

RESEARCH

Smart Government Success Factors

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Smart information and communication technologies are finding their way into public administration. Today, there are numerous initiatives in the public sector, promising a new model for the public services: smart government. In this article, we seek to identify success factors for smart government initiatives. We provide a selected review of the current literature on the motivations, goals, and processes behind smart government so as to provide a conceptual and analytical basis for the analysis. Based on desk research, interviews, and workshops, our qualitative analysis reveals institutional (political commitment, clear governance, legal agility, digital awareness, and IT infrastructure), organizational (structure and processes, capabilities, values, and human resources), and leadership/strategy success factors that must be considered when implementing smart government initiatives. We discuss our findings and conclude by emphasizing the limitations as well as implications for praxis and future research.

Keywords: smart government; digitalization; implementation; public sector; success factors

1 Introduction

Most public administrations constantly seek to enhance their relationships with citizens and businesses. The motto for such efforts today is *digital first*. Since the mid-1990s, governments around the world have been using the Internet to re-invent their structures and processes. These electronic government (*e-government*) initiatives have improved the communication between government agencies and their constituents by providing online access to government information, services, and expertise (Chen, Chen, Huang & Ching 2006). E-government created a digital environment in which public administrations provided e-services to citizens via the world-wide-web (United Nations & ASPA 2002). Terms used for e-government such as *Virtual State* (Fountain 2001) and *NetState* (Lawson 1998) illustrate e-government's focus on Internet technology. While e-government has increased access to information, its development and implementation have had no far-reaching impacts on or changes in the structures and functions of public administration. E-government has become primarily a support instrument for analogous processes. To citizens, this was disappointing. According to the E-Government Monitor Study, citizens' satisfaction with e-government in the German-speaking area is not high. Only half of the users in Germany are satisfied with the existing digital services. The study showed that user satisfaction in Germany, Austria, and Switzerland has declined over the past few years (eGovernment Monitor 2017).

In recent years, we have witnessed the start of a promising transformation in the public sector. Governments around the world are turning cities into smart ecosystems. They are utilizing emerging technologies to improve the quality of public services, to create a business environment for firms and startups, and to reduce both costs and resource consumption. In smart cities, information technologies are networked with infrastructures, everyday objects, and even human bodies so as to improve economic and political efficiency, enable social, cultural and business-driven urban development, and address social, economic, and environmental problems (Hollands 2008; Townsend 2013). Networked technologies also provide new opportunities for citizens to participate in and influence, develop, and test smart city policies (Pereira, Cunha, Lampoltshammer, Parycek & Testa 2017).

The concept of smart government has a key role in the growing discourse on smart cities and is establishing itself along other smart city topics such as smart economy, smart environment, smart living, smart mobility, and smart people (Pereira, Parycek, Falco & Kleinhans 2018). According to Guenduez, Mettler, and Schedler (2019), *smartness* in these areas “lies in the context-related analysis and combination of a large amount of structured and unstructured data, which allows self-learning algorithms to make increasingly precise statements about certain facts, groups, or even single individuals, enabling the automation or execution of certain tasks in much more efficient and citizen-friendly ways.” Today, various city administrations around the world are experimenting with emerging technologies, such as Internet of things (IoT), cloud computing, sensor networks, and artificial intelligence (AI). Using these technologies, they seek to better understand citizens’ needs and to provide services (anytime, anywhere, and even predictively) based on more appropriate and more accurate decisions (Dameri & Rosenthal-Sabroux 2014). Promising examples already exist: In France, AI-supported bots inform and advise the unemployed in their job searches; in Germany, Big Data-supported fishing quota monitoring is paving the way for evidence-based decisions; in Los Angeles, the analysis of traffic data is improving road safety; in Sweden, automatic retrieval of information is saving customers time; and in Estonia, public agencies and real-time data is enabling quick, focused, and even preventative police operations (Daub, Domeyer & Polier 2018). Similar initiatives exist in Switzerland. For instance, the Swiss police uses the Precobs (Pre Crime Observation System) anti-burglary protection software (Institut für musterbasierte Prognosetechnik [Institute for pattern-based Prediction Technique] 2018). Precobs is based on the assumption that burglars strike several times within a short time if they are successful in a certain area. Thus, it is effective for the police to increase its presence in that area. Another example: The city of St. Gallen has fostered the fiber optic and the LoRa (Long Range) network to control and connect many devices, such as streetlights and parking occupancy (St. Galler Stadtwerke 2018). These examples lead to high expectations. According to Gil-Garcia (2012: 270), over the next few years, we will witness “the emergence of a highly integrated virtual State, in which all branches of government and multiple social actors seamlessly interact through the use of sophisticated technologies that integrate business processes, physical infrastructure, organizational resources, and new institutional arrangements.” However, many barriers must first be overcome – current institutional, organizational, economic, and technical obstacles pose major challenges to public administrations (Schedler, Guenduez & Frischknecht 2017).

Today, governments and administrations lack a comprehensive understanding of the success factors of smart government (Hollands 2008). This also applies to Switzerland. Numerous Swiss city governments and administrations – some in their infancy, others very advanced – are taking a *smart city* approach. Guenduez et al. (2017) outlined how smart government initiatives can be implemented. They focused on technical infrastructure, big data, algorithms and citizens’ engagement roles. However, public administrations in smart cities are at the beginning of “the road to smart government” (Mettler 2018). At this stage, not knowing what requirements must be met in order for governments to become *smart* is likely the most serious barrier to exploring the potentials of new technologies in smart cities (Praharaj, Han & Hawken 2018). Thus, in this study, we explore the requirements for a successful implementation of *smart government*. With these research goals in mind, we seek to answer the following question: *What are the success factors of smart government initiatives?*

We identify various institutional, organizational, and leadership success factors for smart government initiatives. Further, for each of these three fields, we develop a set of recommendations for smart government initiatives and identify implications for future research.

