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Shefali Virkar, Peter Parycek, Noella Edelmann, Olivier Glassey,
Marijn Janssen, Hans Jochen Scholl, Efthimios Tambouris (Editors)

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Shefali Virkar, Peter Parycek, Noella Edelmann, Olivier Glassey, Marijn Janssen,
Hans Jochen Scholl, Efthimios Tambouris (Editors)

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Editorial

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Welcome to EGOV-CeDEM-ePart 2018!

This year is an important one in the history of the CeDEM conference series, as we merge with the IFIP WG 8.5 Electronic Government (EGOV) conference and the IFIP WG 8.5 IFIP Electronic Participation (ePart) conference to form the annual International EGOV-CeDEM-ePart Conference. The first edition of this landmark merger will be hosted from 3-5 September 2018 at the Danube University Krems, Austria. In keeping with time-honoured tradition, the Edition Donau-Universität Krems proceedings will make accessible to a global audience nascent and emerging state-of-the-art research and critical expert opinion. These proceedings consist of Ongoing Research Papers, Reflections and Viewpoints, PhD Research Papers, and workshop deliberations that engage with topics across the spectrum of the EGOV-CeDEM-ePart 2018 conference tracks: e-government and open government, e-democracy and e-participation, smart governance, artificial intelligence, data analytics and automated decision making, digital collaboration and social media, policy modelling and policy informatics, social innovation, and open data, linked data and the semantic web.

The ongoing research papers found within the pages of this proceedings elaborate cutting-edge work-in-progress and policy developments; and in doing so focus our attention on the ideas, issues, debates, methodologies, and policy tools that are not only highly relevant now, but those that will be in the foreseeable future. It is only appropriate, therefore, that these proceedings commence with a critical appraisal of the transformative capacity of disruptive technologies – and in particular, BlockChain technology – within the public sector. Charalampos Alexopoulos and colleagues critically review BlockChain technology state-of-the-art, and its application in the e-government domain. In placing BlockChain within the context of Government 3.0, the authors

examine the promised benefits of and barriers to the adoption of this emerging technology, and propose new directions for future research. Lingjun Fan, Sora Park and J. Ramon Gil-Garcia similarly focus, through the simulation of a sensor's network, on extending our understanding of the potential of BlockChain technology to facilitate and strengthen Internet of Things (IoT) data sharing and management in the public sector. Yet other ongoing research papers explore important facets and best practice examples of innovation in e-government systems. Understanding how to achieve interoperability amongst different information systems is an important aspect of the e-government debate. Through their examination of the Greek Ministry of Infrastructure and Transport, Vicky Margariti and Teta Stamati shine a spotlight on organizational interoperability and its relationship to innovations in key areas of e-government practice. Elsewhere, Marcus Zittei and Francisco Fernandes take a slightly different approach: they critically analyse, through the lens of General Systems Theory, the interplay between e-government and risk management systems. From a study of the case example of Mazars Brasil, an accounting services industry-leader in Brazil, their research concludes that e-government systems have the potential to create positive knock-on effects within existing risk management environments.

In research, it is never too late to revisit older debates with a new perspective: Morten Meyerhoff Nielsen, Ibrahim Rohman and Nuno Lopes look at the discussions surrounding the digital divide, and explore the impact that internet price-quality has had on online service use in Europe since 2008. In identifying tendencies and associations which could have an adverse effect on existing digital disparities within a European context, the authors also demonstrate the wider global relevance and applicability of their research. Social media platforms have become important spaces for civic engagement. Crystal Charles and J. Ramon Gil-Garcia, in a study based on social network analysis and content analysis about the New York City School of Data, characterize how governments engage with the civic tech community using Twitter. They show that as social media technologies develop, some of the traditional problems that hinder their effective exploitation as participation tools can be overcome. Lukasz Porwol and Adegboyega Ojo discuss how immersive virtual-reality-supported social media experiences can help mitigate some of the traditional barriers to full-fledged e-Participation, especially in terms of trust and citizen-engagement. Peter Bellström and John Sören Pettersson also focus on the use of social media by public authorities. The authors provide us with critical commentary on the adoption and use of social media by municipalities and local government bodies, through a pilot study of page owner comments on three Swedish municipality Facebook pages. In particular, they examine the degree to which these pages are used by their owners to connect with the people they serve. Elsewhere, in exploring digital collaboration leading to product development in the toy industry, Christos Kontzinos and colleagues discuss how social media channels facilitate co-creation amongst users. In order to learn from innovative e-Participation initiatives, it is important to have a yardstick against which these experiences are evaluated. Niels Primus and colleagues have developed the I-Participation Index, a framework based on guidelines from design science research that can be used by public professionals to describe, understand, benchmark, and to support their innovative participation initiatives. Grounded in a theoretical study, Primus et. al. offer us a validation of the I-Participation index through eight empirical case studies dealing with municipalities in the Netherlands. Increased citizen engagement is one of several factors key to the success of a Smart City. Another is the effective exploitation of city data infrastructure, by making often dispersed and heterogeneous

city data widely accessible to local stakeholders and the general public. Anushri Gupta, Panos Panagiotopoulos and Frances Bowen examine leveraging mechanisms within the context of smart cities using the case of London's city data, and how these can play a critical role in the deployment of integrated city data infrastructures. Other researchers explore how state-of-the-art technology can be used to exploit the massive amounts of data available both within and outside the public sector. Efthimios Tambouris examines closely how applications, based on chatbots and semantics, may be used by citizens to create value effectively from public sector information. Machine learning can also be applied to the study of citizen feedback. Robin Lybeck, Samuel Rönnqvist and Sampo Ruoppila report the results of an exploratory case study concerned with the sentiment analysis of citizen feedback in Finland. Bettina Rinnerbauer, Lörinc Thurnay and Thomas Lampoltshammer approach the study of Big Data from a legal perspective. Their research examines the degree to which legal warranty principles can be applied to the trade of data within the Austrian context and, in doing so, highlight the ways in which emerging technologies pose a challenge to established legal systems. Interesting advances are also being made in the field of open data research. The potential benefits of open data are diverse. However, the key to the effective exploitation of open data lies in developing a more nuanced understanding of the concept and its wider application. A comprehensive open data education can deliver just that, argue Maria Zotou and colleagues. Elsewhere, Ahmad Luthfi, Marijn Janssen and Joep Cromptvoets propose a framework to analyse how governments decide to open up their data. The technical design of an online digital environment or tool directly influences the nature and degree to which the various stakeholder groups become involved in processes of e-governance. Sergei Zhilin, Bram Klievink and Martin de Jong argue strongly for the development of a new type of open design platform, based on requirements gleaned from existing examples of digital platforms, to support Open Source Urbanism (democratized urban development through the co-creation of public spaces). E-governance process innovation may also come through an amalgamation of on- and offline tools and techniques. Chiara Fioravanti and Francesco Romano develop a participatory model aimed at simplifying administrative language pertaining to immigration procedures, and discuss how the resulting guidelines might be used to produce decision support tools.

Critical reflection and considered opinion are two important facets of academic scholarship that are often undervalued or completely overlooked. The Reflections and Viewpoints track at EGOV-CeDEM-ePart seeks to counter-balance this: the expertise of our authors lends fresh perspective to current debates, to fledgling ideas and future trends, and to new and old conceptual tools and methodological approaches alike. Two reflection papers in these proceedings consider the challenges and opportunities afforded by BlockChain technology in democratic environments. While the technology possesses the potential to introduce a high degree of transparency into governance processes by providing an immutable record of all transactions, Paulo Fontana, Bruna Diirr, and Claudia Cappelli argue that discussions about its overall use and impact require more attention. Soumaya Ben Dhaou and Ibrahim Kholil Rohman similarly reflect on the challenges and implications of adopting disruptive platform technologies such as BlockChain as a base for e-Identity systems. Smart Cities are also discussed. Although already a mature research domain, several questions remain open to debate: When is a city considered ready to transition from an ordinary urban to a smart one? What makes a Smart City truly 'smart'? And what implications does smart city governance have for developing countries? Nuno Lopes and Shahid Farooq,

looking at the Pakistani cities of Lahore and Multan, attempt to answer some of these questions. Using the municipality of Búzios in Brazil as a case example, Mariana Brandão, Luiz Antonio Joia, and Gabriel Marcuzzo do Canto Cavalheiro also explore what it means for a city to be 'smart', and in particular whether definitions of 'smartness' go beyond mere technological innovation. Across the world, technology has transformed the relationships between governments, citizens, and businesses. Jörn von Lucke considers how, in Germany, the Federal government's commitment to the Open Government Partnership is paving the way for administrative modernization and regular dialogue with civil society. Technology can further connect, engage, and empower its users. Jakob Svensson and Cecilia Strand explore how Information and Communication Technologies have given the Ugandan LGBTIQI community a voice in the face of state-sponsored persecution. However, motivating citizens to engage and stay engaged in public participation initiatives remains a significant challenge. Can incorporating game-design elements into regular public participation applications to make interactions more entertaining and enjoyable help improve matters? Sarah-Kristin Thiel investigates this issue, and proposes a matrix-based framework to structure past and future entertainment-related participation approaches.

