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E-Government and Smart Cities: Theoretical Reflections and Case Studies

Editors

Peter Mechant and Nils Walravens

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Editorial

E-Government and Smart Cities: Theoretical Reflections and Case Studies

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Abstract
This editorial introduces the thematic issue on "E-Government and Smart Cities: Theoretical Reflections and Case Studies" and presents five articles and one commentary related to e-government and smart cities. All contributions take a use-case driven research approach to investigate, discuss and comment (on) overarching themes such as data, governance and participation which are inherently linked to the concepts of e-government and smart cities.

Keywords
e-government; government communication; government services; participation; smart city; smart governance

Issue
This editorial is part of the issue "E-Government and Smart Cities: Theoretical Reflections and Case Studies", edited by Peter Mechant (Ghent University, Belgium) and Nils Walravens (Vrije Universiteit Brussel, Belgium).

1. Background

Today, the concepts of e-government and smart city are increasingly used to refer to one another and have started to converge. While e-government was introduced under the flag of better service delivery by focusing on internal processes and the use of information and communications technologies (ICTs) by administrations, the smart city concept nowadays builds on this as a way to foster innovation by collecting, processing, integrating and using data on a larger scale than ever before. This supposedly leads to better-informed decision making and high quality services, but assumes far more complex partnerships with very diverse stakeholders, such as large and small companies, civil society, academia, individual citizens and so on (triple, quadruple, and quintuple helix models).

While the concept of "smart city" is adopted by many cities as a strategic priority that recognizes the growing importance of digital technologies (software as well as hardware), at the same time the phrase is used as a marketing concept to envision a city of the future. While very popular, the smart city concept remains elusive. It is often unclear to city administrations how the concept should be interpreted (if there even is a "right" way to do so) and what it can mean in practice. However, most seem to agree a smart city should focus on collaborating with diverse stakeholders, using technology as an enabler to achieve better and more efficient services to citizens.

While the offer of e-government services has increased substantially in the last decade—both in numbers and in complexity—statistics on the demand side (i.e., the actual use), however, show less impressive results. In 2014, usage of e-government services increased to 46% of EU citizens, but more than half dropped out after first use (United Nations, 2014, p. 162). Hence, in order to develop and deliver e-government services that are useful, easy to use, accessible and trustworthy, "efforts to provide e-government need to go hand in hand with efforts to increase demand" (United Nations, 2014, p. 144).

Given the focus of both e-government and the smart city concept on service delivery and optimisation of processes to achieve this, the terms have become increasingly intertwined. This also means looking at the problem from a more interdisciplinary perspective than ever before. This issue of *Media and Communication* delves deeper in the converging concepts of e-government and smart city, taking a critical approach and a perspective from communication-related disciplines and government studies. It tries to bring together research on this topic that follows a use-case driven research approach. Although results from case studies are difficult to generalise from local settings to a wider context or population, they do provide a rich source of qualitative information and make complex issues accessible and interesting to both an expert and non-expert audience. Moreover, they can capture what Hodkinson and Hodkinson call "lived reality" (2001, p. 3), or the complexities of contexts and conditions. A case study approach allows presenting particular instances of the intertwining and converging e-government and smart city practices and policies with an explorative purpose (Denscombe, 2017).

2. Contributions

Three main overarching themes can be discerned throughout this issue that are inherently linked to the intertwined concepts of "e-government" and "smart city": data, governance and participation.

The first theme, *data*, is an aspect that is deemed of particular importance to "smarter" forms of governance. The idea is that governments are currently "sitting" on a wealth of information related to divergent aspects of life in the city, but that this data is neither publicly available, nor easily interpretable. This has sparked a movement to encourage the opening of datasets in a structured and machine-readable way, under the "open data" moniker, which has gained significant traction across local and national governments. This theme is covered by Buyle et al. (2018) more specifically, in the article titled "'Technology Readiness and Acceptance Model' as a Predictor for the Use Intention of Data Standards in Smart Cities" they consider the relationship between individual characteristics of decision makers and their intention to use data standards. Using the Technology Readiness and Acceptance Model (TRAM) in an online survey (n = 205) they conclude that respondents who score high on innovativeness have a higher intention to use data standards. However, their results also show that personality characteristics as described in the TRAM-model are not significant predictors for the perceived usefulness and perceived ease of use of data standards (Buyle et al., 2018). In the article on channel choice determinants of (digital) government communication the authors study among others the perception towards the evolving digitization of communication and services and the "datafication" of e-government services. Laenens, Van den Broeck and Mariën (2018) conducted focus groups with a heterogeneous panel of over 80 citizens, ranging from non-users of digital technologies to high level users, to study their choice of communication channel and their perception towards the evolving digitization of communication and services in specific related to spatial planning in Flanders (Belgium). Their results show that citizens opt for local communication channels when interacting with local, regional, and national governments, and that they prefer to be personally informed when the communicated message has a direct impact on them. It also highlights how more vulnerable digital profiles consider the transition to digital communication by default as problematic (Laenens et al., 2018).

The second theme, *governance*, emphasizes the shifts as the role of the private sector becomes opaquer and (local) governments explore new financing and business models. Developments in the study of new forms of governance and social innovation have focused on the changing roles of public officials in their interactions with citizens and models are proposed in which public officials show higher responsiveness to citizens and promote active citizenship. Indeed, central to the emerging paradigm of governance is that public services should be a co-creation between governments, businesses, non-profit organisations and citizens. As early as the 1970s, Nobel Prize winner Elinor Ostrom (1972) demonstrated that government departments that engaged with their environments functioned much better than those that did not. In this issue, governance is taken on by Shenja van der Graaf (2018) who uses the case of Waze to explore the current "place" of e-government in realizing public value in the context of a complex platform-based urban ecosystem encompassing private and public organisations and citizens. She argues that "mainstreaming" of e-government practices demands cities and governments to reconsider their own role in "city making" so as to achieve meaningful public oversight.

A third, main overarching theme in this issue is *participation*, highlighting how local governments are exploring new forms of collaboration and cooperation with citizens that are enabled by technology, while facing risks related to inclusion, media literacy and privacy. Often participatory design—a diverse collection of principles and practices that facilitate the direct involvement of users in the design of things, services, spaces and technologies—is adopted to empower those citizens who are affected by the design. The first contribution to this theme, and opening piece of this special issue, is by Beth Simone Noveck (2018), who considers new participatory law and policy making platforms in "Forging Smarter Cities through CrowdLaw". She discusses cases that leverage technology to tap into diverse sources of opinions and expertise such as the "vTaiwan" experimental e-consultation platform, the open source platform and process "Better Reykjavik" and "TransGov", a platform created in 2014 to help Ghanaian citizens monitor the progress of local development projects empowering them to hold government accountable. The next

contribution addressing the theme of participation situates in the city of Glasgow and was authored by Webster and Leleux (2018). Their article provides insights into the ways in which its citizens and local communities have been engaged in governance processes. It shows that this engagement has taken place via traditional and innovative smart city technologies, and in particular in relation to policy formulation, service design and delivery. It also demonstrates that the co-creation of governance is shaped by vested interests and that engagement is fragmented and partial. However, the article argues that new technologies, social media and shared learning opportunities offer innovative new ways for some citizens to influence local governance and that an evolution to smart governance is possible given that the key ingredients of political leadership, new financial resources, technological expertise and citizen and community engagement are present. The third article in this theme investigates the impact of user participation methods on e-government projects by means of a case-study of the city of La Louvière. Simonofski, Vanderose, Clarinva and Snoeck (2018) studied this city during more than one year following action research best practices and describe the challenges and benefits the city experienced with participation methods. In their article they suggest a participation method matrix for a participatory e-government project and discuss the similarities and differences, as experienced by practitioners, between the converging concepts of e-government and smart cities.

3. Conclusion

The aim of this issue was to bring together contributions on e-government in a smart city context from a wide variety of communication-related disciplines, government studies and related fields. We hope that this thematic issue of *Media and Communication* will contribute and stimulate further academic discussions and explorations of how data, governance and participation are inherently linked to the converging concepts of "e-government" and "smart city" and hope you enjoy reading it as much as we have.

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Conflict of Interests

The authors declare no conflict of interests.

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Commentary

Forging Smarter Cities through CrowdLaw

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Abstract
Public officials are often ill-equipped when it comes to knowing how to regulate complex societal challenges, especially those that involve cutting-edge scientific and technological advances that raise myriad ethical, moral, political, legal, regulatory and social questions. But what if technology could be used to improve the quality of regulation and legislation? Online, tech-enabled participation methods, known as "CrowdLaw", enable more individuals, not only interest groups, to inform the legislative and policymaking processes. In this brief commentary, I survey a handful of global examples which show CrowdLaw in use at each stage of the lawmaking process at the local level and exhibit how participation is improving outcomes.

Keywords
citizen engagement; citizen participation; CrowdLaw; decision-making; policymaking; smart cities

Issue
This commentary is part of the issue, "E-Government and Smart Cities: Theoretical Reflections and Case Studies", edited by Peter Mechant (Ghent University, Belgium) and Nils Walravens (Vrije Universiteit Brussel, Belgium).

1. Introduction[1]

Communities are grappling with how to regulate new technologies but also with how to stand up to the innovative, yet powerful, private companies that created them. However, public officials are often ill-equipped to negotiate these deals, especially when they involve complex and challenging scientific advances, such as autonomous vehicles, Artificial Intelligence (AI), CRISPR gene editing, or sensor networks. These technological and scientific advances raise myriad ethical, moral, political, legal, regulatory and social questions (Cassani-Davis, 2015).

These questions can include:

- Is current policymaking a legitimate and effective way to make decisions about these technologies?
- Is it even legally acceptable to cede so much power to private interests?
- Is there a way to measure the quality and effectiveness of our legislation and policy?

As we shall explore, the demand on cities to legislate and regulate complex issues effectively—made all the more difficult and urgent because of the still-evolving nature of new technologies—is precipitating the need for bringing greater collective intelligence to bear to enhance the lawmaking processes.

What if new technology could unlock better approaches to lawmaking that would enable more individuals, not only interest groups, to weigh in, not simply on how to advance stakeholder interest, but also on how to solve our collective problems? What if the technologies of collective intelligence could prevent us from being subjugated by technological systems that we cannot understand and that few of us can control. We need platforms to connect public officials and institutions to robust sources of public wisdom in order to help improve policymakers' understanding of science and technology (Susskind, 2018).

New participatory law and policymaking platforms—what I call "CrowdLaw"—leverage technology to tap into diverse opinions and expertise at each stage of the policymaking process to improve the quality of outcomes (Noveck & Capone, 2017).

Although the name is new, the concept of public engagement, of course, is not. But new terminology is war-

[1] This article is based on a longer publication: Crowdlaw: Collective intelligence and lawmaking (Noveck, 2018).

ranted to describe the burgeoning movement in institutionalized practices—as distinct from purely deliberative civil society mechanisms—for using collective intelligence to govern. (Alsina & Marti, 2018; Noveck, 2018). CrowdLaw differs markedly in quantity and quality from earlier forms of public participation for a variety of reasons. First, CrowdLaw is institutionalized and connected to formal decisionmaking, how money is spent, and how power is wielded. Second, CrowdLaw focuses on obtaining expertise and ideas instead of only opinions. It is not merely a form of better polling or a way to win supporters for political causes, but it is designed to use collective intelligence to solve complex and difficult problems. As such, it goes beyond direct democratic approaches to blend more deliberative and thoughtful mechanisms for making policy. Third, CrowdLaw emphasizes the institutional design needed for individuals to participate and the design needed to digest this distributed knowledge. The focus is not simply on the platform but on the whole institutional process for gathering and using information and translating that raw data into insights for law and policymaking.

2. Five Stages of Policymaking

CrowdLaw experiments are taking place at every stage of the law and policymaking process with differing levels of success. Each stage has different informational needs that could be met by an organized use of collective intelligence. We examine an example of CrowdLaw at each of five stages of lawmaking. The stages are, of course, ideal types that in reality sometimes blend together. Nonetheless, distinguishing between them illustrates the need for a careful design of a CrowdLaw process in order to accomplish normative goals.

2.1. Problem Identification: vTaiwan (Taiwan)

The vTaiwan experimental e-consultation platform created and led by Taiwanese Digital Minister Audrey Tang enables the broader public to participate in an ongoing process of problem identification. vTaiwan is a multistep, multi-platform method which enables people to flesh out and define a problem posed by the government using an online forum.

The participants collaboratively compose an open, online glossary to ensure that the relevant terms are properly defined. If the definition of the problem is agreed upon by participants, they then proceed with the "discovery" session. They use this meeting to discover any important issues that both sides have. After this, the self-selected group moves to discuss solutions. The vTaiwan method utilizes Pol.is, a machine-learning software that sorts and clusters responses into categories for more efficient review and discussion. This brings attention to the most popular ideas but also allows for the formation of working groups who turn the findings into policy recommendations that are then delivered to the administration. In more than 80% of cases, the issues which have been defined by the public have been met with government interest and action. This is largely because the process involves civil servants, lawmakers, citizens and stakeholders in the conversation from the beginning. As the creators explain, the process they follow is designed to lead to "coherence, not necessarily consensus".

So far, 26 national issues, including the regulation of telemedicine, online education, telework, company law and Uber, have been discussed with over 200,000 people participating. Although small and still not the norm, it is a very promising approach, largely because of Tang's leadership in both the civic technology community from which she came and the government which she now serves. Tang has been able to establish a connection between public participation and power.

2.2. Solution Identification: Better Reykjavik (Iceland)

In Reykjavik, Iceland, following the banking crisis of 2008, public trust in institutions plummeted. Despite having the oldest parliament in the world and a stable, high-functioning democracy, people's faith in their political leadership faltered.

Active citizens built an open source platform and process known as Better Reykjavik, an open forum web platform for "idea generation" and "policy crowdsourcing". It gave citizens a forum to present and discuss ideas related to the services and operations of the city of Reykjavik. The website is a simple ideation platform where citizens can post their ideas on relevant topics such as education, transportation, tourism and welfare. They can rate one another's ideas and debate amongst each other in the comment sections. This website has been used by 20% of Iceland's population and over half of the people registered use it regularly, along with 1.5 million people in 20 countries who use copycat versions of the platform.

A "pros and cons" feature promotes well-reasoned arguments among users of the site by encouraging them to sort and organize their own feedback. This results in a compilation of the best arguments for and against each of the ideas along with a list of solutions. The true novelty is not the technology, but the process which requires that the city try to implement the public's best ideas. Each month, the five highest rated ideas are processed by the appropriate government standing committee. This has led to the implementation of hundreds of ideas from citizens.

The Icelandic case demonstrates the practical example of collaborative decision-making between state and citizens to solve problems, highlighting the ways in which the public can inform the policymaking process with new, innovative and more creative thinking (Olafsson, 2016). It is worth, however, reflecting on how the process and platform could be improved through more careful distinction between defining problems and finding solutions. In addition to this, a better empirical understanding of the institutional impact would be greatly beneficial.

2.3. Drafting: Marco Civil (Brazil)

The process of drafting legislation, which offers instructions to the implementing agencies and to the public, involves turning a policy proposal into a document with legal validity. This is typically done behind closed doors with professional staff assisting politicians to ensure correct formatting, indexing and referencing back to earlier legislation. Participating in this stage is challenging because it demands a high level of commitment and a greater knowledge of the subject matter. There are two ways to make participation in this stage easier. Either participants must have a good understanding of the legal requirements of the process or administrators need to first create a draft without technical jargon and use this to work out the details with non-experts. It can be said that collaboration during this phase could be seen as an invasion of the inner sanctum of the politician's preserve and threatens the essence of representative democracy. When politicians are able to overcome that fear, however, it creates an opportunity for truly open and inclusive lawmaking.

For example, in 2009, the Ministry of Justice in Brazil collaborated with a local law school to launch an interactive website where they posted the first draft of the Marco Civil—a new bill on Internet freedom—for public comments (Souza, Viola, & Lemos, 2017). This website allowed individual citizens and organizations—including NGOs, businesses, and political parties—to add to the law's content. More than 800 contributions were received in the form of comments, e-mails, alternative drafts and references. After three more collaborative drafting phases, the bill was sent to Congress in 2011 and then-President Dilma Rousseff ratified the bill with the support of four ministries.

Although France and the Philippines both followed Brazil's lead, examples of public participation in writing legislation are still few and far between. A handful of pilot projects have been largely successful but there is still a need for more experimentation to determine:

- What is the impact of an extended versus a shortened drafting process?
- What happens when legislative staff participates actively with the public as opposed to leaving citizens and civil societies to draft on their own?
- Given its technical nature, does involving the public in drafting actually pay off in terms of improving the legitimacy or the effectiveness of the process?

2.4. Implementation: MindLab (Denmark)

After the legislation is drafted and passed, it still has to be implemented. This is normally the responsibility of the agency to which the legislation has been delegated. Implementation provides another opportunity to practice many of the same techniques already outlined as well as to engage with the public in developing concrete strategies to apply. For the last 16 years in Denmark, Mindlab, a cross-ministry innovation lab, facilitated the active involvement of Danish citizens and businesses in developing new public-sector solutions. That is, public servants from Danish ministries brought policy challenges to MindLab for citizens and business stakeholders to collectively participate in the decision-making process, the development of prototypes and large-scale experiments along with the ministries.

MindLab's work focused on human centered design and used iterative design methods such as user journeys, expert interviews, what-if scenarios, and prioritization grids to manage the engagement process. Insights were gathered from their experiments and prototypes in order to determine how initiatives would be implemented by the Danish ministries (MindLab, 2018). In doing so, MindLab directly involved the public in the creation and testing of actual services, policies and programs. MindLab, however, did not use big data or agile new technology in its work. For this and other political reasons, it was disbanded in spring 2018 and incorporated into a new initiative focused on digital and tech-based innovation. Nonetheless, it illustrated the value of involving the public in the implementation process as their experience can aid in producing more detailed and precise plans.

2.5. Evaluation: Social Auditing in Ghana—TransGov

Sadly, policymaking and legislation often end with enactment. There is no systematic effort to understand the impact a law had or whom it impacted. Evaluation plays an important role as it provides feedback which can be used to improve existing service delivery and inform future policy formulation. This stage of the lawmaking process is the one most in need of CrowdLaw projects.

TransGov is a platform created in 2014 to help Ghanaian citizens monitor the progress of local development projects by empowering citizens to hold their government accountable for faulty or incomplete infrastructure projects and service delivery in their localities.

TransGov curates a list of projects in local communities and gives people the ability to comment on them. Today TransGov has 600,000 registered users who provide feedback through the TransGov website, mobile app, by SMS or using Interactive Voice Response (IVRS). Although not strictly legislative in nature, it is an instructive example of giving citizens power and using their collective intelligence to monitor policy outcomes thereby creating an evaluative feedback mechanism. Social auditing and monitoring of this kind that take advantage of the distributed power of citizens to monitor the effectiveness of policies could improve legislative practices if they are systematically implemented as part of the lawmaking process.

With experimentation and testing, CrowdLaw has the potential to go beyond accountability to make public institutions more effective by enabling decision-makers to leverage diverse and innovative solutions to solve prob-

lems more quickly. CrowdLaw can also help by identifying problems like structural inequality which have long been neglected and are yet to be solved.

3. Conclusion

Despite having no special training, city officials are often expected to make decisions about an impossibly wide range of complex issues. It is no wonder that in a 2018 survey, the average level of trust that people in 28 countries have in their governments was only 43% and far lower in many places (Edelman, 2018).

Making policy and legislation that will protect the public while stimulating innovation and the economy demands more expertise. Even the most capable politicians and public servants do not possess all the expertise needed to understand the root causes of problems and then turn the available information into coherent and effective policy. But what if collective intelligence mechanisms could help? What if to become smarter, our cities could tap into their greatest asset, that is, the intelligence and expertise of both their residents and the global public?

We need to re-imagine the processes by which we make laws and regulations. CrowdLaw brings with it the promise of improving the quality and effectiveness of lawmaking while also strengthening citizenship. The projects in Taiwan and Iceland among others are beginning to take off and demonstrate what is possible.

However, it is not always clear how current practices improve the quality of decision-making. Given that they often combine problem identification with problem solving, jumble drafting with commenting and confuse implementation with evaluation, it can be said that these practices are not as well-designed as they could be. The projects that genuinely improve the quality of lawmaking seem to be those that are designed to meet the specific informational needs for that stage of problem solving. However, empirical testing is required in order to understand whether CrowdLaw practices enhance or degrade the substantive quality of democratic decision-making.

These processes utilize software and can be altered with ease so they are capable of running experiments that can test which features of the platform lead to increased participation by a diverse group of individuals. The software can also measure the impact on lawmakers and the lawmaking process.

For example, one could test whether providing users with a checklist, directions and a set of required fields leads to more implementable and realistic proposals. CrowdLaw practices can be greatly beneficial to public institutions which face public pressure to create more legitimate and effective ways to govern. Therefore, research needs to be done to understand the impact of CrowdLaw on the public, city councils and the strength of our democracy.

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Conflict of Interests

The author declares no conflict of interests.

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Article

"Technology Readiness and Acceptance Model" as a Predictor for the Use Intention of Data Standards in Smart Cities

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Abstract
Taking the region of Flanders in Belgium as a case study, this article reflects on how smart cities initiated a grassroots initiative on data interoperability. We observe that cities are struggling due to the fragmentation of data and services across different governmental levels. This may cause frustrations in the everyday life of citizens as they expect a coherent user experience. Our research question considers the relationship between individual characteristics of decision makers and their intention to use data standards. We identified criteria for implementing data standards in the public sector by analysing the factors that affect the adoption of data governance, based on the Technology Readiness and Acceptance Model (TRAM), by conducting an online survey (n = 205). Results indicate that respondents who score high on innovativeness have a higher intention to use data standards. However, we conclude that personality characteristics as described in the TRAM-model are not significant predictors of the perceived usefulness and perceived ease of use of data standards. Therefore, we suggest exploring the effects of network governance and organisational impediments to speed-up the adoption of open standards and raise interoperability in complex ecosystems.

Keywords
data governance; decentralisation; e-government; interoperability; linked data; policy making; smart cities; TRAM; standardisation

Issue
This article is part of the issue "E-Government and Smart Cities: Theoretical Reflections and Case Studies", edited by Peter Mechant (Ghent University, Belgium) and Nils Walravens (Vrije Universiteit Brussel, Belgium).

1. Introduction

1.1. Data Standards

Flemish municipalities provide over 800 public services in domains such as building permits, subsidies, public welfare, and day-care. The back-office processes and service delivery of these services are supported by specialised information systems (IS) from different software vendors (Buyle, 2017). Because the data in these IS is modelled from a single thematic perspective, it is difficult or impossible to share and reuse them across all services (Davies, Harris, Crichton, Shukla, & Gibbons, 2008). This causes unnecessary frustrations in the everyday life of citizens and businesses as they are required to repeatedly provide the same information to their government (European Commission, 2014). The smart use of citizens' information by public administrations is referred to as the once-only principle (European Commission, 2014). Also, the transformation of society towards a digital econ-

omy is leading to changing roles as well as the blurring of the boundaries between public and private actors (European Commission, 2013). This is occurring in a context where information and IS are being combined with new technologies such as live data from physical devices (Viale Pereira, Cunha, Lampoltshammer, Parycek, & Testa, 2017). Smart cities have a comprehensive commitment to innovation in technology, management, and policy according to Nam and Pardo (2011). In 2012 Flemish cities started a grassroots initiative to overcome this fragmented data landscape and implement 'once-only' via the Open Standards for Linked Organisations programme (OSLO). The initiative was launched as a private-public partnership in the region of Flanders in Belgium, co-funded by the cities, the regional government of Flanders, and Information and Communication Technology (ICT) service suppliers (Buyle et al., 2016). The goal of OSLO is to raise interoperability in the region of Flanders. Interoperability is the ability of organisations to share information and knowledge, through the business processes they support, by exchanging data between their ICT systems (European Commission, 2017).

