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# IT GOVERNANCE IN SMART CITIES: AN EXPLORATORY CASE STUDY OF AN EUROPEAN CITY AUTHORITY

Giovanni Maccani
*Maynooth University*, Giovanni.Maccani@mu.ie

Niall Connolly
*Maynooth University*, niall.connolly@mu.ie

Brian Donnellan
*Maynooth University*, Brian.Donnellan@mu.ie

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# IT GOVERNANCE IN SMART CITIES: AN EXPLORATORY CASE STUDY OF AN EUROPEAN CITY AUTHORITY

*Research paper*

Maccani, Giovanni, Maynooth University, Maynooth, Ireland, Giovanni.Maccani@mu.ie

Connolly, Niall, Maynooth University, Maynooth, Ireland, Niall.Connolly@mu.ie

Donnellan, Brian, Maynooth University, Maynooth, Ireland, Brian.Donnellan@mu.ie

## Abstract

*As the focal point of smart cities, city councils are increasingly institutionalizing Smart City Program Offices (SCPO) as an additional/overlay function within city authorities. These are emerging governance structures, working across city silos overseeing the implementation of new and emerging technology at a significantly increased level of scale and complexity. This structural change dictates the need for a triadic alignment incorporating the organization, the IT function and the SCPO. This IT Governance (ITG) challenge is underexplored in extant IS literature, and so is the area of ITG in the complex domain of smart cities. This paper presents an in-depth exploratory case study of ITG implementation in smart cities within a European city council. The findings of this case study contribute to the emerging and underexplored topic of ITG in smart cities, and more broadly, to the academic debate on ITG in the public sector.*

*Keywords: Smart Cities, IT Governance, Qualitative Case Study.*

# 1    Introduction

Over the last decade, there is a growing trend for IT in the public sector to be seen as a source for innovation (Gil-Garcia et al., 2007; Feller et al., 2011; Janssen and van der Voort, 2016; Hong and Lee, 2018), as opposed to previous views of IT as a cost centre within public authorities (Cambpell et al., 2010). Among public agencies such as national governments (e.g. open data initiatives pioneered in the UK and US), city councils are fostering IT-enabled innovation driving the complex, sometimes controversial notion of smart cities (Holland, 2008; Corbett and Mellouli, 2017). Smart cities are broadly defined in this study as a collection of IT-dependent strategic initiatives (Piccoli and Ives, 2005) by a city authority with the ultimate goal of achieving public value (Pang et al., 2014).

Amsterdam City Council, among many examples of smart city initiatives, has been driving a variety of IT/IS projects over the last few years such as developing an IoT infrastructure, open data initiatives, citizens-centric crowdsourcing, smart districts and buildings, and development of innovation ecosystems (Amsterdam Smart City Projects, available at: https://amsterdamsmartcity.com/projects/). These initiatives are often characterized by an increased level of scale and complexity, if compared to previous recent IT-enabled innovations in the public sector, e.g. e-government (Cordella and Iannacci, 2010). The focal point in this smart city image is the city authority (Dameri and Rosenthal-Sabroux, 2014; Popescu, 2015). Service providers may be involved in the provision of infrastructure, such as networks, urban platforms or smart energy control; offering services built on existing infrastructure such as environmental monitoring; or offering services based on the access to public data derived from smart services (Pereira et al., 2017). As the focal point, city authorities are expected to coordinate the choice, the co-creation, and the value delivery of multiple IT-enabled services while continuing to deliver on their traditional expertise. Making these strategic IT choices and ensuring that the initiatives deliver on expectation is a classic IT Governance (ITG) issue (Sambamurthy and Zmud, 1999; Weill and Ross, 2004). This study focuses on city councils' ITG in smart city initiatives.

While the smart city concept is complex and still emerging, the ability to achieve the governance goal of strategic alignment is proving difficult (Nam and Pardo, 2011). With very few exceptions, cities have created separate functions or program offices to manage their smart city initiatives. What we are seeing is an evolution from early stage smart city implementations in which temporary committees and groups were established within city authorities' structures for specific tasks, to a situation in which Smart City Program Offices (SCPO) are increasingly being institutionalized as an additional/overlay structure within city authorities (Ojo et al., 2014; Connolly et al., 2017). SCPOs are emerging governance structures, working across city silos overseeing the implementation of new and emerging technology, often at a significantly increased level of scale and complexity. The addition of this new structure creates an important challenge for ITG. While traditionally ITG has been viewed as a framework to achieve alignment between business and IT functions, with the advent of the SCPO, ITG of smart city initiatives now needs to enable an alignment between the overall organization, the IT function, which tends to focus on internal service provision, and the SCPO, which focuses on IT-enabled innovation.