This paper has four sections. In the next section, we will provide an overview of smart government, outlining its goals, motives, and underlying processes. We will then explain our data collection and analysis procedures, and will discuss our findings.

2 Smart Government: *What, Why, and How*

Smart government is a new phenomenon. There are only a few definitions of it in the literature (Harsh & Ichalkaranje 2015; Mellouli, Luna-Reyes & Zhang 2014; Scholl & Scholl 2014; von Lucke 2016), and none have widespread acceptance. We define it as follows: smart government takes advantage of the opportunities offered by ICT, connecting and integrating physical, digital, public, and private environments (Scholl & Scholl 2014) to passively and actively interact and collaborate with citizens (Guenduez et al. 2017) so as to better understand their needs and to creatively, effectively, and efficiently provide services at any time (even predictively) and anywhere (Gil-Garcia, Zhang & Puron-Cid 2016; Schedler 2018). We will now provide an overview of smart government, outlining its goals (a focus on *what*), motives (a focus on *why*), and underlying processes (a focus on *how*).

2.1 What makes government smart

There is every indication that smart government will disrupt the fundamentals of the public sector. The concept first emerged after the turn of the millennium, with for instance Coe and colleagues (2001: 93) developing the vision that new forms of technical connection and social creation will define smart communities. Early on, *smart government* was used to refer to governments becoming aware of their key roles in society and producing their outcomes extremely effectively by adapting apposite management capacities (Kliksberg 2000). In the current discussion, there are different understandings of smart government. The broad spectrum includes the focus on intelligent and integrated technologies (Scholl & Scholl 2014; Zhang, Luna-Reyes & Mellouli 2014), networked government, and administrative actions made possible by these technologies (von Lucke 2016), innovation management (Nam & Pardo 2011), and new service delivery models based on behavioral insights from data (Schedler 2018). Gil-Garcia, Zhang, and Puron-Cid's (2016) conceptualization of smartness in government has drawn much academic attention. The authors use the term more comprehensively; their list of relevant aspects that define *smartness* in government is long. In their literature review, they identify 14 components of smartness in government: integration, innovation, evidence-based, citizen-centricity, sustainability, creativity, effectiveness, efficiency, equality, entrepreneurialism, citizen engagement, openness, resiliency, and tech savvy. This comprehensive framework helps to avoid a simplistic focus on technology and offers an orientation for corresponding initiatives on the way to a smart government over time. Every initiative that pursues one or more of these dimensions takes a step towards a smart government.

2.2 Why governments become smart

Public enterprises are driven by the need to meet the needs of different stakeholders, such as citizens and businesses. Previous reform initiatives such as *new public administration* and *e-government* were introduced for this reason (Schedler & Proeller 2010; Schedler, Summermatter & Schmidt 2004). This is also one of the main motivations for governments to become *smart*. In Switzerland, in September 2018, the Federal Council published its Digital Switzerland strategy, which has the following objectives: (1) "Enabling equal participation for all and strengthening solidarity", (2) "Guaranteeing security, trust and transparency", (3) "Further improving the digital empowerment of the citizens", and (4) "Ensuring value creation, growth and well-being" (Swiss Federal Office of Communication 2018: 4). The purpose to achieve these key objectives is to benefit society in the best possible ways; further, the goal is that all prosper from such digitalization. This can be made possible if society as a whole engages the digitalization together (Swiss Federal Office of Communication 2018). Thus, smart government that relies on IoT, Big Data, and simple to self-learning algorithms (Schedler 2018) can complement e-government, which becomes possible via Internet technologies and has a long history (e.g. e-government strategy from Swiss Confederation & Conference of Cantonal Governments 2007). Smart government can be seen as an attempt to use emerging technologies to redeem promises that have not yet been fulfilled by previous modernization initiatives such as (the aforementioned) new public management and e-government (Guenduez et al. 2017). In fact, most of the aspects of smart government listed by Gil-Garcia, Zhang, and Puron-Cid (2016) – such as integration, innovation, citizen-centricity, sustainability, effectiveness, efficiency, equality, tech savvy, and citizen engagement – are also known from the e-government literature (see e.g. Schedler et al. 2003). Smart government adopts these goals and expands them with new ones such as data-based decisions, creativity, entrepreneurialism, and resilience (Gil-Garcia et al. 2016).

2.3 How governments become smart

Smart government requires a comprehensive and integrated view of technology, data, processes, products, participants, and services (Guenduez et al. 2017). **Figure 1** proposes a conceptual model of smart government by integrating these elements in a two-phase process.