For centuries, standards have been fueling innovation, catalysing the growth of markets, and protecting the health and safety of citizens (Mills, 2013). In the sixteenth century, nuts and bolts were hand-crafted in matching pairs. In 1800, Henry Maudslay invented the screw-cutting lathe, which allowed screws to be produced with standardised thread (Roe, 1916). As they became interchangeable, it was possible to create interchangeable machine parts which enabled the Industrial Revolution. This turning point can be compared to the invention of the World Wide Web by Tim Berners Lee. Just as any nut and bolt adhering to the standards can be combined, electronic documents formatted in HyperText Markup Language (HTML) and transferred using the (Hypertext Transfer Protocol) HTTP can be exchanged via the Web (Sheridan, 2010). This created a digital revolution with new forms for social and economic enterprise as well as a new scope and greater efficiency for markets (Brynjolfsson & Kahin, 2000). The safety of citizens is often a driver for standardisation. On July 30th, 2004, an immense explosion took place in the city of Ghislenghien in Belgium. The blast, with a radius of 6km, killed 24 people instantly and injured over 232 others. The disaster was caused by the leakage of a high-pressure gas pipe which had been damaged by a drilling machine (De Soir et al., 2015). Following this incident, the Flemish Government agreed on a common standard for exchanging information on cables and pipes and a single-point-of-access was established to automate the process to provide utility data in support of groundworks (Vlaams Parlement, 2008). This standardisation process resulted in a reduction of claims and incidents, and in significant time and financial savings (Lieberman & Ryan, 2017).

The literature differentiates between de jure and de facto standards (Farrell & Simcoe, 1996; Funk, 2001). De facto standards refer to processes whose objective is uniformity, where all or nearly all potential adopters use the same interoperability agreements and turn it into a system that is hard to deviate from (Brunsson, Rasche, & Seidl, 2012), such as the native Microsoft Word 'doc' and 'docx' file format for storing and exchanging text documents. By contrast, de jure standards are those which emerge through consensus. Consensus may be reached informally or formally expressed through an industry standards body or by a standards organisation such as the International Organization for Standardization (Stango, 2004). EU-Regulation No 1025/2012 (European Union, 2012, pp. 316–319) defines a 'standard' as "a technical specification, adopted by a recognised standardisation body, for repeated or continuous application".

Most standard setting organisations promote the adoption of Open Standards (Simcoe, 2006). Although the precise meaning of "open" in the context of data standards is highly debated and contested (Chesbrough, Vanhaverbeke, & West, 2006), the term "open" refers both to the availability of specifications as well as the openness of the development process itself (Open Stand, 2012).

1.2. A Historical Perspective of Standardisation Initiatives in Flanders

Belgium is a federal country with three communities, three regions, and four language areas. Flanders is the northern federal state of Belgium with over 6 million inhabitants, or about 60% of the population, covering an area of 13,522 km². According to Steen and Wayenberg (2003), the complex state structure is reflected in the organisation of local government. Just 12 cities have more than 50,000 citizens whereas 30% of cities have less than 10,000 citizens. As the number of public servants in the cities varies from 1 in the municipality of Herstappe up to 6,900 in the City of Antwerp, it is clear that the organization of local governments' administrations is diverse (Steen and Wayenberg, 2003). Data and information in the Region of Flanders are fragmented across 308 municipalities, the regional administration, the federal administration, and the private sector. To achieve interoperability among these actors, robust, coherent, and universally applicable data standards are essential (European Commission, 2017). Since 2009, there has been a demand for Open Data standards and transparent governance (Hautekiet, 2009). The Region of Flanders has an extensive track record on information governance since 2009 which stems from its governance of geospatial data (Chantillon, Crompvoets, Peristeras, 2017). In 2012, the Flemish municipalities initiated an interoperability initiative 'Open Standards for Local Governments' (OSLO) to facilitate the re-use of information across all IS (Buyle et al., 2016). They initiated thematic working groups with participants from government, industry, and academia, agreeing on reusable data specifications to facilitate sharing and re-use of information across IS. In 2015, the steering committee for Flemish Information

and ICT Policy was installed. The committee is empowered by decree and engages the regional government, cities, academia, and industry via a so-called Triple Helix approach (Kolehmainen et al., 2016).

1.3. Data Standards in Smart Cities

In Smart Cities an amalgamate set of devices is deployed to generate different types of (real-time) data. These peripheral devices are connected to IS via existing communication networks. The mapping of traffic flows is an epitome case for interoperability in smart cities. For example, the quality of service, air, and noise can be ascertained from traffic models. Without proper agreements, multiple sound meters and cameras end up being connected to the same post because their sensor data is only suitable for a specific application. An example of a widespread data standard is the data exchange standard for the transfer of traffic information (DATEX2) managed by the European Committee for Standardisation (CEN) (Badii et al., 2017). The standard was extended so as to be able to publish the availability of parking spaces within Smart Cities. DATEX2 was rewired to a Linked Data format, allowing different sensor datasets to be interlinked on a semantical level and become machine-readable (Colpaert, 2017). In the region of Flanders, best practices related to publishing data in an interoperable and sustainable way are ratified by the thirteen biggest Cities and the Regional Government in an Open Data Charter (Smart Flanders, 2018).

2. Theoretical Background and Hypothesis Development

2.1. Acceptance Models for Data Standards

The goal of this article is to explore the user's attitude towards data standards in the public sector as well as the factors that affect their adoption. The identification of the factors that cause people to accept new technologies has been researched heavily over the past decades (Keen, 1981; King & He, 2006; Venkatesh, Morris, Davis, & Davis, 2003). Acceptance models in relation to the adoption of data standards emerged in the health and e-commerce sector (Chen, 2003; Lin, Roan, & Yeh, 2012; Pai, 2011). As e-commerce websites need to be seamlessly integrated with the back-office applications of their suppliers, who provide information on the price and availability of their products, data standards that lower the integration cost and avoid vendor lock-in are crucial. Chen (2003) researched the adoption and diffusion of standards in the context of e-business. The adoption framework builds upon Rogers' (2003) Innovation Diffusion Theory (IDT). Rogers defines innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (1983, p. 12). Chen identified the challenge of "separating individual and organizational decisions" (2002, p. 277). Also, this research shows that standards are often embedded in software components, which makes it hard to distinguish the adoption of the standards from the de-facto adoption of the tools. In the health sector, information standards are crucial to create patient-centric records and to allow their exchange between health-care providers. Lin et al. (2012) proposed a framework for evaluating the adoption of data standards in hospitals, which also builds upon the IDT. Lins' framework identified industrial competition and government involvement, system integrity, top management attitudes, technological capability of the staff, and organisation scale as influencers of the adoption of health data standards in hospitals. Pai (2011) analysed the introduction of healthcare IS. A healthcare IS is "a set of standards based on healthcare diagnosis, symptoms, cause, healthcare target and measurements" (Pai, 2011, p 651). These IS provide the hospital staff with integrated healthcare plans. This research builds upon one of the most widely accepted frameworks to predict and explain the adoption of IS: the Technology Acceptance Model (TAM; Davis, 1985). TAM asserts that perceived usefulness (PU) and perceived ease of use (PEU) have a determining impact on the intended and actual use of technology (Del-Aguila-Obra, Padilla-Meléndez, & Abouseada, 2014). PU is defined as the probability to which a user believes that an IS will improve his or her job performance. PEU refers to the degree to which the eventual user foresees that the target system will be effortless (Davis, Bagozzi, & Warshaw, 1989). Pai (2011) integrates TAM with the IS Success Model (Delone & McLean, 2003) and analyses three interrelated dimensions that have an impact on PU and PEU: Information Quality, Service Quality, and System Quality. This study concludes that the proposed factors' dimensions have a positive influence on the use intention via the mediating constructs PU and PEU. As with Chen (2002), this research combines the impact of standards and technology. Mueller, Dittes, Ahlemann, Urbach, & Smolnik (2015) researches the elements that influence the intention to accept and use IT standards and focuses on the individual. The study researches the acceptance using the TAM and the theory of planned behaviour (TPB; Ajzen, 1991). TPB states that "Attitudes toward the behaviour, subjective norms with respect to the behaviour, and perceived control over the behaviour are usually found to predict behavioural intentions with a high degree of accuracy" (Ajzen, 1991, p. 206). Mueller et al. (2015) discusses the moderating role of the personality of the individual. People with a high score on 'openness' are likely to adopt innovations.

2.2. Technology Readiness and Acceptance Model

The problem statement of this article is: cities are struggling due to the fragmentation of data and services across federal, regional, and local administrations. Our research question considers the relationship between individual characteristics of decision makers and their intention to use data standards. The insights of this

paper are valuable for organisations and government administrations which aim to speed up the adoption of Open Standards to raise interoperability in complex ecosystems. Also, it provides valuable observations for researchers who aim to study and predict the use intention of Data Standards.

To find a predictor for the use of data standards in smart cities, we chose a deductive approach based on existing research. First, we derived the concept of a 'data standard'. Second, we gained a deeper understanding of the acceptance research stream. Mueller et al.'s (2015) research indicated that the acceptance of standards can be embedded in TAM. This shaped the idea of building upon TAM, as did Pai (2011) and Mueller et al. (2015). The innovative aspect of this study is that we research the moderating role of people's individual characteristics (Chen 2002; Mueller et al., 2015) in the context of the adoption of data standards.

As TAM was initially developed to predict technology adoption in settings where organizational objectives mandated their adoption, the model has limitations when applied to users who are freer to choose between several alternatives (Lin, Shih, & Sher, 2007). Lin et al. (2007, p. 642) argue that "a model incorporating some individual difference variables is a necessary first step toward identifying and qualifying the psychological processes of the perceptions of a technology's value".

A model that considers individual differences is the technology readiness (TR) construct). Parasuraman defines the TR-construct as "people's propensity to embrace new technologies for accomplishing goals in life and work" (2000, p. 308). The construct addresses four sub-dimensions which predict people's technology-related behaviour: optimism and innovativeness, which can boost TR, and discomfort and insecurity, which may reduce it (Parasuraman, 2000).

The limitation of TAM is that it was initially designed to predict technology adoption in work environments, which makes it less applicable in contexts where the consumer has a higher autonomy (Lin et al., 2007). The user's perception of the usefulness and ease of use is determined by prior experience (Rao & Monroe, 1988). Therefore Lin et al. (2007) broaden the applicability of TAM by augmenting it with the TR individual-specific construct into the Technology Readiness and Acceptance Model (TRAM). The findings of TRAM emphasise the impact of the user/individual characteristics and their prior experience on the use intention. Also, the impact of usefulness and ease of use dominates the decision-making process of adoption behaviour, which can explain why a high TR score does automatically result in a high adoption.

2.3. Development of Hypothesis

2.3.1. Hypothesis

In this article, we investigate the potential to use the TRAM-model (see Figure 1) to predict the use intention of data standards in Flanders. This will be done through the use of an adapted version of the TRAM-model as developed by Lin et al. (2007). This model is based on TAM (Davis et al., 1989) and TRI (Parasuraman & Colby, 2015), see Figure 1.

Optimistic people generally expect that "good rather than bad things will happen to them" (Scheier & Carver, 1985, p. 219). How they approach the world will have an impact on their attitude towards risk perception and acceptance in relation to technology (Costa-Font, Mossialos, & Rudisill, 2009). Parasuraman argued that optimism relates to "a positive view towards technology and trust that it will offer people more efficiency, flexibility and control" (2000, p. 311). Also, he concludes that this has a positive impact on TR. According to Lin et al. (2007), PU and PEU have reconciling effects between TR and the use intentions. Based on these insights, Hallikainen and Laukkanen (2016) argued that optimism has a positive influence on both the PEU and the PU of digital services in the business-to-business healthcare sector. Building upon this research, we propose the following hypothesis:

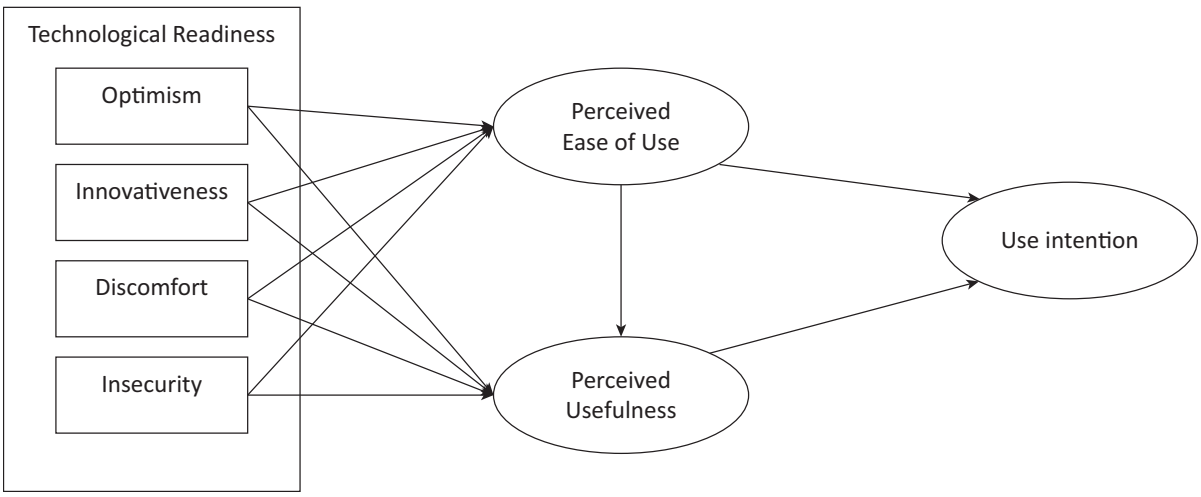

Figure 1. Theoretical model based on TRAM (Lin et al., 2007).

- H1a: Optimism has a positive influence on perceived ease of use of data standards.
- H1b: Optimism has a positive influence on the perceived usefulness of data standards.

Garcia and Calantone (2002) state that 'innovativeness' is generally used to assess the 'newness' of an innovation, where innovative products are labelled with a high degree of newness. Users who are characterised as 'innovative' adopt new ideas earlier than others (Rogers, 2003, p. 22). Parasuraman introduces the technological dimension and refers to "a propensity of being a technology pioneer and influencer" (2000, p. 311). Venkatesh and Bala (2012) identify a direct positive link between technology readiness and the adoption of business process standards. Building upon these insights, we propose the following hypothesis:

- H2a: Innovativeness has a positive influence on perceived ease of data standards.
- H2b: Innovativeness has a positive influence on the perceived usefulness of data standards.

Discomfort attributes are defined as "a perceived lack of control regarding technology and the sense of being overwhelmed by it" (Parasuraman, 2000, p. 311). Mukherjee and Hoyer (2001) argue that the high-complexity features of technology products have a negative impact on product evaluation because of the user's learning-cost. Despite the fact that both studies have hinted at there being a negative impact on the PEU and PU, some recent studies have not been able to find a correlation (Godoe & Johansen, 2012; Walczuch, Lemmink, & Streukens, 2007). Building upon TRAM, we propose the following hypothesis:

- H3a: Discomfort has a negative influence on perceived ease of use of data standards.
- H3b: Discomfort has a negative influence on the perceived usefulness of data standards.

Insecurity "implicates a distrust of technology and the disbelief about its ability to work properly" (Parasuraman, 2000, p. 311). Even though TRAM suggests that there is a negative impact on the PEU and PU, some recent studies have not been able to find a correlation (Godoe & Johansen, 2012; Walczuch et al., 2007). Building upon the insights of TRAM, we propose the following hypothesis:

- H4a: Insecurity has a negative influence on perceived ease of use of data standards.
- H4b: Insecurity has a negative influence on the perceived usefulness of data standards.

Scholars have been researching the effect of PU and PEU on UI, according to the initial TAM model, reporting that PU and PEU positively influence use intention (Davis et al., 1989). However, studies on the use intention of data standards are very limited, nevertheless Pai (2011) refers to a healthcare IS as a set of standards and his study demonstrates that PEU positively affects users' intention to use the IS. Therefore, we propose the following hypothesis:

- H5a: The perceived usefulness has a positive influence on the intention to use data standards.
- H5b: The perceived ease of use has a positive influence on the intention to use data standards.

There are researchers (e.g., Ramayah & Ignatius, 2005) who have studied the relationship between perceived ease of use and perceived usefulness. In the context of data standards, both are surmised to be closely linked as the argument is such that a user who perceives data standards as "easy to use" should, in turn, develop a tendency to perceive them as useful. Therefore, we hypothesize that:

- H6: The perceived ease of use has a positive influence on perceived usefulness of data standards.

2.3.2. Control Variable

We have added 'the decision' maker as a control variable, by asking the respondents whether they make decisions regarding the implementation of new ICT principles. According to Mazis (1972), decision-makers are more receptive to novel information than non-decision makers.

3. Method: Data Collection and Measurement Scales

Data for this research was collected in June 2018 from people working in the public and private sector or as academics. An online questionnaire was developed in English and translated into Dutch. A qualitative pretest was carried out by 20 respondents. The pretest indicated that some of the questions about data standards were too conceptual. Also, the terms 'technology' and 'standards' proved to be too broad. Therefore, the questions were adjusted and definitions were added. Survey respondents were recruited using the snowball method (Biernacki & Waldorf, 1981). This resulted in 338 responses, which after the exclusion of unfinished answers and unanswered questions provided 205 usable respondents.

The study adopts measure items of technology readiness from Parasuraman and Colby (2015) consisting of a 16-item measurement instrument evaluating an individual's propensity to adopt and use new technologies at work. The four dimensions of TRI, optimism, innovativeness, insecurity, and discomfort, consist of four measure items each. Moreover, four measure items of PEU and PU were adopted from Venkatesh and Bala (2012) (see Table 1). Use intention for data standards and decision-maker or not are measured using manifest variables. A seven-point Likert scale ranging from "1 = Strongly

Table 1. The questionnaire.

Construct	Questions	Cronbach's Alpha
Optimism	1. New technologies contribute to a better quality of life. 2. Technology gives me more freedom of mobility. 3. Technology gives people more control over their daily lives. 4. Technology makes me more productive in my personal life.	0.800
Innovativeness	1. Other people come to me for advice on new technologies. 2. In general, I am among the first in my circle of friends to acquire new technology when it appears. 3. I can usually figure out new high-tech products and services without help from others. 4. I keep up with the latest technological developments in my areas of interest.	0.807
Discomfort	1. When I get technical support from a provider of a high-tech product or service, I sometimes feel as if I am being taken advantage of by someone who knows more than I do.	
Insecurity	1. People are too dependent on technology to do things for them. 2. Too much technology distracts people to a point that is harmful. 3. Technology lowers the quality of relationships by reducing personal interaction.	0.678
Perceived ease of use	1. Learning to work with data standards would be easy for me. 2. I find it easy to work with data standards to do what I want it to do. 3. It is easy for me to become skilful at using data standards. 4. I find it easy to use data standards.	0.931
Perceived usefulness	1. The use of data standards in my job enables me to accomplish tasks more quickly. 2. The use of data standards in my job increases my productivity. 3. The use of data standards in my job makes it easier to do my job. 4. The use of data standards in my job is very useful.	0.886
Use intention	In the future months, I will make use of data standards in my job.	
Decision maker	I see myself as someone who takes decisions when it comes to purchasing or implementing new ICT principles.	

agree" to "7 = Strongly disagree" was used for technology readiness, PEU, PU and use intention.

4. Data Analysis and Results

4.1. Descriptive Statistics

In all, 205 respondents completed the questionnaire (21% female and 79% male). 1% having an age of less than 24, 22% between 25 and 34, 40% between 35 and 44, 27% between 45 and 54, and 10% over 55 years old. Regarding the respondent's educational level, 27% have a bachelor's degree, 66% have a master's degree, 4% have a PhD degree. Just 3% only have a degree of secondary education (see Figure 2).

Regarding professional experience, 78% of the respondents are active in the public sector, 19% in the private sector and 3% in academia. From all the respondents active in the public sector; 3% are active in the Federal Government (including the federal Digital Transformation Office), 37% in the Regional Government, 9% in the Provincial Government, 24% in the Local Government, and 2% in intermunicipal associations. 24% of respondents did not provide this information (this question was not a required one) (see Figure 2).

Results show that 56% of the respondents in this sample saw themselves as a decision maker in their organisation regarding the purchase or implementation of new ICT principles or technology. 88% of our respondents working in the public sector reported that their organisation makes use of data standards.

T-tests showed no difference between gender and organisation (public, sector, academia) when it comes to making decisions. Also, we detected that people who identify themselves as a decision maker, are significantly (on the 0.05 level) more innovative, than the respondents who indicated that they are a non-decision maker.

4.2. Validity and Reliability

The validity of the TRAM approach was tested using convergent validity and discriminant validity. A measurement model with seven latent constructs and 26 observed variables was fit using lavaan version 0.6–2.1268

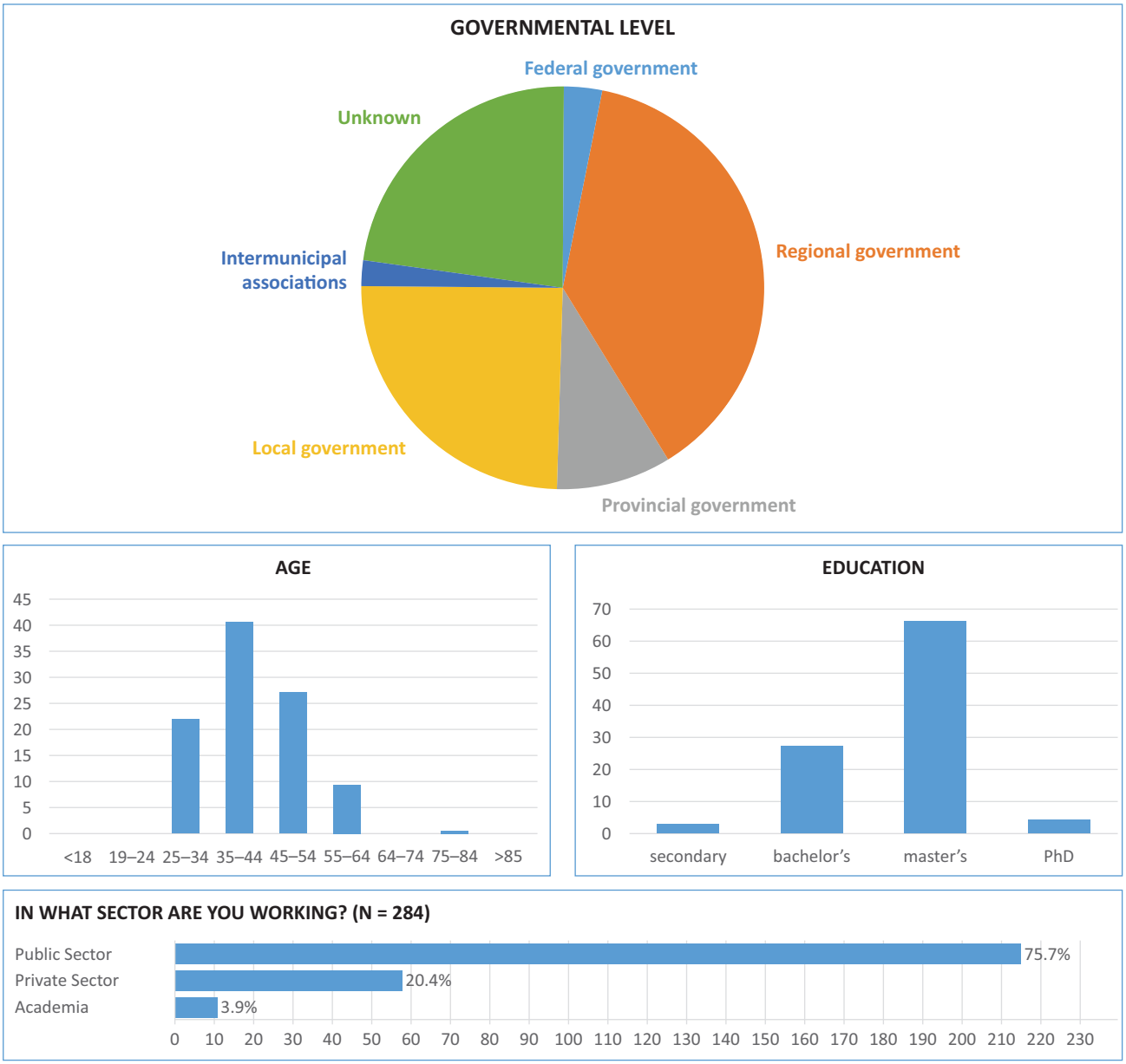

Figure 2. A sample profile of the respondents (sector, age, education and governmental level).