Academic scholarship and its relationship with policymaking is an issue of perennial concern. Can there be harmony in the relationship between researchers and policymakers? When and how do increases in knowledge lead to practical improvement? Based on a specific study of improving justice for economic development and growth Soumaya Ben Dhaou, Mariana Lameiras, Delfina Soares and Ibrahim Rohman show us how scientific research can be leveraged and built upon to feed into policy-modelling. An informed analysis of key concepts, methodologies, and techniques is just as important to research-driven decision and policymaking. Nettra Pan, in discussing the role of social investors as enablers of social innovation and social innovation research, takes a close look at 'identity duality' and examines how organisations navigate their dual commercial and social identities in this context.

EGOV-CeDEM-ePart 2018 is not just a forum for well-established researchers. The conference's PhD Colloquium brings together young scholars and supports them in the dissemination of their research ideas and original solutions to complex problems. A pressing issue for many governments is how to expand citizen acceptance of e-government systems, and to extend their participation in processes of e-government service co-creation. In contributing to this discussion, Anthony Simonofski has developed the CitiVoice Framework: a formalized rubric of citizen participation categories gleaned from across the related research fields of e-government, public administration, open government, e-participation, and smart cities). Based on this, Simonofski aims to create a usable methodology to help scholars and practitioners identify the most appropriate methods for involving citizens in the co-creation of e-government services. Alexander Hoose is also concerned with the users of e-government systems and their role in the system development process. His work takes a close look at the characteristics of online platforms, and examines whether these can be harnessed to solve adaptation and co-ordination problems encountered by different stakeholders during the ongoing development of networked e-government systems. But does moving government services online add a new layer of complexity to e-government service provision? Maija Ylinen believes it does, and her doctoral work explores how the increased complexity associated with moving government systems online can be

managed through the use of enterprise architecture (EA). Ylinen's research aims to extend current understanding about EA application, especially within the context of the implementation of a holistic approach to IT management in public sector.

The establishment of functioning e-government systems is an essential step for those local government authorities intent on building smart cities around the world. However, digital technology alone does not guarantee improvements in citizen welfare. Adeoluwa Akande focuses on the dual requirement of modern cities to be both 'smart' and 'sustainable', and the urgent need to evaluate the progress made along each dimension at every step of smart city transformation. Akande proposes the development of a framework to assess the relationship between smart and sustainable cities, particularly in Europe, based on critical indicators acquired from an extensive research literature review and in-depth case study analysis. Creative solutions to welfare-related issues may be reached through the use of digital technologies and digital platforms. Judith Schossböck critically analyses bottom-up health discourse on social media. Based on semantic network analysis, netnography and semi-structured interviews, her study focuses on issue-based advocacy groups and social support communities for thyroid disease. In particular, she aims to develop a framework for the analysis of social media interactions within contemporary health advocacy.

Some of the PhD scholars also grapple with issues related to open data. While it is widely recognized by governments that are significant benefits to opening up data banks, many public agencies are often reluctant to do so; especially since decision makers often have no way of determining the magnitude of the actual risk involved. To tackle the problem, Ahmad Luthfi's work proposes a Decision Support System (DSS) based on Design Science Research Methodology (DSRM) principles. Luthfi envisages that a robust DSS would not only help decision makers evaluate the potential risks and benefits of opening a dataset, but also enable them to select the best possible course of action going forward. Heike Vornhagen takes a critical look at the demand-side of open data. She argues that data visualisation is particularly useful for communicating open government data to a wider (and often lay) audience, and can support increased engagement with the underlying datasets. Using governance dashboards as case examples, Vornhagen's research aims to develop a visualisation model for open data practitioners that captures the complexity of an e-government system and allows users to focus on details without losing the impact of any macro-trend.

Workshops are by definition interactive sessions where a group of people engage in a focused discussion or activity relating to a particular topic. The three workshops at EGOV-CeDEM-ePart 2018 allows conference attendees to discuss and deliberate on an eclectic mix of current research issues, curated by experienced researchers and expert practitioners: from Government 3.0 (Maria Wimmer, Alexander Ronzhyn, Gabriela Viale Pereira, Yannis Charalabidis, and Harris Alexopoulos), to the application of Big Data to decision and policy making (Panagiotis Kokkinakos, Spiros Mouzakitidis, Esther Garrido Gamazo, Nuria Rodríguez Domínguez, Pavel Kogut and Francesco Mureddu), and the use of social media in public administration (Noella Edelman, Bettina Rinnerbauer, and Daniel Medimorec).

We hope that you enjoy your time at the conference! The editors would like to thank the authors for their contributions; but also the peer-reviewers, the programme committee, the track chairs, the proof-readers, and the sponsors for the time and effort expended in making the inaugural edition of the EGOV-CeDEM-ePart Edition Donau-Universität Krems proceedings a stimulating and thought-provoking volume.

Ongoing Research

BlockChain Technologies in Government 3.0: A Review

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Abstract: Government 3.0 is characterised by the utilisation of disruptive technologies in conjunction with already established ones towards data-intensive decision- and policy-making. One of the disruptive technologies that will affect in general e-government applications and services provided and will more specifically frame government 3.0, is BCT. Yet no systematic research is available which compares the benefits of BCT with the barriers to its adoption. This paper conducts a literature review, research projects and applications review for the BCT within the respecting area of e-government. The inquiry follows a desk-based methodology for the identification of the primary references and research projects as well as a qualitative discussion with experts of the domain. This study identifies the major benefits and impediments for the application of this technology in the e-government domain. The findings show that a gap exists between the promised benefits and barriers and frame future research directions.

Keywords: government 3.0; blockchain technologies; policy-making

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1. Introduction

Government 3.0 (Pereira et al., 2018) refers to the use of disruptive ICTs such as big data, blockchain technologies (BCT) and artificial intelligence technologies in combination with established ICTs such as distributed technologies for data storage and service delivery and the wisdom of crowd (crowd-sourcing and co-creation) towards data-driven and evidence-based

decision- and policy-making (Nam, 2015; Song, 2014). Previous research mapping the disruptive technologies against their transformative capacity within the public sector (SONNETS, 2015), has indicated that currently, the most hyped technology is BCT. BCT consists of the technology behind Bitcoin, both introduced and implemented by Nakamoto (2008). Hou Heng (2017) defines BCT as *“a distributed ledger that maintains a continually growing list of publicly accessible records cryptographically secured from tampering and revision.”*

By using a P2P network, BCT is considered as the best solution so far for transactions between system's actors (called nodes) while storage of these transactions enabling all nodes to track the history in a distributed way is a fact (Antonopoulos, 2014). One of the most important processes is the consensus mechanism, an agreement by a selected number of nodes for the next block to be added (Van Valkenburgh et al., 2016). Distributed ledger is the usage of different nodes in order to store transaction information (Ølnes, S. et al, 2017). Digital signature is a combination of private key and transaction's data. Public key and digital signatures are being used for a safe transaction to be completed (Warburg, 2016); thus, BCT keeps sensitive information (such as personal, business) secured and private, allowing an unmediated process of a transparent and indestructible activity.

