibility or authority for decisions about operation, policies, or actions of government." This conceptualization of collaboration, emphasizing shared decision-making, is consistent with that of Keast et al. [9].

Some smart city theorists do distinguish between collaboration and related concepts. Nam and Pardo [17] use the terms collaboration and coordination in tandem, distinguishing as to meaning. Gil-Garcia et al. [1] establish governance, engagement, and collaboration as one of 10 core components of the conceptualization of a smart city yet, within that component, carefully distinguish between collaboration and engagement with stakeholders.

2.3. How Do We Collaborate?

When introducing collaboration, Mora, Deakin, and Reid [3] assert smart cities must address: whether the strategy is to be technology-led or holistic; whether the approach is to be top-down or bottom-up; whether there is to be a monodimensional or integrated intervention logic; and whether collaboration is to follow the double-, triple-, or quadruple-helix model.

The top-down approach requires city government to drive the strategy, applying incentives, funding, and publicity to facilitate a program of city government initiatives [18]. In the bottom-up approach, planning involves stakeholders from all sectors, organizations, and individuals, creating cross-sectoral partnerships. City government must not only achieve strong stakeholder engagement in respect of city government initiatives but also bring proposals from the bottom up into the political arena, facilitating consensus-building [18].

The double-helix model involves two actors, the city government and typically a smart city system vendor [19][20]. The triple-helix model of collaboration is formed of actors drawn from government, industry, and research institutions [21]. The quadruple-helix model encompasses those sectors plus citizens and community organizations [22]. Notwithstanding their prominence within the smart city literature, the helix models do not attempt to address the matter of collaboration internal to an organization.

2.4. With Whom Do We Collaborate?

Within these top-down/bottom-up and helix approaches, to achieve smart city objectives, there are diverse relationships between actors. To achieve clarity, we assembled the evidence from the smart city theory literature against the SCCF categories of relationships.

2.4.1. City Government Internal Collaboration

In the context of the smart city, Alhusban [7] and Viale Pereira et al. [8] identify the need for collaboration between units within public organizations as important to the implementation of an ICT-based smart governance approach, remedying a siloed approach, and achieving objectives.

Managers in four North American smart cities informed Alawadhi et al. [23] that interdepartmental collaboration and cooperation had been essential for the success of smart city initiatives. Similarly, Pierce and Andersson [24] interviewed 12 municipal administrators involved in smart city initiatives, finding that collaboration was their predominant challenge.

Within the overall collaboration challenge, absence of internal cooperation was specified by 11 of the 12 informants as frustrating the achievement of initiatives [24]. A compelling explanation is made by one of the informants from Rotterdam [24] who said "[…] I have colleagues that are responsible for the street lighting […] for the sewer system or the parking lots […] have only one responsibility […] and everything that you want to combine […] connectivity to our street lighting or charging equipment for electronic vehicles […] you complicate their tasks […] it is not always easy to convince colleagues to co-operate […]."

Interorganizational collaboration goes beyond efficiency and effectiveness. Keast et al. [9] were informed that governments that seek to develop collaboration with other sectors must accept that they are responsible for providing leadership as to collaboration, by example. The smart city context requires city governments to 'walk the talk' by way of cooperation and collaboration between its units and with other government organizations.

2.4.2. City Government and Other Government Organizations

Collaboration between municipalities and with other levels of government is essential to the achievement of smart city objectives. Many cities comprise multiple local governments, reflecting the sprawl of the town into surrounding local government areas. Higher levels of government enter the mix, typically creating organizations to provide health, education, transport, and water services across multiple municipalities, and thus having purposes and objectives that are not focused on a sole municipality.

Capacity to manage across geographical or jurisdictional boundaries is key to the achievement of smart city objectives [7] [8]. Pardo, Gil-Garcia, and Luna-Reyes [25] identified collaborative capacity as essential to the success of organizations in establishing effective information sharing across the boundaries of organizations.