(Rosseel, 2012) in R version 3.4.3 (R Core Team, 2017). For the model fit assessment, we evaluated the Robust Root Mean Square Error of Approximation (RMSEA) and the Robust Comparative Fit Index (CFI). CFI should be larger than .95, RMSEA values should be .05 or lower to indicate a good fit. Small deviations from these standards are, however, acceptable (Marsh, Hau, & Wen, 2004).

Reliability was measured based on the Cronbach's Alpha score of the constructs. As a rule of thumb, a Cronbach's Alpha ratio greater than 0.7 is considered acceptable. We can conclude that the values show acceptable reliability (see Table 1).

4.3. Results

The overall measurement model provides an adequate fit with $chi^2 = 419.110$ (df = 259); $p < 0.000$, CFI = 0.925 and RMSEA = 0.055. Standardised regression loadings for all measures exceeds 0.60 except for seven items. Based on these low factor loadings (below 0.6), which indicate that the items are not valid and would, therefore, falsify results, we decided to eliminate four items for which the loadings were extremely low. Low factor loadings can be problematic because questions with low loadings do not measure the intended element. Following these modifications, the final model demonstrated an acceptable fit with $chi^2 = 278.790$ (df = 174); $p < 0.000$., CFI = 0.948 and RMSEA = 0.054. Figure 2 shows the structural model.

Table 2 provides an overview of the hypothesis results. Hypothesis H1a and H1b are rejected because the correlation is not statistically significant. Optimism concerns the positive attitude toward technology such as one's perceived level of control, the technology's flexi-

Table 2. The hypothesis test results.

	Hypotheses	Estimate	Std. Error	Z-values	P-values	Std. All	Decision
H1a	Optimism → Perceived ease of use	0.114	0.156	0.734	0.463	0.065	Not supported
H1b	Optimism → Perceived usefulness	0.109	0.146	0.748	0.454	0.062	Not supported
H2a	Innovativeness → Perceived ease of use	0.397	0.126	3.147	0.002	0.287	Supported
H2b	Innovativeness → Perceived usefulness	0.297	0.122	2.440	0.015	0.216	Supported
H3a	Discomfort → Perceived ease of use	−0.002	0.067	−0.035	0.972	−0.003	Not supported
H3b	Discomfort → Perceived usefulness	0.203	0.063	3.199	0.001	0.236	Supported
H4a	Insecurity → Perceived ease of use	−0.154	0.169	−0.908	0.364	−0.081	Not supported
H4b	Insecurity → Perceived usefulness	−0.317	0.165	−1.924	0.054	−0.169	Not supported
H5a	Perceived usefulness → use intention	0.095	0.089	1 .064	0.287	0.081	Not supported
H5b	Perceived ease of use → use intention	0.317	0.089	3.560	0.000	0.271	Supported
H6	Perceived ease of use → perceived usefulness	0.311	0.074	4.205	0.000	0.313	Supported

bility, convenience, and efficiency (Parasuraman, 2000). For people to be optimistic it is particularly essential that they are confident that the technology is under their control (Dabholkar, 1996). The results show that whether someone is a technological optimist is not related to the PEU and the PU of data standards. Other factors might be more relevant.

As expected, we obtained a positive relationship between innovativeness and both PEU and PU (H2a and H2b). This highlights that innovativeness has a positive influence on perceived ease and PU of data standards. This can be explained by the fact that innovative people are more open to new ideas in general (Kwang & Rodrigues, 2002). An individual's level of innovative attitude has been shown to be a key element in his/her acceptance of new technologies (Brancheau & Wetherbe, 1990). Innovative individuals are eager to learn new technologies and to understand and use them which increases their technology acceptance rate (Turan, Tunc, & Zehir, 2015). We assume that innovative people are more familiar with new technological concepts, such as data standards.

Hypothesis H3a is not supported because the correlation is not statistically significant. Hypothesis 3b is supported and implies that discomfort is positively correlated with PU of data standards. It implies that if people are uncomfortable with technology, they will be more likely to perceive data standards as being useful. These results are not consistent with previous literature where discomfort negatively influenced PU (Igbaria, Schiffman, & Wieckowski, 1994). This may seem counterintuitive, however, this discomfort could lead to new solutions that mitigate the discomfort. Also, people feeling more uncomfortable with technology may have become accustomed to using existing technologies which do not meet their needs and therefore perceive data standards as useful (Kuo, Liu, & Ma, 2013).

Hypotheses H4a and H4b are both rejected because the correlation is not statistically significant. This means that there are other predictors that influence this PEU and PU of data standards (Kuo et al., 2013).

Hypothesis H5a is rejected because the correlation is not statistically significant. In line with the findings of Lin et al. (2007), we see that hypothesis H5b is supported, demonstrating the positive influence of PEU on the intention to use data standards. This proves that the "user-friendliness" of data standards is associated with the use intention. Factors that contribute to higher perceived unfriendliness of data standards may be for example the conceptual or intangible characteristic of data standards or the implementation cost. Because of this high cost, (potential) users of data standards could lose focus on the advantages and the ease of use of the data standards. In other words, barriers such as cost reduce the perception of the ease of use of data standards, causing users

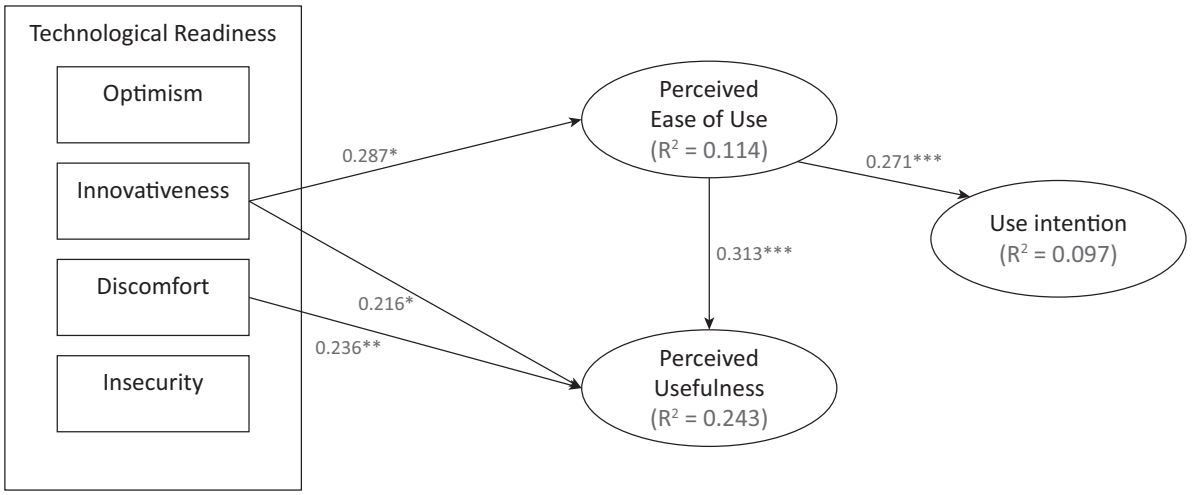

Figure 3. Structural model (standardised paths) of the total sample.

to develop a negative attitude which, in turn, leads to an unwillingness to use such data standards (Ramayah & Ignatius, 2005).

Lastly, hypothesis H6 is supported. It is widely acknowledged that PEU contributes to PU (King & He, 2006; Lin, Shih, Sher, & Wang, 2005; Schepers & Wetzels, 2007; Venkatesh, 2000). This is based on the theoretical argument that some user-friendly technologies could be perceived as useful, but not all useful technologies are user-friendly (Godoe & Johansen, 2012). PU is influenced by the PEU, which means that if data standards are perceived as easy to use, they are also perceived as more useful (Kuo et al., 2013).

We can conclude that a low effect size is measured for PEU ($R^2 = 0.114$). Figure 3 shows that PEU is driven by one determinant (innovativeness) derived from the TRAM model. Another low effect size is measured for use intention ($R^2 = 0.097$), we see that there is only one determinant (PEU) that contributes to this construct. Finally, we see a moderate effect for PU ($R^2 = 0.243$), predicted by innovativeness and insecurity.

5. Discussions and Conclusion

In this article, we investigated the potential to use the TRAM-model to predict the use intention of data standards, specifically, we looked at the relationship between individual characteristics of the decision and non-decision makers in Flanders and their intention to use data standards. This study was the first to apply the TRAM model on the use intention of data standards. Also, we applied the TRI 2.0 scale, a recently developed scale by Parasuraman & Colby (2015). This a more recent version of the TRI 1.0, characterised by the fact that the new questionnaire is shorter and better adapted to current technological developments such as the Internet, smartphones, as well as the apps that are used on those platforms.

We detected a positive correlation between the respondent's perception of the ease of use of data standards and the perceived usefulness. Also, our analysis indicates that the respondent's perceptions of data standards are positively correlated with their intention to use it. The study also indicated the positive correlation between perceived ease of use and the use intention of data standards.

This research is subject to several limitations that need to be considered. First and foremost, we saw that one characteristic of the TRAM model (innovativeness), predicts perceived ease of use and perceived usefulness of data standards within our sample of respondents. The low effect sizes show that the TRAM model is not a good fit for this context. The characteristics of our respondents indicate that they are a homogeneous group of people; active in information management with a high level of education. These different kinds of homogeneity may have biased our results as with to the study of Godoe and Johansen (2012). Moreover, creating the scores for PU and PEU was often based on a purely subjective judgement of respondents as some did not have prior experience with (implementing) data standards, as such this subjective appraisal of performance and effort does not necessarily reflect objective reality (Davis, 1989). Second, although the pretest indicated that some of the questions about data standards were too conceptual, and although the questions were adjusted and working definitions for concepts such as data standards added, respondents showed a wide diversity in interpreting the concepts that were polled, thus lessening the reliability of the results. Third, given the lack of literature on the relationship between personality traits and adoption of data standards, a more qualitative approach might have been more helpful as it would allow a more exploratory and broader research approach.

Our results indicate that respondents who score high on innovativeness have a higher intention to use data standards. According to Melas, Zampetakis, Dimopoulou and Moustakis (2011), it is essential to target these early adopters first, as they can influence their peers and the diffusion process. The diffusion process is the crucial

stage in which "more members of the social system also adopt the same innovation" (Hoffmann, 2007, p. 87). To speed up the adoption of Open Standards and raise interoperability in complex ecosystems, we should focus on these early adopters. Our research results show that personality traits are less influential in terms of adopting data standards. Even though the TRAM-model reveals that innovativeness is an important influencer for the use intention of data standards, we expect that other parameters which are not included in the model might have an impact on the use intention such as organisational factors and potential network effects because data standardisation is a multistakeholder activity (e.g., coordination between agencies, the context of policy framework, etc.). The governance model in Flanders, with its roots in geospatial e-services and standards, can be characterised as a mix of hierarchical and network governance (Chantillon et al., 2017). Network coordination has an important impact on addressing complex problems (Provan & Kenis, 2008). Therefore, we suggest that the effects of network governance should be investigated in order to speed up the adoption of Open Standards to raise interoperability in complex ecosystems. We suggest researching the impact of organisational impediments (e.g., lack of support from top management) and economic impediments (Ouma, 2014). As Lee & Yu (2015) suggest, raising the organisational competencies (e.g., providing user-friendly tools, training and success stories) heightens the perceived ease of use and use intention. Furthermore, our research suggests that the characteristics of the data standard (complexity, cost, relative advantage, and impact) might influence adoption (Damanpour & Schneider, 2009).

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Conflict of Interests

The authors declare no conflict of interests.

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Article

Channel Choice Determinants of (Digital) Government Communication: A Case Study of Spatial Planning in Flanders

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Abstract
Governments at all levels believe the digitisation of their services and increased interaction with citizens will bring significant advantages in terms of transparency, creation of public value, and improvement of government performance (Al-Hujran, Al-Debei, Chatfield, & Migdadi, 2015). Nonetheless, this evolution towards more digital services and communication by governments raises questions in terms of inclusivity and accessibility. We conducted focus groups with a heterogeneous panel of over 80 citizens, ranging from non-users of digital technologies to high-level users, to study their choice of channel and their perception towards the evolving digitisation of communication and services, applied to the case of spatial planning in Flanders (Belgium). The results reveal that the most decisive channel choice determinants in spatial planning relate to the channel characteristics themselves, the information, the contextual aspect of the communication flow, and digital inequality mechanisms; meaning that (a) citizens opt for local communication channels when interacting with local, regional, and national governments, (b) citizens prefer to be personally informed when the communicated message has a direct impact on them, and (c) more vulnerable digital profiles consider the transition to digital communication by default as problematic.

Keywords
channel choice; digital by default; government communication; government services; media user profiles; public services; spatial planning

Issue
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1. Introduction

The digitisation of government services and communication is believed to bring many advancements regarding transparency, creation of public value, and improvement of government performance (Al-Hujran, Al-Debei, Chatfield, & Migdadi, 2015). E-Government is not a new phenomenon. Since the beginning of the 21st century, governments have been exploring the potential of information and communication technologies (ICTs) in their daily functioning (Prins, 2001; Zakareya & Zahir, 2005). More recently, there has been a shift from e-government to open governments and smart cities. This shift not only includes the digitisation of services and communication, but considers the digitisation process as a means to deal with diverse urban and societal problems in cities. This move is supported by governments as well as the private and public sector. Each one aspires to take part in this movement by experimenting with and developing diverse new digital tools and services (e.g., open government, open data), accompanied with a customised digital communication strategy to enable bottom-up information production and sharing (Hansson, Belkacem, & Ekenberg, 2015).

In the Flemish region (Belgium), the "Radicaal Digitaal" (radically digital) campaign was launched in 2015, which strives for a pursued digitisation in the services and communication strategy of the different government departments by 2020. Although this might seem a sound strategy to rationalise governmental services, there are potential barriers. In Flanders, one in ten citizens has no internet connection at home (Vanhaelewyn & De Marez, 2017). In 2017, 61% of the Belgian population had general digital skills, going from the basic level to a more advanced level (Federale Overheidsdienst Economie, K.M.O., Middenstand en Energie, 2017). Despite issues concerning access and digital skills decrease, and many organisations aim to improve these issues among their target groups (e.g., via public access in libraries) (Mariën & Vleugels, 2011), some citizens are still digitally excluded and a digital-by-default strategy may have severe consequences for them. A key question is whether the perceived advantages of a digital government foster the promised benefits for all citizens. Despite the great belief in digital services, governments at all levels face low use of these services due to challenges regarding both supply (e.g., management support, IT infrastructure) and demand (e.g., trust, usefulness, skills) (Al-Hujran et al., 2015; Anthopoulos, Reddick, Giannakidou, & Mavridis, 2016).

The demand-side is referred to as channel choice or elements influencing a citizen's decision-making process when opting for particular communication channels for their interaction with governments (Ebbers, Pieterson, & Noordman, 2007). The literature on channel choice is scarce and its exact influence is rarely measured (Pieterson & van Dijk, 2007). Therefore, updated research on channel choice of (e-)government services is needed.

We, therefore, provide a case study on government communication channels for spatial planning in Flanders, based on a commissioned study (Laenens, Vanderstraeten, Braet, Mariën, & Van den Broeck, 2017) by the Department of Environment and Spatial Development (Department) and the Department of Public Governance and the Chancellery of the Flemish Government that aimed to evaluate and improve their communication strategies. Spatial planning makes an interesting case, as it concerns information that can be both very close to citizens (e.g., concerning their own street or village) or further away (e.g., concerning more remote projects). Communication in spatial planning is mostly one-way communication. The Department distributes information via a range of channels such as newspaper advertisements, Twitter, posters, the Belgian Official Gazette, government websites, information events, messages in municipal information sheets, commercials on public radio and television, and registered letters. The only interaction between the Department and citizens is via so-called participatory meetings, where citizens are invited to give ideas and feedback on a certain area.

Consequently, this article will answer the following two questions: which elements influence citizens' channel choice for spatial planning? Would citizens embrace a move towards digital channels in spatial planning or do they see too many barriers?

We first provide an in-depth literature study on the need for inclusive communication in regard to digitising governments. Second, a framework on channel choice is deducted from literature. Third, we use qualitative data—focus groups with diverse projective techniques—to answer the research questions. Finally, we present the results, discussion, and conclusion.

2. Inclusive Communication in a Context of Digitising Governments

Sanders and Canel (2013, p. 4) define government communication as communication by public institutions that is executive in the services of political reasoning and aims to enact the will of citizens. This definition, however, lacks a particular scope on the flows of communication. Traditional communication tools (e.g., telephone and front desk), though still relevant today, limit the information flow as interactive communication between governments and citizens is impossible. With the emergence of ICTs, public services and communication became more efficient (Gil-Garcia & Martinez-Moyano, 2007; Reddick, 2005b; Verdegem & Verleye, 2009). They were hoped to even foster greater interactivity and participation (Dugdale, Daly, Papandrea, & Maley, 2005). But this became only widely discussed after the emergence of digital technologies (e.g., social media, mobile applications) as they enable governments to open up and become innovative and collaborative (Hansson et al., 2014). They are believed to bring benefits in terms of transparency, participation, and accountability as well (Hansson et al., 2014; Harrison & Sayogo, 2014; Wijnhoven, Ehrenhard, & Kuhn, 2015). However, the potential of open governments is often taken for granted. Critics express their concerns regarding privacy and risk, trust, the design of the platform, etc. (Lourenço, 2015; Wijnhoven et al., 2015).

This critical reflection is also apparent in the field of spatial planning. Technologies are believed to bring more openness to planning activities, more participation of citizens, and opportunities to collaborate (Criado, Sandoval-Almazan, & Gil-Garcia, 2013; Meijer & Torenvlied, 2014). Social media and mobile technologies enable citizens with an internet connection to receive information whenever and wherever they want, and to participate online and generate their own content (Kleinhans, van Ham, & Evans-Cowley, 2015). However, there is still an overrepresentation of informing and reporting applications and a lack of successful participatory applications (Ertiö, 2015). The emergence of social media and mobile communication in the field also poses additional challenges (e.g., to guarantee the quality of online information, how to create a trustful relationship, etc.) (Afzalan & Evans-Cowley, 2015). Government agencies need to deal with

disaffection online, instead of just spreading online announcements (Schweitzer, 2014). Digitisation also goes hand in hand with digital inequality mechanisms, posing a threat to those who lack access or skills (Kleinhans et al., 2015; Reddick & Anthopoulos, 2014; Williamson & Ruming, 2017).

Digital inequalities were believed to have a major influence on the uptake of e-services (van Dijk, Pieterson, van Deuren, & Ebbers, 2007). Van Deursen, van Dijk and Ebbers (2006) identified a number of building blocks for successful e-services: accessibility, user-friendliness, and a multi-channel approach. The latter highlights the importance of communicating through several, both offline and online, channels to ensure no citizen is set aside because of his or her lack of digital media usage (Dugdale et al., 2005).

To counter digital exclusion mechanisms, our study is based upon a conceptual framework that distinguishes different media profiles and how each of these profiles is confronted, or not, with digital exclusion (Mariën & Baelden, 2015). This framework, entitled "8 profiles of digital inequalities" distinguishes 8 media profiles based upon 13 key indicators, of which 5 are in the social field (i.e., income, education, participation in life domains, agency, and well-being) and 8 in the digital field (i.e., access, attitude, digital skills, social and soft skills, autonomy of use, user practices, media richness of the environment, and support networks). The framework emphasises that there is not a clear-cut distinction between digitally included and digitally excluded persons, but that digital exclusion is a fragmented phenomenon defined by how the 13 indicators interact. We targeted each of the 8 profiles in this study, which enabled us to include the wants and needs of non-users to high-level users.

3. Channel Choice in Government Communication

In order to answer the question of why citizens would opt for a particular government channel, the factors influencing their decision-making process were studied in detail. Channel choice literature is inspired by disciplines such as Media Richness Theory (Daft & Lengel, 1986) and theories on technology acceptance and use (Aizen, 1991; Davis, 1989; Fishbein & Aizen, 1975; Rogers, 2003; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003), although they do not specifically focus on (e-)government channels. The literature on channel choice itself is mostly concentrated on the comparison between websites, telephone, front desk, and e-mail (Pieterson, 2009, 2010; Reddick & Turner, 2012). However, the focus on new digital media is increasingly gaining attention (Mergel & Bretschneider, 2013; Reddick & Anthopoulos, 2014).

Channel choice is an individual and continuing process: when citizens have had a bad experience with a channel, they will look for another one that meets their needs (Pieterson & Ebbers, 2008). Pieterson (2009) confirms and expands this as citizens initially opt for habitual decision-making (i.e., based on previous experiences) and only when they are not satisfied with their choice, will they think about this (i.e., based on finding a match between the envisioned task and the most appropriate channel). According to Pieterson (2009), several determinants influence which decision-strategy is being followed. He groups these determinants into four main categories: personal characteristics, channel characteristics, task characteristics, and situational characteristics.

Socio-demographic elements (e.g., gender, age, educational level) influence channel choice (Ebbers et al., 2007; Plattfaut et al., 2013; Reddick & Turner, 2012). Reddick and Turner (2012) position these elements in the broader context of 'digital divide and demographics' because they have a direct impact on the access and use of e-government channels. However, because digital inequality mechanisms are so important for the choice between e-services and offline government services, we position these elements into a new category (see below). Ethnicity, daily Internet use, being a government employee, income, having a disability, and the size of a person's network might also play a role (Reddick & Turner, 2012), just as individual preferences regarding the use of traditional or digital media (Pieterson & van Dijk, 2007). Personal characteristics can exert influence on all other determinants and are, therefore, considered as very decisive.

Channel characteristics relate to the (perceived) performance of public services (Ebbers et al., 2007; Hung, Chang, & Kuo, 2013; Pieterson, 2010). Over the years, many of these characteristics were presented and a broad set of determinants is known today, but their influence still needs to be further studied (Bagozzi, 2007). The most referred channel characteristics are perceived usefulness and perceived ease of use (Davis, 1989). Though Davis's technology acceptance model (1989) was thoroughly criticised and edited over the years (Bagozzi, 2007), it is still relevant in the discussion on channel choice. Aizen (1991) adds perceived behavioural control, which consists of self-efficacy and controllability. In his diffusion of innovations theory, Rogers (2003) stresses the importance of compatibility or to what extent an innovation is perceived as consistent with previous experiences and current beliefs and norms. Ohme (2014) identified perceived risk in his m-government acceptance research model. Lastly, Pieterson (2009) adds speed (contact speed and feedback speed), personalisation of services, level of interactivity, tangibility, and accountability to these characteristics.

When a task is perceived as rather complex or ambiguous, citizens prefer personal contact (e.g. telephone, front desk) and the Internet for more effortless tasks (Ebbers et al., 2007; Pieterson & van Dijk, 2007). Reddick (2005a) found that although citizens achieve their desired outcomes when using the telephone, they are not necessarily satisfied with this type of contact. These findings are in line with Media Richness Theory (Daft & Lengel, 1986) which states that some media are better

suited to transmit information based on the level of uncertainty and ambiguity. The type of task is also important, as citizens prefer to go online for collecting information, whereas they prefer the telephone or a front desk for solving problems (Reddick & Anthopoulous, 2014; Reddick & Turner, 2012).

Situational characteristics refer to constraints such as the availability of the channel, practical restrictions (e.g., time, distance), emotions when choosing a channel, efficiency (i.e., balance between effort and invested time), effectiveness (e.g., need for closure) and trust in government (Ebbers et al., 2007; Ebbers, Jansen, & van Deursen, 2016; Pieterson, 2009, 2010; Reddick, 2005b). According to the unified theory of acceptance and use of technology (Venkatesh et al., 2003), four elements can be added: performance expectancy, effort expectancy, social influence, and facilitating conditions. The first three determinants influence a user's behavioural intention, while facilitating conditions are directly linked to usage behaviour. They also identified four elements moderating the impact of these determinants: age, gender, experience, and voluntariness of use (Venkatesh et al., 2003).

Digital inequality mechanisms, such as material access, motivation, digital skills, diversity, and intensity of use might influence channel choice (Almuwil, Weerakkody, & El-Haddadeh, 2011; Helsper, 2012; Helsper & Reisdorf, 2013; van Dijk, 2006). These mechanisms were believed to have a major influence on the uptake of e-government services (van Dijk et al., 2007). However, they have a greater influence on the perceived satisfaction of citizens regarding e-services (Ebbers et al., 2016). Trust in digital media can also influence channel choice as a negative attitude towards Internet, and ICTs may lead to limited use of e/m-services (Helsper, 2012; Hung et al., 2013).