BCT is much more than enablers of crypto-currencies since it can be thought of as a distributed record of any type of transactions between parties (Zheng et al., 2017), where transactions are validated and recorded in chronological order (in a sequence of “blocks” – hence the name) by a decentralized network of peers (Antonopoulos, 2014), without need for a central/trusted/third party. BC is a promising solution for a variety of services (Narayanan et al., 2016) such as smart contracts (Kosba et al., 2016), public services (Akins et al., 2013), and Internet of Things (IoT) (Zhang and Wen, 2015). As it has been stated in a number of recent studies (Engelenburg et al., 2017), DLT's can also significantly contribute in making the public sector a faster, more open, trusted party. A recent survey conducted by IBM (2017) and the Economic Intelligence Unit, that 7 out of 10 government executives predict BCT will significantly disrupt the area of contract management, while 14% of government organizations expect to have BCT in production and at scale in 2017.

Generally, BCT implementations are largely technology driven and often various combinations of technologies are needed to make the BCT architecture fit for e-government applications (Engelenburg et al., 2017). However, since the field is still in its infancy, a series of challenges exist, which call for further investigation. Therefore, it is necessary to analyse BCT from various perspectives, in order to gain a better understanding of its potential benefits as well as factors that determine their adoption in the public sector. Our paper makes a contribution towards this direction. On the one hand, it reviews existing literature on the e-government field and presents the current landscape of BCT implementations in the public sector. Hence, the aim of this study of the literature is to identify benefits and barriers for the application of BCT in government and shape the directions of future research in the Government 3.0 field related to that.

This paper consists of seven sections. In the following Section 2, the methodology underlying our research is presented. Section 3 and 4 illustrate the results of the literature, the analysis of existing implementation of BTC in the public sector and the workshop conducted. Section 5

summarizes the benefits and challenges of BTC. In the final Section 6, the conclusions are summarized, and future research directions are proposed.

2. Methodology

This chapter presents the methodological approach of our study in order to complete a review of the current landscape of BCT including the opinions of experts in the domain following the snowball approach for redirecting to additional sources from the initial ones. We first conduct a literature review that enabled us to assemble the basic types and characteristics of BCT, as well as the types of benefits and barriers that have been identified until now. In particular, the research began by searching for relevant publications in the EGRL database using the following keywords: “blockchain government”, “blockchain public sector”, “blockchain benefits”, “blockchain barriers”, “blockchain challenges”, “blockchain public services”. Then it continued with a careful examination of four bibliographic databases, Google Scholar, Scopus, IEEE Xplore and Web of Science using the same keywords.

Guided by the research papers, pinpointing in specific projects and applications identified in the previous step (Sullivan & Burger, 2017; Ølnes, 2016; Luther, 2016; Hou Heng, 2017), the next step of our methodology consists the identification of running projects relevant to e-government. Combined with desk research, we analysed each project by its domain of application, type of BCT, partner that undertook implementation and the scope of the application (local, national). The final step of our methodology includes the organisation of semi-structured interviews with six experts from the industry, the academia, and the public sector. For that reason, a workshop had been organised during the kick-off meeting of the Hellenic Blockchain Hub, where we had the opportunity to discuss with blockchain experts about the importance and prospects as well as the challenges of BCT in government in order to validate our findings and identify missing parts. The results of these steps (i.e., literature, applications review, and workshop) are reported in the following sections. In section 6 the results have been merged and analysed. Section 4 on potential benefits and challenges of the technology is a merge of literature review and interviews results. Section 5 presents the projects types and countries of implementation and it is the result of the second step of the methodology. The discussion and conclusions sections are derived from all the three steps of the methodology.

3. Landscaping BCT Applications in E-Government

BCT is often used as a solution for the improvement of public services. Recent case studies include BCT for digital payments (Luther, W.J., 2016), providing academic certificates stored on the BCT at the University of Nicosia (Ølnes S., 2016), a sovereign government – backed identity credential (e-ID card, e- Residency) in Estonia (Sullivan & Burger, 2017) and healthcare, pensions, government performance, food safety, and government divisions, all of which have close relationships with individuals’ livelihood in China (Hou Heng, 2017). Another stream of literature shows that there are more than one categories/types for current BCT systems. Buterin V. (2015) distinguishes three types which are (1)public BCT, (2)private BCT and (3)consortium BCT while Ølnes S. et al. (2016)

stated that BCT systems can be viewed into two basic types (1) private BCT or (2) public BC including their subcategories which are either open/permissionless or closed/permissioned. The continuously growing number of BCT initiatives that are being adopted in the public sector by various states is a strong indicator of the current trend advocating the utilization of key BCT.

Figure 1: Examined BC Initiatives

IMPLEMENTATION PARTNERS	Government	Extension	Type	Domain	ABOUT
Blockcerts	Malta	National	Public	Academic Certificates	Blockcerts is an open standard for creating, issuing, viewing, and verifying blockchain based certificates.
uPort	Switzerland	Municipal	Public	Identity Management	uPort is a self-sovereign identity system that allows people to own their identity.
R3	United Kingdom	National	Private	B2B Solutions	R3 is an enterprise software firm developing Corda, a distributed ledger platform designed specifically for financial services.
Guardtime	Estonia	National	Private	Health	Guardtime is a technology platform called KSI that allows to tackle hard problems in security, supply chain, compliance and networking.
Cambridge Blockchain	Luxembourg	National	Private	e-ID	Cambridge Blockchain's distributed architecture resolves the competing challenges of transparency and privacy, leading to stronger regulatory compliance, lower costs and a seamless customer experiences.
Loyyal	Norway	Organizational	Private	Loyalty Program	Loyyal is the universal loyalty and rewards platform, built with blockchain and smart contract technology.
Chroma Way	Sweden	National	Private	Land Registry	ChromaWay provides go-to-market solutions for different financial sectors.
Proclivis	Switzerland	National	Private	eID	Proclivis was founded by a clear mission: to empower individuals everywhere by providing them with trusted and compliant digital identity solutions they can fully own and control.
MONI	Finland	National	Public	Finnish Immigration Service	MONI's technology uses one of a number of public blockchains as the means of transferring value—but in a way that to the users seems like using a debit card.

In general, the use of BCT in the public sector is still limited to a few relevant cases (Figure 1). BCT represent a core segment of technology innovations that create significant opportunities for a major and disruptive refresh of a wide spectrum of infrastructure and applications. The analysis of these BCT applications results in the following observations:

- The applications have covered a lot of domains: health records, identity management, land registry, document exchange, and academic certificates.
- The majority of BCT implementations in the EU area results from partnerships with private companies, undertaking the role of technology providers that implement BCT based solution to governments.
- The applications and/or case studies utilizes both public and private BCT regardless of their scope (e.g., identity management and land registry projects utilize both public and private ones). Projects dealing with health records utilizing private BCT implementation.
- There are different levels (organisational, municipal and national) of initiatives extension. The majority of the case studies have been implemented at national level. There is no correlation between the level of extension and the type of application according to their TRL level. Some large-scaled implementations applied to the national level while other national implementations have developed proof of concept. This probably depends on the experience of the staff involved and the orientation of national governments towards the adoption of innovation (i.e., how much they trust or are convinced about the benefits of the new BCT).

4. Workshop Findings

Most of the interviewed experts agree that BC is a promising technology that will frame government 3.0 but lacks evaluation results as well as requirements specification in the applied

domains. One expert from the public sector stated: "...the way forward is to apply and evaluate". Government 3.0 is about data-intensive policy-making in which the BCT offers the great advantage of trustworthy data for analysis and decision support. Another expert from industry stated: "...all benefits coming from the utilisation of BCT or DLT in e-government will alternate the way public services are offered". Another expert from academia stated: "We are a step closer to the realisation of the fifth stage of e-government - personalisation and proactive government" since the information will not be circulated between different information systems through web services but it will be always there for use.

The discussion with the experts unveils two major issues about BCT use and future prospects: Data exchange through BCT could not be applied in all systems. According to GDPR, the right to be forgotten, also known as data erasure, "...entitles the data subject to have the data controller erase his/her personal data, cease further dissemination of the data, and potentially have third parties halt processing of the data. The conditions for erasure, as outlined in article 17, include the data no longer being relevant to original purposes for processing or a data subjects withdrawing consent. It should also be noted that this right requires controllers to compare the subjects' rights to "the public interest in the availability of the data" when considering such requests.". Since this right should be applied in certain occasions dealing with sensitive information of a human being such as health history (a person might need at some point to erase his/her information from his/her health record), it constitutes a great barrier in BCT application. It is obvious that each system should carefully evaluate its transition to BCT. Most of the cases in government though does not apply to this regulation.