2.4.3. City Government and Organizations

Mainstream to the smart city conceptualization of collaboration is the relationship between the city government and nongovernmental parties, such as companies, not-for-profit organizations, and civic groups [8]. Smart city collaborative interorganizational configurations have been influenced by those found to be successful in digital government projects [26], ranging from quasi-markets and Public and Private Partnerships (PPPs), to public procurement, to project financing, and to innovative forms based on the active engagement of citizens [27].

A significant innovative form is the Urban Living Lab (ULL), which is authentic collaboration, taking a real-life environment, being managed by the municipality in collaboration with civil society organizations or research centers, and being where citizens, experts, and private companies codesign, coproduce, and test services intended for the whole city [27].

2.4.4. City Government, Organizations, and Citizens

Citizens were added as the fourth helix [22] to emphasize the importance of citizens to achieving social and economic benefits through collaboration [28]. Conceptual models of smart city governance take a citizen-centric approach [29][30][31]. The citizen is to be the focus of collaboration between city government and external organizations and citizens, not only to achieve increased efficiency, effectiveness, and transparency but also to facilitate nongovernment entities' participation in decision-making [15].

This high level of conceptualization does not inform the reader as to the configuration of, or characteristics of, the relationship between the citizen and city government, leaving unanswered the question of whether it is one of collaboration, cooperation, consultation, or communication.

At a lower, transactional level, smart cities are said to be achieving collaborative governance when there is citizen involvement in public affairs, through transparency websites, open data platforms or e-participation platforms [32], or social media [2]. Having regard to the findings of Keast et al. [9] that governments assert that they want collaboration but mostly want coordination that governments wanted [9], we were concerned as to whether authentic collaboration is taking place through these ICT-based channels. Zavattaro and Brainard [33] designate smart city social media microencounters between citizens and their governments as collaboration, which provide city government with a chance to interact with someone to share information, to crowdsource ideas, to find policy ideas, and to be part of evidence-based decision-making. None of that explanation meets the attributes of authentic collaboration set by Keast et al. [9], by, for example, achieving a long-term perspective to the relationship, substantial integration of activities, synergy, tight links, and interdependence.

Other theorists distinguish collaboration from other relationships between city governments and citizens. For Yerden, Gasco-Hernandez, Gil-Garcia, Burke, and Figueroa [34], smartness of a city has four dimensions, two of which are 'Citizen

Participation' and 'Community and Stakeholder Engagement'. The authors situate collaboration within the Community and Stakeholder Engagement dimension, suggesting the possibility of a perspective that citizen participation does not primarily require collaboration, but that collaboration is but one of the options as to city government engagement of stakeholders (including the community).

Put another way, no assumption should be made that citizen participation requires collaboration. Stakeholder engagement relationships other than collaboration may accurately describe the intended interaction between city government and citizens.

2.4.5. Organizations and Citizens without City Government

Smart city theory conceptualizes city government not only as an actor in collaborations but also as responsible for both inciting others to respond to smart city challenges and for creating an environment that encourages others to collaborate.

The concept of governance without government was identified by Gil-Garcia et al. [1] as a distinct strand of literature where stakeholders, advocates, civil groups, and individual citizens are depicted as integrating to form a governance mechanism, which does not include government. This smart city conceptualization is consistent with Klijn and Koppenjan's [35] authoritative definition of governance networks as "[…] social relations between mutually dependent actors […]". Similarly, innovative governance networks may be based on a collaborative relationship not involving government [36].

Whilst the government may not be an actor within the collaboration, smart city literature conceptualizes the city as accentuating the participation of citizens, organizations, and industry to attract human capital, which is then mobilized in collaborations to achieve the city's objectives [6]. The city government's role is to facilitate networks, which collaborate to produce innovations that benefit the city. This is a strategy in itself, one where the city government develops a collaborative environment [37].

Put another way, city government is required both to develop a collaborative ecosystem, including the inherent bottom-up processes, and to coordinate the efforts of the collaborating actors towards shared smart city objectives [3].