First, the passive participation cycle is made possible by the development of powerful *technological infrastructures*, such as an intelligent power grid, to measure and regulate energy consumption, or intelligent parking guidance systems, to manage the uses of different parking facilities in a region or community (Albino, Berardi & Dangelico 2015; Guenduez et al. 2017; Nilssen 2018; Shen, Huang, Wong, Liao & Lou 2018) – for instance, the Chicago project Array of Things (Array of Things 2018), where many sensors measure the city's pedestrian streams, air quality, magnetic fields, etc. With this gathered data, it is for instance possible to, in real time, detect flooding or study the relationship between diseases and an urban environment. Second, this public infrastructure is complemented by a large number of private data sources (e.g. smartphones, smartwatches, and micro-computers) that systematically provide detailed data

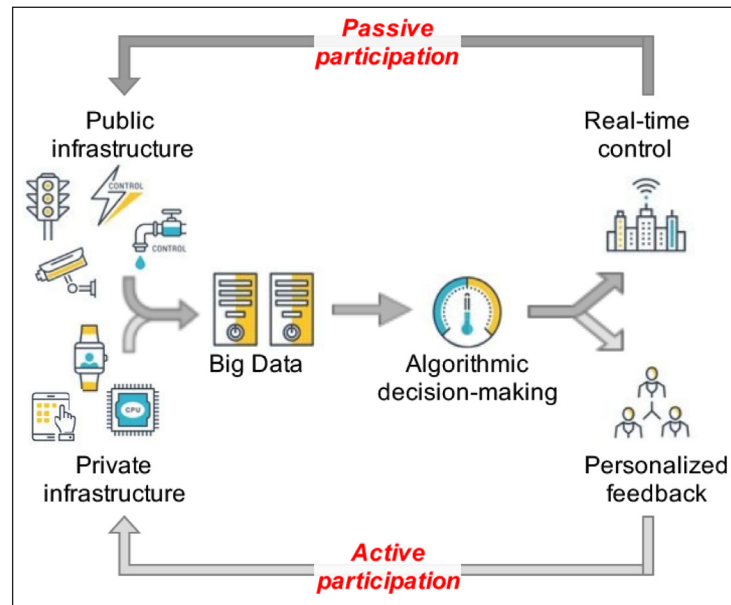


Figure 1: Conceptual Model Describing Active and Passive Citizen Participation in Smart Government Initiatives (translated from Guenduez et al. 2017).

about a population's habits, routines, and wishes. This private infrastructure enables active interactions between citizens and public administrations. In Singapore, France, and Switzerland, for instance, citizens can interact with the government via bots and can receive personalized services (Infocomm Media Development Authority 2017; Microsoft 2016). The data obtained through the active participation cycle can be used to further customize services.

The public and private technological infrastructures gather a wide range of contextualized data. Data has an implicit or explicit key role in smart government initiatives. Data is the underlying foundation of "information gathering" (Kennedy 2016: 78) and enables the achievement of agile government structures (Gil-Garcia 2012; Gil-Garcia, Helbig & Ojo 2014: 11), enhancements of services (Kennedy 2016; Nam & Pardo 2011), participation and transparency (Scholl & Scholl 2014), and new service delivery models (Schedler 2018). Algorithms turn data into information and create possibilities for new service delivery models, such as predictive and preventive policies, real-time control, and personalized feedback. According to Guenduez, Mettler, and Schedler (2017), smartness does not end with data analysis and the prediction of events. To become smart, government authorities must engage with citizens and must pass the outcomes of algorithmic decision-making on to them, enabling them to actively and passively co-produce and co-create new services.

3 Research approach

Since the literature has provided no significant insights into the phenomenon, we adopted an explorative sequential qualitative approach (see **Figure 2**). This design allowed us to develop insights from different angles and to develop, refine, and deepen our findings. To systematically analyze the findings from desk research, workshops, and interviews in both phases, we used thematic analysis, a qualitative descriptive approach best suited for identifying, analyzing, and reporting themes (patterns) in data (Braun & Clarke 2006). Details about the interviews and workshops appear in the Appendix.

Regarding the thematic analysis, we chose to provide a detailed description of our dataset rather than to emphasize a particular aspect, since we focused on our research question and did not need to gather a wide range of data (Braun & Clarke 2006). Further, we searched for patterns with a theoretical approach, since we had a specific research question in mind from the outset and had a specific "analytic interest" (Braun & Clarke 2006: 12). We focused on the explicit meanings of the data and did not look 'beyond' what workshop participants and interviewees said; thus, we followed a semantic approach (Braun & Clarke 2006: 13). Finally, we followed Braun and Clarke's (2006) guidelines for the six phases of thematic analysis. The phases should not be seen as a linear process, but as a recursive one (Braun & Clarke 2006: 16). The six phases are: (1) familiarizing oneself with your data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report.

We began with a scoping phase. We conducted a combination of desk research, workshops, and semi-structured interviews to identify, scope, and understand the strategic fields of action to be considered when