At this point in time, there is little guidance on how this new form of governance should be implemented. While work on urban governance has developed into a mature academic field in other disciplines (Pierre, 1999), including some focus on Information Systems (IS) and innovation such as e-government (Gil-Garcia, 2012), there has been no focus in research literature on how ITG is or should be implemented in smart cities. Notwithstanding this lack of literature, SCPOs are now part of most major city governance structure. This has led us to ask ourselves the following exploratory research question: What is the role of SCPOs in the implementation of IT Governance to oversee portfolios of smart city initiatives? Therefore, we aim at extending ITG research into the complex and high scale portfolio of IT-enabled innovations in the public sector and specifically within city authorities.

To address this question this paper describes an in-depth case study carried out in the period from January 2016 to June 2018 of an IT Governance (ITG) implementation in a mid-size European city council. A SCPO was established within the authority's structure in early 2015 and has been in operation

ever since. The findings of this case study contribute to the emerging and underexplored topic of ITG in smart cities, and more broader to the academic debate on ITG in the public sector, where "researchers are far from establishing a consensus on the effects of IT governance mechanisms in public organizations" (Tonelli et al., 2017, p. 595). This qualitative case study also complements existing IS literature on ITG in the public sector, which mainly focused on quantitatively investigating the relationship between structures, processes, and relations, and ITG effectiveness (Ali and Green, 2009; Nfuka and Rusu, 2011; Srimai et al., 2011; Ali and Green, 2012; Yousaf et al., 2015; Tonelli et al., 2017;).

This paper is structured as follows: section two focuses on ITG and on the development of a structure-process-relations analytical framework for the study. Section three describes the research methodology, while section four proposes an extensive outline of the findings. These findings are discussed in section five. Finally, we propose conclusions, limitations and future research.

# 2 Theoretical Background

IT Governance (ITG) is "the capacity of top management to control the formulation and implementation of the IT strategy via organizational structures and processes that produce desirable behaviours, which will ensure that IT initiatives sustain and extend the organization's strategy and objectives" (Bradley et al., 2012). De Haes and Van Grembergen (2009) focus on ITG implementation specifically. They define ITG as: "integral part of corporate governance", which "addresses the definition and implementation of processes, structures and relational mechanisms in the organization that enable both business and IT people to execute their responsibilities in support of business/IT alignment and the creation of business value from IT-enabled business investments".

Early research on ITG focused on vertical coordination and integration, for example through SLAs, or debating decentralization and centralization of IT decisions (Sambamurthy and Zmud, 1999; Ross, 2003). However, these provide only a limited ability to govern IT effectively (Galbraith, 1994; Peterson et al., 2000; Tiwana et al., 2013; Tiwana and Kim, 2015). Peterson (2004) seminal work on ITG described how, within a business or unit, the key elements of ITG are structure, process and relations mechanisms (see also: Weill and Woodham, 2002; Peterson, 2004; De Haes and Van Grembergen, 2005, 2009; Wu et al., 2015; Boonstra et al., 2018). This framework has been extended to include external entities, described as the "lateral structures, processes and relational abilities to direct and coordinate the multifaceted activities associated with the planning, organization and control of IT" (Peterson, 2004, p.16). This perspective has been extensively used in IS research to explore ITG implementation across a variety of organizational and industry contexts, and contingency factors (Kuruzovich et al., 2012), including the public sector (Nfuka and Rusu, 2010; Kaur and Bahri, 2014). In addition, the framework has been used to explore ITG metric and compliance processes (Brown and Grant, 2005; Herz et al., 2012). Due to the high level of acceptance of Peterson's (2004) concepts, we leverage this structural-process-relational framework to explore ITG implementation in smart cities.

## 2.1 Structural Mechanisms

According to Peterson (2004), the structural component of ITG implementation focuses on the formal mechanisms for connecting and enabling horizontal, or liaison, contacts between business and IT management functions. These include formal positions and roles, structure, and decision rights. Extant literature has extensively focused on these mechanisms in the private sector (De Haes and Van Grembergen, 2005; 2009; Tiwana, 2009; Winkler and Brown, 2014). One of the most cited contributions in these regards comes from Weill and Ross (2004), who found that structural configurations influence results for decisions related to IT principles, IT architecture, IT infrastructure, business and investment applications, and prioritization. In the public sector, structural mechanisms remain underexplored in the extant IS literature and the few contributions to date seem to be contradictory (Tonelli et al., 2017). For example, Nfuka and Rusu (2011) demonstrated a positive relationship between structure that ensures IT responsibility and ITG effectiveness. On the other hand, Ali and Green (2009) did not find such a positive significant correlation.

In this research, with respect to structural mechanisms, we aim to understand: (1) how the SCPO is positioned within the organizational structure and in relation to the IT function; (2) the roles formally assigned and established within the SCPO; and (3) the decision rights of the SCPO (i.e. an indication of the authority of this function and of the roles established within it).