5. Results and Discussion

Regarding the benefits of using BCT, Hou Heng (2017) reveals that BCT can bring many benefits including improvements in the quality and quantity of government services by the simplification of most government processes, such as bureaucratic processes, government information with greater transparency, open and accessible; thus, government's credibility can be improved, and even assistance in building an individual credit system including data safety (Gervais et al., 2016) and anonymity (Böhme et al., 2015) among any authorized party. Moreover, storing any secured information using BCT is a profitable solution for public services. Thus, offered government services could be personalized and borderless transforming society into a more collaborative one (Swan M, 2015; Atzori M, 2016).

At the same time, the application of the BCT to the domain of e-Government is associated with some challenges (Zheng Z. et al. 2017) as listed in Figure 3. Scalability is an important challenge problem since only seven transactions per second can be processed. If we consider BCT as a payment solution used by the government with a requirement of processing millions of transactions, many of these transactions might be delayed. Furthermore, while BCT uses public keys publicly visible of any transaction there might be safety challenges including information leakage (Zheng Z. et al. 2017).

Another challenge reported by Zheng Z. et al., (2017) is Selfish Mining. While selfish miners try to hack the chain, not only nodes with more than a half (51%+) computing power can reverse a transaction, but it is shown (Eyal and Sirer, 2014) that also around the half computing power is dangerous. Another challenge which is faced by the usage of BCT is the impression that only the trust of the technology, rather than management, is enough for a system to be safe and reliable (Hou H., 2017). Alternatively, authentication can be offered to be valid in one country for instance e-IDs, but they are not necessarily legally binding in any other nation-state. Moreover, as Sullivan C. & Burger E. (2017) mentioned “*there is the risk that identity information authenticated on the BC but which is otherwise invalid may find its way into traditional channels to enable creation of new, false identities, which could then be used to hide one’s real identity*”.

Figure 2: Potential Benefits of BCT usage by governments

Topic	Reference	Details
Quality & Quantity	Hou Heng (2017)	BCT can empower public services by improving their interoperability, speed of service and increasing their predictive capability
Processes Simplification	Hou Heng (2017)	BCT boosts government’s processes by speeding up necessary sub-processes since information’s access is easiest and quickest.
Transparency	Hou Heng (2017); Atzori M. (2015)	Transactions and historical data of transactions are publicly visible on a chain and cannot be modified.
Openness Accessible	Hou Heng (2017); Swan M. (2015)	Information stored in a chain is open and accessible by anyone.
Information Sharing	Hou Heng (2017)	Stored data in a chain can be easily shared among all participants (organizations, citizens etc)
Data Safety	Gervais et al. (2016)	Consensus mechanism is being used by BCT and ensures the integrity of the chain (data).
Privacy	Tapscott D. and Tapscott A. (2016); Zyskind and Nathan (2015)	User’s or information’s anonymity can be accomplished by the usage of private keys
Reduced cost	Øines (2016)	Transaction’s costs can be reduced since by using BCT the need for third parties is being removed.
Government Credibility	Engelenbur S et al. (2017), Hou Heng (2017)	BCT-based platforms can be used to give citizens access to reliable governmental information increasing citizens’ trust to governments.
Standardization	HBH workshop	There are eight ISO standards under development for BCT
Flexibility	HBH Workshop	BCT can be used in several ways in order to improve public services.

Figure 3: Potential challenges of BCT

Topic	Reference	Details
Scalability	Zheng Z. et al. (2017)	Since only few transactions per second can be processed, transactions might be delayed.
Privacy Leakage	Zheng Z. et al. (2017)	Public keys of any transaction are being visible, so safety challenges may be detected
Selfish Mining	Zheng Z. et al. (2017); Eyal and Sirer (2014)	Selfish miners may try to acquire nodes' computing power in order to reverse transactions.
Trust of the Technology	Hou H. (2017)	A blind trust which relies exclusive on the BC's technology may include risks
Legally Binding	Sullivan C. & Burger E. (2017)	Although chain is accessible by any node, information may be invalid in other nation states.
Applicability in terms of GDPR	HBH workshop	GDPR's goal is opposite effective in some cases compared with BCT's especially in the domain of personal data.

6. Conclusions and Further Research Directions

This study has conducted a review towards the identification of benefits and obstacles towards the adoption of the BCT innovative technology in the public sector. Our findings indicate that BCT as an enabling array of technologies that can contribute to the openness and transparency of services in the public sector. This technology has been analyzed as a prominent component of the next generation of e-government, namely, Government 3.0. According to the applications and benefits identified, blockchain-based technologies can be incorporated in several public services and enhance transparency and trust in governments. BCT is capable of underpinning many innovations such as the Internet of Things, as well as disrupting radically its own. Many technologies have great potential for use but without including the service provision. Instead, BCT is a promising technology and by having a great potential, can be used in public sector. BCT consists of political implications which can reconfigure ultimately broader socio-political relationships such as legal, institutional even economic.

However, considering all BCT's benefits and challenges, it is important to understand whether the use of a technology such BCT is important in the domain of e-Government and if so in which sectors. Careful consideration of the use of BCT should be given in the cases the GDPR right to be forgotten is applied (even bank records could be deleted after five years). Moreover, all the identified benefits and obstacles should be proven and addressed through impact analyses and thorough examination of current and future applications. Future studies have to answer a lot of research questions to confirm the importance of using this emerging technology by governments. Among the many research questions are which is the value of adopting BCT by governments? To what extent citizens' trust will be influenced by the adoption of this technology? To what extent the use of this technology will help governments to struggle against fraud? Should the public sector use a separate sidechain and if so, what would be the major threats to such a strategy? According to the answers, governments could identify the impact of BCT adoption by public services and how public sector should approach the BCT.

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Understanding the Potential of Blockchain for IoT Data in the Public Sector: Challenges and Benefits in a Simulated Environment

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Abstract: Data from Internet of Things (IoT) networks are being generated in many smart city- and other public-sector initiatives around the world. While current cloud center-based IoT network shows some advantages for data management in the public sector (e.g., large capacity, flexibility), several data privacy and security challenges arise in these centralized IoT networks. Because blockchain technology can store IoT data in a distributed way as well as manage the data by allowing the participants (stakeholders) to design and implement their own data access control policies, blockchain technology has the potential to facilitate and strengthen data sharing and management in the public sector. However, the benefits of blockchain technology are only conceptual and it lacks empirical evidence as to what kinds of benefits and challenges blockchain technology would bring to data management. In this paper, we simulate a sensors' network and analyze how blockchain can be used for IoT data management in the public sector.

Keywords: blockchain technology, Internet of Things, smart contract, data management

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1. Introduction

In building a smart city, the public sector often sets various kinds of sensors or develops information systems to collect and analyze data to improve public service. Internet of Things (IoT) is utilized to improve the quality of citizen's life in a city by enabling the collection and sharing of information related to transportation, public health, and environmental protection. However, the IoT data is stored and managed by a centralized cloud center, thus raising security and privacy concerns, which implies a single point of failure, easily being attacked, and performance bottleneck. The recent development of blockchain technology could be seen as an innovation that can offset the major drawbacks of IoT by changing the whole landscape of how data is stored,

shared and managed securely. Blockchain technology allows for secure transactions of data by storing new information in different nodes and adding new information in its transaction history only when the nodes reach consensus. This distributed ledger system stores full transaction history which cannot be altered once a node approved by the trusted users in the blockchain network. As blockchain technology reduces the risk of manipulation, it has the potential for the handling of highly sensitive information such as land registry, voting records, educational certificates, and so on (Ølnes et al., 2017). This presents the new possibilities for e-government for storing, exchanging, and integrating data effectively and securely although blockchain technology still faces several challenges with software bugs, discrepancies and processing capabilities and other system vulnerability for its internal users (Al-Saquaf & Seidler, 2017; Atzori, 2015; Walport, 2016). Blockchain technology relies on ad-hoc processes in which relevant stakeholders come to a consensus on the technical code. Some researchers raised concerns about the potential role of blockchain technology in decentralizing the traditional form of institutional governance (Hsieh et al., 2018; MacDonald et al., 2016; Narayanan et al., 2016). While traditional governance mechanisms involve public, private, and civic organizations, digital governance requires the alignment of interests of internal users inside the governance network.