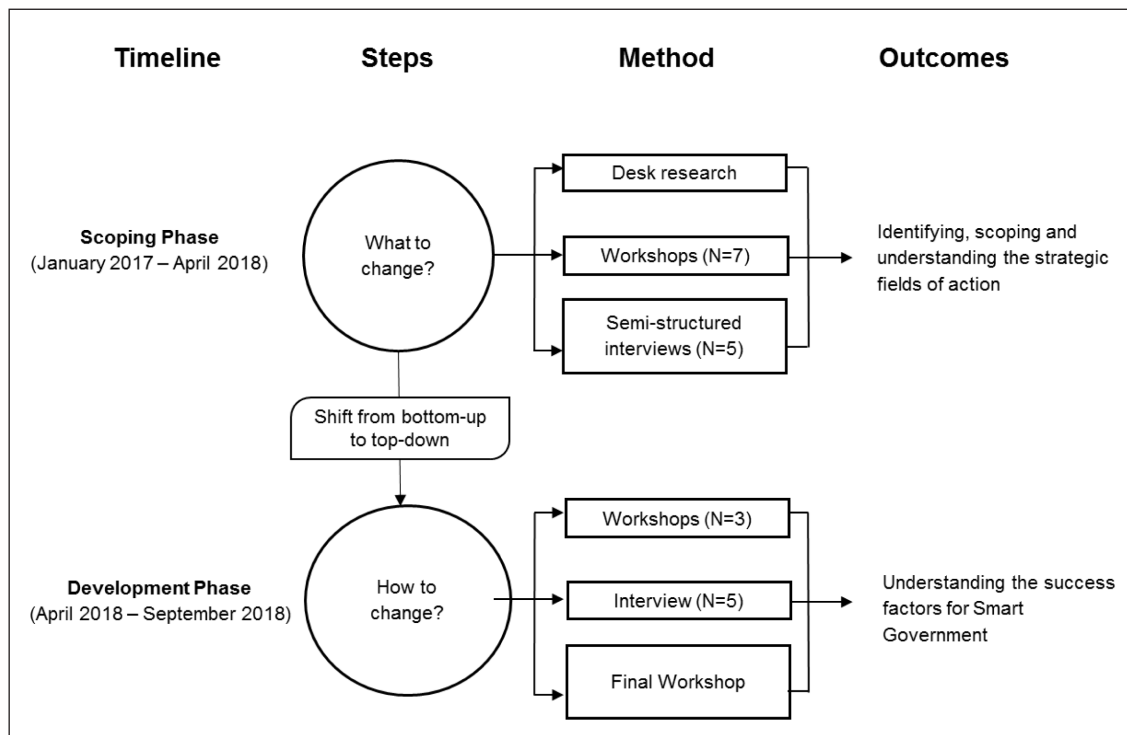


Figure 2: Overall Research Design.

implementing smart government. In this phase, the key question was: *What is relevant and must be changed when implementing smart government?*

We started with desk research in January 2017. We primarily obtained relevant information at this stage from smart government and digitalization strategies of various government bodies (both Swiss and international, and different state levels), as well as scientific and practice-oriented studies. This allowed us to gain insights into the topic from both a practical and a scientific perspective. This is also in line with our theoretical approach to engage with the literature prior to our thematic analysis (Braun & Clarke 2006). Based on these insights, we derived first hypotheses for strategic fields of action and key success factors for smart government. We used these hypotheses as initial themes for the further research steps.

We then discussed and deepened the hypotheses for the fields of action in seven workshops. Each workshop lasted between four and five hours. A total of 15 public managers from various cantons, municipalities, and policy areas (such as education, transport, infrastructure, finance, IT, or human resources) attended. In the first workshop, we validated our hypotheses for fields of action with our workshop participants. The leading question in the workshop was: *Is this list of fields of action complete, are there any missing, or do any need to be removed?*

After having validated the fields of action, the following six workshops each addressed certain fields of action so as to further deepen and concretize them. The workshops provided broad and in-depth insights into the perspectives, thoughts, and opinions of public managers involved in digitization initiatives in Switzerland. Further, we conducted five semi-structured interviews, starting in May 2017. In contrast to the workshops, the semi-structured interviews with experts enabled us to gain an external view. All the interviewees have accompanied and advised digitalization projects in public administration across the world. Each interview lasted between 60 and 90 minutes. As with the workshops, we sought to validate and concretize the strategic fields of action. We took notes during the interviews and coded the inputs according to the identified major themes. As for the workshops, we summarized the results at the end of each workshop with the participants, and then coded the summarized results according to the major themes we had identified.

After the scoping phase, we started the development phase. In this phase, we sought to develop concrete requirements and success factors for each field of action via targeted workshops and interviews (starting in March 2018). The key question here was: *What do we have to take into consideration in the fields of action to successfully implement Smart Government?*

First, we conducted three workshops with 10 experts responsible for digitalization projects in public administration (e.g. for past e-government projects). The workshop participants were public managers from Swiss federal government, the cantons, and the municipalities. Here, we critically examined the

specific challenges of implementing earlier smart government and digitalization initiatives and derived the lessons learnt for implementation requirements and success factors. We then conducted four individual interviews with government executives to reflect on and enrich the results from a political perspective. Also, we conducted an interview with a data protection officer so as to clarify privacy issues relating to smart government implementation, because the workshop participants and interviewed politicians had highlighted this topic. Finally, we conducted a full-day workshop with smart government experts from politics, administration, business, and academia, who had not been involved in the previous workshops and interviews, jointly discussing and challenging the results from different perspectives. We took notes during the interviews and coded the inputs according to the identified major themes. Again, we summarized the results at the end of each workshop with the participants, and then coded the summarized results according to the major themes we had identified. Throughout the discussions and via repeated reading of our data and coding, we identified different strategic fields of action that must be considered when implementing smart government initiatives; we will now list and describe them.

4 Findings and Discussions

To avoid any redundancies, we will discuss the results of the two research phases together. We first name and describe the strategic fields of action and then discuss what must be considered when implementing smart government initiatives. Our results showed that institutional, organization, and leadership/strategy factors are crucial in smart government initiatives. We first describe the institutional factors, followed by the organizational and the leadership ones.

4.1 Institutional factors

We identified five institutional factors: (1) political commitment, (2) clear governance, (3) legal understanding, (4) digital awareness, and (5) IT infrastructure and standards.

4.1.1 Political commitment

Our workshop participants and interviewees see smart government as a statewide, long-term transformation agenda across various functions, state levels, and powers and which requires financial and personnel investments, to which government, parliament, and administrative management must commit. They emphasized the importance of such political commitment, because smart government initiatives compete with other initiatives and policy fields for financial and personnel resources and attention. Without strong and broad commitment, smart government would lack necessary resources and would remain a “paper tiger”, as one participant put it. These findings correspond to the literature. A lack of political commitment, with the accompanying inadequate financial resources, hinder the implementation of both e-government (Capgemini 2010; Henningsson & Vanveenstra 2010; Norris & Moon 2005; Savoldelli, Codagnone & Misuraca 2014) and smart government (Schedler et al. 2017) initiatives.