## 2.2 Process Mechanisms

ITG process mechanisms are the formalization and institutionalization of strategic IT decision making and IT monitoring procedures (Peterson, 2004; De Haes and Van Grembergen, 2009), i.e. how to make decisions involving IT, as well as how to monitor and evaluate IT concerns in line with business priorities. Process mechanisms involve: (a) the identification and formulation of business rationale for IT decisions; (b) the prioritization, justification, and authorization of IT investment decisions; and (c) the monitoring and evaluation of IT decision implementation and IT performance (Henderson and Lentz, 1995; Weill and Broadbent, 1998; Williams and Karahanna, 2013; Wu et al., 2015).

As with structural mechanisms, existing IS literature on ITG processes in the public sector is limited and mainly focused on quantitatively exploring the relationships between processes and ITG effectiveness (Ali and Green, 2009; 2012; Srimai et al., 2011; Marnewick and Labuschagne, 2011; Tonelli et al., 2017). However, similarly to the research on ITG structures, the findings in ITG processes in the public sector seem contradictory. For example, Srimai et al. (2011) found a positive correlation between performance measurement and strategic alignment (i.e. a measure of ITG effectiveness) in the public sector. Others have found that these processes have no significant effects on success in Australian (Ali and Green, 2009) and South African (Marnewick and Labuschagne, 2011) public sector organizations.

Following the existing literature, in this study we explore: (1) the strategic IT decision-making and monitoring processes in the context of the structure and the decision rights in which the SCPO resides; and (2) what practices/frameworks are in place to monitor and evaluate performance of IT-enabled initiatives led by the SCPO.

## 2.3 Relational Mechanisms

ITG relational mechanisms are traditionally defined as the active participation of, and collaborative relationships among, corporate executives, IT management, and business management (Peterson, 2004). Critically, collaboration allows members to clarify differences and solve problems, through integrative solutions (Weill and Broadbent, 1998; De Haes and Van Grembergen, 2009). Interaction also provides the opportunity to learn. Peterson (2004) outlines two mechanisms within relational capabilities: business-IT partnership (focusing on mutual participation and collaboration across the IT function and the business) and shared learning (achieved for example through strategic dialogues and cross-functional business and IT training (Brown, 1999)).

According to the extant IS research on ITG in the public sector, the positive relationship between relational mechanisms and IT governance effectiveness is well acknowledged (Scholl et al., 2012; Ali and Green, 2012; Tonelli et al., 2017). Examples of identified set of relational mechanisms in the public sector include: top management involvement with IT and enterprise communication systems (Ali and Green, 2009), understanding of business objectives by IT teams, partnership and communication between business and IT, key stakeholders engagement, governance training, and IT training (Nfuka and Rusu, 2011).

We argue that a limitation of the structure, process, and relational framework is that it was developed in an industrial setting, internally focused. This is very different from the complex ecosystem scenario that the SCPO must govern (Janssen and Van der Voort, 2016; Corbett and Mellouli, 2017; Hong and Lee, 2018; Wang et al., 2018). SCPOs are, by design, also focused outwards towards external technology providers. In the smart city context, typically the technology is purchased from external providers and is often at a low level of maturity. In novel service provision, procurement regulation has often led cities to co-create the service with the external provider, necessitating the involvement of IT-enabled

service providers in decision making and problem structuring/solving activities (i.e. level of participation and collaboration), where a strong trust relationship is necessary, within the relational mechanisms, for co-creation and pre-procurement collaborations. Therefore, the type of relationship the SCPO has with external providers must go beyond simple performance contracts and include joint decision-making. We argue that in this context, these external relationships must be explicitly part of the framework.

These notions are not totally new in the IS literature. Although mainly in the context of one-to-one outsourcing relationships, the existing literature outlines two possible forms of ITG implementation mechanisms to support and govern external relationships: These are formal and informal mechanisms (Tiwana, 2009; Bapna et al., 2010; Tiwana and Kim, 2015), also described as contract-based ITG and relational governance respectively (Rai et al., 2012; Oshri et al., 2015).

On the one hand, we do acknowledge the ITG research that highlights the importance of contract, (e.g. Cross, 1995; Currie and Willcocks, 1998; Herz et al., 2012; Cao et al., 2013; Chatterjee and Ravichandran, 2013; Oshri et al., 2015), which extends the framework into the supply base.

On the other hand, relational informal governance mechanisms emerged in the last decade as a response to the emerging need of achieving strategic agility (Tiwana, 2009; Tiwana and Kim, 2015). In a public sector ITG context, recent literature acknowledges the need for government agencies to implement agile and adaptive governance mechanisms (Janssen and Van der Voort, 2016; Wang et al., 2018; Hong and Lee, 2018).

A simpler but more effective addition to the framework is to expand the definition of relational ITG mechanisms to include external service providers. Therefore, we distinguish between internal and external relational mechanisms. Concerning the latter, we consider and distinguish between formal (i.e. contract-based) and informal external ITG relational mechanism.