3. Current Insights on Smart City Collaboration

3.1. The Role of Collaboration in a Smart City

We find that the advocacy of the smart city literature for the adoption of collaboration as a strategy to achieve smart city objectives is apposite and supported by a broad range of literature and the Amsterdam experience. However, practice and the application of widely accepted attributes of authentic collaboration established by Keast et al. [9] revealed aspects of smart city collaboration conceptualizations that are problematical or require further development. Our findings are summarized in **Table 1** ('Findings as to smart city collaboration theory and practice'). We now justify our conclusions and explore the key implications of the evidence.

Table 1. Findings as to smart city collaboration theory and practice.

SCCF Relationship Category	Smart City Theory Tenets	Learnings from the Amsterdam Experience
City government internal collaboration	Required to achieve smart city objectives that are typically 'wicked', possibly involving reorganization.	Not integral to the Amsterdam Smart City strategy, which is positioned external to the politico-administrative system. Evidence that an external stakeholder perceived internal city government collaboration as a condition to external collaborations.
City government and other government organizations	Strong emphasis upon cross-boundary collaboration with other local governments, regional and functional purpose government entities.	Fully evident in ASC. Driven from the bottom up with only occasional involvement of national-level entities, on an as-needs basis.

SCCF Relationship Category	Smart City Theory Tenets	Learnings from the Amsterdam Experience
City government and organizations	Core to smart city collaboration conceptualizations.	ASC initiative driven and governed by large for-profit organizations, social organizations, and city governments. A small proportion of smart city projects involve city government.
City government, organizations, and citizens	Growing focus on city government collaborating with citizens. Limited models that are authentic collaboration involving citizens, e.g., urban living labs. Problematical. Likely that cooperation, consultation, or communication is envisaged.	The AEB/ASC configuration did encompass citizen participation in projects. Literature is critical of AEB/ASC not achieving citizen participation in practice.
Organizations and citizens without city government	Collaboration between parties but not necessarily including city government is essential to the achievement of smart city objectives. Collaborative ecosystem city wide.	Municipalities have taken responsibility for building a collaborative ecosystem. AEB/ASC arranges a collaborative ecosystem nested within a city-wide innovative ecosystem.

The conceptualization of collaboration [24] within a city government as being required to achieve smart city objectives [7][8] was confirmed by evidence from the Municipality of Amsterdam. There was evidence that the Amsterdam Smart City (ASC) arrangements were created to improve coordination between departments [27] and that the Office of the Chief Technology Officer was created to work against the silos within the city administration [38].

This limited change to internal organizational arrangements is intriguingly contrary to the smart city prescription of collaboration [7][8] and the introduction of new organizational arrangements [27]. Smart city theory has yet to explore whether, and why, organizational units within city administrations are active (or not) in internal and external smart city collaborations. The evidence from a private partner informant was that prospective private partners required assurance that there was collaboration within the city administration as a whole so that the project was fully supported [38]. It follows then that elected officials and city administrators would value knowledge that would better equip them to address the reputed siloed behavior and apply city resources directly to the smart city objectives.

Collaboration between levels of government as a remedy for issues arising from geographical and jurisdictional boundaries is fundamental to smart city conceptualizations. Such intergovernmental collaboration was evident in Amsterdam in the collaboration between local governments and bottom-up approach to the involvement of other levels of government.

Collaboration [1][7][8] between city government and companies, nonprofit organizations, and civic groups is core to smart city literature [8][26][27] and was demonstrated to be necessary to the achievement of smart city objectives by the Amsterdam evidence.