Channel choice and its role in spatial planning has not been deeply discussed. Most research focuses on the benefits and hindrances of both traditional and technological channels in spatial planning (Evans-Cowley & Hollander, 2010; Trapenberg Frick, 2016; Williamson & Ruming, 2017), but does not reveal which elements influence citizens' decision-making process when choosing a channel. This study, therefore, proposes a conceptual framework summarising the identified determinants based on our literature review (see Table 1). We will analyse which of these determinants indeed played a role in the decision-making process of our respondents. Note that this table does not highlight causal relationships as this is not the goal of the study.

4. Methods and Data Analysis

A qualitative research study was performed to identify (1) participants' channel choice determinants of channels used for spatial planning in Flanders, and (2) their opinion and perception towards digital communication in spatial planning. 10 focus groups were conducted with a total of 86 participants between 18 and 79 years old (mean of 46 years) of which 36% male, 64% female respondents. Considering the educational level, we reached both higher-educated as well as lower-educated citizens (see Figure 1).

Focus groups enable one to efficiently gather information of a group of people. The group aspect allows for rich interactions between the participants, as they can build further onto each other's answers and are encouraged to talk about matters that are evident and would otherwise not be mentioned. Contradictory responses can immediately be discussed (Stewart & Shamdasani, 1990).

Table 1. Conceptual framework of channel choice.

Personal characteristics
- socio-demographic elements

Channel characteristics
- perceived usefulness
- perceived ease of use
- perceived behavioural control
- compatibility
- perceived risk
- speed
- personalization of services
- level of interactivity
- tangibility
- accountability

Task characteristics
- complexity
- ambiguity
- type of task
- uncertainty

Situational characteristics
- availability
- practical constraints
- emotions
- social influence
- effectiveness
- trust in government
- facilitating conditions
- efficiency

Digital inequality mechanisms
- access
- skills
- motivation
- diversity of use
- intensity of use
- belief in digital

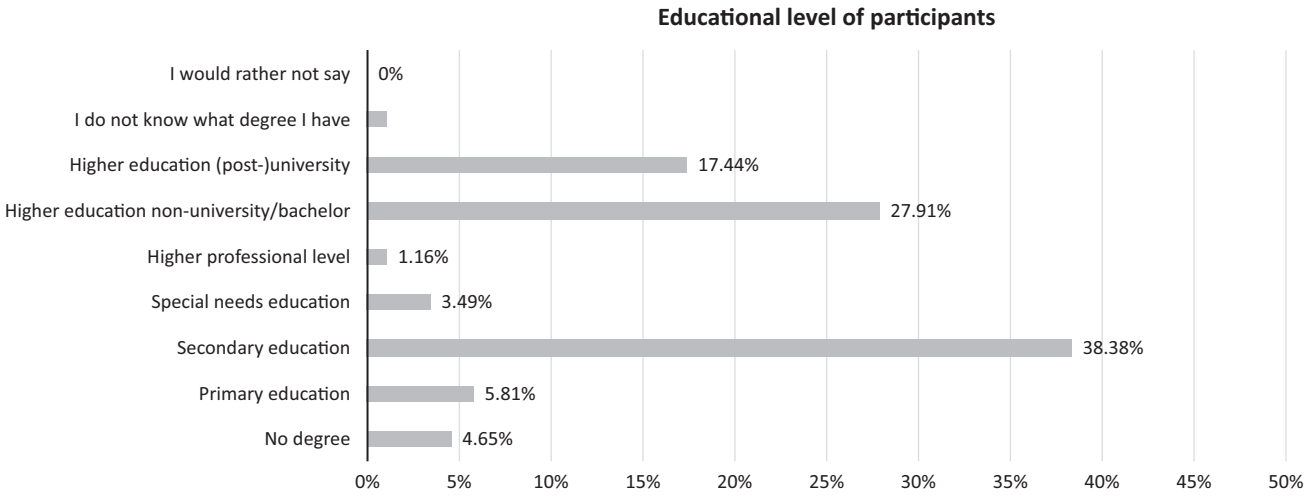

Figure 1. Educational level of participants.

A purposeful sampling was applied (Sandelowski, 1995). Recruitment criteria included a mixture of socio-demographic profiles and a diversity of media possession, usage, and skills in line with the 8 media profiles of Mariën and Baelden (2015). The focus groups were held at different socio-cultural organisations, including poverty organisations and universities. They were organised all over Flanders to avoid geographical sampling bias.

Every focus group lasted approximately two hours and a video and audio recording was made to process the data afterward. The focus groups were guided by a semi-structured topic list. We applied a grounded theory approach (Glaser & Strauss, 1967) for the data analysis. Participants also had to fill in a quantitative self-assessment test based on the 8 profiles of digital inequalities (Mariën & Baelden, 2015) to examine their exposure to digital inequality mechanisms and determine their media profile.

5. Results

This section outlines the main findings of the case study. First, we present an overview of the channel choice determinants for spatial planning, and then we examine how citizens perceive the move towards digital communication strategies.

5.1. Channel Choice Determinants for Spatial Planning in Flanders

Based on the results, the conceptual framework (see Table 2) was modified. Several determinants of the original framework were not mentioned and thus removed from the framework. Newly mentioned determinants were added in italics. In the next section, we will only concentrate on the (new) determinants mentioned by our participants.

5.1.1. Personal Characteristics

In literature, personal characteristics were seen as very decisive because they influence all other determinants. However, only *age* and *educational level* were mentioned in the focus groups. Some participants especially had trouble with digital channels because they felt too old to use them or lacked the necessary skills. Also, digitally literate participants expressed these concerns with regards to other individuals, such as their parents. This is partly due to the age bias people have with regard to digital media use. The idea that all youngsters are digital natives and elderly people do not master digital tools is still present today. The influence of one's educational level was seen as decisive because of the language complexity and legislative character of the specific content in spatial planning.

> "For the older generation, these things [digital media] are all new and very different, which makes it harder for them." (Female)

> "This is primarily [written] for intellectuals and professionals, not for Joe Public." [about the Belgian Official Gazette] (Female)

5.1.2. Channel Characteristics

According to the results, we can distinguish diverse channel characteristics, as some characteristics are more concentrated on the look and feel of the channels (i.e., design, professional level of the channel, accountability), while others refer to the presence of the channels (i.e., knowledge of existence, interconnectedness, cost), their usability and user-friendliness (i.e., perceived usefulness, perceived ease of use, tangibility), and the negative perception of our participants towards these channels (i.e., perceived risk).

Table 2. Modified conceptual framework of channel choice.

Personal characteristics	**Situational characteristics**
• socio-demographic elements	• availability
	• practical constraints
Channel characteristics	~~• emotions~~
• perceived usefulness	~~• social influence~~
• perceived ease of use	• effectiveness
~~• perceived behavioural control~~	• trust in government
~~• compatibility~~	~~• facilitating conditions~~
• perceived risk	~~• efficiency~~
~~• speed~~	
~~• personalization of services~~	**Digital inequality mechanisms**
~~• level of interactivity~~	• access
• tangibility	• skills
• accountability	• motivation
• *cost*	~~• diversity of use~~
• *professional level*	• intensity of use
• *knowledge of existence*	• belief in digital
• *design*	
	Information characteristics
Task characteristics	• *information quality*
~~• complexity~~	• *information quantity*
~~• ambiguity~~	• *comprehensibility*
~~• type of task~~	• *proximity level*
~~• uncertainty~~	• *governance level*

• Look and feel

The *design* (e.g., graphical elements, content and used materials) of the channels was heavily discussed and evaluated. Respondents particularly suggested improving the design of the Belgian Official Gazette, the poster, and the posts on social media by making the content more clear, readable (e.g., less text), and attractive (e.g., less legislation, more visuals).

> "There is so much on that poster that you cannot see the wood from the trees." (Female)

> "That font, Times New Roman [laughter]." (Female)

Second, participants believed the Belgian Official Gazette was more for professional use because of the language and content, so the channel was not popular among our respondents.

Lastly, they mentioned the differing *accountability* of the channels. Generally, a registered letter includes a clear sender and receiver and feels, therefore, more official and personal, definitely in contrast to an e-mail which is perceived as less reliable because of the many advertisements and digital newsletters. Some wanted to choose through which channel (i.e., post or e-mail) they received information themselves. We, therefore, recommend the option to unsubscribe from channels in spatial planning.

> "Getting information by post is definitely more official. E-mail, there you also receive a lot of advertising." (Male)

> "It's important that direct communication is personally addressed, with your name on it, so people feel more affected and perhaps feel the need to speak up." (Female)

• Presence

Many participants did not know certain channels existed (e.g., Belgian Official Gazette, poster, and Twitter). According to them, this can be solved by connecting these channels to a better-known channel (*interconnectedness*). The distinction between an information event (i.e., communicating the made decision) and a participatory meeting (i.e., giving ideas, suggestions) was also not clear, which might explain the frustration among participants that their voices are often not heard in "those meetings."

> "You might also want to link up to it sooner, nobody knows you can read it in the Belgian Official Gazette, so you need to put the Belgian Official Gazette itself in the picture." (Female)

They also indicated that some information on spatial planning can only be read after paying for the channel itself (i.e., newspaper advertisement) (*cost of the channel*). For some, newspapers provide little information, in gen-

eral, so they do not see the benefit of paying for it. Consequently, a newspaper advertisement on spatial planning might not be the best channel to communicate, as newspapers are not for free and not always perceived as interesting.

> "I think a newspaper is quite expensive for the amount of information that you can find in it." (Male)

• Usability and user-friendliness

Participants suggested the provision of search engines and the availability of filtering information via hashtags could improve the *perceived ease of use* of government websites for spatial planning. Such tools are strongly related to the type of information people are interested in. In the case of spatial planning, this is about the proximity towards their own region of interest (i.e., where they live, work, etc.).

> "Search engines are an added value for government websites." (Male)

> "But that you can really select this is my region, give me a notification if something happens within my region, or that you can filter according to your interests, for example, if environmental issues are of interest to you." (Female)

Participants disagreed on the *perceived usefulness* of social media and government websites especially. Since we reached both low-level and high-level users of digital technologies, this is not surprising. Advanced digital profiles believed social media and government websites would bring benefits regarding access to information (e.g., they would no longer have to go to the town hall to look into the plans), while low-level digital profiles are still confronted with lack of access, skills, etc. to efficiently use these channels. They perceive analogue channels as easier to use, partly due to their *tangibility* (i.e., having it on paper feels more official). This is, of course, not in line with the pursued digital approach by governments.

> "You should be able to access the plans of spatial planning online. There should be a database, so you can at least prepare yourself [for an information meeting] at home in front of your computer." (Female)

> "I would like to receive this type of information, preferably by post or municipal information sheet, so it is comfortable to read." (Female)

• Negative perception

Some participants expressed concerns about their privacy when using social media (*perceived risk*). If the Department wishes to further utilise social media, it needs to guarantee a safe and trusted environment where citizens can share ideas and thoughts.

> "I do have a lot of distrust about receiving things in a digital manner….Receiving information by post is a bit more official anyway." (Male)

> "I think social media is harmful to my privacy." (Female)

5.1.3. Task Characteristics

Task characteristics were not found to be important, probably because information on spatial planning in Flanders is mostly communicated from a top-down perspective, hence paying less attention to bottom-up approaches. However, our participants want to have a voice in this discussion and state that more bottom-up initiatives are needed. Apart from the information event and participatory meeting, the potential of social media in spatial planning in Flanders should be explored as it enables, when used in the right conditions, more diverse interaction and active participation.

5.1.4. Situational Characteristics

Our participants reported having doubts about the policies and the implementation of spatial planning in Flanders (*trust in government*) and consequently did not trust the *effectiveness* of particular channels (e.g., information event, participatory meeting). They questioned the relevance of participatory meetings, as they have the idea that everything is already planned and decided and, therefore, they have no real voice. As aforementioned, this might be because the distinction between an information event and a participatory meeting is vague.

> "I have not been to such a meeting yet, because it does not make sense. Everything has been done and decided already." [about the participatory meeting] (Female)

Respondents also questioned the *availability* of certain channels, as for example, not everyone had received the municipal information sheet with information on the planned works. Consequently, some participants were frustrated because they were not prepared to adapt to the adjustments due to these works (i.e., fewer parking spots, more detours). Another issue concerning the availability of channels is *practical constraints* (e.g. distance). This is especially true for the poster as it needs to be put up in the actual location where the works will take place, and not everyone passes through that area.

> "But if you do not pass by, you do not see it and you have to stop to read it too." [about the poster] (Female)

5.1.5. Digital Inequality Mechanisms

Some participants mentioned having no *access* to digital technologies and were therefore unable to engage with governments online. They stated being disappointed in the Department for communicating so much online and felt left behind.

> "I do not have any [digital] media because it does not interest me….So, I also do not have any of these at home: I do not have a smartphone, no iPhone, I had a laptop but I threw it away." (Male)

> "But what are they doing? I feel so bad that they [the Department] just assume everyone has a computer….Belgium has 3.7 million connections to the Internet, which corresponds roughly to 70% of the people with an Internet connection, but that also corresponds to 30% who do not have it and are left behind." (Male)

Some participants are just not *motivated* to use digital technologies and, therefore, prefer to receive information via analogue channels. Motivation can be influenced by the digital skill level of the participant, as the quote below illustrates. Governments must create a safe and trusted environment where those who have fewer digital skills and are less confident over their skills can also feel at ease.

> "The problem is that it goes in one ear and out the other. I cannot remember it and my interest is too low to make an effort for it." [computer use]. (Female)

Digital skills do not solely include technical skills, but also the ability to solve problems and to learn and think autonomously. Some participants lacked digital skills to use digital technologies in an efficient way and became frustrated. They proposed to install computers in the city hall where citizens can ask employees for help.

> "An email that I have received, I am sorry, but it is too technical for me and then to have a good deal of energy to read it on screen. I really need to read it on paper." (Female)

> "Or if you do not have a computer, you should be able to go to your city hall and that they explain where you can read the information [online] and that they explain to you how it works so you can find the information on your own." (Female)

Lastly, participants mentioned that the *intensity of their use of digital media and their belief in digital media* also influenced their decision-making process. By using digital media in an intensive way, you become more confident about your skills, which might (as aforementioned) improve your attitude towards digital media. The ones who mentioned to not believe in digital media were also those confronted with digital inequality mechanisms.

5.1.6. Information Characteristics

The transmitted information is rarely seen as a determinant, probably because people only see the information after they have already chosen a channel. However, we integrated them in our modified framework as information may influence citizens' second choice of a channel.

Information quality, *information quantity*, and *comprehensibility* are linked to each other as they refer to the amount and utility of the information. Comprehensibility was most mentioned. Providing a clear message in an understandable language is crucial. Nowadays, communication on spatial planning includes many concepts and legal notions citizens are not familiar with.

> "What does this mean? It doesn't give you any information, unless that you can further inform yourself. But first, who does that? And second, isn't it the intention of such a poster to inform people so they already know what will happen?" (Male)

When a planning project is nearby, citizens want to receive information via more personal and/or local channels because the information has a direct impact on them (*proximity level*). When the project is more general or further away, they do not expect to be personally informed.

> "If the streets are going to be changed on the other side of the city, I don't have to be personally informed. If I can just read it in the municipal information sheet, that is enough." (Female)

> "Local television for things happening in our city. But when they are going to build a football stadium, then, of course, national television." (Male)

However, most participants lean towards local channels in general, as they are often the most relevant for them compared to non-local government channels (*level of governance*). Information on spatial planning should, therefore, use both local and national channels, especially for social media as our participants reported preferring local social media channels.

> "I wouldn't follow the social media channels of the Department of Environment and Spatial Development because the information they provide is so wide-ranging." (Female)

5.2. Digital Communication by Default for Spatial Planning in Flanders?

In this section, we will describe how our participants perceived a digital-by-default strategy, and what conse-

quences this might have for communication channels of spatial planning. Based on the previous quotations, we can identify two camps in general.

The first camp emphasises the need for more digitised communication as it would significantly increase ease of use. They even proposed new tools for spatial planning, such as a mobile application that signals and informs you when you are physically close to a planning project, the ability to look into the plans of the works online, etc. These tools contribute to user-friendliness as they inform citizens at an earlier stage and wherever and whenever they want it. Today, the Department already uses digital technologies in its communication strategy, but it remains very top-down, allowing no real interactions between citizens and government. Nevertheless, our respondents mentioned that they want to participate and interact more.

The second camp expresses concerns over the continuing digital strategy of Flemish policy departments. This was expected because we reached both low-level and high-level users. However, not only digitally excluded citizens raised this concern, digitally included citizens were also concerned as they feared it would push more citizens into exclusion. A multi-channel approach, consisting of both offline and online channels, is recommended to reach as many citizens as possible.

Regardless of which channels are used in spatial planning, each channel must have the possibility to unsubscribe so citizens can choose how they want to receive information or contact the Department. They want to be able to customise the communication strategy of the Department. We also saw this need for customisation in the use of hashtags and filtering systems on government websites and social media.

6. Discussion and Conclusion

This study has provided insights regarding channel choice for spatial planning and whether citizens embrace the move towards digital by default. It adds to the limited existing research on channel choice for spatial planning by proposing a framework of channel choice and applying it to the field of spatial planning. We conducted 10 focus groups with 86 citizens, both low-level digital users and high-level users, and evaluated the current channels of spatial planning in order to come up with recommendations. Additionally, we gathered their opinion regarding digital communication for spatial planning and particularly focused on the impact of digital exclusion in this field, a research need indicated by Evans-Cowley and Hollander (2010).

The analysis on channel choice in spatial planning shows that the most well-known channels are the poster, the municipal information sheet, the information event, and the registered letter. Some channels are not known (e.g., Belgian Offical Gazette, Twitter, participatory meeting). These results confirm the research of van Dijk et al. (2007) on e-services in the Netherlands. They found that some citizens were unfamiliar with e-services and governments should raise more awareness of these channels. All well-known channels in our focus groups are analogue, so we recommend that the Department invests in the promotion of their channels, especially social media and the diverse websites, by advertising them (e.g., promote the use of social media in a bus shelter) and by connecting them to each other (e.g., for more information visit the website).

The most decisive channel choice determinants are related to the channel itself and the given information. The look and feel, the presence, the user-friendliness, and the perceived negative image of channels were mentioned as decisive. The Department should take these determinants into account in future communication strategies in order to deal with negative perceptions of citizens. Regarding information, the message needs to be clear and self-explanatory so citizens no longer have questions. The message is best communicated via local channels of spatial planning as most of the respondents opt for local channels regardless of the level of governance of the communicated message. By doing so, a widespread distribution of the message can be ensured. In case of a close connection with the goal of the message (e.g., when works will occur in their street), information is preferably received via more personal channels (e.g., registered letter, municipal information sheet). This confirms the work of Reddick (2005a), who argues that citizens opt for contact by phone when the public institution is closer to the local level.

Situational determinants were also found to be important, especially trust in government and the effectiveness of the channels. In order to deal with the disappointment of citizens, they should be informed about their role as a citizen in the debate and within which limits they can participate in order to manage their expectations (transparency). New modes for participation via digital technologies (e.g., applications, social media) can be researched by the Department as it would enable citizens to no longer be physically present in a participatory meeting or in the city hall. However, they need to be implemented under the right conditions (e.g., enable interaction, competent staff, etc.) (Evans-Cowley & Hollander, 2010; Trapenberg Frick, 2016; Williamson & Ruming, 2017; Wilson, Tewdwr-Jones, & Comber, 2017). Perhaps the most important aspect is to really engage with citizens via these technologies, as it would otherwise create more frustration and negative discussions (Schweitzer, 2014; Williamson & Parolin, 2013; Williamson & Ruming, 2017; Wilson et al., 2017). The Department should evaluate how they (would) use their existing and future channels to see if their strategy is in line with the specific features of these channels. A match between the type of communication and the type of channel must be made.

Though digital inequality mechanisms were mentioned less in the focus groups, their influence should not be underestimated. A digital-by-default strategy is problematic, as having access to digital technologies is

the main requirement for the use of e-services (Ebbers et al., 2007). Some of our participants were unable to use e-services of spatial planning because they lacked the means to go online. However, as mentioned by our respondents, other issues also come into play, such as skills, motivations, use, and desires. These issues are assumed to have a major impact on the perceived satisfaction of e-services (Ebbers et al., 2016). To promote the use of e-services in spatial planning, the Department should limit problems of access, skills, motivation, etc. by investing in computer access in the city hall and providing assistance for those in need. Another recommendation is to collaborate with e-inclusion intermediaries and set up low-level and bottom-up programmes that support citizens in their use of e-government services and strengthen their confidence and autonomy of use.

The question related to the perception of citizens towards digital communication in spatial planning made it clear that most citizens were positive about it, while others were definitely not. The Department should further improve existing digital channels and explore new ways of interacting with citizens online, while also investing in analogue channels to ensure no citizen is left out of the conversation as they too are entitled to public information. This multi-channel approach might be a solution to deal with digital inequalities (Kleinhans et al., 2015; Wilson et al., 2017). We acknowledge this, but add that the multi-channel approach of the Department may not be seen as an extra element and should be part of their wider communication strategy.

Since our research is a case study, further work should be carried out to see if our findings on channel choice are also applicable to other public authorities. Additionally, they should also consider the role of income, race, and ethnicity, as this was now lacking in our study. As our study was limited to the existing channels in spatial planning and given the focus on the use of digital technologies in spatial planning, further projects can explore channel choice of e-services and map user requirements in order to improve existing and future digital channels.

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Conflict of Interests

The authors declare no conflict of interests.

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Article

In Waze We Trust: Algorithmic Governance of the Public Sphere

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Abstract
This article explores the current 'place' of e-government in realizing public value in the context of what seems to be an emerging platform urbanism. It highlights a complex platform-based urban ecosystem encompassing private and public organisations and citizens. This 'mainstreaming' of e-government practices puts demands on cities and governments to reconsider their own role in 'city making' so as to achieve meaningful public oversight. The point of departure is the operationalization of this 'place' by conceptualizing participation and (multi-sided) platformisation as a framework to draw attention to the dynamic domain of e-governance where shifts can be seen in market structures, infrastructures, and changing forms of governance, and which may challenge the public interest. This is illustrated by an exploration of the social traffic and navigation application Waze.

Keywords
e-governance; participation; platforms; public value; social navigation application; smart city; Waze

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1. Introduction

With the omnipresence of pervasive and always-on (mobile) computing technologies and absence of ethernet cables and dial-up modems, 'the Internet is everywhere, all the time.' Since people no longer need to consciously connect to the Internet (until it breaks down), the idea of the Internet as an infrastructure has receded into the background of everyday life (Driscoll, 2016). 'The Internet' has been overhauled by other terms and metaphors, such as convergence (Jenkins, 2006) and cloud (Hu, 2016), and now something called 'the platform' has taken centre stage. In conveying an ideological imaginary associated with the reconfiguration of production, consumption, distribution and monetization of cultural goods and services (Nieborg & Poell, 2018), the platform is currently a powerful metaphor for the way contemporary society organizes and understands itself. Understanding the dynamics and influence of platforms over the public sphere—particularly, with a recent focus to 'smarten up' our cities—has become an important task, warranting an investigation into what role platforms and closely connected terms such as algorithms and artificial intelligence truly play (Komninos & Mora, 2018; cf. Finn, 2017). Sensors, cameras, smartphones, and so forth operate in a platform-based ecosystem and can reveal, map, monitor, and process huge volumes of data which, if shared, allow all kinds of stakeholders including citizens, to rethink the action modalities, the interventions, and the very policies of many subjects in our everyday life (cf. Bernardi, 2015). Moreover, as platforms develop and algorithms increase in power and complexity—in their various manifestations deeply embedded into the systems and infrastructures that underpin the built environment and governance dynamics—, new service models, new forms of reciprocity and public management are emerging to tap value from these growing assets. While some hail these developments, others point to the possible risks and detrimental effects for individuals and for society at large. In particular, as many of our everyday activities are increasingly becoming automated, delegation of decision-making and governance to mere algorithmic

engines of smart city infrastructures is not clear-cut. It involves the risk of losing sight of critical attention to social and environmental processes including public values and sustainability efforts (Caplan & boyd, 2016; Gillespie, 2018; Overton, 2017; van Dijck, Poell, & de Waal, 2016; Zambonelli, Salim, Loke, De Meuter, & Kanhere, 2018). In addition, automated processes and supporting platforms tend not to be stand-alone but are laboriously connected (and ever-expanding) with other platforms, by way of facilitating access to portal sites via social network logins, or creating tailored advertisements from one site to the next, or using recommendation systems via digital data footprints.