A careful analysis of the extant literature on ITG leads us to a description of the structure-process-relations framework to be applied in our study (see Table 1). The associated key components were the foundation for developing the research sub-questions that guided the case study investigation (see Table 2, next section).

| ITG Implementation Mechanism | Key components |
|---|---|
| Structures | - Position within organizational structure (Sambamurthy and Zmud, 1999; Weill and Ross, 2004; Wu et al., 2015)<br>- Roles formally established (Peterson, 2004; Weill and Ross, 2004)<br>- Decision rights / authority (Tiwana, 2009; Winkler and Brown, 2014) |
| Processes | - Strategic IT decision making processes (Peterson, 2004; De Haes and Van Grembergen, 2009)<br>- Strategic IT monitoring processes (Weill and Broadbent, 1998; Wu et al., 2015) |
| Internal Relationships | - Active participation of, and collaborative relationships among: corporate executives, IT management, and business management (Peterson, 2004) |
| External Relationships | - Active participation of, and collaborative relationships with external players – formal and informal ITG (Tiwana, 2009; Rai et al., 2012; Oshri et al., 2015) |

*Table 1.       ITG implementation mechanisms and key components*

# 3    Research Approach

The goal of this research is to investigate how city authorities are implementing ITG in smart city initiatives. Smart cities represent complex settings in which cultural, social, and institutional contexts

play a great influential role on ITG. In order to take into account these complexities, this study must generate rich data. Therefore, also given the exploratory nature of the research question, we have adopted a qualitative approach to data collection and analysis. Miles and Hubermann (1994) have strongly advocated the strengths of qualitative data to generate rich descriptions, and, finally, to investigate the topic "from the inside" (p. 255).

## 3.1    Research Methodology

Case study is considered an appropriate empirical methodology to investigate real life contexts, such as in ITG implementations in smart cities where control over the context is not required or possible (Yin, 2013). Case study research is the most common qualitative method used in IS (Orlikowski and Baroudi, 1991) and has proven effective in ITG-related research (Stewart, 2012; Cao et al., 2013; Constantinides and Barret, 2014). Case studies are forms of "empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2013, p.13). In particular, given the objectives of this research, i.e. to acknowledge the importance of context in Smart City ITG and therefore generate rich data, we adopted Walsham (1995)'s interpretive case study methodology. Case study methodology was found suitable to address the research question for the following reasons: (1) it is consistent with exploratory research and qualitative approaches (Eisenhardt, 1989; Walsham, 1995); (2) it ensures richness and depth in order to understand the phenomenon of interest (Flyvbjerg, 2006); (3) it enables the exploration of complex situations allowing for the gathering of multiple perspectives, including contextual information (Flyvbjerg, 2006); and (4) it is particularly useful when the unit of analysis is a process, which is compatible with the research question of this study (Walsham, 1995). The core case study questions were derived from the framework introduced in the previous section, and are consequently organized by the three ITG implementation mechanisms (see Table 2).

| ITG Mechanisms | Core questions |
|---|---|
| Structures | - How is the SCPO positioned within the organizational structure?<br>- What roles are formally assigned?<br>- What decision rights does the SCPO have? |
| Processes | - What is the IT decision-making process within the SCPO?<br>- What practices are in place to monitor and evaluate these decisions? |
| Relationships | - What is the level of collaboration and participation with the IT function and with the rest of the organization?<br>- What is the level of collaboration and participation with external parties? |

*Table 2.        Core Case Study Questions*

In the context of a case study, Yin (2013) emphasizes the importance of establishing a specific framework to structure data collection. In this research, data was collected over a period of two and a half years through: online public documents, internally archived project files and other internal documents (e.g., we were granted access to the internal Alfresco document-sharing platform), semi-structured interviews, and interventions designed to help the city develop a digital strategy. The interventions took the form of digital readiness workshops using the Sustainable Connected Cities Capability and Maturity Framework (SCC-CMF) (Kenneally et al., 2013; Maccani et al., 2014). Such workshops helped the city create a single language and support for its smart city plans. It was at these workshops that we garnered a deep rich insight, namely: (1) capture deep information about the smart city strategy, IT projects, and other contextual information; (2) enable engagement with those formally involved

in the smart city function; (3) understand their perception of smart cities; (4) and extract significant insights regarding ITG mechanisms. From a methodological perspective, Walsham (1995) argues that interviews in exploratory IS case studies are the primary data source, and "are highly efficient ways to gather rich, empirical data" (Eisenhardt and Graebner, 2007, p.28), consistent with the scope of this research. Subsequent semi-structured interviews were conducted with the goal of investigating in-depth the actual phenomenon of interest. The smart city leader, mangers formally appointed, and other decision makers within the SCPO were interviewed. A semi-structured interview protocol was developed from the core case study questions (Table 2).