The conceptualizations of collaboration between city government and citizens as advocated by some smart city theorists [28][29][30][31] are problematical in that they do not specify the practical detail of the actual envisaged relationship. Our application of the general public management attributes of collaboration specified by Keast et al. [9] revealed that the smart city conceptualizations of collaboration by city government with citizens are highly unlikely to be collaboration. The exception is the ULL model [27]. We find that smart city theory as to collaboration between city government and citizens is underdeveloped, requiring a greater explanation of the bidirectional relationship between citizen and government. Pending further explanation of conceptualizations of collaboration involving citizens, we suggest that scholars proceed on the basis that citizen participation does not necessarily require collaboration and that usage of the term collaboration may well be an artifact of government rhetoric [9] that obscures an intent to communicate, consult, cooperate, or coordinate.

Collaboration without city government in the relationship, but between all parties involved in a project [1][6], was confirmed to be essential to the achievement of smart city objectives. Importantly, the responsibility of the city government both for the development of an open, collaborative environment for stakeholders [37] and for the coordination of the collaborating parties towards shared smart city goals [3] was confirmed by the Amsterdam example.

The scope of the collaborative environment is conceptualized as city wide [3][37], but the Amsterdam evidence was that a collaborative ecosystem surrounded the AEB/ASC institutional arrangements and was nested within the innovative ecosystem of the entire city [38][39]. We recommend that theorists and practitioners adopt a similar distinction.

3.2. Efficacy of Smart City Collaboration Framework

The SCCF applied throughout this study has clarified the participants in the purported collaborations. It has facilitated the application of the Keast et al. [9] attributes of collaboration to determine whether the conceptualization or actual practice was indeed authentic collaboration or perhaps another relationship such as consultation, cooperation, or coordination, or merely communication.

We suggest that smart city governance theory be extended by the adoption of the attributes of collaboration established by Keast et al. [9] in all conceptualizations of collaborative relationships. The resultant clarity as to meaning would assist governments and practitioners to better communicate their intended meaning and reduce the confusion, disappointment on the part of organizations and citizens, and allegations of government rhetoric.

Similarly, the SCCF will assist to better order smart city collaboration theory, facilitating the work of theorists and practitioners. The framework offers the capacity for adjustment to meet the needs of research. An example would be the unpacking of 'City government and organizations' to distinguish between companies and, say, utilities.

3.3. Factors Impacting Collaboration in a Smart City

Evidence as to factors impacting collaboration was captured incidental to our main focus, yet we knew that collaboration presents challenges that must be met. In the wider public sector, Keast et al. [9] found that collaboration is time consuming, is a more intense, resource-hungry relationship, and that there is a tendency for the collaboration to fail or to revert to cooperation. Here we discuss the implications of the available evidence as to the factors and justify future research into the crucial emerging area of sustainability of smart city collaboration.

Funding source, and the propensity for its withdrawal, is highly likely to lead to the initiative not achieving objectives [38]. One example involved a municipality that ceased support when EU subsidy ended leaving the for-profit technology provider partner without the expected marketable product envisaged in the original collaboration. A second was a municipality that ceased funding at the completion of the pilot phase because of the lack of ownership of the objectives by any significant member, including itself.

This risk to the collaboration of funding being withdrawn relates directly to the problem caused by collaboration members not having ownership because they have not invested resources in the project. Van Winden et al. [38] observed that the success of an ASC project was accompanied by there being one partner organization that could clearly benefit from the project and that, having invested funding and resources in the project, felt responsible to make it a success. Ownership of the project by that invested organization was linked to there being a highly committed person as project leader, ideally from that organization, and possessing competencies suitable to the challenge of multistakeholder collaboration [38].

This jumble of interconnected factors signposts an area where smart city theorists and practitioners have been signaling difficulty. The smart urban collaboration model of the smart city requires a high level of transformation [6]. The AEB summed up the problem and need as "[…] the stimulation and support of sustainable collaboration …" (AEB cited in [20], p 256). Substantial problems with sustaining collaborative relationships have been the experience with collaborations centered on the public sector [40][41][42][43] and the private sector [44][45]. Research aimed at understanding the barriers to sustained collaboration in smart cities would benefit a range of smart city stakeholders.

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