4.1.2 Clear governance

Switzerland's political system has a pluralist and federalist structure and processes. In it, according to the workshop participants and interviewees, clear governance excels through systematic coordination and clear responsibilities, which are necessary in order to avoid redundancies, unaligned investments and legal foundations, as well as incompatible technical systems and data structures. This is especially true for smart government, which depends on vertical and horizontal (cross-state and within the same state level) cooperation and, to an extent, on shared standards and certain common basic services (e.g. electronic identity) to fully unfold smart government's potential. The participants and interviewees emphasized the importance of clear governance in Switzerland's *smart government ecosystem*. They see the confusion about the mandates of the many actors involved in policymaking and implementation (e.g. federal government, cantons, cities, E-Government Switzerland, and expert committees such as Swiss Conference on Informatics (SIK/CSI), e-Justice, privatim, and eAHV/IV) as the major challenge. Other studies of smart government support the finding that Switzerland's political system (with its pluralist and federalist structure) is an obstacle (Mettler 2018; Schedler et al. 2017). Further, in e-government, lacks of measurement, evaluation, and political coordination constitute barriers (Capgemini 2010; Feeney & Welch 2012; Lofstedt 2012; Moon 2002). The workshop participants and interviewees stated that, in order to streamline the governance of Switzerland's smart government ecosystem, its politicians must push to clarify the roles and mandates and their resulting implementation in day-to-day business. Further, they underlined that this governance must be more binding on all actors. Thus, resources can be systematically bundled in the system, unnecessary

redundancies can be reduced, and the interoperability of systems, solutions, data, and legal foundations can be increased.

4.1.3 Legal understanding

The workshop participants and interviewees saw fewer barriers in specific legal regulations than in the significant uncertainty about legal regulations (and the data protection implications) of smart government initiatives. This uncertainty may well slow these initiatives' implementation. Workshop participants and interviewees spoke of the need to create a shared understanding between legal and other experts. They also underlined that smart government requires the alignment and systematic analysis of regulatory needs across all state levels in Switzerland. In the e-government literature, a lack of legal foundations is seen as a barrier (Henningsson & Vanveenstra 2010; Savoldelli et al. 2014; UN-DESA 2010) which corresponds to our findings from the smart government literature. Regarding uncertainty, Mergel et al. (2016: 5) stated that public organizations must be aware of the current *regulatory framework* movement when using data. Also, concerning legal foundations and data, Schedler et al. (2017) called attention to the need to balance penalizing exploitation and prevention in initiatives.

4.1.4 Digital awareness

The workshop participants and interviewees indicated that citizens often don't respond to digitalization initiatives, are not prepared to accept them, and don't want to participate in them. The literature supports these findings: in smart government and e-government initiatives, citizens' lack of participation hinder implementation (Besharov, Barabashev, Baehler & Klerman 2013; Savoldelli et al. 2014; Schedler et al. 2017; UN-DESA 2010). According to our workshop participants and interviewees, this leads to a strong need to empower citizens to actively participate in implementing smart government initiatives. Our results show that creating new services and solutions is insufficient; digital awareness in a population is a prerequisite for smart government and must therefore be actively promoted by public administrations.

4.1.5 IT infrastructure and standards

According to the workshop participants and interviewees, Swiss public administration faces two primary challenges regarding technical infrastructure and architecture: (1) heterogeneous infrastructures, both at the same state level (e.g. canton to canton), between state levels (e.g. commune to canton), and between departments and offices of the same body; (2) many proprietary legacy systems; (3) and a procurement law that hinders the re-use of solutions. These results are supported by the literature. Technical infrastructure and IT standards hinder the implementation of smart government (Schedler et al. 2017). To address this, the workshop participants and interviewees recommended investing in interoperable and modular infrastructure, solutions, and services (e.g. appointment scheduling, contact forms, and chatbots). Basic services such as electronic signatures, identities, or payment systems are highly scalable and simplify usage for citizens and companies, yet offer little potential for differentiation. While this should not mean that all government agencies, municipalities, and cantons must use the same solutions, they do need to be interoperable and expandable.

4.2 Organizational factors

We identified four factors regarding internal organizational characteristics: (1) structure and processes, (2) organizational capabilities, (3) values, and (4) human resources.

4.2.1 Structure and processes

In the workshops, and as strongly emphasized by the external experts, we found that organizational changes are required for successful implementation of smart government. These changes address new tasks that the organization must fulfil, but also the setup in which it executes these tasks. Traditionally, current organizational setups in Swiss public administration are often de-centralized and functionally oriented in, and often hampered by, silo mentalities. Both the workshops participants and interviewees concluded that it is key for implementation to push for the temporary centralization of certain tasks and competencies in order to bundle resources, prioritize initiatives, and provide an impulse for change (e.g. in digitalization programs or digital offices). They emphasized that the lower a public administration's digital maturity – understood as the extent to which the application of digital technologies facilitate high-quality service (Flott, Callahan, Darzi & Mayer 2016: 2) – is, the more intense such a centralization impulse must be. However, the more digitally mature an organization is or becomes over time, the more centralization should be reduced again. We found

that the rationale behind this is that, after having spread the digital mindset and competences to de-central units and having realized major overarching investments and projects via a central push, de-central units are then able to manage, coordinate, and push smart government on their own. Nonetheless, when giving a centralization impulse, our workshop participants stated that it is key to very carefully balance central and de-central elements. On the one hand, this is to avoid culture shocks and resistance in the de-central units; on the other hand, de-central units in public administration are responsible for the de facto tasks, citizens' needs, and services to companies.