Open coding was used across the sources of data collected which were all in text form (interviews were transcribed, and workshop data was captured in field notes). The following six main steps were involved in this process (Miles and Huberman, 1994; Walsham, 1995; Stake, 2013): (1) manually review the transcripts, documents, and field notes line-by-line and sentence-by-sentence, to uncover key patterns/themes and produce key words/phrases in relation to the ITG mechanisms; (2) produce labels/categories of these key words/phrases; (3) develop preliminary assertions; (5) validation phase; (6) and finalize findings. In this process, preliminary assertions were developed when sufficient evidence was found (i.e. supported by at least three sources of data). These were finally structured, brought back to the city council, and validated through further discussions with the smart city leader.

## 3.2    Case Site

The case selected for this study is a city council of a mid-size European city with a population of 200,000 inhabitants. The council initiated a smart city program in 2014 in support of a previously developed 2030 strategic plan. According to the city's Digital Strategy Program Manager, "a smart city function was established to promote the idea of a digital strategy beyond the IT function. The IT function was internally focused and there was an opportunity to engage externally and even internally to look at digital from a strategic and not just technology point of view." A Head of Smart City Strategy was appointed. This person had previously worked in IT and as a change manager within the council, where his experience had led him to have strong ideas on a smart city vision and how the SCPO would operate. His first decision was to create two goals. The first, focused on enabling "digitization of the organization" across all the council's departments. The second goal is to enable and foster IT-dependent service innovation across a number of domains within the city (i.e. economy, culture and entertainment, movement and transport, urban places and spaces, and environmental practices). As an example of internal digitization, the decision was made to implement a customer relationship management (CRM) system. The development of this system continues, designed to be an end-to-end system incorporating all the city's internal service catalogue. Activities for the second, external, goal focus on facilitating collaboration and integration between multiple stakeholders, and providing "strategy, tools, insights, and guidance" for innovative projects. One example is the city's Safer Communities project, which focuses on improving the feeling of safety and the protection of public areas across the city. Initially several consultations and an impact study were completed which led to the implementation of 44 CCTV cameras in 24 locations in the city. The implementation is a collaboration between public servants from various departments within the local authority, public representatives, members of local communities, the police force, civil engineers, business and technology specialists from multiple companies. This example gives a clear idea of the increased level of scale and complexity compared to previous IT-enabled innovation projects examined in the public sector ITG-related literature. The city authority has recently received an international award for best practices on governance in the public sector.

## 4    Findings

In this section, we present the findings of this case study across the three ITG implementation mechanisms: structure, processes, and relations. Findings are organized consistently with the core case questions (Table 2). Finally, we outline some of the perceived challenges that the case study is currently facing. Quotes from interviews are written within quotation marks.

## 4.1    Structure

*How is the SCPO positioned within organizational structure?* Although this evolved over time, the SCPO function is now established as part of the Economic Development (ED) function (i.e. Head of Smart City reports to the Director of ED). The IT function is responsible for operational tasks (e.g. "make sure internal systems are up and running"), and, unlike the SCPO, it is structurally positioned under the finance department (i.e. Head of IT reports to the Director of Finance).

*What roles are formally assigned in the SCPO?* Today the SCPO has a capital budget available and ten people are formally assigned to the division. Of these, managerial roles include: Head of Smart City Strategy, Digital Strategy Program Manager, Internal User Experience Manager, External Customer Manager, and Data Analytics and GIS Manager. All these managers have IT background, which is evolving "more into business analyst role for the two customer managers and into data manager for the GIS and analytics person". Within the SCPO, two additional supporting structures were established with respect to the internal and external focuses outlined above. A "Digital Champions Forum" was created to oversee the internal digital transformation, made up of budget holders and decision makers from all departments. The "Champion" roles are formally assigned and terms of reference have been established. Externally, a "liaison group" called Digital Leadership Network, including representatives of both the private and the public sector, complements the council's efforts in overseeing external programs. Importantly, these two supporting structures were viewed as critical by the Head of Smart City Strategy and it was because his drive that they were initiated and made impact from the outset.