Drawing on those various challenges of blockchain governance, we wanted to explore the ways in which blockchain can be used in the public sector and produce positive results. In particular, we decided to examine the potential benefits and challenges of peer-to-peer, decentralized networks in which different users (e.g., government agencies, research organizations, private firms) can join, verify, and share a constant stream of real-time data without much constraints (e.g., infrastructure, technology, personnel). Because the actual application of blockchain technology in the public sector is in its exploratory stage, this study intends to lay out some empirical foundations by simulating the environment in which practical benefits and challenges of blockchain governance can be examined and further discussed for future studies. For simulating a data governance environment backed by blockchain technology, we utilized an IoT network because it is increasingly recognized as an essential platform for capturing a continuous flow of data in building smart cities and working as a sensory system of a city. It is well known that security and privacy issues are major challenges to the IoT network and its data. In this paper, we examine how blockchain can complement or enhance data management in the IoT network environment. As we compare the theoretical concepts to the practical challenges arising from the simulated environment, our preliminary findings show that blockchain technology can enhance the data management process by mitigating some of the privacy and security concerns rising in the centralized IoT management. The organization of the rest of the paper is as follows. In section 2, we summarize the related work followed by our approach in section 3. Lastly, we discussed our preliminary findings in section 4.

2. Literature Review

While traditional information exchange requires a trusted intermediary that enables secure transactions of information and assets, blockchain eliminates the need of such intermediary by providing a decentralized, immutable, and transparent public ledger shared by all network

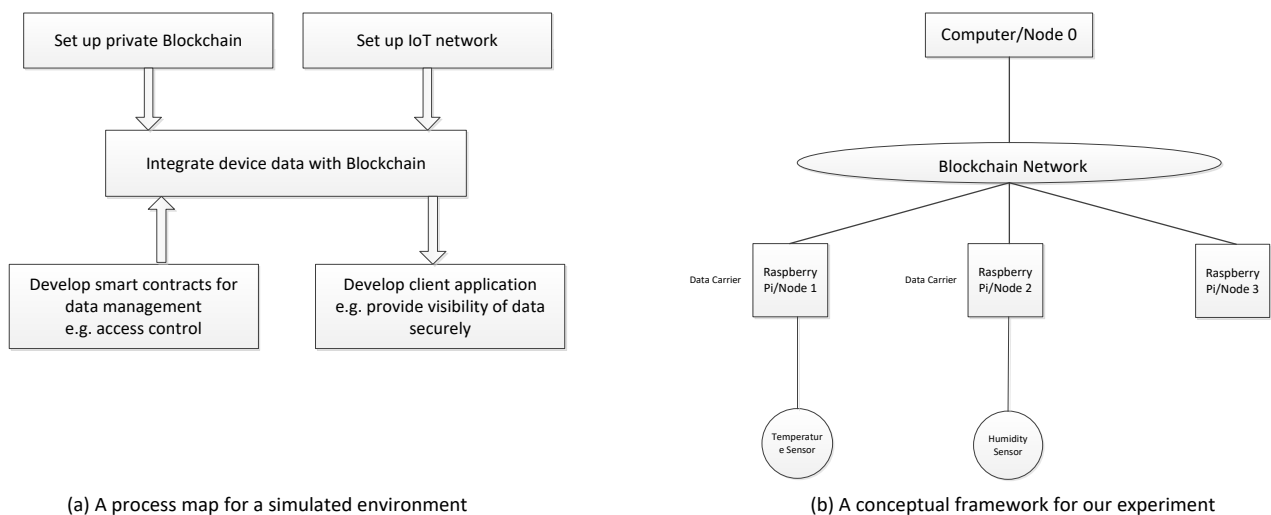
participants (Lin & Liao, 2017; Puthal et al., 2018). All transactions are permanently recorded while each transaction is verified and approved by the network participants based on their pre-defined consensus mechanisms (Puthal et al., 2018). Governments around the world are currently working on developing blockchain services and applications. For example, the Dutch government set up 40 different pilot projects at multiple levels of the government (e.g., ministries, municipalities). Their pilot projects develop use cases for a blockchain based-system to store and process public information which expands from digital identity to judicial decision to public financing (Blockchain Projects, 2018). Similarly, the Estonian government developed a blockchain platform to protect its electronic data from hacking, manipulation, and system failures (e-estonia.com, 2018). Researchers expected that the blockchain technology system would be useful for government organizations exchanging information directly on peer-to-peer platforms (Ølnes et al., 2017). This also has future implications as to how such technology will enhance data sharing and management across different government organizations and thus serve as a support infrastructure for e-government (Ølnes & Jansen, 2017).

The concept of smart cities by definition seeks for innovative ways to communicate and share information that can improve the quality of urban life (Sun et al., 2016) and thus smart cities can benefit from IoT network and its broadband connectivity. While IoT is useful for gathering and sharing real-time information relating to traffic, weather conditions, pollution status, and the like, it is characterized by low storage capacities and other privacy and security vulnerability issues (Bota et al., 2016; Dorri et al., 2016). Given the weaknesses of IoT, an increasing number of researchers integrated blockchain technology into IoT devices because blockchain provides security and privacy benefits that IoT lacks. Dorri et al. (2016) proposed a blockchain-based architecture for IoT that delivers lightweight and decentralized security and privacy. Their proposed IoT architecture eliminates the high bandwidth overhead and delays while maintaining most of blockchain's security and privacy benefits. They applied such architecture to smart home devices with local blockchain and local storage. Similarly, Christidis and Devetsikiotis (2016) examined the ways blockchain and IoT can be used together, highlighting certain issues with transactional privacy and the expected value of the digitized assets trade on the network. Huh et al. (2017) chose Ethereum as the blockchain platform to control and configure IoT devices. They proposed that smart contracts can help manage configurations of IoT devices and build key management systems. A main drawback of IoT applications and platforms, however, was their reliance on a centralized cloud from a security standpoint. In an effort to strengthen IoT security, they suggested that blockchain can reduce IP spoofing and other securities issues related to identity and access management (Kshetri, 2017). Access control and protection are significant issues for IoT data management, especially for private and sensitive data such as personal medical information collected through IoT devices (Azaria et al., 2016). Rifi et al. (2017) proposed a blockchain-based architecture by using smart contracts and a publisher-subscriber mechanism to overcome this issue. Other researchers also raised concerns regarding the access control issue of the IoT. They propose a smart contract system to achieve a distributed and trustworthy access control for IoT systems (Zhang et al. 2018).

3. Our Approach

Blockchain technology can be useful in not only securing data access but also storing and integrating data in a distributed way. Researchers already attempted to combine IoT and blockchain. IOTA is a distributed ledger that is being built to power the future of the IoT with feeless microtransactions and data integrity for machines, anyone who wants a transaction must verify two existing transactions for others (IOTA Foundation, 2018). It has better scalability with a Tangle architecture. However, with no blocks and no chain, the data would be stored in a more complex way. Also, without a miner, the data security is hard to ensure, because not enough computing power is encouraged to participate in the network. This would result in the verification efficiency of IOTA not being fast enough to process IoT instant data.