In the context of this argumentation, we identified three primary organizational tasks that must be discussed, distributed, and established in a public administration if smart government is to be successfully implemented: (1) strategic steering of resources, projects, and measures; (2) coordination, knowledge-sharing, and standardization; (3) development and realization of new services and solutions.

A public organization's ability to steer, lead, and control (1) the smart government agenda across all departments is key; hence the strong preference to centralize this task. We observed the same preference for coordination, knowledge-sharing, and standardization (2). Especially for less digitally mature and/or fairly de-centrally-oriented organizations, our workshops participants and interviewees highlighted that it is important to have strong steering and systematic coordination between departments and other state levels and standardization efforts. Workshop participants and interviewees mostly recommended realizing this through a steering committee consisting of all department heads and a supporting unit (e.g. a digital office) located in the state chancellery. When establishing such new units, workshops participants and interviewees reported conflicts with other cross-departmental internal service units, such as HR and IT. Thus, roles must be clearly defined. Even for digitally more mature organizations, our workshops participants and interviewees recommended that these two tasks remain centralized, since they must become part of the central leadership's 'standard' strategic process. According to our workshop participants and interviewees, the development, execution, and implementation of new services and processes (3) must be led by de-centralized units with business expertise and knowledge of customers and existing processes – indeed, various IT/developer teams remain responsible for the technical realization of applications. Our workshops participants and interviewees recommended that even strategic projects and basic services that are used by all departments (e.g. electronic document management system, electronic payment service, and electronic identity) should be managed by a de-central unit, yet steered and coordinated via central processes (see points 1 and 2 in this section).

4.2.2 Organizational capabilities

Discussions in the workshops and interviews revealed that developing and strengthening organizational capabilities is at the heart of implementing smart government. Most workshop participants (who work in public administration) admitted that their organization lacked the necessary capabilities to sustainably push smart government. Besides fairly new skills categories such as data management, cybersecurity, or user experiences (UX), this also included 'traditional' cross-cutting capabilities such as project and change management. Further, the capability to bridge business and functional knowledge (e.g. specialized knowledge such as traffic management) were emphasized. On the one hand, we found that this is because smart government fundamentally changes the required capability sets (e.g. data analytics); on the other hand, this is because smart government requires a much more cross-functional, multi-rational, agile, and project-based approach, as especially our interviewees highlighted. Our findings are in line with the literature. A lack of skills and know-how hinder the successful implementation of digital initiatives in the public sector (Feeney & Welch 2012; Henningsson & Vanveenstra 2010; Savoldelli et al. 2014; UN-DESA 2010).

Our analysis showed that the most important capabilities for implementing smart government are:

- Technology management: To make use of the new technologies required for smart government, public administration needs the various skills to be able to manage them. Technology management comprises the forecasting, planning, implementation, and control of the development and application of (new) technologies in order to create competitive advantages (Feldmann 2007).
- Data management: Data management comprises all disciplines relating to managing data as a valuable resource. There are many challenges for public administration, including ensuring privacy and data security, as well as avoiding redundancies in data management that may result from federalism in Switzerland (see the once-only principle).
- Cybersecurity: Cybersecurity is central to smart government applications; especially IoT extends

the target area for hackers. Consequences may be severe and could pose life-and-death risks, for instance if security systems, power grids, and water supplies are compromised. Public administrations will have to invest in cybersecurity capabilities.

- Business analysis and modeling: This is about systematically identifying new requirements and needs, and determining solutions to address these. In smart government, business analysis is closely connected to technology management, yet covers not only the application of technologies, but also changes to structures, processes, and services.
- Change management: Smart government requires change management for far-reaching, rapid, and frequent changes in structures, processes, and business models. These changes need to be prepared and executed across departments so as to successfully implement new solutions. In public administrations, these tasks have been undervalued, according to the workshop participants and interviewees.
- User experience: UX describes all aspects of a user's experience when interacting with a product, service, or facility. Especially in public administration, interactions are often designed only from an internal and legal perspective, as the workshop participants and interviewees noted. Since smart government is also about improving and fostering interactions with stakeholders, this is a key competency that public administration must develop, for instance by establishing *design thinking* approaches.
- Innovation management. Systematic innovation management, which helps to identify, prototype, develop, implement, and control innovations in an organization, is often lacking in public administrations, according to the workshop participants and interviewees. Many of the workshop participants and interviewees suggested establishing dedicated departments to build this capability and to support other departments, teams, and employees in realizing their ideas.

4.2.3 Values

Both the workshop participants and the interviewees emphasized the need for changes to the ways people collaborate, share knowledge within and outside the organization, approach their tasks, and deliver services to citizens and companies. As noted in the previous section, this is because smart government requires a much more cross-functional, multi-rational, agile, and project-based approach. Especially collaboration and knowledge-sharing internally and with external stakeholders (e.g. other government bodies, companies, and universities) is essential, to keep pace with the increasingly rapid societal and technological changes. Further, smart government necessitates a new service design approach in public administration in order to create more citizen-centric service delivery models – as Guenduez et al. (2017) noted. According to our workshops participants and interviewees, changing the organizational setup by adding horizontal, more flexible structures and processes without changing employees' ways of working and mindsets is insufficient. Discomfort and a lack of readiness to innovate has been identified as hindering the implementation of smart government (Schedler et al. 2017), which indirectly supports our findings by being essential prior to the fostering of collaboration and knowledge-sharing.