Information and communication technologies (ICT) and services can thus be seen to elevate and facilitate how cities, in general and in the public sphere, in particular, are understood and planned, the way urban services and utilities are managed, and how we experience and live our urban lives (Mattern, 2017). By and large, cities seem to play catch-up, learning how to navigate, process, manage and negotiate the real-time (big) data flows and disruptive business models stemming from new digital infrastructure and services as major drivers of urban change (or, platform capitalism; Srnicek, 2017) by, in the West, platform companies Google, Apple, Facebook, Amazon and Microsoft as well as 'variants' such as Uber and Airbnb. Today, this significance of platforms (and data) in our everyday communication, social, and economic life fuels many questions such as Who owns platforms with what implications? Who generates data collected via platforms? Is a platform public or private? How do different and diverse actors get access to platforms? How are platforms protected and regulated? These and other questions, guided by conceptualizing terms like algorithmic accountability, augmented civic space, and platformisation, reflect an important focal point for academics in developing critical accounts of the every-increasing role of ICT in our society. Particularly, communication and media scholars can be seen to focus on the contemporary position of platforms and how platforms are implicated in the structures that shape everyday life and cities as a whole. In doing so, they seek to produce insights into the ways cities growingly rely upon and push back against platform-based communication and practices characterized by market and nonmarket relations as well as a so-called 'platform dependency' (cf. Nieborg & Poell, 2018). The idea of a private, commercial public sphere may not be new, yet what seems to be at stake is a meaningful public oversight over the coevolution of social (community/public) and business (commerce/private) developments, operations and implications for cities in the realm of platforms (cf. Van Couvering, 2017). The definite blurring of commercial, government as well as citizen interests seems to be indicative of the way public space is 'translated' into 'code', and how 'code' is seen to 'reshape' the public sphere, thereby alluding to a kind of 'platform urbanism' that increasingly underpins what it means to live in cities (Kitchin & Dodge, 2011; van der Graaf & Ballon, 2018). In fact, nowadays, many cities across the globe can be seen to expand their efforts to improve their cities by becoming 'more digitalized', 'more intelligent', and 'smarter', associated with the smarter government movements. The current shifting of the conceptual and technological status quo warrants an investigation into the role of e-government vis-à-vis this smart city imaginary which, in turn, draws attention to public value. The reason for this is that, 'the work' of e-governance has always tended to be somewhat problematic and now, in this set-up, understood as primarily a government-led initiative is even more at risk as arguably city governments seem to be losing control of their capability to 'design their city'. Thus, the objective here is to discuss the need for a more holistic approach that calls for a framework to evaluate the effective 'smartness' of e-governance initiatives in an increasingly complex multi-stakeholder platform-based urban ecosystem (cf. Castelnovo, Misuraca, & Savoldelli, 2016).

More specifically, over the past twenty years, the management of government and governance practices, through the use of ICT, have rendered government more accessible to citizens and facilitate interlinking between citizens, civil society and market players, and government institutions. The objective of e-government lies herein to maximize the benefits for all stakeholders (United Nations, 2014). While the adoption, scope and advancement of e-government technologies have expanded widely, the outcomes tend to be directed at the achievement of efficiency and service effectiveness benefits (such as cost cutting and optimizing internal organization) rather than public service delivery. Actually, studies point to an overall minimal impact of e-government on public value (Rose, Persson, & Heeager, 2015), as well as a robust understanding of the factors that government agencies put forward towards the delivery of public value vis-à-vis user reception and engagement (Meijer & Bekkers, 2015). Furthermore, the conceptualization of public value is somewhat contested and cannot be easily distilled from the literature, however, the term seems to be deployed as an assessment tool for the performance of public services, involves co-creation between multiple stakeholders, such as governments and user communities, and it necessitates an increase in services that enrich democratic, public values (Bryant, 2007; Nugent, 2001; Rawahi, Coombs, & Doherty, 2016). In this view, a call for a future-orientated perspective can be heard, putting the urge of sustainability forward (Larsson & Grönlund, 2016).

The discourse on smart cities, however, has been having a tendency to focus on rankings of technological capability, paying insufficient attention to alternative, minority and informal, or even more 'human' views. The aim of designing for smart cities is thus to connect between the conceptual, physical, and technological status quo. And this is exactly where the challenge lies. The predominant provider's perspective has tended to impose

a rather narrow (top-down and techno-centric) view of 'what' and 'who' the city is for, and is at the heart of power struggles. And now with the interest in and uptake of a seeming 'platform urbanism' it is time to look at the intersection of e-governance objectives, public value and smart city service designs and ask Whose version is it? In order to establish public oversight attention needs to shift to the platform arrangements so that, at a minimum, governments get a clear understanding of the 'black box' that platform(-ecosystem) innovation entails and may impact on broad public interest goals (Mansell, 2016), so cities can make better informed decisions to see what their 'place' is in it. In other words, there is a need to understand the 'reconfiguration' of cities as a multi-stakeholder place through ICT (or, platforms); both in terms of the city's governance and representation, on the one hand, and its mediated production, consumption and experience, on the other hand (cf. Georgiou, 2010).

This article explores, against this backdrop, the current 'place' of e-government in realizing public value in the context of what seems to be an emerging 'platform urbanism.' It highlights a complex platform-based ecosystem encompassing private and public organisations and citizens. This 'mainstreaming' of e-government practices via platform services demands cities and governments to reconsider their own role in 'city making' so as to achieve meaningful public oversight and anticipate and mitigate (un)intended consequences in the long-run. The point of departure is then the operationalization of this 'place' by conceptualizing participation and (multi-sided) platformisation as a framework to draw attention to the dynamic domain of e-governance where shifts can be seen in market structures, infrastructures, and changing forms of governance, and which may challenge the public interest. This is further illustrated by an exploration of the systemic features of (social) traffic and navigation application Waze[1]. Some concluding remarks stressing the need for further insights to develop an effective assessment approach are offered in the last section.

2. Emerging Spaces of E-Governance

With persistent developments in ICT as well as a preoccupation with 'smart cities', the interest in e-governance is thriving (Rawahi et al., 2016). The term is used for the management of government and governance practices through the use of ICT and is aimed at making government more accessible to citizens and other stakeholders. In addition, by its material infrastructure it also contributes to the promise in support of the democratic process, such as in terms of allowing for a more participatory means for citizen engagement and consultation, pointing to a move from adoption to adaptation (Bryant, 2007; cf. Habermas, 1991). Conceptions of e-governance tend to understand technological systems and tools as the enablers of a new type of governance that are said to make government more efficient as well as more democratic (and which may lead to a kind of e-democracy)—often described in terms of 'complementary', or in a stronger outlook, 'evolutionary' (Fisher, 2012). The latter has been found to encompass four stages, that is, 'digitization' (where the governmental agency implements and experiments with the technology), 'transformation' (the technology is deployed for re-engineering and streamlining internal processes), 'engagement' (focus on expansion so as to communicate and engage with external stakeholders), and 'customization' (customization of services vis-à-vis the needs of specific communities, citizens, and so forth) (Janowski, 2015, 2016). While a shift in focus can be detected in the literature on e-government, from a 'technological-operational' orientation, to a 'managerial-organizational' orientation, and today a 'political-institutional' orientation (where some emphasis can be distilled on transparency and open government) (Savoldelli, Codagnone, & Misuraca, 2014). It is in this perspective, where digital public services have the potential to actively engage with citizens and cater to their specific needs, that e-government is said to have the opportunity to serve as an explicit mechanism to underpin the delivery of public value (Rawahi et al., 2016). Such discourse seems to presume that e-governance is in essence a government-led initiative, instigated by the necessity to keep pace with digital developments and to improve governance practices and services. However, this obscures the conflation of technology and politics that seems to be merely legitimizing shifts in the balance of power between states and markets, arguably, masking its discursive and practical configuration that underpins the structural transformations toward neoliberal democracy (Fisher, 2012).

Moreover, in today's context, particularly in urban settings like smart cities, attention is also drawn to terms such as 'algorithmic governance' (Coletta & Kitchin, 2017; Danaher et al., 2017), 'artificial intelligence governance' (Gasser & Almeida, 2017), 'Internet of Things governance' (Almeida, Doneda, & Monteiro, 2018), and 'smart city governance' (Castelnovo et al., 2016). What these terms have in common is that they are deployed to point to the specificities and complexities of certain ICT and governance issues involved. Generally they tend to refer to the underpinning hard- and software, and for which, more commonly the buzzword 'platform' is used to point to a complex configuration of stakeholders and played out, here, in the city.[2] More specifically, the term platform is often used to carry out discursive work, for example, for so-called platform companies like Google to ambiguously describe their role in the market as well as their services towards users and other

[1] See https://www.waze.com

[2] Platforms are, arguably, central to the so-called content or media infrastructure of the Internet and is emerging as the distinctive new media industrial form of the digital era. In addition, platforms are said to undergo a process of mediatisation in generating meta-information about the platform as a key part of their (platform) business strategy suggesting that 'non-media' platform organisations start to take after media businesses (Nieborg & Poell, 2018; Van Couvering, 2017).

stakeholders cutting across sectors, genres and so forth (Gillespie, 2010; Srnicek, 2017). Many definitions can be detected highlighting the term's various connotations (Evans, Hagiu, & Schmalensee, 2006; Helmond, 2015; Sun, Gregor, & Keating, 2016; van Dijck, 2013). A focus on medium-specificity can be detected in understanding a digital platform as "a reconfigurable base of compatible components on which firms and users build applications. Applications share the general purpose components, thereby exploiting increasing returns at an industry wide level" (Bresnahan & Greenstein, 2014, p. 475). Such a definition highlights that sites can be modified or programmed by 3rd parties or other stakeholders, such as through software interfaces. It ignores however the way platform companies may render social computing and with what implications for citizens (Mansell, 2016). Put aptly by Gillespie platforms are:

> Sites and services that host public expression, store it on and serve it up from the cloud, organize access to it through search and recommendation, or install it onto mobile devices….What unites them all is their central offer: to host and organize user content for public circulation, without having produced or commissioned it. They don't make the content, but they make important choices about that content: what they will distribute and to whom, how they will connect users and broker their interactions, and what they will refuse. (2010, p. 1)

This understanding corresponds somewhat to what is associated with the term 'multi-sided markets' in the economics and management literature, and where a platform is seen as an enabler of interactions between two or more distinct parties (Rochet & Tirole, 2003). In this view, users and intermediaries like advertisers are, for example, brought together by Facebook, and can so benefit from network effects (Hagiu, 2014). Platforms thus tend to be understood as 'platforms as markets' or 'platforms as modular technological architectures' (Gawer, 2014).

In this stream of thought, a multifaceted dynamic becomes apparent encapsulating all agents, both private and public, involved in the (e-governance) ecosystem, as 'participants' which is closely linked to what has been termed the Web 2.0 Internet economy and its 'participatory turn' in digital development practices (O'Reilly, 2005). It denotes the convergence of production, distribution, and consumption practices and a combination of creativity, collaboration, sharing-enabled digital technologies related with knowledge-intensive and information-rich user-created content activities (van der Graaf, 2018). Participation has then become an important term in developing a framework to understand how the changing media and communication environment enables or hinders participation in society, in reshaping the 'opportunity structures' by which people can participate in an increasingly mediatized society (Cammaerts, 2012; Livingstone, 2013). Facilitated by accessible and easy-to-use tools for content production and distribution, user participation has since been emerging as a creative infrastructure, where users—though not all, and not equally—actively engage in shaping, altering, and sharing digital content (or, data) and attracting their own publics across complex platforms hosted by digital firms like Instagram that cannot exist without it (van der Graaf & Ballon, 2018). The processes of participation (and, more widely, of democracy) are thus increasingly shaped by modern digital networked media. Moreover, practices that emerge are said to render cultural production and cultural commodities 'contingent', that is, 'dependent on' a select group of powerful platforms. This further implies that in using platforms, such as Google or Facebook, people trust their personal data to these platform companies. A practice that increasingly also has been taken up by the state or city administrations, such as via city-developed applications and open data and citizen science initiatives to participate in (for example, measuring air quality locally or marking what needs to be fixed or cleaned up in your street), and deployed for social, economic, environmental or political governance purposes (Brown & Marsden, 2013; van der Graaf & Veeckman, 2014; Zittrain, 2008). Furthermore, these platform-based products and services are also 'contingent' in that they are modular and malleable facilitating a perpetual stream of input, output, revisions, and recirculation practices, which is no longer bounded by private or public or third sector institutional boundaries. This means that processes at work are indicative of a blending together of dynamics of community and commerce underpinned by trajectories of what increasingly seems to be termed 'platformisation.' Here, the platform is the dominant infrastructural and economic model with centrifugal powers (Helmond, 2015; Nieborg & Poell, 2018), thereby also introducing all actors involved to new options and challenges that in their turn may impact these trajectories as they materialize (cf. Srnicek, 2017).

Today, while increasingly attention is being directed to this development (in various disciplines, such as business and software studies) insufficient systematic insights are available in its mechanisms and the consequent becoming contingent of cultural, governmental commodities and so forth, fundamentally affecting the operations of e-governance practices and services, and, hence, the smart city imaginary. The idea of participation is not new in this context, but engaging with users is thus an important focal point for private, public and third sector organisations and the 'platform' has become a common type of online organizational form to do so. It highlights the need for multi-sided-based structures to determine the right balance between control and openness, supported by considerable technical infrastructure (van der Graaf & Ballon, 2018). In this, the role of public institutions and the government has become multifold, namely as user, developer and regulator of platforms, and consequently, demands public scrutiny. What are the trade-offs of investing public money in a com-

mercial platform or application where data of citizens will be collected and stored? And what if that platform company is a global company? What are the platform arrangements with other intermediaries? How transparent are these? Can platform operators exercise direct control over content? Can they shape citizen's (online) experience in ways that are consistent with optimising their revenues or is that inconsistent with fostering the public interest, such as for example in terms of media plurality? Indeed, a platform urbanism can be seen to emerge which puts the issue of public value forward. Again, the interest in examining public value is not new in the wider context of public administration (Rutgers, 2014). Also, a robust definition of the term or a construct cannot be easily distilled from the literature. However, important elements are aptly captured by "maximising the utility of government to civil society by providing services directed towards the public good" (Rose et al., 2014, p. 540). The operationalization of public value by means of decision-making processes stresses accountability among stakeholders throughout, underpinned by questions of legitimization, political acceptability, feasibility and valuable public outcomes (Moore, 2014; Williams & Shearer, 2011). In the context of the increasing (private) platform(ised)-supported digital services the delivery of a balanced portfolio of benefits and perceived as such by all stakeholders needs to be sought after, whereby the value of the service-enabling objective should be assessed in terms of the quality of 'public service' and the extent of 'citizen-centricity' (Rose et al., 2014). Studies have shown, however, that "whilst citizens may desire [public value] to be delivered through their digitized services, in practice, the effects of e-government initiatives are rather different" and, as a result, more research is needed "of electronic government-enabled [public value] realization, to better understand the relationship between technology, stakeholders and organisational structures" as well as that of co-creation dynamics of public value among governments and user communities (Rawahi et al., 2016, pp. 4–5). In particular, the latter effort also draws attention to the future orientation perspective of e-governance. More specifically, it highlights an emerging interest in the sustainability concept as a response to the current public practice so to optimize "a process of continuously managing conflicts between different values", thereby making constant trade-offs between social, economic, environmental and technical aspects (Larsson & Grönlund, 2016, p. 106).

In order to reveal better the rapidly increasing complexity that e-government services and practices are facing in smart cities, particularly in terms of growing numbers of multiple stakeholders and perpetual platform-dependency, the next section explores such manifestations on the basis of the social navigation application Waze (Alphabeth Inc./Google). The findings illustrate systemic features of possible platform-based e-governance solutions that need to be carefully examined by academics and regulators so as to not (un/intentionally) counter public value and versions of smart cities design by lack of public oversight and an effective assessment framework.

3. Waze. Outsmarting Traffic, Together

In order to explore the current dynamics in e-governance practices materializing between 'commerce and community' associated with an emerging platform urbanism, a single case study approach was selected (Yin, 2003). This exploratory study therefore does not represent a 'sample' but aims to be generalizable to the theoretical propositions. The focus is on the popular social navigation application Waze that caters to several stakeholder groups and plays out on the actual streets of cities (and beyond). The preliminary findings presented within the confines of this study, are part of a larger study on smart mobility in Belgium (van der Graaf & Ballon, 2018). Here, the narrative is based on document and content analysis of the website of Waze Belgium/Benelux community and its roughly 50.000 users[3] (Bryman, 2012). What follows first is a short overview of the ins and outs of Waze as well as its systemic features. The aim is thus not to offer an understanding of its success or, for example, how the Waze interface enables participation, or establishes new driving experiences (van der Graaf & Ballon, 2018). Rather, the scope is to reveal the complex multi-stakeholder ecosystem of a firm-hosted and platform-based social navigation service that impacts the public sphere, thereby highlighting the interest and challenges for cities and e-governance practices.

In 2006 Waze Mobile Limited released a free open source mapping project called "Freemap Israel", which in 2008 transited into the for-profit company Waze, and in 2013 was bought by Alphabeth Inc. (Google). Today, Waze is purposefully designed navigation software for smartphones and GPS-based tablets which facilitates various stakeholder groups to engage and participate (at different stages and in different capacities) in information-based development practices impacting wayfinding. As its main features, the application offers turn-by-turn (voice) navigation information, real-time and location-specific traffic as well as user-generated map data, travel times and route details. As a result, it can provide so-called 'Wazers' (drivers) with the fastest real-time route. Waze also facilitates and encourages Wazers to participate in practices such as reporting accidents, speed and police traps, and the more vested ones can get involved in practices such as editing maps. In this view, criticisms such as from police departments can be detected too, challenging somewhat precarious government relations. Furthermore, the application can be used to connect to other services like Facebook. It has also expanded its services to, among others, carpooling, media partnerships (e.g., traffic reporting), and a data exchange program with cities ('Connected Citizens Program'). In prin-

[3] For more specific stats per city see:: https: //wazebelgium.be/stat/high.php

ciple, Waze can be deployed anywhere but requires sufficient initial users to generate (and update) the maps to make it functional. Presently, 13 countries have a full base map and many more cope with incomplete maps, actively inviting users to participate in recording roads and so forth. Currently, Waze counts about 100 million users worldwide and is available in 50+ languages, supporting so one of the biggest 'community-based' traffic and navigation application. Its network effect (the more people/data, the better the accuracy of information returns), the fact that it is free of charge, and many participatory and gamified elements may hint to its success (Ramos, 2016). The latter can be seen in, for example, the use of an avatar-based profile: driving, reporting, editing the map will earn users different amounts of points moving up from a 'Baby' avatar to eventually 'Royalty'. The app interface itself shows a virtual map of one's immediate surroundings and shows the location of nearby Wazers allowing for a spatial, temporal and social feel of one's position. Furthermore, the app consists of several features that elaborate one's (personal) information, current location, input for directions, a friend finder and a 'report' menu to give in accidents, traffic jams, police nearby, speed cameras, road hazards, fuel prices, map issues, road hazards, and a social mechanism to take and post pictures of places and chat with other Wazers.

Waze subscribes to the 'participatory turn' with slogans like "Nothing can beat real people working together" and "Partner with Waze". It draws various user groups associated with different modes of engagement, varying from a basic user to a more advanced one (such as developer) to partnerships, facilitated by designated tools. More specifically, Waze discerns between 'Drivers' which are passive users (use app for navigation purposes only, yet their data such as 'speed' is collected); 'Reporters' are more active and contribute input, such as accidents; 'Editors' are the more advanced users and participate in map editing practices (herein 6 editor ranks exist as well and operate like a 'community of practice' supported by an apprentice system (Berdou, 2011). What is the value or benefits that can be distilled among its users? The findings suggest that the main benefit is not navigation from A to B per se but rather lies in its capability to avoid traffic by offering alternative ways, that are often unfamiliar to the user. Not everyone likes this "sight-seeing" element but the app does seem to contribute in this way to emergent forms of spatial awareness and may set new habits and patterns for mobility (cf. van der Graaf & Ballon, 2018). Moreover, increasingly complaints (also to their city governments) can be heard from people living in residential streets were suddenly a rat race during rush hour can be detected. In addition, for Editors, benefits can be detected, such as aspects of 'enjoyment', 'peer recognition,' 'career advancement'—summed up by a Belgium country manager by "if you get involved enough, the opportunity to help shape the future of Waze." Secondary order benefits include value stemming from among others shorter transit times, lower gas consumption, playful interface, and its social features (Hind & Gekker, 2014). The sociability element is mainly reported on by way of seeing others on the interface, rendering an explicit reminder of participation in a collective of drivers which may challenge existing driving theories that tend to focus on anonymity and individuality of the driving experience (Ramirez, 2016). Glitches sometimes show users nearby when in reality there is nobody around which "puts the gamified aspect upfront" and may downplay Waze's real-time data selling-point and overall trust.

The 'work' of Waze is played out on (mostly) public roads, and, hence, cities—that have willingness to innovate and the technical capabilities necessary to share data—represent an important side of Waze's multi-sided market model for which Waze developed a city-facing partnership program, operational from 2014, called Connected Citizens Program. It is advertised as "the Waze Way of free data exchange, yielding actionable insights and improved mobility on a local and global scale" for public institutions world-wide to "take part in the smart solution" on its firm-hosted platform. Furthermore, the term "proof" is deployed to boldly claim that Waze already holds the answer to some mobility challenges by stressing that their platform in this way can expand "from a data-sharing initiative with Waze to a knowledge-sharing platform where they can apply learnings from across the world to their local communities." In stressing the promise of creating shared value in 'private and public (and people) partnership' without financial costs, the partnerships are two-way exchanges of information: at minimum, Waze shares data about traffic jams (collected from drivers) and user-reported traffic issues and partnering governments share information about road closures and other incidents, so helping to optimize route options for drivers. In particular, the CCP program—encompassing around 600 partners—draws on data exchanges between city, state and national governments (such as departments of transportation and mobility, police departments) non-profits and first responders. For example, the city of Ghent (Belgium), for its 'Ghent's Circulation Plan', partnered up to reduce traffic, make the city safer, and improve air quality by 'reshaping' the centre by changing and adding 2,000 road signs (Tilto, 2017; Waze, 2017). The city has reported a 30% reduction in accidents, 27% more cyclists, and a 15% increase in people taking a bus or tram. Note that other companies like TomTom were also contacted to make subsequent changes, as a result. An important benefit for cities to partner up is saving costs and efficiency as it offers a means, for example, to freely expand its view of its roads and streets, but also to come to better insights into, for example, particular congested areas to facilitate "smarter urban planning", yet concerns are raised too, such as about the degrees of anonymity as social navigation tools 'turn' their user base into a "network of sensors". For Waze it is an important way to grow and improve its services and facilitates more accurate inputs to

complex traffic algorithms, and, city-provided data may help them to stay ahead of crowd-sourced data. More services can also be developed using this information, such as specific routes on trash collection days. In fact, and this goes for all platform companies, the competition to engage and retain users is fierce, partnering up with cities is therefore also an important means to expand and sustain its market penetration. Moreover, as the market for wayfinding and ride-sharing (and pending self-driving cars) is still taking flight, for now, the competitive advantage can be mostly found in the volume and accuracy of traffic data, street data, and so forth. This is facilitated by Waze's set data standards so as to minimize data fragmentation and to better aggregate transport and government data.