Figure 1: The Experimental Framework



(a) A process map for a simulated environment

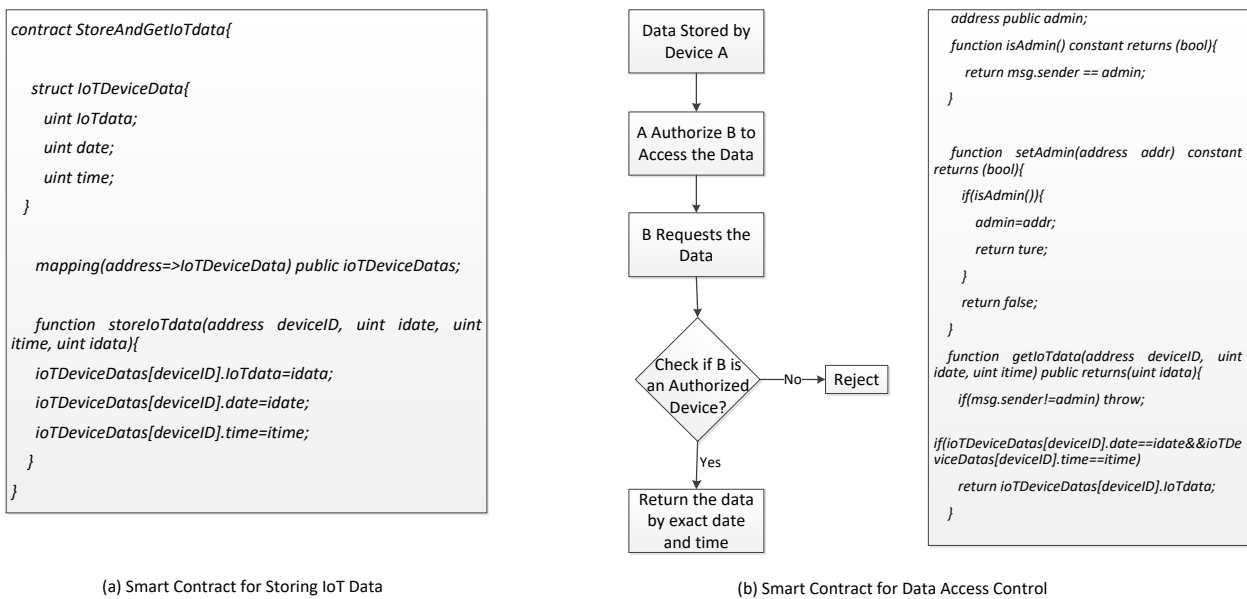
(b) A conceptual framework for our experiment

We, therefore, chose Ethereum in our simulated environment to conduct the experiments. Ethereum is recognized as the second generation of blockchain platforms, and, like Bitcoin, it saves transaction records in blocks. Adding a new block requires a consensus by all the nodes connected to the network and each node can have a copy of the blockchain data. In addition, Ethereum provides an environment called EVM (Ethereum Virtual Machine) to support smart contracts (Solidity, n.d.). Smart contracts are codes implemented on blockchain for managing interactions between nodes and participants of the system. It can have conditions and consequences depending on actions. A smart contract usually provides many functions or applications binary interfaces (ABIs) that can be used to interact with it. Triggering a smart contract is done by addressing a transaction from an account or a message from another contract to it. It can also be executed by invoking the call function without sending transactions and messages. By being flexibly designed and deployed, smart contracts can run without human interventions, and thus it reduces the security and access control concerned with the exchange of data in the IoT system.

Public blockchain, permissioned blockchain, and private blockchain are three kinds of blockchain network. Public blockchain network is open to public and thus everyone can be a participant; permissioned blockchain only allow authorized organization or person to participate;

private blockchain is open to a specific person or organization. It is best to adopt permissioned blockchain, if there exists more than one public sector for an IoT scenario, in which, integrating, sharing, and management of IoT data are critical issues. The goal of this paper is investigating the potential benefits and challenges when combine IoT data and blockchain technology and how smart contracts can support data management policies. In the experiment, we chose to build a private blockchain for simplicity. However, this will not affect the distributed storage of data, the formation of consensus, and the design and operation of smart contracts.

Figure 2: Pseudo-Code of Smart Contracts



3.1. Description of the Experimental Framework

For our experiment, the main steps are as follows. First, we set up an IoT network ecosystem containing data producers, data consumers, and data carriers. Second, we set up Ethereum platforms in order to create a private blockchain environment. Ethereum platforms can consist of several nodes; each node has its own account and communicate with each other. Third, we integrate IoT data with blockchain by storing the data from IoT devices in our private blockchain. Blockchain here works as a database for IoT devices. Lastly, we implement smart contracts as a way to enhance data management. This will also enable data retrieval from blockchain for further utilization, for example, developing data visualizations and other applications. Smart contracts essentially facilitate the utilization of blockchain data. This entire process is mapped in Figure 1(a).

As shown in Figure 1(b), we utilize Ethereum's smart contract platforms to create intelligent and automatic policies to manage the data. We design and implement the contracts to store, transfer, exchange, and integrate sensor data that was transferred by Raspberry Pis (RPi). A total of two sensors – one temperature sensor and one humidity sensor – are used as two IoT devices to produce data. Because of their computing capability, both sensors need an RPi as a proxy to connect to the blockchain network to store or get data. In other words, the RPis are installed with Ethereum client (a software) and work as a data carrier node. Also, a separate RPi connected to the

blockchain will work only as a data requester. Each of them plays different roles. This simulated environment is similar to the public sector when it comes to data sharing and management between different agencies. Different organizations in the data ecosystem have different roles and rights to data access and exchange.

3.2. Design and Implementation

Because smart contracts can be individually designed to meet the user's needs, we write specific policies for smart contracts to enhance IoT data access control. The basic smart contract for storing IoT data is depicted in pseudo code in Figure 2(a). We define the structure of the IoT data including date, time, and IoT device ID. All of them will be used later as the key to finding the exact data being requested and queried.

The key properties of smart contracts are decentralization and automation. Smart contracts do not rely on one central node but are distributed by various network nodes. Smart contracts are automatically triggered to manage data collected from IoT devices connected to the network. An example of allowing an authorized IoT device to get IoT data from blockchain without any interventions is shown in Figure 2(b). Thus, IoT data can be cryptographically encrypted and stored on blockchain other than in a cloud center owned or controlled by a third party, which may reduce the issues with privacy and security in traditional IoT networks.

4. Preliminary Findings

In this paper, we simulated a data sharing environment in the public sector by creating an IoT network in which three Raspberry Pis are connected to the network while they are assigned different roles. Those Raspberry Pis played different roles that various actors may play in an IoT network and thus they required permission to get access to data in the network. Moreover, smart contracts allowed users to freely design their own security policies in the data system and thus they showed the potential for resolving the traditional challenges of access and rights to data in complex public-sector environments in which multiple agencies and multiple levels of government exist. Smart contracts not only keep good records of data transactions, but they also make data management more transparent because they are agreed upon by the rules and policies set by different stakeholders in the system. This has also the potential to contribute to openness and accountability. We believe that our experiment can also be extended to the government data sharing environment and be particularly useful in the context of smart city initiatives.

This paper examines the blockchain support for IoT data management in the public sector, including the use of smart contracts to implement data management strategies to enhance data security and privacy protection. What needs to be clear is that using blockchain for data storage is not a cost-effective thing. Blockchain distributed technology focuses on the implementation of decentralized mechanisms. Data storage can be handled by a dedicated storage system, for example, IPFS (Interplanetary File System), which will require good integration and cooperation. This will also be our future work.

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Organizational Interoperability in E-government: A Case Study from the Greek Public Sector

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Abstract: Digitization of public administrations across Europe is considered a tool for the delivery of efficient, cost-effective, and transparent public services. The essence of implementing e-government services lies in accomplishing interoperability among the different information systems. There are still many challenges and limitations due to technical, semantic, and organizational factors. The importance of organizational interoperability towards information integration has been known for years, but not only does it remain an enduring challenge, it also gains momentum due to the enforcement of new policies, such as open data. This paper initially presents a brief literature review on interoperability and then highlights the importance of organizational interoperability in e-government, along with its relevance to governance, open data policies, and information sharing. A case study for accomplishing organizational interoperability in the Greek public sector is also presented. Best practices are proposed to implement interoperable government services for the Greek Ministry of Infrastructure and Transport.

Keywords: interoperability, organizational interoperability, e-government, public sector

1. Introduction

Interoperability of information systems is a major factor for economic efficiency. There are a number of European Commission directives that indicate the crucial impact of interoperability on information society, while it is presented as one of the main principles in the Digital Single Market (DSM) Strategy for Europe - EU e-government Action Plan 2016-2020 (European Commission, 2016). As Casalino (2014) notes:

“Interoperability is the capacity of information systems to process, store and exchange electronic documents using uniform technology standards and processes” (Casalino, 2014).