We consolidated these changes in following values, which provide guidance both in employees' strategic decisions and their daily work:

- Digital first and digital only: *Digital first* and *digital only* are digital service principles for government-to-citizen and government-to-business services. Digital first means that services are so attractive regarding for instance efficiency and user-friendliness that they become the first choice, although analog channels remain open. Digital only seeks to increase efficiency and quality by digitalizing processes and services both within and between government bodies (government-to-government).
- Enabling citizens: The aim is to create awareness among citizens for the offered solutions and services and, at the same time, supporting them in their use. This helps citizens to understand the new processes and to strengthen their competence as users (support citizen-enabling).
- Collaboration: Collaboration in heterogeneous teams and knowledge-sharing become more important for instance within and between the organization, other government bodies, universities, private companies, and citizens. Citizens and other stakeholders become 'prosumers' ('producer' and 'consumer') (Ritzer & Jurgenson 2010) of public services. Public administration must open up to external ideas and delivery models.
- Entrepreneurship and innovation: Entrepreneurship and innovation are promoted by leadership

examples, incentives, and creating space and opportunities (e.g. innovation labs) in order to overcome a risk-averse culture (*innovation as a credo*). Flagship projects help to build trust in the smart government agenda and foster entrepreneurship (*seeing is believing*).

4.2.4 Human resources

Our findings suggest that the new tasks, capabilities, and cultural aspects required for smart government (as described in the previous sections) must be reflected in corresponding changes to public administrations' human resources policies. Further, our findings suggest another key aspect that was emphasized especially in the interviews: employee knowledge is rapidly eroding. In 1984, the half-life of an acquired competence was estimated at 30 years, while in 2014 it was already only five years (Thomas & Brown 2011). Accordingly, the WEF estimates that more than one-third of the core competencies required in the future are not yet relevant today (WEF 2016). Thus, public administrations must adapt their recruiting and training criteria, accepting re-qualification and lifelong learning as increasingly important. Resistance to change and a lack of skills and know-how are known barriers to the implementation of smart government (Schedler et al. 2017) and e-government (Feeney & Welch 2012; Henningsson & Vanveenstra 2010; Savoldelli et al. 2014; UN-DESA 2010). We found that three aspects must be addressed when implementing smart government initiatives:

First, recruiting should be adapted according to new capabilities required for smart government. On the one hand, our workshop participants and interviewees highlighted that public administrations must hire dedicated staff for certain highly specialized tasks such as data management and cybersecurity. On the other hand, many functional job profiles are supposed to be complemented by the capability categories described in the previous section: technological, methodological, people, and bridging skills. According to the workshops participants and interviewees, job profiles are generally becoming more hybridic and multi-rational.

Second, training should be adapted accordingly, as the workshops participants and interviewees emphasized. On the one hand, they highlighted that the training's content should shift from just functional towards the capability categories of technological, methodological, people, and bridging skills. On the other hand, re-qualification and lifelong learning are becoming increasingly important, since competencies' half-lives continue to decrease (Thomas & Brown 2011).

Third, public administration must prepare and allow for less linear career paths, as the workshops participants and interviewees noted. While public administrations are currently oriented towards traditional career paths, non-linear careers are becoming increasingly common (Baruch 2004); these employees bring multi-rationality to the table, which is necessary for smart government.

4.3 Leadership and strategy

According to our workshops participants and interviewees, a broadly coordinated and policy-driven strategy as well as leadership are key to smart government initiatives' success. The participants see the need for a strong focus on cross-departmental leadership and strategy, because public administration usually has a departmental focus. However, smart government requires a cross-functional and process-oriented approach. Further, for the same reasons, the participants and interviewees emphasized the importance of top management in politics and administration pushing and clearly committing to the smart government strategy (*tone from the top*). The literature supports these findings (Gil-Garcia 2012; Schedler et al. 2017). Our results indicate that four factors facilitate the successful formulation of smart government strategies and bold leadership support.

First, smart government must be – and remain – a regular agenda item, and the leadership must be actively involved in and committed to smart government plans and decisions; if not, digitalization initiatives don't unfold their potential, since they lack cross-departmental alignment, embeddedness in the overarching strategy, and financial and personnel investments. Projects tend to remain small and silo-oriented.

Second, workshops participants and interviewees emphasized that it is crucial to establish a shared understanding of general concept, vision, strategy, and responsibilities by initiating a cross-departmental and cross-state-level alignment process in politics and administration. This is usually not clear in cross-departmental topics such as smart government, especially in a federalist and de-centralized system with very heterogeneous fields of activity such as Switzerland. Otherwise, the threat is that the – still inherent – silo mentality undermines the required cross-departmental and process-oriented approach of smart government. A very promising approach that is already being taken today is instituting a Chief Digital Officer, understood as a digital “transformer in chief” (Rickards, Smaje & Sohoni, 2015: n.a.), who also has cross-departmental

roles and tasks similar and relating to smart government. Our workshops participants and interviewees generally found it important that this person be well-connected in all departments and has a thorough understanding of business needs rather than specific deep technological knowledge. Especially external experts in our interviews noted that successful government organizations have often reached such a shared understanding by setting up an alignment process that includes key stakeholders from all departments and from politics and administration, resulting in a clear written document that can also be distributed to employees and the public.

Third, our workshops participants and interviewees found that digitalization initiatives often fail because they lack a consequent formulation and prioritization of strategic long-term objectives and concrete action areas. However, this is necessary to enforce the financing and implementation of measures across all levels and departments (from parliament to government agencies) and beyond legislation periods, because smart government is a long-term and cross-departmental vision. Further, concrete action areas are important for politicians' political communication. In our desk research, we found that public administrations often design elaborate high-level strategies but struggle to implement, because they don't formulate, define, and prioritize action areas and concrete objectives.