*What decision rights does the SCPO have?* In terms of authority and decision rights, the SCPO is responsible for: (1) "commissioning, design, architecture and / or procurement of specific systems to support internal transformation (e.g. integrated CRM) and external customers (e.g. CCTV project)"; (2) liaising with city partners and industry partners within and beyond the city (i.e. EU level); (3) "some legacy responsibilities that came with the role because of it having evolved from the IT function" (e.g. "management of certain applications and databases"); and (4) project selection. With regard to project selection, all projects, independent of type or origin, are approved and monitored by a separate project management layer called the Business Improvement Unit. As with the Digital Champions, this unit is represented by all departments, including IT. Locally referred to as the "project coordinating unit," it enables a "cohesive organizational view of projects ensuring: there are no overlaps; there is commitment to the projects; and there is a fit with the overall organization". Since "every project needs to go through this unit", the SCPO's project prioritization authority is still dependent on this additional layer. How the SCPO fits within the city's structure, is depicted in Figure 1.
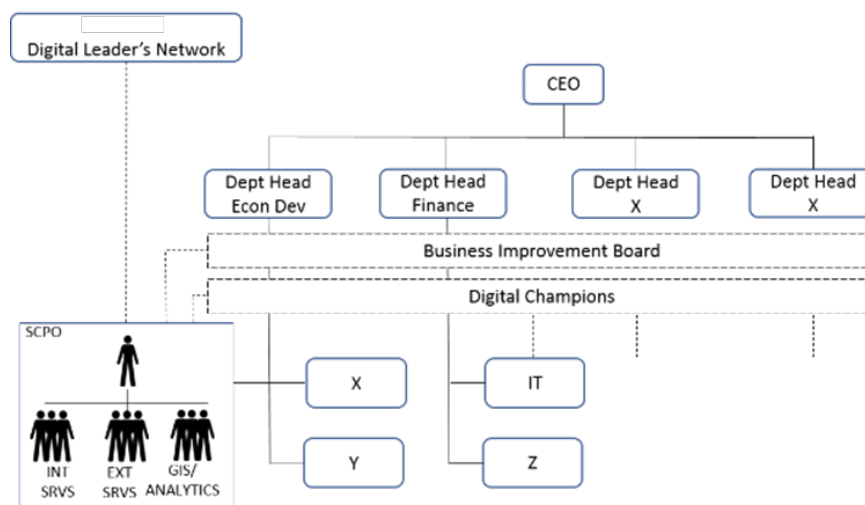


*Figure 1.        SCPO Structure*

## 4.2    Processes

*What is the IT decision-making process of the SCPO?* As mentioned above, the key types of decisions taken at the SCPO level involve generation, selection and prioritization of innovative IT/IS projects. According to the Program Manager, "traditionally projects were ad-hoc and it was someone highly motivated with a good idea that was driving it with the business unit engaged with IT." Today, mainly due to the establishment of the Business Improvement Unit, the council's project governance is well structured. Internal project boards (both at the Digital Champions Forum and within the Business Improvement Unit level) have formal terms of reference. When an idea emerges, the first step is to ensure that there is a potential contribution to (i.e. alignment with) the overall 2030 Strategic Plan for the city. According to the Head of Smart City, ideas might emerge either from the SCPO itself (i.e. during brainstorming and discussion sessions of the Digital Champions Forum), or they can be brought in by other departments. Subsequently, "the approach is to work with the business unit to develop a requirements document, the business case from an enterprise architecture perspective, and to decide what are the dependent systems, what are the work flows etc." At this stage, the project proposal goes through the Business Improvement Unit (chaired by the CEO) for approval.

*What practices are in place to monitor and evaluate these decisions?* Monitoring practices are undertaken at two different levels: (1) the SCPO level; and (2) the overall council level. Regarding the former, the Head of Smart City typically sets targets and deliverables for projects, which are monitored weekly. At the project inception phase, success factors are agreed and documented. These fit in broader team plans developed within the SCPO and are usually accompanied with specific goals. At the individual level, SCPO managers have "a personal development plan outlining each person responsibilities in the team plan". In addition, the SCPO is leveraging existing Smart City maturity frameworks such as the SCC-CMF (Maccani et al., 2014) in collaboration with academics. At the council level, monitoring is undertaken through the existing "performance management review systems in the local authority". Overall, interviewees and participants acknowledge that the organization has a strong project management culture and capability.

## 4.3    Relationships

*What is the level of collaboration and participation with the IT function and with the rest of the organization?* The establishment of the Digital Champions Forum ensures participation and collaboration from every department across the city council as well as knowledge sharing among relevant people in the organization. Representatives from all departments meet regularly ("monthly to discuss project alignment and bi-monthly to discuss organizational alignment") to discuss emerging ideas and drive innovative IT/IS projects. Building this engagement was a transformative project in itself. Indeed, "engagement was built as a phased approach because you couldn't do everything simultaneously; in fact there was a structured project plan and schedule to manage these processes – so overall it was done through meetings between departments head, and functional areas, and sometimes the all team to do a business process improvement exercise." The IT function participates in the Digital Champions, suggesting good relations between the SCPO, all department and IT. However, when asked about the level of collaboration and participation of the IT function, one interviewee stated "well, yes and no; other departments were more engaged through the Business Improvement Unit – IT was the facilitation of everything else that was happening, for example for the provision of systems for operations".