Interoperability has 3 fundamental dimensions: technical, semantic and organizational, all of which have been thoroughly presented in the literature. Technical interoperability (Saether, 2011) may be seen as a starting point for achieving e-governance interoperability. According to the European Interoperability Framework (EIF) (European Commission, 2004):

“It covers the technical issues of linking computer systems and services, data integration and middleware, data presentation and exchange, accessibility and security services” (European Commission, 2004, p.16)

The accomplishment of technical interoperability includes several parameters, with the most important being application of existing technologies, common understanding and use of data, accessibility, security and privacy. Semantic interoperability (Saether, 2011) is another important dimension of interoperability. According to the EIF (European Commission, 2004):

“Semantic interoperability enables systems to combine received information with other information resources and to process it in a meaningful manner” (European Commission, 2004, p.16)

Semantic issues are found either at the data level or at the work process level. Data level issues are concerned with the actual meaning of data found between systems that need to cooperate, while work process level issues focus on the mutual agreement between business processes. Organizational interoperability (Saether, 2011) aims at linking processes among different organizations. According to the EIF (European Commission, 2004):

“It is concerned with defining business processes and bringing about the collaboration of administrations that wish to exchange information and may have different internal structures as well as aspects related to requirements of the user community” (European Commission, 2004, p.16)

2. Methodology Section

Full-text articles from existing studies in the Elsevier, ScienceDirect, IEEE, and ResearchGate databases were extracted to ensure an extended search from multiple disciplines. The search covered the literature published between 2003 and 2016. The main keywords used in the academic search were *interoperability, organizational interoperability, e-government, and public sector*. After a critical review of the extracted papers, the most relevant and cited ones were selected, so as to include the most reliable references.

A case study from the Greek public sector was selected to present the practical implementation of organizational interoperability, using best practices from the academic field. This idea arose due to the participation of one of the authors as an IT officer in the development of a specific project at the Greek Ministry of Infrastructure and Transport.

3. Current Research

Integration, information sharing, and interoperability in government have become of major interest (Scholl, Kubicek, Cimander, & Klischewski, 2012). Current research focuses on open issues in organizational and semantic interoperability between public organizations. Lack of commonly agreed data models, the absence of universal reference data, and difficulties in interpreting administrative procedures and legislation are some reasons why cross-border and national interoperability have not yet been achieved (Scholl & Klischewski, 2007).

Many research papers present e-government interoperability evaluation using interoperability assessment models (Rezaei, Chiew, & Lee, 2013) and technology maturity indexes (Crowley, 2016).

Nowadays, organizational interoperability seems to require new ways of intergovernmental cooperation so there is an obvious challenge concerning traditional ways of governance. Recent research (Kubicek, Cimander, & Scholl, 2011) presented the need for redefining organizational interoperability and proposed to rename this layer “business process interoperability”. This idea focuses on the technical side of automated processing of sub-functions to one-single (inter-organizational) automated workflow.

4. Technological Challenges and Limitations for Interoperability

Several governmental programs, action plans, interoperability strategies, and public IS frameworks were established in the last five years. Moreover, a number of public projects were funded by the European Commission, and observatories on e-government issues were created in order to highlight the importance of interoperability for public organizations.

Despite the recognition, investment, and effort already expended in the pursuit of improved collaboration and data exchange capacity between different public authorities, the level of interoperability remains far from adequate. Highly fragmented operation, service delivery delays and lack of transparency in administrative procedures highlight the low interoperability level among governmental agencies.

Interoperability assessment models (Rezaei, Chiew, & Lee, 2013) identify three main categories of interoperability barriers:

- **Organizational incompatibility:** There is still lack of organizational compatibility due to internal organizational complexity. Authorities and responsibilities are not clearly defined. Moreover, there is an unwillingness on behalf of people and governments to adapt to changes, while the level of education is not adequate so as to follow up new procedures.
- **Conceptual incompatibility:** Heterogeneity in information systems causes difficulties in syntactic and semantic integration. There is lack of common syntax used for the information exchanged between the two systems and the meaning of the exchanged information is not always identical. Although there are several technologies, methods, and tools assisting conceptual compatibility, there is still high heterogeneity among systems.
- **Technological incompatibility:** Although most assessment models address technical interoperability, there are still open issues regarding the IT platforms used on both sides and the exchange protocols.

5. Organizational Interoperability in E-government

5.1. Interoperability-Related Governance

Researchers in the area of e-government agree that interoperability is not only technical standards and interfaces. It includes organizational, legal, and cultural aspects (Scholl & Klischewski, 2007). In recent years, interoperability seems to present a challenge to traditional ways of governance in public administration, by requiring new ways of intergovernmental cooperation.

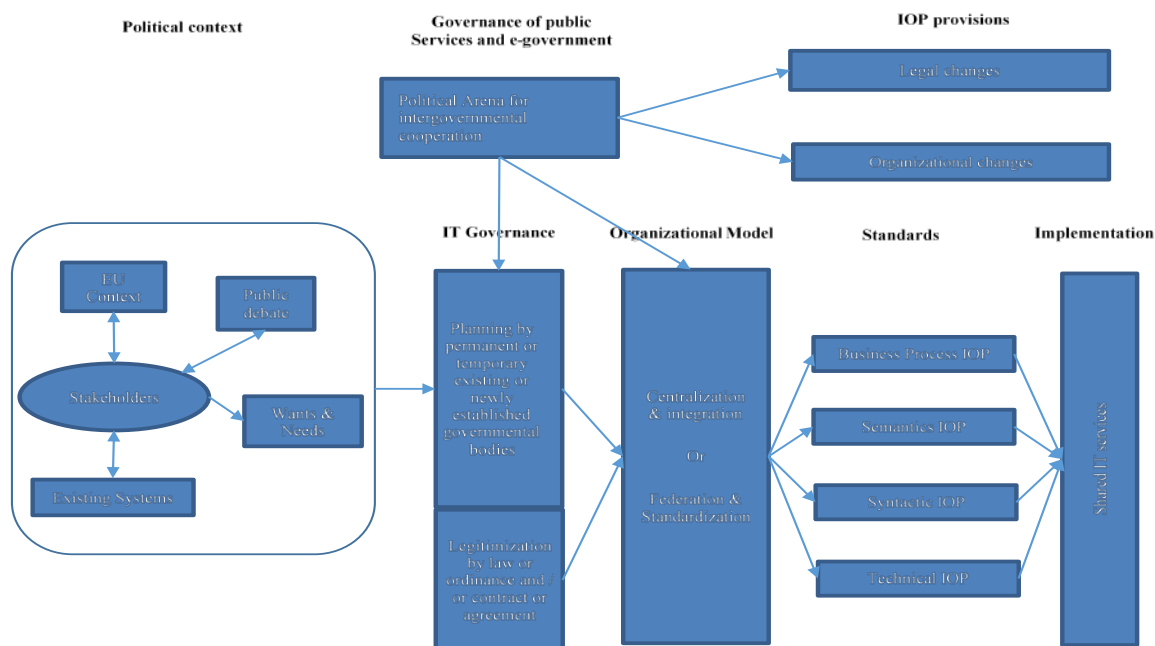
Concepts and classifications have arisen from recent research (Kubicek, Cimander, & Scholl, 2011) based on 77 “good-practice” cases of e-government interoperability. An empirically based conceptual framework was developed for IT governance interoperability in the public sector. The whole attempt aims to clarify and reconceptualize the layer of organizational interoperability.

Interoperability in government interacts with many factors, such as culture and traditions, human issues, political power relations, and other soft factors. It is therefore multi-dimensional. To address the interoperability challenges, it seems necessary to reorganize processes and structures, repurpose existing organizations and create new ones. As Kubicek notes:

“A resilient and flexible model for IT governance is needed to advance the political, institutional and functional opportunities over time” (Kubicek et al., 2011, p.144).

An empirically based conceptual framework is depicted in the Figure below, detailing the options for IT governance interoperability. Particular attention is paid to the relationship between governance and IT governance, and to the alignment of technical organizational and legal changes. IT governance deals with the complex relationship between political government and IT management. It is necessary to identify an IT governance model for successful cooperation among all stakeholders. The next step is to choose an organizational model, either for centralization/integration or for federation/standardization.

Figure 1: Governance of Interoperability for Dedicated Services



A seven-step life cycle for interoperable governmental services has been proposed (Kubicek, Cimander, & Scholl, 2011):

- initiation
- determination of IT governance model
- determination of IT organizational model
- definition of standards
- activation of the selected standards

- implementation and support
- evaluation and change management

5.2. Organizational Interoperability and Open Data Policies

Open data is considered a crucial factor for innovation. Open datasets are expected to offer benefits, such as greater transparency and innovation in the public and private sector (Anamaria Buda, Jolien Ubacht, Marijn Janssen, & Robert-Jan Sips, 2016). Many research papers present methods and technologies for Linked Open Data (Bizer, Tom Heath, & Berners-Lee, 2009), (Bizer, Heath, Sören Auer, & Tim Berners-Lee, 2014). Governmental organizations have developed frameworks (Perera & Parma Nand, 2016) , (Janev, Uros Milosevic , Mirko Spasic , Jelena Milojkovic, & Sanja Vranes, 2016), ontologies (Fragkou, Eleni Galiotou, & Michalis Matsakas, 2014), and open data policies for the best use of open data. According to recent research, there are impediments (Zuiderwijk, Janssen, & Choenni, 2012) for open data policies. The most important are: 1) political, economic, technical and social 2) data access 3) data deposition and data use.