Fourth, the workshops participants and interviewees highlighted the importance of aligning and embedding the smart government strategy in the overall strategy of the government body in question, because smart government is not a goal but a means to an end. It is about responding more effectively and dynamically to the needs of a population and companies, about improving results and winning active participation, thereby further developing communities. They also emphasized that the smart government agenda must be clearly differentiated from other substrategies, especially from IT strategy.

5 Conclusion

Today, there are a range of initiatives towards smart government in many countries around the world, including Switzerland. Many of these promising initiatives are still in early stages, and many barriers must still be overcome if smart government is to be successfully implemented. We sought to identify and understand strategic fields of action for public administrations that must be addressed to implement smart government, and to understand what must be considered in order to successfully implement smart government.

Our analysis revealed institutional, organizational, and leadership as key success factors for smart government initiatives. Regarding the institutional factors, our findings suggest the need for political commitment and clarity regarding the different roles and, thus, implementation on a day-to-day basis (*clear governance*). Further, legal experts must be consulted, and a systematic analysis of the regulatory needs is necessary (*legal understanding*). Public administrations must increase the digital awareness of citizens and, to a lesser extent, that of companies (*digital awareness*). The ITs must be interoperable, must be based on a modular system, must use scalable and simple basic services such as electronic identification services, and must have a shared foundation regarding standards, terminology, and architecture (*IT infrastructure and standards*). Regarding organizational characteristics, in a first step, public administrations should centralize their activities, to de-centralize again in a second step, to foster a strong push through the whole organization (*organizational structure and processes*). Further, public administrations should develop their technology management, data management, cybersecurity, business analysis and modeling, change management, user experiences, and innovation management capabilities (*organizational capabilities*). Beyond that, public administrations should value digital first and digital only, should value citizens, and should collaborate and foster entrepreneurship and innovation (values). Finally, the requirements do not stop at employees – public administrations must adapt recruiting, training, and designated career paths (*human resources*). Regarding leadership and strategy, our findings suggest that public decision-makers must take responsibility, establish a shared understanding, and foster long-term thinking. Further, a smart government strategy must be part of the overall strategy, and different digital maturity levels should be considered (*leadership and strategy*).

Our findings have broadened the debate on smart government by going beyond the technological requirements that have dominated the debate on smart government in the research. Successful initiatives focus not only on new technologies such as Internet of Things (IoT), sensor networks, and artificial intelligence (see **Figure 1**), but also on managing organizational capabilities, addressing environmental requirements, building leadership, and developing common strategies and standards. These key success factors are essential in addressing the challenges and barriers faced by smart government initiatives (Schedler et al. 2017).

We conclude by pointing out limitations and corresponding implications for future research. First, our research is limited by its qualitative nature and the context in which it was carried out. Thus, it is possible that other success factors exist in other parts of the world. While – in order to avoid a strong connection to

the study context – we included the perceptions of experts from other countries in the analysis, the results remain context-specific. Future research could focus on smart government's implementation requirements in other contexts. Second, we have examined the success factors in an initial implementation phase of smart government initiatives. We cannot draw conclusions about how these factors will affect such initiatives' de facto implementations over time. This should be clarified through future research. Longitudinal studies can document these factors' relevance in the entire implementation process.

Appendix: Details of the Research Process

A. Initial hypotheses for strategic fields of action (based on desk research)

- Collaboration between federal government, cantons, and cities
- Service offering
- Structure and processes
- Leadership, culture, and competences
- Legal foundations
- Technical infrastructure, architecture, and digital workplace
- Data management, data security, and data analysis
- Participation and inclusion.

B. Scoping phase: Workshop and interview questions

- Question 1: Is the list of fields of action complete, are there any missing, or do any need to be removed (see the list above)?
- Question 2: Is the clustering and phrasing of each field of action accurate?
- Question 3: What are the concrete reasons and major topics for each field of action?

Question 1 and 2 were discussed in the first workshop, question 3 in the following workshop, each focusing on specific fields of action. In the interviews, we discussed all the questions sequentially.

C. Development phase: Workshop and interview questions

- Question: What do we have to take into consideration in the fields of action to successfully implement Smart Government?

Based on the previous hypotheses and results from the scoping phase, we further elaborated and described the fields of action. We asked the abovementioned question for each field of action.

We used the following list of fields of action, which was also the final list in our findings.

- External institutional factors: (1) political commitment, (2) plain, clear governance, (3) legal agility, (4) digital awareness, and (5) IT infrastructure.
- Internal organization characteristics: (1) management, (2) organization [(a) structures and processes and (b) organizational capabilities], (3) values, and (4) human resources.

Description example of a field of action that we used for workshops and interviews in the development phase:

Organizational capabilities

Developing and strengthening organizational capabilities is at the heart of the implementation of smart government. Public sector organizations often lack the necessary capabilities to sustainably push smart government. Besides fairly new skills categories, such as data management, cybersecurity, or user experiences (UX), this also includes 'traditional' cross-cutting capabilities such as project and change management. Further, the capability to bridge business and functional knowledge (e.g. specialized knowledge such as traffic management) is essential. On the one hand, this is because smart government fundamentally changes the required capability sets (e.g. data analytics); on the other hand, this is because smart government requires a much more cross-functional, multi-rational, agile, and project-based approach.

Competing Interests

The authors have no competing interests to declare.

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