4. Conclusion: A Dialogue of Values

From the exploratory analysis, a complex ecosystem is surfacing where different commercial, public and communal modalities intersect and interact driven by and impacting on different agendas and values. The argument is that the urban public sphere via a social wayfinding application is becoming more 'platformised' as more sides are introduced to the public sphere of streets as market, especially in the form of the abstraction of data/information production from data/information distribution. Also, the platform has become more 'mediatised' as not only it increasingly stores a layer of meta-information about users and content for resale such as to advertisers, but also it allows for in/direct social interactions via its participatory features. Lastly, a competitive logic to draw in and ensure a critical mass of stakeholders (drivers but also cities) can be distilled not only for the application to become more useful for immediate users (network effect) but also to build up information about the user base to sell on to others. The algorithms at work in this ecosystem operate then to, at minimum, search, display, track and trace, to match and sort (cf. Van Couvering, 2017). As the commercial and global developer firm (and now owned by Google), Waze puts—at minimum—pressing issues of (algorithmically-based) control and transparency, or lack thereof, forward raising some rather crucial questions touching upon the very essence of e-governance and the public value promise. A promise that, based on existing literature on the impact of e-government on public value, is not a given, and especially not in a smart city context where the focus has been, thus far, more technocratic than humane (Almeida et al., 2018; Rose et al., 2015).

Critical discussion is called for about who decides which problems merit to partner with global platform companies? How is public spending allocated in this? What are the trade-offs of data wants/needs and how are they exchanged vis-à-vis the corporate and public agendas? What are the objectives of cities in their data aspirations? How to circumvent platform companies or other corporate power to capture the multi-stakeholder trajectory and process? What role to take on, that of performing an operator or an orchestrator role? Or, what is the (power) trajectory of 'platform as governance' vis-à-vis 'government as platform'? How to move from vertical segment thinking to new points of control? Derivative questions are raised too, such as about the future of governmental structures of driving control. Furthermore, the trajectory of platform dependency in this multi-stakeholder and multi-sided market context alludes to government practices and behaviour becoming co-dependent on actors 'elsewhere', where markets and associated e-government products and services connote multiplying, opaqueness and perpetual embeddedness of markets (cf. 'stacking' in Vonderau, 2017). Silo measures of market power or excluding intermediary platform companies from public interest regulation seems no longer a preferred way forward. Achieving these goals demands a balance, but the platform companies are not neutral gatekeepers and also will not become so as a consequence of market dynamics (Mansell, 2016). Economic calculus and citizen use indicators should not be the motivators for a normative consideration of the need for establishing effective smart e-governance services and a vibrant public sphere that is compatible with democratic practice. Thus, these and other tough questions remain if we want to build cities that are truly smart and humane provisioned perhaps as a public good, supporting public values like participation, trust, privacy, inclusivity and diversity.

A critical investigation is thus warranted into, especially, algorithmic regulation and governance structures between the urban and 'platforms' in the context of what is, arguably, considered to be a weakness in understanding today's smart cities framework. That is, how public value can be realized and sustained under the current 'mainstreaming e-government's condition', thereby highlighting and reconsidering seeming dynamic roles and ownerships in 'city making'—to determine whose version it is. The trend of platform-based e-governance solutions, associated with platform urbanism, is thus another black box, and highlights massive information asymmetries between, most notably, the developers of such systems, cities, citizens and policymakers. When considering future e-governance models for platform-based urban ecosystems, it is helpful and necessary to consider some structural challenges associated with the 'regulation' of platforms and which may result in an effective assessment framework for smart cities (cf. Gasser & Almeida, 2017; Rawahi et al., 2016). Attention therefore needs to shift to platform arrangements and creating an evidence base, allowing the focus the move to new control points.

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Conflict of Interests

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Article

Delivering Smart Governance in a Future City: The Case of Glasgow

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Abstract
In 2013, Glasgow City Council received significant funding to develop innovative smart city applications, including the delivery of new electronic public services and the co-production of governance. This case study examines the processes that underpin the ways in which the 'Future City Glasgow programme' delivered 'smart governance', in the context of a regenerating post-industrial city. We assess the contribution of smart city technologies and data collection and monitoring processes designed to facilitate citizen engagement and sustainable governance practices. The Future City Glasgow programme ran from 2013–2015, and included the Open Glasgow project, and 'Demonstrator Projects' of: Energy Efficiency; Intelligent Street Lighting; Active Travel; and, Integrated Social Transport. Opportunities arose from these demonstrators for developing co-production and legacy initiatives. The case study provides insight into the ways in which citizens and local communities in Glasgow have been engaged in governance processes. This engagement has taken place via traditional and innovative smart city technologies, and in particular in relation to policy formulation, service design and delivery. It finds that the co-creation of governance is shaped by vested interests, that engagement is fragmented and partial, but at the same time new technologies, social media and shared learning opportunities offer innovative new ways for *some* citizens to influence local governance.

Keywords
citizen engagement; co-production; eGovernment; Future City Glasgow; Glasgow; post-industrial city; smart governance; sustainability

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1. Introduction

The city of Glasgow, population 615,000 (Glasgow City Council [GCC], 2018a), is the largest of the seven cities in Scotland, and lies at the centre of the much larger Glasgow city-region of approximately 1.8 million people (GCC, 2018b). In common with many other cities in the United Kingdom (UK) Glasgow aspires to become a 'smart' or 'future' city (GCC, 2011). In 2012, GCC won a UK-wide 'Future cities demonstrator competition' (United Kingdom Government, 2017). The competition, which was funded in part by IBM, was organised by the Technology Strategy Board (Technology Strategy Board, 2013), now Innovate UK (a non-departmental body which is part of the UK Government). Thirty cities took part in the competition and £24 million was awarded to GCC as the overall competition winner. The concept of the proposal which GCC submitted was to undertake a single city demonstrator project known as 'Future City Glasgow' (GCC, 2018c). The demonstrator would provide evidence of benefits to the economic performance, quality of life, societal cohesion, and environmental performance (including sustainability targets) of Glasgow. The infrastructural legacy of the 2014 Glasgow Commonwealth Games was cited as a strong example of Glasgow's commitment to realise its potential as a lead-

ing innovative municipality. The Future City Glasgow programme (FCGP) ran from February 2013 to August 2015, and a team of around twenty-six personnel was established to manage all aspects of the programme, the key components of which were:

- the creation of an integrated Operations Centre, bringing together traffic management, security, and public space CCTV;
- construction of a City Data Hub to allow for easier access to open datasets (health, socio-economic, demographic and other information);
- individual demonstrator projects to facilitate innovation in: Active Travel (cycling and walking); Social Transport; Energy Efficiency, and Intelligent Street Lighting; and,
- investment in physical infrastructure to support integration of city systems.

This case study considers the extent to which there has been transition in Glasgow towards a 'smart' or 'future' city through the FCGP and from ongoing smart legacy projects, such as the transformation programme (GCC, 2015a). The analysis provides an opportunity to assess whether or not the city of Glasgow is delivering 'smart governance' to its citizens, and if so, how is this being achieved? By smart governance, we mean the opportunities which citizens have had to become involved in local decision-making processes through engagement (Gabrys, 2014), participation (Chourabi et al., 2012), co-production (Alford & Yates, 2015), and, the co-creation of value (Osborne, Radnor, & Strokosch, 2016). Importantly, we assess where these practices have occurred through the use of smart technologies, including social media. Table 1 sets out a timeline of key dates and activities in the evolution and development of Future City Glasgow.

Governance of the FCGP was provided through the FCGP Demonstrator Delivery Board and Executive Steering Group, and partnership infrastructures were established across the public, private and academic sectors (GCC, 2015b). The final evaluation report on the FCGP was submitted to GCC in 2017 (mruk, 2017), and analysis of this is provided at Section 4. Our case study findings reveal extensive use of online consultation mechanisms to solicit the views of citizens, on a wide variety of proposals affecting their neighbourhoods. These include, Facebook, Twitter and dedicated project webpages to inform citizens of current events and projects. Citizens have been encouraged to participate in discussion, for example cycling groups have been engaged to shape cycling infrastructure investment via crowdsourcing techniques and apps. Schoolchildren were involved in using 'code' to improve their ICT skills and all latter-stage primary school children in the city were provided with a tablet (Paterson, 2017). Although a range of mechanisms have been used, online participation levels appear to be relatively low and further empirical investigation is required to determine the reasons for this. It would be useful to understand more about the socio-demographic composition of participating citizens, the extent of their influence and community groups' capacity for building social capital.

The remainder of the article is split into six main sections. Section 2 sets out the methods underpinning the research presented here, with specific reference to the 'SmartGov' transnational research project. Section 3 provides more information about the literature review conducted for this research. Section 4 evaluates three of the FCGP projects (Energy Efficiency, Active Travel and Open Glasgow). Section 5 discusses the FCGP in relation to how Smart governance is being delivered. Section 6 provides some concluding comments.

2. Methodology

The research underpinning this case study derives from the SmartGov 'Smart Governance of Sustainable Cities' research project, 2015–2019. SmartGov is a four-year collaborative transnational multi-disciplinary project, examining the value of information and communication technologies (ICTs) for engaging citizens in the governance of sustainable cities. The project involves research teams from the Netherlands, UK and Brazil. The research methodology incorporates a 'systematic' literature review, a comparative analytical framework, semi-structured interviews, practitioner engagement (co-production) in research design, case studies and networking and capacity building as a co-production technique. The SmartGov project considered legacy outcomes of the FCGP in terms of citizen engagement in using ICTs, sustainability and governance.

In September 2016, the University of Stirling approved the ethical structure for the empirical investigation to be carried out by SmartGov research team. This included proposals to undertake semi-structured interviews with officers (employees) and elected members (councillors) of GCC, and citizens and citizens' groups within Glasgow. The interviews involving officers were agreed jointly with GCC on the basis of the officers' prior involvement with the various Demonstrator projects of the FCGP. The interviews with elected members were arranged in accordance with their allocated responsibility through appointed Convenerships and committee memberships within the council. Interviews with citizens and citizens groups were organised in relation to their known participation in either the FCGP, or its legacy projects. The SmartGov research team has assisted GCC in the co-production of potential citizen-engagement mechanisms regarding the H2020 'RUGGEDISED' innovative energy renewables project (EU, 2018), and GCC has participated in the annual virtual conferences of the SmartGov project, which has involved all three academic partners associated with the project and practitioner partners from the three respective case study cities. Several meetings have been held with officers from GCC to discuss the delivery of the different stages of the empirical work,

Table 1. Timeline: Future City Glasgow.

Date	Organisation	Activity
June 2012	Technology Strategy Board	Report announcing 'Future cities demonstrator' competition for large-scale demonstrator project funding.
14 November 2012	Glasgow City Council	Final Report to Technology Strategy Board proposing the establishment of a 'Glasgow City Management System' to manage the Future City Glasgow Demonstrator project.
January 2013	Department for Business, Innovation and Skills	UK Government Press release announcing Glasgow as the winner of the Technology Strategy Board's 'Future Cities Demonstrator', with £24m GBP to 'make Glasgow a city of the future'.
20 March 2013	Glasgow City Council	Report to Sustainability and Environment Policy Development Committee confirming Glasgow's successful bid for funding of £24m from the Technology Strategy Board (TSB) Future Cities Demonstrator competition.
26 November 2014	Glasgow City Council	Report to Sustainability and Environment Policy Development Committee advising on progress with the publishing of over 370 datasets on the OPEN Glasgow portal, and how these datasets might be analysed to assist with service planning.
26 November 2014	Glasgow City Council	Report to Sustainability and Environment Policy Development Committee providing an overview of the Future Hacks (Hackathon) events that took place as a component of the Future City Glasgow Programme.
18 March 2015	Glasgow City Council	Report to Sustainability and Environment Policy Development Committee with a progress update on the Future City Glasgow programme, including: the creation of an integrated operations centre; construction of a City Data Hub to enable easier access to open datasets, and showing the value of an integrated programme of digital activity in support of Glasgow's Strategic Plan 2012/17.
July 2015	Glasgow City Council	Overview of project reporting within the Future City Glasgow programme, summarising progress to date on the build phase of Open Glasgow and each of the demonstrators (*Energy Efficiency; Integrated Social Transport; Intelligent Street Lighting; Active Travel*) including recommendations to undertake further workstreams and proceeding to Phase 2 demonstrator phase.
October 2015	Innovate UK	Report on the impact of the £34.5m future city challenge, including focus on Glasgow's achievements, and how cities across the UK could take advantage of technology to be better places to live, work and play.
16 March 2016	Glasgow City Council	Report to Sustainability and Environment Policy Development Committee on GCC's role in the ERDF programme: 'Scotland's 8th City—The Smart City'.
2017	mruk	'Building a Future City': Future City Glasgow Evaluation, prepared for Glasgow City Council.

to ensure its practical value and the co-production of value. At the time of writing, historical research concerning the Future City Demonstrator has been completed, along with a series of detailed case studies and site visits. To date, 25 interviews have been completed. Ongoing empirical research is taking place around a number of legacy initiatives.

In relation to this article and its focus on smart governance and citizen engagement, three projects from FCGP were selected for detailed investigation: Energy Efficiency; Active Travel; and, Open Glasgow. The literature review pointed towards a potential gap in our understanding of smart governance in three overarching and connected themes, citizens and ICT engagement (Albino, Berardi, & Dangelico, 2015), governance (Meijer & Bolívar, 2016), and sustainability (Hara, Nagao, Hannoe, & Nakamura, 2016). A case study analytical framework, emerging from the SmartGov project literature review, was used to analyse the three FCGP projects and is illustrated at Table 2. This framework is used in this article to describe and assess each case in relation to the three core themes of ICT engagement, governance and sustainability—the three core components of smart governance.

Table 2. Case study framework of analysis.

	Overarching Themes		
Case Study Selection	**Citizens and ICTs**	**Governance**	**Sustainability**
Energy Innovation (FCGP Energy Efficiency)			
Cycling and Walking (FCGP Active Travel)			
Connected Glasgow (FCGP Open Glasgow)			

3. Literature Review

Academic literature about the impact of Glasgow becoming a smart city is scarce and under-developed, which is perhaps understandable given how recently the FCGP concluded. Buck and While (2017, p. 502) argue that the core challenge facing policy-makers in Glasgow and elsewhere is to move the discourse from 'the attractive but elusive imaginaries to tangible intervention'. Calzada (2017) identifies a strong commitment to partnership working, although concerns are noted about the benefits of making data publicly available and the vagueness of the transformation concept. O'Connor, Gurguc and van Dam (2016) point to the 'data-centric' strategy adopted for driving improvement and the low user utility of apps such as 'MyGlasgow'. Contemporary studies of Glasgow have tended to focus on how the city is addressing the continuing challenge of emerging as a post-industrial city, for example in relation to urban regeneration (Boyle, 1990; Lever, 2017), social capital (Walsh et al., 2015), the possible existence of a detrimental 'Glasgow effect' on health (Walsh, Bendel, Jones, & Hanlon, 2010), the geography of deprivation (Pacione, 2013), housing tenure mix (McIntyre & McKee, 2012), the working class experience of gentrification (Paton, 2016), and sustainable transport and active travel (McCartney, Whyte, Livingston, & Crawford, 2012). There is very little contemporary research published on the governance of smart technologies and citizen engagement in Glasgow.

The SmartGov project literature review examined over 150 academic articles, assessing what is already known about smart governance using technologically mediated citizen-centric models of engagement, such as hackathons, living labs, maker spaces, gamification, the use of 'open data', and crowdsourcing (Webster & Leleux, 2018). Contemporary academic perspectives on smart cities/governance were reviewed in relation to urban growth and development (Albino et al., 2015), new urbanization environmental sustainability (Zygiaris, 2012), capacity-building within communities relating to quality of life and participation in society (Caragliu, Del Bo, & Nijkamp, 2011), participation by citizens in the governance of cities (Lombardi, Giordano, Farouh, & Yousef, 2012), and theories of social capital (Lin, 2017). Meijer and Bolívar (2016) argue that smart city governance is not a technological issue, but rather a complex process of institutional change, and that further research should focus on the critical e-Government success factors, and build upon sophisticated theories of socio-technical change. The literature review was used to identify the elements and components of 'smart' governance, to develop analytical models, and to create frameworks to guide the project's empirical research. Allied to academic literature, 'grey' matter, in the form of reports, minutes and media publications (etc.) were collected in relation to the Future City programme and its component case study initiatives. These documents provide an important evidence base for the cases studied and are referenced throughout this article.

4. Glasgow Future City Projects

Two of the four core Demonstrator projects at the heart of the Glasgow Future City project and the Open Glasgow project are explored in detail in this article using the cases 'Energy Innovation' (the Energy Efficiency Demonstrator), 'Cycling and Walking' (the Active Travel Demonstrator) and 'Connected Glasgow' (the Open Glasgow project). Each is presented and discussed in relation to the three core smart governance themes of ICTs and citizens, governance and sustainability.

4.1. Energy Innovation

Investment in innovative new technologies and new practices to achieve reductions in demand for energy and CO2 emissions are sizeable challenges for the city of Glasgow, and have involved citizens, community organisations and the private/public sectors. Citizen engagement has been problematic due to the 34% of households that are estimated to be living in fuel poverty (GCC, 2016a) and which may be faced with the stark choice of whether to 'eat' or 'heat'. In 2010, GCC established 'Sustainable Glasgow' to address the challenges of climate change and set a target to reduce the city's CO2 emissions by 30% by 2020 (GCC, 2017a).

Building on the work carried out as part of the Energy Efficiency Demonstrator, GCC was successful in 2016 with a bid to undertake the 'RUGGEDISED' EU Horizon 2020 research project (EU, 2018). This project will test,

implement and accelerate the smart city model across Europe. The 'RUGGEDISED' project, which includes the Glasgow Smart Street, has many innovative elements. These include the introduction of a roof-mounted solar PV canopy, ducted wind turbines, EV charging points, district heating proposals, and the use of stored renewable energy. GCC aims to lead the deployment of innovative technologies, helping to improve the quality of life for citizens by reducing CO2 emissions, improving air quality, reducing fuel poverty, improving infrastructure, and for developing opportunities to develop social capital within the city via citizen engagement.

The sub-projects which formed the FCGP Energy Efficiency Demonstrator are presented in Table 3 and included proposals for commercial and domestic properties, and the use of integrated technology/data for citizen behaviour change. Core themes which emerged from the analysis of Energy Innovation, included the active participation of citizens in energy-saving practices, and the existence of a technical competence gap which impeded the achievement of real behavioural change amongst citizens. From interviews with GCC officers, it was evident that the behavioural change tool proved to be too complex for citizens to use effectively. This meant that the intended roll-out of the tool across Glasgow was not viable. GCC also interacted with citizens via community hubs, corresponding directly to citizens and using iPads for undertaking surveys, etc. GCC analysis found

Table 3. Energy innovation.

Individual Projects	Citizens and ICTs	Governance	Sustainability
1. Virtual Building Modelling/City Energy Model (development of an Energy app. for enhanced understanding of energy consumption).	The energy app was to be used by citizens, however, it did require some technical knowledge which limited participation.	Security requirements related to personal data, and development of Privacy Impact Assessments where identifying the data controller/data processor, limited the use of data collected.	The online virtual building tool and energy app for citizens and businesses, provide advice on actions which citizens and businesses can use to make their buildings more energy efficient.
2. Demand-Side Management Systems (installation of remote monitoring equipment in ten Council buildings to assist load shifting, peak shaving).	This project did not involve citizens.	Limited opportunities for engagement and participation of stakeholders in the objectives.	Controlling of electrical demand will lead to reduced energy consumption and CO2 levels.
3. Housing Tenement Retrofit (installation of sensors in 60 homes (of different types) to better understand the impact of retrofit—savings in energy, but potentially increased moisture levels).	Citizens had no direct control over the sensors, but were consulted on the trial, and with the help of Housing Associations, most were keen to participate.	Limited opportunities for engagement and participation of stakeholders in the objectives.	Database was developed of building types, insulation systems, to better inform future insulation decision-making.
4. Renewables—Photovoltaic (PV) Mapping (opportunities to host renewables such as PV on derelict sites).	The mapping exercise did not involve citizens.	Limited opportunities for engagement and participation of stakeholders in the objectives.	Improved coverage of PV renewable technologies will reduce electrical demand on the main grid system.
5. Behavioural Change (citizen engagement) (Better understanding of citizens' views and concerns around energy, and development of a gamified engagement tool, specifically aimed at schoolchildren).	'Gamified' engagement tool developed to shape behaviour of Glaswegians and schoolchildren to allow a 'trickle-down' effect amongst parents and families leading to reduced energy usage.	The requirement for some technical knowledge to use the app, and the lack of 'instant' results, impeded the development of the reach of this initiative.	Providing accessible and engaging platforms to access energy information, may encourage citizens to make changes to their energy consumption behaviour.

that the 'digital divide' in some areas did not relate to technical competence. Instead, some citizens whilst being technically competent did not have an iPad, laptop, or fixed Internet connection in their home and were therefore unable to participate in the technologically mediated governance mechanisms.

4.2. Cycling and Walking

The promotion of active travel for citizens involving cycling and walking for transport and leisure is a Scottish Government objective (Transport Scotland, 2018). Benefits of increased levels of cycling and walking are cited as easing congestion, reducing noise pollution, cutting exhaust emissions, improving health and cost savings. In the context of the city of Glasgow, these potential benefits have particular resonance, given the city's relatively high levels of poor health and wide variations of mortality between neighbourhoods (Walsh et al., 2010). GCC has supported cycling and walking in Glasgow, through for example the 'Connecting Woodside' project which aims to deliver world class walking and cycling infrastructure (GCC, 2018d). The FCGP Active Travel Demonstrator encouraged citizens and cycling/walking groups to engage with GCC about infrastructure initiatives, through the creation of new cycling and walking apps developed alongside an education website tool. The 'Glasgow Cycling App' was launched in November 2014, cycling organisations promoted the app through their networks and actively engaged with GCC by supplying recommendations about the upgrading of routes and proposals for establishing new ones. Marketing took place through peer-to-peer networks and through social media. As of January 2016, there had been 1,200 downloads on iOS and Android and 1,393 routes had been captured with a total distance of 9,138 km.

GCC's vision is to increase levels of cycling for leisure, sport and as a mode of transport. On 3 March 2016, the Executive Committee of GCC approved the city's Strategic Plan for cycling 2016–2025, and agreed to commit £2m for each of the next three years on the basis that match-funding is provided by other key stakeholders. Further investment by the GCC of £3m was announced in June 2016 for cycling, walking and road safety projects across the city. Funding of this new investment would be supplied by five public sector partners: GCC, Strathclyde Partnership for Transport; Sustrans Scotland; Paths for All; and, Transport Scotland—Walking Safer Streets Fund (GCC, 2016b). The sub-projects of the Active Travel Demonstrator are reviewed in Table 4. Core themes which emerged from the analysis of Cycling and Walking included active citizen participation and the co-design of new cycling and walking routes, improved infrastructure which could lead to healthier lifestyles for cyclists and walkers, the creation of new apps which has led to improved conditions for knowledge transfer capabilities, and successful community/business networking.

4.3. Connected Glasgow

Whilst GCC claimed to have one of the most popular council Twitter feeds in the UK, with over 26,200 followers (GCC, 2011), a survey by Citizens Advice Scotland (Anderson, Gijón, & Whalley, 2015) found clear links between age, deprivation and Internet use in Glasgow. The survey showed that 42% of residents had never used the Internet and almost half had no computer or Internet connection in their home. A core feature of Glasgow's aspiration to be a 'future city' was to increase citizen-engagement through the use of innovative new technologies. This presented unique challenges for Glasgow, as in comparison to other Scottish cities, it had the greatest percentage of households living in poverty (approaching 50%) (The Scottish Government, 2018).

The Open Glasgow project included proposals for empowering communities to allow them to engage in local affairs and decision-making, and to encourage citizens to contribute data 'rich with local knowledge'. The Open Glasgow project had a diverse range of sub-projects, including Hackathon events (Future Hacks) being held on the topics of public safety, energy, and health and transport. The creation of the Glasgow Operations Centre, provided an integrated multi-public service command and control centre for monitoring Glasgow's security, traffic management and public space CCTV systems. Open datasets were published so that citizens could access service and administrative data, and the creation of a MyGlasgow Smartphone app allowed citizens to access information and provide comments to GCC. The sub-projects of the Open Glasgow project are reviewed in Table 5. Core themes which emerged from the analysis of Connected Glasgow included the challenge of how to create sustainable engagement mechanisms which allow increasing levels of citizen awareness, engagement and participation, and how to improve data literacy skills, and reduce digital exclusion. Formal reporting by GCC and case study research for the SmartGov project suggests that whilst a number of data sets are now accessible there has been limited public interest in using them. This may be because of limited awareness of what data is available or because of limited data skills in how to access, process and use such data. Research also points to the Hackathon mechanism as a productive means to generate interest in using data and designing service solutions amongst small expert technical communities. The MyGlasgow app was also deemed a success and was widely used by Glaswegians for a variety of purposes, including providing feedback on local public policy initiatives.