*What is the level of collaboration and participation with external parties?* One of the peculiarities of this city is its small-medium size and at the same time its vibrant economic and social environment. According to the Head of Smart City, this "lends itself to many informal gatherings where commercial, community and public people meet" to create engagement and foster participation and collaboration outside the council's organization. From a governance structure perspective, the Digital Leadership Network is key for engaging external entities. This is also called the "liaison group" and, although members are involved informally rather than being contracted, the network gives strategic support to foster external engagement with the SCPO. While this relationship appears very loose, in fact the ex-

ternal organisations are highly committed to the city and the success of its smart agenda. However, there is no accountability framework to govern this participation. The SCPO has also implemented specific programs to support external relationships, e.g. "the development of a collaboration portal" (Alfresco). Commercial entities that participate and collaborate are usually at the project level, rather than an overall strategic collaboration. Other project collaborators are "academics, not for profit organizations, and community leaders".

## 4.4 Existing Challenges

When discussing existing challenges, three significant points emerged. First, a lack of resources (both human and financial) was the most common issue described by the interviewees. This reflects a commonly perceived organizational issue, especially in the public sector realm. Secondly, slow engagement of service providers in the highly regulated public procurement processes was highlighted. Private service providers find the public procurement process over bureaucratic to the point it becomes a barrier. Private companies are "often solely interested in selling products without going through the tendering process". According to the Head of Smart City, "this is very frustrating," suggesting it restricts his ability to do his work. Lastly, the integration of shared use of resources between the SCPO and the IT department emerged in interviews and conversations a number of times. More integration and collaboration with the IT function is believed to be needed to add IT skill-sets that are currently lacking within the SCPO. As argued by the program manager, "a lot of skills from IT function could be very useful to drive smart cities here".

## 5 Reflections and Discussion

The creation of SCPOs breaks the traditional governance dyadic relationship between IT and the business. This structural change dictates a triadic relationship incorporating the organization, the IT function and the SCPO. The case study presented in this paper addresses the gap in the current literature on how ITG is implemented within local authorities to manage portfolio of smart city initiatives. Specifically, this interpretive case study proposes one effective approach for effective ITG implementation in this context, where triadic alignment between the SCPOs, the IT function, and the overall organization has proven difficult. This case study also complements emerging research on ITG in the public sector at a project level (Wang et al., 2018; Hong and Lee, 2018), by considering a portfolio perspective.

This study also represents a contribution to the overall IS debate on ITG in the public sector which is also argued to be immature (Ojo and Mellouli, 2016), where "researchers are far from establishing a consensus on the effects of ITG mechanisms in public organizations" (Tonelli et al., 2017, p. 595). Finally, this interpretive case study complements existing IS literature on ITG in the public sector, which mainly focused on quantitatively investigating the relationship between structures, processes, and relations, and ITG effectiveness (Ali and Green, 2009; Nfuka and Rusu, 2011; Srimai et al., 2011; Ali and Green, 2012; Yousaf et al., 2015; Tonelli et al., 2017) by proposing an in-depth qualitative analysis on ITG implementation.

As we reflect on these findings, we believe that one of the most important governance related decision when creating these functions is where it is located in the organization's structure and the ensuing authority it is given. The case study's choice of positioning the SCPO (and therefore IT-enabled innovation) within the Economic Development department allowed the SCPO a wide remit in project selection, focusing both internally and externally. Internally the existence of the Digital Champions provided a means of greater involvement from the organisation, as a whole, in decision making, while also providing sponsorship for selected projects. Similarly, the external Digital Leadership Network provides greater involvement of external stakeholders on decision making, with the added benefit of becoming quasi sponsors for services or activity accessible to the city's citizens. The separation of the SCPO from IT is problematic as it is possible that project selection may be affected by perceptions of different accountabilities and not wishing to overstep the mark. It is worth noting that other cities, such as Cork, and Moscow have taken an alternative approach and have embedded their smart city offices

in the IT department forcing what may be traditionally an internally focused group to look externally and search for novel IT-enabled solutions.

In this case, we observed a very high level of process to support the SCPO in its goals. Mostly this is because of the strong project management culture, exemplified by the existence of the Business Improvement Unit and the formally assigned Digital Champion roles with formal terms of reference. The role of sponsorship was identified as the key success factor perceived by most of the participants in this study.

With respect to strategic IT decision-making processes, we consider the level of IT decision-making process integration (Teo and King, 1999). According to this view, organizations differ in the degree to which business and IT decisions are integrated (see Table 3, next page).

In this study, we analysed the level of integration across two different relationships: the SCPO and the IT function; and the SCPO and the city authority's organization. Concerning the latter, the presence of the Business Improvement Unit ensures that strong alignment between the SCPO and the rest of the organization is in place. This shows Full Integration (Teo and King, 1999) between the SCPO and the council, as the SCPO and business decisions are concurrently part of the same process. However, despite the Head of IT is actively part of the SCPO, the level of integration between the IT function and the SCPO seems lower. According to the program manager, the IT function is seen as a "cost centre" (also demonstrated by its position in the organizational structure within the Department of Finance). The findings suggest that there is Sequential Integration (Teo and King, 1999) between the IT function and the council and the SCPO (i.e. business/SCPO decisions provide direction for IT function's decisions).