5. Discussion

Unlike rapidly expanding cities in Africa, South East Asia and South America (Hoornweg & Pope, 2017), the drive to find sustainable smart solutions to urban problems in Glasgow has not been fuelled by increasing migration

Table 4. Cycling and walking.

Individual Projects	Citizens and ICTs	Governance	Sustainability
1. Mapped Current Infrastructure (for active and sustainable travel using spatial analysis).	This sub-project laid the groundwork for future online engagement with citizens.	Encouraging citizens to communicate with GCC using online tools, proved to be an effective engagement mechanism.	Promotion of healthier lifestyles and behaviour change through active travel, and improved quality of life is a GCC objective for Glasgow's citizens.
2. Development of 'Glasgow Walking App' and 'Glasgow Cycling App'.	Glasgow citizens actively participated in the co-design of new and upgraded cycling and walking routes, supplying information through online means.	The infrastructure investment decisions which GCC made were influenced by citizens supplying their views online, making this a tangible example of 'Smart governance'.	Encouraging the adoption of sustainable forms of active travel, has made Glasgow more pedestrian and cyclist friendly.
3. Creation of Administration Portal (to allow groups to upload and edit content for the apps.).	Engagement of citizens took place at the development phase of the technologies involved.	The development of the technologies used was carried out following stakeholder engagement with health organisations, universities, schools, and passenger transport bodies.	Promotion of healthier lifestyles and behaviour change through active travel, and improved quality of life is a GCC objective for Glasgow's citizens.
4. Integration of Online Mapping Tools to the developed apps.	Engagement of citizens took place at the development phase of the technologies involved.	Information generated from the apps has been used for academic and public health studies.	Promotion of healthier lifestyles and behaviour change through active travel, and improved quality of life is a GCC objective for Glasgow's citizens.
5. Administration Platform for innovative app development.	Engagement of citizens took place at the development phase of the technologies involved.	The development of the apps for cycling/walking has helped local businesses create networking opportunities and benefited the digital economy.	Knowledge transfer from the cycling/ walking apps could see communities developing their own apps, and potentially helping to improve active lifestyles and wellbeing.

of the rural population from the surrounding city-region into the city. Instead, there have been declining population levels within Glasgow from a peak of over 1 million inhabitants in 1950, to approximately 615,000 today (GCC, 2018a). The focus for urban and societal change in Glasgow has been driven by its transition from a post-industrial city and dependence on shipbuilding and heavy engineering, to a 'future' high-tech city. Compared to other cities in Scotland, Glasgow has a disproportionately high number of disadvantaged communities (approaching 50%), which presents particular engagement challenges (The Scottish Government, 2018). Glaswegian's have the lowest life expectancy in Scotland and the lowest levels of home broadband access. GCC has produced detailed neighbourhood profiles of the city, allowing GCC to make more informed decisions about the targeting of resources (GCC, 2018a).

The aim of the research presented here is to look beyond conventional eGovernment approaches, which have had a focus on the efficient delivery of services, and to look instead at how such technologies can be used to engage citizens (Meijer, 2012; Meijer & Bolívar, 2016). If citizens are interested in what is happening in their community, then there may be a greater chance of them participating in local decision-making. New technologies and new forms of engagement offer the pos-

Table 5. Connected Glasgow.

Individual Projects	Citizens and ICTs	Governance	Sustainability
1. City Data: City Data Hub (world-leading scalable big data platform); City Data Hub Integration; Open Data Catalogue; Open Datasets Published; Community Area Partnership Map; Open City Dashboard (online personalised dashboard presenting real time information).	Development of the 'MyGlasgow' smartphone app for citizens to report environmental and community issues. Over 400 open datasets published by the GCC and partner organisations.	Innovative technologies made available with the intention of informing and engaging citizens, creating closer relationships, while encouraging participation in local decision-making.	Sustainability benefits arising from the transition from paper-based to online systems are still to be quantified.
2. City Innovation: MyGlasgow App (smartphone app allowing residents to report issues to the City); Hackathons; Sensor Store; Open Data Publication Processes.	Four Hackathons involved 239 citizens, 192 hours of activity, 33 teams, 30 mentors, 22 judges, and 1030 tweets for #hackglasgow. The number of datasets presented to each 'Hack' increased from 18 to 143.	GCC considered the hackathons to be an effective tool for engaging citizens, business start-ups and SMEs, and for stimulating innovation.	One of the apps developed from the Future Hacks, 'Health Walks Plus', has a strong link to the Active Travel Demonstrator, by directing citizens to nearby walks with physical markers on the pavements.
3. City Engagement: Open Glasgow Website; Engagement Hub; Infographics; Case Study Videos; Day in the Life Video; Future Makers; Coder Dojo; Future Maps; Open Glasgow Social Media Presence; City Observatory (engagement space to analyse data using a range of technologies)	Numerous opportunities for citizens to use new technologies to engage with GCC. A challenge is to increase levels of digital literacy and reduce digital exclusion.	Citizens, including schoolchildren, can access information and contribute their views through dedicated project webpages, Facebook, Twitter and other online means.	Better informed citizens now have more information available about how they can take part in community life, and lead healthier and more active lifestyles.

sibility of creating the necessary conditions for smart governance, co-production and the co-creation of value. Elsewhere, Webster and Leleux (2018) have argued that such smart city governance opportunities are reliant on mutual reciprocity and trust. The Economic and Social Research Council (ESRC) funded integrated Multimedia City data project, co-ordinated at the University of Glasgow (Urban Big Data Centre, 2015), provides useful survey information on Glasgow citizens' attitudes and behaviours relating to civic participation, transport, education, computer and mobile phone usage, and sustainability. It finds that active citizenry is most achievable in relation to local issues, as opposed to city wide initiatives and policy.

The FCGP has been heralded as a world leader in developing smart city solutions. In a relatively short period of time, between 2013 and 2015, a range of smart city initiatives were designed, commissioned, implemented and evaluated. This has been a significant undertaking and has required support at the highest levels within GCC. Glasgow has now entered a post-Demonstrator phase with legacy systems, new practices, and more information being generated than was previously available. This has created opportunities for using data analytics for evidence-based decision-making and for the re-design and improvement of services. Many Demonstrator subprojects have now become 'mainstream' core Council activities, including the gathering of information from intelligent street lights to reduce energy costs and carbon emissions. The increased targeting of active lifestyles has been supported through cycling and walking infrastructure investment. The development of innovative energy renewable solutions is ongoing as part of the H2020 'RUGGEDISED' project. There are improved opportunities for citizens and businesses to communicate and engage with GCC online, through the MyGlasgow App, the walking app and via Facebook, Twitter and online consultation platforms. GCC has taken a holistic approach to creating a Future city by concentrating on several themes in the FCGP simultaneously—improving the quality of life, economic performance, societal benefits and the environment.

The legacy of FCGP is now being used to address fuel poverty, which is increasing in the city, by improving energy efficiency in homes and creating 'space' for new research into emerging renewable technolo-

gies. The multi-functional and multi-technology Glasgow Operations Centre is heralded as one of the best in the UK and has successfully integrated systems and practices from across a number of public service agencies. The active travel objectives are being adopted in Council regeneration projects, such as the proposal to create a pedestrian and cycle bridge over the M8 motorway, connecting the largely deprived and excluded Sighthill community to the city centre (GCC, 2016c). Traditional methods for citizens to communicate with GCC still exist, whether this is by telephone, letter, in person, or through elected members who represent the views of the local community. In 2017, the conditions for smart governance have been substantially improved through a new city charter for consultation (GCC, 2017b). Additionally, examples from the Demonstrator projects highlight there are more opportunities afforded to citizens for accessing information online and the use of apps and social media to engage, participate, co-produce and co-create with GCC. Whilst it is evident that the capacity for smart governance in Glasgow has been enhanced it is not clear how effective these mechanisms have been or the extent to which citizens have been empowered.

6. Concluding Comments

This case study of smart governance in the city of Glasgow involved an examination of the FCGP through an assessment of some of its key projects, using a mixed-methods research approach including document and literature review and semi-structured interviews. The contribution provides new knowledge to the academic discourse on the FCGP, its legacy outcomes, and how smart governance is being created in a city where a significant number of citizens live in deprived areas.

The FCGP project engaged citizens through a variety of mechanisms and included 'coding for kids' and the roll-out of a plan to provide every latter-stage primary schoolchild in Glasgow with a tablet device to help bridge the data literacy gap (Paterson, 2017). The importance of combining socio and technological structures to achieve co-production between government and communities is central to creating a smart city with legacy outcomes. In Glasgow this has been evidenced by the implementation of new smart services and the introduction of technologically mediated governance mechanisms. This has been achieved in a relatively short space of time and has only been realised with the availability of key resources and high-level political and administrative leadership.

At the outset of this article we raised the question of whether 'smart governance' is being delivered in Glasgow through its smart city initiatives? It is important to note the continuing and positive role played by political leaders in shaping the strategic direction of the city's transformation. In 2011, under a Labour Party Administration, GCC launched a 'Fifty Year Vision for the Future: Future Glasgow 2011–61' (GCC, 2011), followed in 2012, by the bid to undertake the FCGP. In 2017, despite a change in Administration to the Scottish National Party (SNP), plans to deliver the Future City continued. Additional challenges arose due to personnel changes in the senior management of the FCGP at approximately the mid-way stage in its lifespan. These changes presented particular difficulties in delivering the project within a very tight timescale, given that GCC had committed to spending the entire project sum of GBP £24m within a twenty-four month period. It is also evident that GCC has actively encouraged citizen engagement through social media, online surveys and dedicated community and project webpages. Citizens can now contribute their views online about major policy issues, including suggestions on budget priorities, and options on how to make savings to meet future projected budget shortfalls (GCC, 2018e). Regarding youth engagement, GCC has encouraged participants to use an online tool where they can register with other users and exchange views (GCC, 2018f).

The legacy outcomes of FCGP include new ways of engaging citizens, SMEs and corporate partners, and new ways of using data analytics to inform policy and re-design services. Smart solutions are being sought to meet challenges in infrastructure, water management, bridges, city centre footfall, pollution, traffic and parking. Work is taking place with vulnerable citizens and a key challenge of how to engage and empower such citizens has become a Council priority (O'Hagan, 2018). GCC has committed to using the legacy of the FCGP to deliver a 'Transformation Programme' where digital and data are seen as key enablers. A centre of excellence has been created for using data analytics and visualisation, where data is used as an evidence-base for decision-making. Through these initiatives GCC are trying to bring about cultural change where service re-design and open innovation can take place. In the short-term, the future or smart city ambitions of GCC are continuing through further funding bids. The 'RUGGEDISED' H2020 innovative energy renewables EC research project (EU, 2018) is utilising pioneering work carried out through the FCGP Energy Efficiency demonstrator project. Other legacy outcomes from FCGP include GCC acting as a lead partner in the Scottish Cities Alliance and the submission of a successful bid to the ERDF programme to develop Scotland's 8th city—the 'Smart City'. The 8th city is a virtual city and has a focus on two key themes of 'data' and 'technology', including increasing citizen engagement through mobile technology and social media (GCC, 2016d). There are points of interest which may be drawn from a study of Glasgow as a 'future' city which might be relevant to other cities in Scotland and beyond. First, Glasgow shares close similarities with many other cities in Scotland, in terms of its socio-demographic composition, as evidenced through the Scottish Index for Multiple Deprivation (The Scottish Government, 2018). Here, lessons can be learned about how to use technologically mediated engagement practices to reach different parts of the citizenry. Second, is the existence of a

'digital divide' in Glasgow, evident from the low levels of Internet access (Anderson et al., 2015). This divide is likely to exist in other cities and mechanisms and practices to reach excluded elements of the population can be shared with other cities. The Scottish Cities Alliance and GCC's position as lead body for developing the Smart city allows GCC the opportunity to share its experiences of developing the Future City with other public agencies. From the research conducted for this study it is apparent that the FCGP created opportunities for citizen engagement via smart city technologies. This allowed citizens to contribute to local decision-making and influence local policy and services in a number of areas. This was achieved alongside traditional participatory mechanisms and in particular, processes associated with local representative democracy. One major challenge remains, that is for policy-makers and practitioners to reach-out and attract the interest and participation of disadvantaged communities.

Although the Glasgow Future City Programme successfully piloted a number of smart city initiatives, further empirical work is required to evaluate the efficacy of the approach to 'reaching' disadvantaged communities and for realising the full potential of smart governance. To date, a series of technologically-led smart city initiatives have been integrated with existing engagement mechanisms. These have demonstrated that an evolution to smart governance is possible, but that the key ingredients of political leadership, new financial resources, technological expertise and citizen and community engagement must be evident.

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Conflict of Interests

The authors declare no conflict of interests.

Research Data Policy

The research conducted for this article complies with the principles of the Economic and Social Research Council's Research Data policy, and will be deposited in the University of Stirling's DataSTORRE repository following completion of the project. The research also complies with the Data Management Plan and Ethics approval granted by the University of Stirling, specifically related to the SmartGov research project.

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Article

The Impact of User Participation Methods on E-Government Projects: The Case of La Louvière, Belgium

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Abstract
In recent years, information and communication technologies (ICT) have allowed governments to improve their internal functioning and to improve the delivery of information and services to their users. This application of ICT in governments has been conceptualized as "e-government". However, more recently, smart cities emerged as a locally-embedded paradigm that proposes the design of innovative solutions across all domains of our everyday life (mobility, environment, economy, education, quality of life, and governance) with ICT as an enabler. In their recent evolutions, these two concepts have advocated for increased involvement of their stakeholders (citizens, businesses, public servants, etc.) through user-participation methods to support the design of their projects. This article intends to examine how these methods impact an e-government project and, more particularly, to find out which challenges and benefits practitioners experience. In order to reach that goal, we studied the case of the city of La Louvière (Belgium) through a one year plus study following action research's best practices. This article contributes at several levels. First, it describes the challenges and benefits experienced with participation methods in a concrete project. Second, it proposes an e-government implementation process enhanced with these methods. Third, this article discusses the similarities and differences between e-government and smart cities through the lens of participation methods.

Keywords
action research; citizen; e-government; information and communication technologies; smart city; user participation

Issue
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1. Introduction

E-Government refers to the use of information and communication technologies to improve the delivery of information and services by governments to their stakeholders. However, in recent years, both research and practice have tried to identify what the "next stage" of e-government will be by focusing on all affected stakeholders as well as on the shift in governance which it enables. In this context, smart cities emerge as a more locally-embedded paradigm referring to the design of innovative solutions to tackle issues of public interest by including all the city's major stakeholders (government, the private sector, NGOs, citizens). As with e-government, this paradigm has evolved from a technology-centred perspective to a more stakeholder-oriented one.

As a result, both e-government and smart cities evolve and converge towards stakeholder-oriented concepts which give increased consideration of the need for participation from their stakeholders (citizens, busi-

nesses, public servants, etc.) through user participation methods in order to design their projects. In this article, we focus on the two particular stakeholder groups impacted by this shift: citizens and public servants, and we look into the potential for their participation in the context of e-government and smart cities. However, even though they realize some of the potential benefits of such participation, local communities still have to integrate the governance changes and related challenges that this participation requires. Therefore, the main goal of this article is to examine how their participation is enabled at all stages of a local e-government project. Furthermore, we also want to examine what the relationship is with the participation stimulated by the smart city research field. However, we do not limit the perspectives of participation to these two research fields but we also map it to the user participation perspective as found in information systems engineering. In order to reach that goal, we examined one particular city's engagement in participation methods through the lenses of e-government, smart city and user participation: the Belgian city of La Louvière. We had the opportunity to help them from the start to the development of their strategy and to monitor the implementation of participation methods. Through a one year plus study, we were able to conduct in-depth interviews with major practitioners in this city. They were either linked to the e-government or to the smart city strategy of La Louvière. We, therefore, examined how the e-government strategy was impacted by the participation methods and which challenges and benefits emerged from this strategy. Furthermore, we also had the opportunity to make recommendations about the participation methods applied following action research's methodological best practices.

The results presented in this article provide practitioners with concrete recommendations and guidelines to stimulate citizens and public servants to participate in an e-government context through appropriate methods. Furthermore, it proposes an e-government implementation process enhanced with these methods. In addition, this article also contributes to the conceptual discussion on e-government and smart cities through the lens of participation methods as well as the governance shift it has been inducing.

The article is structured as follows: in the "Background" section, we present the concepts of e-government, smart city, participation, and their interrelations. In the "Methodology" section, we formulate the research gap this article address and describe how the study of La Louvière was conducted following action research's best practices. In the "Results" section, we present the e-government strategy of La Louvière and the participation methods implemented based on our recommendations. In the "Discussion" section, we reflect on the research implications of how to bridge the gap between smart city and e-government research. Then, we give recommendations for practitioners involved in an e-government implementation process to help them develop their projects with the aid of participation methods. The "Conclusion" section summarizes the contributions and limitations of the article as well as leads for further research.

2. Background

This section positions the research problem within the existing literature regarding participation in e-government and smart cities. First, the e-government research and its evolution towards a stakeholder-centred concept is described. Second, smart cities are introduced as well as the specific Smart Governance sub-area that focuses on participation. Finally, the participation research field is described and is linked with e-government and smart cities. This last sub-section introduces the role of user participation methods, fueled by smart city and smart governance research, in an e-government project and presents research gaps this article intends to answer.

Figure 1 represents the presented research fields as well as their interconnections. The goal of this article (within the yellow frame) is to examine how a sub-field of participation research (user participation), fueled and stimulated by smart city and smart governance research, concretely impacts an e-government project.

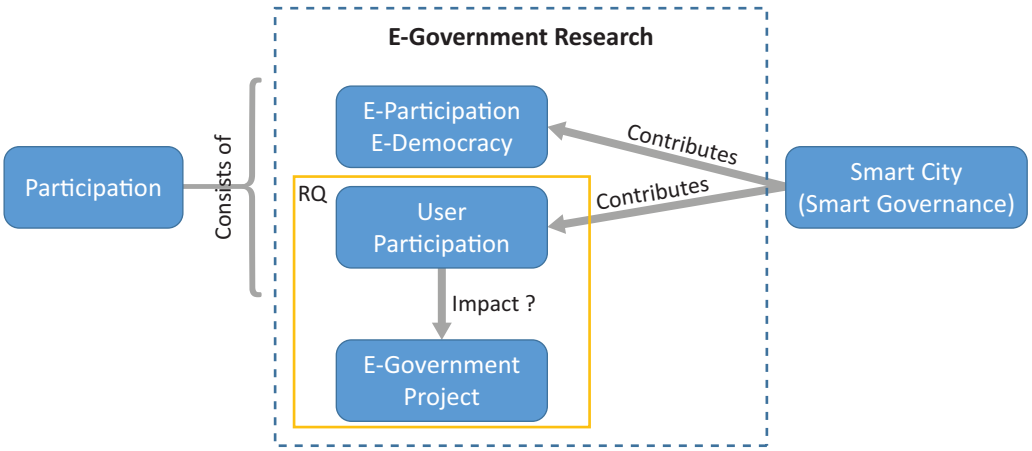

Figure 1. Background representation.

2.1. E-Government

E-government has become a general-purpose word for the use of information technology by a government. E-government is defined as the use of information and communication technologies (ICT) by governments to improve the delivery of information and services to citizens, business partners, employees and other government entities (Andersen & Henriksen, 2006; Layne & Lee, 2001). Sang, Xin and Silvana (2005) provide a classification of the e-government domain based on the target audience: G2C (citizens), G2B (businesses), G2G (government), IEE (internal efficiency and effectiveness) and overarching infrastructure (cross-cutting). In this article, we take a deeper look at the G2C sub-domain and the increasingly active role of citizens in it. There have been many attempts in the literature to design an evolutionary approach to e-government. The most influential was designed by Layne and Lee (2001), and distinguishes four stages:

1. cataloguing ("establishing government presence online and presenting information"),
2. transaction ("allowing citizens to transact with government electronically"),
3. vertical integration ("connecting government functions across different levels of government"),
4. horizontal integration ("connecting different government functions across the same level of government").

However, within the literature, discussion is ongoing regarding what the next stage of e-government will be. Verdegem and Verleye (2009) suggest developing an e-government strategy centred on user satisfaction and provide a list of indicators to evaluate it. Soon Ae, Shulman, Sandoval and Hovy (2010) propose integrating Web 2.0 principles into e-government and the provision of an evolutionary approach towards "e-government 2.0" to facilitate user participation by allowing them to interact and collaborate with each other in a social media dialogue as creators of user-generated content. Lee and Kwak (2012) suggest another maturity model for the e-government paradigm where there is an evolution towards open government with a focus on the citizen participation and the opening up of access to governmental data. In their attempt to propose a research agenda for smarter government, Scholl and Scholl (2014) introduce the smart government paradigm and underline the need for e-government to evolve and integrate the needs and requirements of a greater number of stakeholders, with a focus on citizens. All these visions of the "next step" of e-government converge towards user-centricity and argue for the participation of citizens.

2.2. Smart Cities

In the last few years, smart cities have become more popular than ever with the promise of new solutions in the domains of mobility, environment, economy, governance, quality of life, and education, thanks to the innovative use ICT (Caragliu, Del Bo, & Nijkamp, 2011). Generally, the interest in smart cities is strongly linked to the rise of new information technologies such as mobile devices, semantic web, cloud computing, and the Internet of Things (Schaffers et al., 2011). The term "smart city" was adopted in 2005 by a number of technology companies as they offered complex information systems to integrate the operations of an urban infrastructure (Harrison & Donnelly, 2011).

However, the literature shows that smart city projects pushed solely through technological solutions do not always meet the requirements and the actual needs of citizens (Hollands, 2008). The smart city concept aims to increase the quality of life of citizens, but cannot be limited to technology only, and must start from the human side of the equation (Nam & Pardo, 2011). Thus, a critique for this technological focus of smart cities led by authors such as Greenfield (2013) and Hollands (2008). Current literature underlines the importance of citizens in this transformation process for cities (Berntzen & Johannessen, 2016; Hollands, 2015). Hollands (2008) also claims that smart cities must be based on something more than the use of ICT if they want to enable social, environmental, economic, and cultural development. The real smart city, according to Hollands (2008), should start from the people and human capital of the city and use ICT to favour democratic debates about the kind of city people want to live in. As with e-government, the smart city also converges towards the stimulation of citizen participation. Among the different dimensions of the broad smart city concept, the smart governance dimension advocates for a shift in governance to allow stakeholders in governments to foster collaboration and participation (Rodríguez Bolívar & Meijer, 2016). In fact, it argues for an increased consideration of this by public servants and more industrial democracy. Furthermore, it also recommends a more important role for citizens in public life. Even though smart cities did not launch the discussion on citizen participation, they shed new light on this concept. Simonofski, Serral, De Smedt and Snoeck (2017) summarize the different enablers of citizen participation which can be implemented in a smart city context.