| Integration level | Description |
|---|---|
| Administrative | Budgets and scheduled are amalgamated between business and IT. |
| Sequential | Business decisions provide directions for IT decisions. |
| Reciprocal | Business and IT decisions are mutually influential. |
| Full | IT and business decisions are concurrently part of the same process. |

*Table 3.        Level of IT Decision Making Process Integration (Teo and King, 1999)*

With respect to relations, it is clear to see that, in general, relations are strong and this supports the goals of the SCPO. Relations are firstly embedded in structure and process, but more importantly it was observed that a very high level of commitment exists that bring the relationships to life. Notwithstanding this strength, it was observed that participation of the IT department in the Digital Champions was lower compared to other departments. While perceptions of demarcation may explain this to some extent, there may also be legacy issues, as the IT department was broken up in the creation of the SCPO. Historically the IT department owned internal service provision but after the creation of the SCPO, the IT department's sole responsibility was "to keep the light on." In time, the whole system will mature and there would be an expectation of some integration between the SCPO and IT. For example, novel, externally sourced services will become mainstream and it is quite conceivable that the IT department will play a larger role in ensuring the sustainability of these services. Therefore, the relationship between the IT function and the SCPO should be seen as critical and built from the start.

Beyond the structure-process-relations framework, a number of other observations were made that shed light on the SCPO practices. It became clear over the time of the study that, while the structure-process-relations framework appears in rude health, the drive and commitment from the Head of Smart City Strategy and the Director of Economic Development were critical. The Head of Smart City Strategy had a clear vison, supported by the ED Director, since his appointment and this has defined the path the SCPO has taken since.

One further observation from this case study is that by initiating a SCPO the city is making a conscious decision with respect to change management. Their job is to explore and exploit a new unknown world of technology. In the context of change, we view SCPOs are capability building cata-

lysts. For example, all SCPOs are building capability in relation to ecosystem coordination and pre-procurement / co-creation. This is one of the most critical scenarios where the SCPO needs to have IT and service skills to choose and coordinate service offerings. In effect, the SCPO is building a capability in understanding the market, a first step in developing a dynamic capability enabling it to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments (Teece et al., 1997). In a classic dynamic capability framework of sensing, seizing and transforming (Yeow et al, 2018), the SCPO is currently in sensing mode with its first steps into a seizing phase. It is interesting to consider how this will evolve and what part the IT department plays in a transforming, or continued renewal, stage. An important subset of dynamic capability relevant in smart city scenarios is enterprise agility, which refers to those processes relevant for sensing and responding to environmental change (Overby et al., 2006). Of particular concern are the capabilities in relation to innovation brokering, to make things happen by the strength of the city authority's central position in the smart city ecosystem, and expertise in working and developing pre-procurement and co-creation practices.

# 6 Conclusions, Limitations and Future Work

This study contributes to the IS debate of how complex and high scale portfolio of IT-enabled innovations should be governed in the public sector, and specifically within city authorities. The exploratory case study presented in this paper shows one successful way to implement ITG in smart cities.

The trade-off between contextual richness of a single case study and generalizability of a multiple case study points towards a potential limitation in our work. However, as argued in the methodology section, multiple seminal works in the literature (Eisenhardt, 1989; Walsham, 1995; Flyvbjerg, 2006; Yin, 2013) advocate single case study as a method of enquiry. This has been argued in the literature especially in relation to exploratory research aiming at capturing the complexity of the context in which the case is situated (i.e. consistent with the objective of this study). We highlight this potential limitation, as we believe this may be particularly relevant in this context, as we do not claim that the case study presented here can be considered a collection of best practices and the only option of ITG implementation. In fact, we acknowledge that different types of approaches to ITG implementation in smart cities exist across contexts. In some cases smart city functions emanate from the IT function (e.g. Atlanta, Moscow) while others have created offices reporting directly to the city CEO or to a business directorate (e.g. Dublin, Belfast, Ghent, Paris). Thus, as part of our future research, we are currently carrying out multiple case studies (Stake, 2013) characterized by context-related diversities – such as position of the SCPO within the organization, size of the city, and other socio-political variables.

Two other future research questions emerged as a result of this study, which relate to impact of specific individuals and the maturing of the SCPO into newer forms of dynamic capability. We observed that the Head of Smart City Strategy and the Director of Economic Development were pivotal, as it was their motivation that created a new environment for IT-enabled innovation in the city. We assume that it is not by accident that the SCPO is positioned in Economic Development whereas we would expect the critical individuals for Atlanta and Moscow to reside in IT. In this way, several research questions remain open. For example, would a SCPO, when structurally placed within the IT function, have a different attitude to sensing and seizing as their traditional comfort zone is internally focused, and how would this impact IT Governance? It appears that SCPO are part of a city's dynamic capability, either consciously or unconsciously. Given this, how does the SCPO evolve, with whom, and how should this new alignment be manifest?

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