2.3. Participation Methods

The concept of participation has been theorized by Arnstein (1969), who suggests that participation is a spectrum consisting of three main tiers: non-participation, consultation (gathering of ideas but no impact on decision-making) and co-decision (sharing of the decision–making process between officials and citizens). From a previously performed systematic literature review on citizen participation in e-government, it is concluded that the proactive role of citizens can take two forms (Simonofski, Snoeck, Vanderose, Crompvoets, & Habra, 2017):

> First, citizens can be democratic participants who use the new technologies to impact the policy-making and decision-making processes of their governments. This participation has been conceptualized has e-participation or e-democracy by previous literature. (Macintosh, 2007)

Second, and form of participation which is the focus of this article, citizens can be considered as potential users of the e-government services whose requirements need to be assessed so that the services can be aligned with their actual needs. We label this participation as "user participation" in this article. Axelsson and Melin (2008) have analysed the importance of this role in previous research. At the centre of the convergence of the smart city and e-government concepts, several participation methods that concretely stimulate the gathering of users' input can be extracted. Simonofski, Snoeck et al. (2017) have identified eight main participation methods that can be used to include citizens in the development of smart city and e-government services:

- Interviews and group discussions
- Representation in project teams
- Workshops
- Surveys
- Dedicated software
- Social media
- Living labs
- Prototyping

Human–Computer Interaction (HCI) is heavily linked to this sub-area of participation as its core idea is to involve the end-user in the development of a system. Hence, HCI can help to gain insights into citizen participation in cases where the e-government project consists in developing a system in which citizens are end-users. In particular, user experience (UX) becomes critical in the development of e-government services as these often reflect complex procedures. Hartson and Pyla (2012) believe that developing systems guaranteeing a high-quality user experience is an iterative process composed of four steps. These steps are "Analysis", where data on end-users' needs and wishes are gathered and analyzed, "Design", where design alternatives for the to-be participatory system are built and reflected upon, "Prototype", where prototypes of the system are built with various fidelity levels, and "Evaluate", where the prototypes are evaluated by UX experts and/or end-users. These steps are iterative and can overlap (for instance, a quick prototype can be sketched to foster discussion in the "Design" step). Considering citizens as end-users, the participation methods listed by Simonofski, Snoeck et al. (2017) can be invoked in the four stages of the process in order to guarantee a high usability and in turn an efficient use of the system by citizens. For instance, interviews for the analysis, workshops for the design, living labs for the prototyping, and questionnaires with usability tests for the evaluation. In the next sections, we will refine and apply this methodology to a specific e-government project.

3. Methodology

3.1. Research Question

As seen in the literature analysis of the previous section, we have identified a research gap which this article intends to address. The relation between e-government and the smart city research fields remains blurred. However, as shown in the Background Section, both concepts seem to converge towards stakeholder-centricity by putting users at the centre of their strategy. Previous work such as Scholl and Scholl (2014) attempted to conceptualize this convergence with the idea of "smart government". However, there is no published research on the impact of participation methods, introduced or stimulated by the smart city and smart governance literature, on e-government. Furthermore, insight into the benefits and challenges of this implementation in concrete e-government project are still lacking. Thus, in order to fill that research gap, we propose the following research question: "What are the practical implications of user participation methods on an e-government project?"

3.2. Action Research Methodology

We have chosen to apply Action Research methodology, defined as "an approach in which the action researcher and a client collaborate in the diagnosis of the problem and in the development of a solution based on the diagnosis" (Bryman & Bell, 2007). We believe this approach is appropriate as it implies a close collaboration between the researchers and the members of the organization in which the research takes place. In this case, we applied this methodology to the case of La Louvière which wanted to engage in an e-government strategy and develop of an e-government portal to offer its services online.

For each of the four steps of the e-government strategy described in the next section, we applied the four stages of the action research spiral as described by Altrichter, Kemmis, McTaggart and Zuber-Skerritt (2002):

1. Plan: in this step, with the aid of best practices from the scientific literature, we were able to assist La Louvière officials in the design of a participatory e-government strategy;
2. Act: by means of on-field interaction, La Louvière officials implemented the actions and strategy discussed in the "Plan" step.
3. Observe: in this step, we were able to understand the impact of the actions that were taken upon the daily lives of the stakeholders as well as the impact on the portal that was to be developed;
4. Reflect: By means of in-depth interviews and focus groups, we were able to reflect on the process and to make improvements for the next iteration.

In order to plan and reflect on the e-government strategy, in addition to the close collaboration with the stakeholders during the one year plus study, semi-structured interviews were scheduled with relevant stakeholders throughout the process, as listed in Table 1. This qualitative method is effective when covering a complex topic in detail (Baarda, Goede, & Meer-Middelburg, 1996; Boyce & Neale, 2006). Moreover, this technique fits the research question well, as we intend to collect the experiences from the practitioners and not to validate their knowledge. Unfortunately, this method is prone to interviewee bias as individuals may give a distorted view of the subject. Triangulation is thus crucial for the validity of the research. Therefore, people from four different positions and perspective were interviewed to obtain the following perspectives: a strategic project management perspective, two operational perspectives (portal design and procedure rationalization) as well as a technical perspective. The interviews occurred in February, April, June, August, September, and November 2017, as well as February and March 2018. These semi-structured interviews were complemented by more informal discussions throughout the whole project as the different interviewees were continuously open for collaboration and feedback.

For each phase of the e-government process of La Louvière, we implemented the four main steps of action research (Plan, Act, Observe, Reflect) as summarized in Table 2. First, the global e-government strategy was formulated by the stakeholders. Second, the as-is processes of the administration were rationalized before engaging in any IT investments. Third, an online portal was developed to simplify the internal processes as well as the services offered to citizens. Finally, a feedback mechanism (in the form of an online survey on the portal) was added in order to gather input from the users. Improvements to the portal were made based on this feedback. This survey constitutes the only quantitative method to collect data from users in the overarching action research methodology due to the high number of citizens using the portal. A large-scale method was a more effective way to collect representative feedback.

4. Results: E-Government Strategy of La Louvière

The research was performed in the Belgian city of La Louvière (80,719 inhabitants) was particularly interesting as no e-government actions had been taken prior to our intervention. Thus, from the outset, we were able to analyze the different challenges and choices that the

Table 1. Interviewees.

ID	Function	Responsibility	Gender	Number of interviews
1	Head of Unit	Designing the e-government strategy	Man	8
2	e-Government Manager	Implementing the e-government strategy	Female	3
3	Document Management System Manager	Rationalizing the internal processes	Female	4
4	IT Responsible	IT Support of La Louvière	Man	2

Table 2. Action research: study summary.

	Plan	Act	Observe	Reflect
Strategy	Presentation of a theoretical framework and review strategy drafts by the researchers	Diffusion of the strategy internally	Interviews	Advice for the "Digital Strategic Plan" and continuous improvement of strategy
Processes	Recommendation of participation methods	Set up of a working group	Interviews	Benefits and inconveniences of the first participation activity
Portal	Agile practices and testing	Design of the portal	Interactive testing + interviews	Collaborative work analysis
Improvement	Introduction of feedback mechanism	Introduction of a satisfaction survey	Live testing + interviews	Analysis of insights from citizens and improvement

stakeholders had to make. Furthermore, La Louvière was also an interesting choice as there is an important digital divide amongst its citizens in terms of skills and access to IT tools. The term "digital divide" is used to refer to the differences in digital literacy and access to digital tools among citizens, but the digital inequality is not limited to its cognitive perspective. Indeed, La Louvière is a city of the Wallonia region where the access to IT resources and internet is low compared to EU average (Statbel, 2016). Furthermore, interviewees also stated that, according to their personal experience, the citizens of La Louvière suffer from a high digital divide as a consequence of the large proportion of unemployed people (21.85%) who rarely interact with e-government services.

This section is structured around the four main phases of the e-government project of La Louvière. For each of these phases, we detail how specific user participation methods were used to gather the input of citizens or public servants.

4.1. Formulating the Strategy

In this initial step of the e-government strategy of La Louvière, it was first necessary for the stakeholders to fully understand the ins and outs of e-government prior to starting any concrete action. Thus, we provided a course for the head of the unit about e-government in which the managerial and technological opportunities and challenges were discussed. More specifically, a specific e-government maturity model was presented. The head of unit reacted very positively to this structuring maturity model as it "allowed him to present his ideas and implement the e-government vision concretely". With the help of this structuring theory, it was also easier for the head of unit to present the draft strategy to the political representatives in order to secure the project's funding.

We were able to make recommendations about the strategy on three main axes. First, the necessity to work in an agile manner through the iterative execution the different phases of the project. Second, the need for increased consideration for citizens during the testing of the portal and its refinement. Finally, the need to make good use of a variety of communication channels (mail, social media, etc.) in order to inform the public of the new strategy.

It must also be stated that the strategy evolved throughout the project. At the latest stage of the study, the e-government strategy evolved towards a "Digital Strategic Plan". In this new plan, the head of unit organized the current and future actions of the city around several smart city dimensions. The e-government project could only be found in the "smart governance" dimension. however, the "smart people" dimension also introduced some elements applicable to e-government such as the nomination of "digital referents" within each department or the organization of workshops to train the staff.

4.2. Rationalizing the Processes

After the validation of the strategy by the political representatives, two new staff were hired to implement the strategy. First, an e-government manager was recruited to plan the development of the e-government portal in which citizens would be able to access the major part of the services provided by the municipal administration of La Louvière. Second, a Document Management System (DMS) manager was hired as the rationalization of the as-is processes constitutes an essential preliminary step to the e-government portal development. The DMS activity has a limited impact on the citizens but allows for self-evaluation of the internal processes and workflows by public servants. Thanks to this activity, the public servants benefited from common encoding metadata and facilitated the back-office adoption of the portal. The participation of public servants in the strategy was not limited to the DMS but shaped the whole e-government strategy. In order to increase the acceptance of the project and to gain input from public servants, the e-government manager organized a working group (method: interviews and group discussion) to explain the methodology applied in the strategy to one representative from each impacted department (Human Resources, IT, Records Management, Communication, Finance, Legal, etc.). The idea behind the working group was also to identify people who could prove to be valuable resources within each department. The e-government manager stated that "the overall reaction from public servants was positive since they had the opportunity to give ideas and feedback beforehand". However, the manager also noted that "the digital divide is present within the population but also internally between departments. Therefore, the explanations had to be adapted in function of the digital literacy of the department". The work performed by the DMS Manager also benefited from these participation methods. After she analyzed and modelled the existing process as is, she worked in pairs with the representatives from each department to validate the workflows.

4.3. Designing the Portal

While integrating the input internally and rationalizing the processes, the e-government manager also acquired an e-government software from an IT company specialized in that domain. Through a contact developer in that IT company, they were able to work in close collaboration with the manager giving direct feedback to customize the portal of the IT firm. It must also be noted that the IT company works with Open Source software that encourages continuous improvement and feedback from their users. However, the manager noted that the collaboration was sometimes hindered by the difficulty for the developer to fully understand the complex requirements of the manager.

After a first iteration, the manager submitted the portal to interactive testing internally to once again gain in-

put from the public servants. The organization of workshops with citizens was discussed but not conducted due to time and budget constraints.

The e-government manager also took into account feedback from various stakeholders as well as from the public servants. For instance, she collaborated closely with another city working on a similar portal project to exchange best practices and to understand the risks of failure. Furthermore, we intervened as researchers to test the portal through live testing (method: prototyping). We also conducted a heuristic evaluation following the method prescribed by Nielsen and Molich (1990). This evaluation was relevant at this stage of the project as it could be used to eliminate usability problems prior to live testing of the portal. Another advantage of heuristic evaluation is that it produces rich results with little effort and does not require extensive UX training. Later, a live testing session was organized at the municipal administration of La Louvière. We approached citizens who were coming to take care of administrative tasks and suggested that they try the portal instead of going through the traditional time-consuming process. As it is often the case with live testing activities, most citizens preferred not to use the portal. However, we gained valuable insights into the barriers citizens experience when facing such a portal. The most common barrier was that the portal did not support the specific administrative processes needed by the citizen. The other frequent hindrances were the lack of time (many citizens felt that they would not gain time by using the portal) and perceived complexity, reflecting the digital divide present among citizens. In addition, we think that a large majority of citizens consider administrative tasks as a chore. As a result, they come to the city administration willing to get it over with and are not inclined to try anything new. This would explain the unconvincing reasons for not using the portal that we received from some citizens, with one of them refusing to use the portal because she, in her own words, has "the brain of a goldfish". On a brighter note, the citizens who did use the portal were satisfied overall, despite the minor usability issues they encountered. One said that "it is quite nice of the city to make this available to the people of La Louvière".

Figure 2 presents a screenshot of the current version of the portal. This portal is an essential first step in their e-government strategy as it fits into the "Cataloguing" and "Transaction" stages described in Section 2.1. Some transactions available even offer "Vertical Integration" with the federal Belgian administration.

4.4. Improvement of the Portal and Strategy

Six months after its online launch, more than 6,400 demands were filed on the portal by the users. In order to evaluate the satisfaction and to collect the ideas of the citizens regarding the portal, we refined the evaluation survey suggested by Alawneh, Al-Refai and Batiha (2013). Their survey intended to evaluate the satisfaction of the users of e-government portals along several dimensions (method: survey). This questionnaire enables citizens to give their opinion in terms of:

- Accessibility: degree to which the interface of the portal is accessible for citizens with all levels of digital literacy;
- Communication on online procedures: degree to which citizens are aware of the existence of the portal and its benefits;

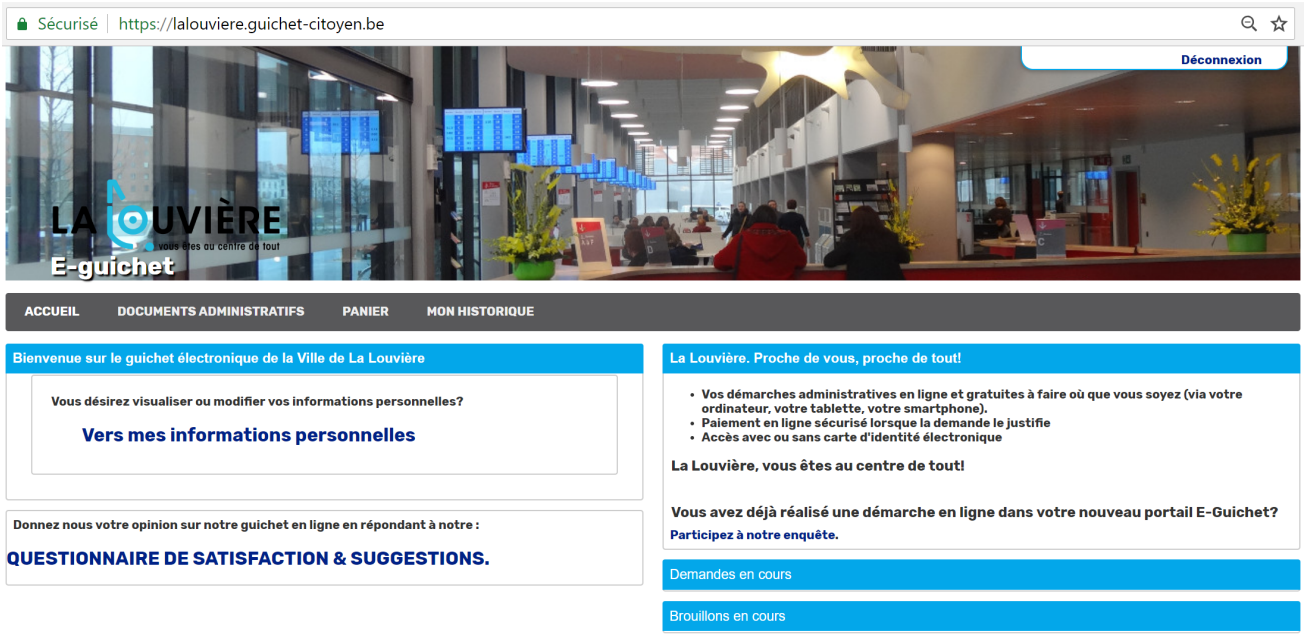

Figure 2. Portal screenshot.

- Quality of online administrative procedures: citizens' perception about the quality of services and products available on the portal;
- Future use: citizens' intention to re-use or recommend to the portal to others.

The questionnaire currently has more than 100 responses. The responses were collected thanks to convenience sampling based on people voluntarily wanting to answer the satisfaction survey on the portal. The link to the survey was set on the welcome screen (lower-left side of Figure 2) as well as after the citizens completed a procedure. On top of the evaluation dimensions, the survey also allows citizens to provide suggestions about the future documents and procedures to put online as well as ways to improve the e-government strategy. Therefore, it is a direct way for citizens to participate in the improvement of the e-government strategy of a Louvière. The e-government manager of La Louvière monitors the suggestions and feedback from citizens, answering them as promptly as possible.

The e-government manager has also decided to install a terminal on the ground floor of the administration. With the terminal, citizens are able to access the e-government portal with the assistance of employees to explain its functioning. This allows people to access the multi-channel strategy of La Louvière, thus tackling the significant digital divide within the city. However, discussions are currently underway regarding the future of the terminal, as it will require additional investment to maintain a welcoming public agent to work alongside it.

5. Discussion: Participatory E-Government Implementation Process

As previously discussed, smart cities refer to the use of ICT to improve the quality of life of the impacted stakeholders through a smart (or participatory) governance. Therefore, e-government can be considered as a subdomain of smart cities as, in this specific case, ICT is used to improve the functioning of government. In this article, we focused on the relevance of user participation in this improvement through the introduction of three participation methods. However, this article has also inherent limitations. First, we were only able to analyze the impact of three participation methods on the project but other methods should be examined in the future. The stakeholders we interviewed were limited to four (though we interviewed them multiple times). More information about the challenges and the perceptions of the project could have been elicited with a greater number of interviewees. Furthermore, the findings only reflect the situation of one city in Belgium and should be cross-validated with studies in other cities (of different scales, e-government maturity, population distributions, etc.) in Belgium or internationally to determine the extent to which our findings can be generalized. Another neglected aspect of this study is the physical accessibility of the portal. The digital divide is a recurrent term in discussions about smart cities. There are cases where citizens cannot interact with technology because it is physically impossible for them (for instance, they suffer from a heavy disability, or they do not have access to the required hardware). A solution labelled as smart such as the portal developed in La Louvière should tackle digital divide from both perspectives.

In order to demonstrate the relevance of participation methods in an e-government project, we propose an implementation process describing the different phases of an e-government project and where the three participation methods applied in La Louvière added value in the process. Figure 3 details this implementation process by abstracting the four main phases described in the Results Section.

Through the studied case, three different participation methods were used to introduce governance shifts in the e-government strategy of La Louvière: Interviews and Group Discussions, Prototyping, and Online Surveys. However, many more methods exist (including ones researched in the smart city literature) which could be

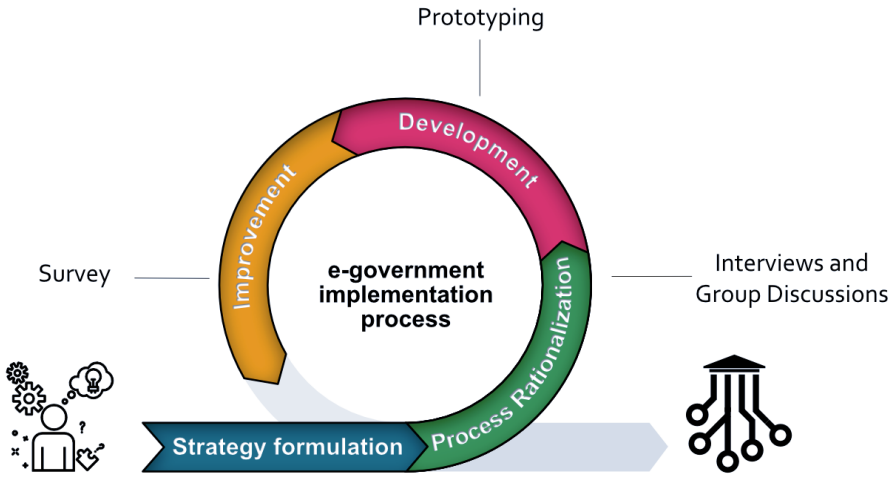

Figure 3. E-government implementation process.

applied in this context. Table 3 suggests a participation method matrix where we formulate a hypothesis about the potential relevance of participation methods in each of the four steps of the implementation process. The green cells refer to the methods tested in La Louvière. In blue, we make a positive recommendation since our experience with the studied case and related research suggest that the method could have benefits for the suggested step. In orange, we make a negative recommendation since the methods may not be appropriate to the respective phase.

All of the cells in Table 1 are leads for further research. The positive and negative recommendations should be tested in concrete settings. Due to space limitations, we only detail here four hypotheses that are particularly promising:

- H1: Workshops to "Formulate the Strategy"

In the context of the studied case, no participation methods were applied to formulate the strategy as this was performed by the head of unit of the city in collaboration with the researchers. However, insights to gain ideas from citizens and public servants could have been collected by organizing workshops. Indeed, the organization of workshops to interact with a selected group of representative stakeholders has already been applied in e-government service development (Oostveen & Van Den Besselaar, 2004). The insights gained from workshops can also be helpful in more strategy-related phases before developing the e-government service. Furthermore, as citizens or public servants may be reluctant to speak openly about their ideas and feedback, facilitation techniques should be used. For instance, creativity techniques such as visualization tools or improvisation principles have already been applied (Mahaux & Maiden, 2008).

- H2: Representation in Project team to "Rationalize the Processes"

In La Louvière, the e-government manager and the DMS manager conducted interviews and group discussions to understand the current processes and how they could improve them. However, the participation method was only applied to gain insight from public servants and not of the citizen's perspective. Furthermore, their impact was limited as they only gave information without contributing any ideas as how best to improve the current situation. In order to give greater influence to users (including citizens), the managers could have included interested public servants or citizens in the project team (or in a steering committee) to gather direct feedback on the rationalization. This has already been underlined in literature as Chan and Pan (2008) advocate the identification of salient intermediaries in all phases of an e-government project.

- H3: Living Lab to "Design the Portal"

During the development of the portal, the IT manager and the e-government manager used the prototyping technique to get insights from potential users to assess the usability of the portal during its development. We argue that input can and should be gathered in other phases of the software development process (requirements elicitation or implementation). One possible method that allows this end-to-end participation resides

Table 3. Participation methods matrix.

	Strategy Formulation	Process Rationalization	Development	Improvement
Interview and Group Discussions	Positive	Tested In La Louvière	Positive	Lack of representativeness
Workshops	Positive (H1)	Positive	Positive	Lack of representativeness
Representation in Project Team	Positive	Positive (H2)	Positive	Lack of representativeness
Dedicated Software	Important investment at this stage	Not applicable	Positive	Positive
Living Lab	Important investment at this stage	Not applicable	Positive (H3)	Positive
Prototyping	Not applicable	Not applicable	Tested In La Louvière	Not applicable
Social Media	Too many stakeholders involved	Not applicable	Positive	Positive (H4)
Survey	Too many stakeholders involved	Too many stakeholders involved	Positive	Tested In La Louvière

in the Living Labs, defined as "user-driven open innovation ecosystem based on a business-citizens-government partnership which enables users to take an active part in the research, development and innovation process" (European Commission, 2009). This method, often implemented in smart cities, can be applied to explore the needs and ideas of citizens regarding e-government projects (Cossetta & Palumbo, 2014). Furthermore, additional activities could be organized within this living lab such as Hackatons to provide citizens with the opportunity to actively participate in the implementation of the solution.

- H4: Social Media to "Improve the Portal and Strategy":

In order to get continuous feedback and ideas about their portal, La Louvière set up an online survey on the portal. However, this will only gain feedback from the people using the platform. Even though this survey gathers relevant feedback, more extensive inputs could be raised by using social media channels. Indeed, the use of Social Media in an e-government context often refers to the political participation of citizens but it can also be used in software development (Storey, Treude, & Van Deursen, 2010). Some authors including Bonsón, Torres, Royo and Flores (2012) have already studied the use of social media in an e-government setting.

6. Conclusions

User participation is an opportunity for governments to benefit from relevant information to design and improve their projects. The number of participation methods keeps increasing and is increasingly under discussion in various research fields (e-government, smart city, open government, information systems, human–computer interaction, etc.). However, there is little information about the impact of these methods on concrete projects.

This article contributes at several levels. First, we examined the case of La Louvière and were able to analyze empirically the impact of three participation methods in the processes of the city. Second, we were able to abstract in an implementation process four different steps that could be applied in other cities. Furthermore, we also suggested a participation method matrix for a participatory e-government project building on upon the aforementioned four phases and participation methods. Finally, this article also discussed the similarities and differences, as experienced by practitioners, between the converging concepts of e-government and smart cities.

This article provides leads for further research. The participation methods presented in the matrix that were not tested in this study should be implemented in concrete cases as recommended in the Discussion Section. Also, further research should be conducted to investigate whether the participation methods indeed led to an increased used of the portal in La Louvière. The impact of participation should also receive additional attention. Indeed, all activities performed in this study were limited to consultation purposes with no guarantee of impact on decision-making. An analysis of the extent to which the citizens have had an impact on the decisions of the e-government projects would be particularly valuable.

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Conflict of Interests

The authors declare no conflict of interests.

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