The main challenges identified for open data policies are: data fragmentation, inability to access data, lack of organizational and technical interoperability, and data processing difficulties. Another recent study (Janssen & Zuiderwijk, 2013) presented a framework for comparing the open data policies of seven Dutch governmental organizations, noting:

“Collaboration in the development of open data policies between government organizations does not seem to be systematically organized. Differences concerning open data policies exist both on different government levels and between organizations operating at the same level. This is due to different responsibilities and different data ownership that exist in the public organizations” (Janssen & Zuiderwijk, 2013, p.23).

These problems could be overcome by adopting guidelines to achieve centralization of open data repositories and minimize the degree of fragmentation. Moreover, the guidelines should focus on stimulating dialogue among data producing public bodies and data users. This way, datasets will be released based on open data policy, for easy discovery and understanding.

5.3. Inter-Organizational Information Sharing and Expected Benefits

The importance of inter-organizational information sharing (Karlsson, Frostenson, Prenekert, Kolkowska, & Helin, 2017) in providing higher information quality, improved decision-making, increased productivity, and more integrated services has been recognized across the public sector. Despite the importance of inter-organizational information sharing, attempts in this direction are not always successful. This failure is often attributed not only to lack of technical interoperability but also to organizational issues (Allen, Karanasios, & Norman, 2014)

6. Case Study

The Greek Ministry of Infrastructure and Transport is currently developing an information system which consists of a number of data registries concerning processes relative to public works. The project aims to digitalize the processes in order to accomplish data integrity, transparency, and more effective data administration.

Because there are several Ministry Departments responsible for the development, implementation, and operation of data registries, along with several external public authorities, there is an obvious demand for inter-organizational and intra-organizational cooperation. In terms of interoperability in e-government, organizational interoperability must be achieved.

Our research focuses on strategic choices for setting up interoperable e-government services in the area of public works. Because there had been a lot of examples of unsuccessful IT projects in the Greek public sector, including the Ministry itself, it was clear that a new methodology should be adopted to reach the best outcome. Kubicek's conceptual framework for accomplishing organizational interoperability (Kubicek, Cimander, & Scholl, 2011), with improvements wherever deemed appropriate, was chosen to satisfy our aim. The first step was to select the most suitable IT governance model so as to accomplish the best cooperation between involved parties.

A working group responsible for the project management was set up. It consisted of members representing Ministry Departments, such as IT, IS, and Departments responsible for the operation of each data registry. External stakeholders also contributed to the development of the information system. Furthermore, available legislation in the area of public works, along with EU guidelines and best practices for interoperability, security, and data protection were taken into account.

The first-stage deliverables were the successful mapping of all authorities involved and services they provided, as well as a complete issue of requirement analysis for all subsystem entities and functionalities. Both deliverables were submitted based on the project schedule, so there was no time delay and contributed to the next stage of the ongoing project. Furthermore, since the Ministry working group consisted of internal human resources, the entire process was cost-saving.

7. Conclusions

Interoperability is a crucial factor for the digital transformation of public administrations in Europe. Although there are technologies, guidelines, and frameworks available in the literature for information integration in the public sector, the level of interoperability concerning digital interaction between information systems remains far from adequate due to significant burdens. According to the European Commission and existing studies, the focus should be given more to the organizational aspects of interoperability.

Organizational interoperability seems to be a crucial factor for accomplishing efficient, integrated, and transparent intergovernmental services and is considered to strongly relate to IT governance. Moreover, the public sector considers it a key prerequisite to applying open data policies and therefore providing open data services.

Based on the case study presented, public authorities should adopt the best practices available in the literature to improve the effectiveness of IT projects on organizational interoperability issues.

8. Future Work

Our future research will focus on choosing an organizational model to integrate the separated processes and databases. A feasibility study on operating costs, service quality, legal, and political

issues will be conducted to determine whether the centralization/technical integration option is the most suitable solution.

Modelling of all the business processes included in the life cycle of the information system will be accomplished with the aid of OWL (Ontology Web Language), since several research findings point to ontologies as the most suitable technology for semantically enterprise systems, from both structural and behavioural perspectives (Chen & Doumeingts, 2003).

All European guidelines (EIF 2.0) relative to interoperability will also be taken into account to provide the best service. By the end of the implementation and operation of these registries, a multi-level government interoperability maturity model will be developed to evaluate the maturity level of interoperability achieved. The maturity assessment model will be based on what Pardo and Burke conceived as interoperability (Pardo & Burke, 2008).

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Relationship between E-Government and Risk Management Systems: A Case Study in Accounting Firms

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Abstract: In Brazil, are being implemented since 2007, the tools for accounting and tax transactions with government and enterprise. The literature shows that in change processes, the risks are increased because new relationships not known yet arise. Assuming that the introduction of a new system causes changes and altering existing systems, this study aims to verify how is the relationship between e-government systems and risk management in the accounting firms. The research has a qualitative approach, using the single case study with descriptive exploratory purpose. The conclusions point that the systems exchange information with the external environment and adapt seeking balance. The systems use the GED software and E-audit for self-regulation. And the two systems exist to ensure compliance and the quality of operations research company. Finally, autopoiesis occurs when the e-government system caused the resurgence of risk management system.

Keywords: electronic government, general systems theory, risk management, accounting firms

1. Introduction

The General Theory of Systems (GTS) proposes to administrative sciences and organizations ways of studying their functioning and dividing them into the smallest possible parts for their complete understanding. With the soft methodologies, the open systems are studied, verifying their dynamics, complexity and interrelationships. Churchman (1971) proposes, through the questioning systems, the use of five aspects for interpretation: environment, resources, components, administration and objectives. From the perspective of GTS, a company is formed by a set of specialized subsystems that need to be managed (Miller, 1972) to work in equilibrium (homeostasis / autopiase) (Varela, Maturana, & Uribe, 1974) and achieve its finality (equifinality) (Beer, 1979; Mele, Pels, & Polese, 2010). Accounting is present in this set and has the role of providing and managing information critical to the system (Hahn, 2007).

When changes occur and new systems are inserted into the enterprise system - for example, the electronic government system - new relationships and interactions occur, resulting in uncertainties

to be investigated. The General Theory of Systems can collaborate in this aspect, aiding in risk management, since the provision of information and identification of the system can contribute to the correct decision-making. Corporate Risk Management, when considering subjectivity and behavioural vision in decision-making, assists in understanding the uncertainties that arise in the relationships and complexity of systems (Arena, Arnaboldi, & Azzone, 2010).

Electronic Government is not only a technological advance, but a change of participation in the public thing, of how the government relates to society and society relates to the government (Irani, Love, & Jones, 2008). In the context of public management, it is one of the links of the government process (establishment and application of public policies) with governance (accountability and pursuit of efficiency and effectiveness of public management) and with the effective participation of society (F. Bannister & Connolly, 2011; Frank Bannister & Connolly, 2012).

Gil-García and Pardo (2005) discuss success factors for the implementation of e-government tools, such as the government's concern with systematizing public services - which are now electronic ones - and their use by companies, taking into account the need for quality and compliance. Gil-García and Pardo (2005) recommend the inclusion of risk information and risk management in this citizen-government process.

Starting in 2007, Brazil started to implement new Electronic Government tools for companies, involving accounting, and tax, and labour information. In the process of implementation and use of these tools by Brazilian companies, accounting firms are a link between taxpayers and the government.

Accounting services companies have, among their activities, accountability and do so for different users. Firstly, for the clients who hire their services, and as a consequence, the information generated is used by employees, banks, society and governments (Hasseldine, Holland, & van der Rijt, 2011). Therefore, the accounting services companies become a link in the various relations of the clients: company-company, company-employee, company-consumer, company-government; with this, the responsibility and influence of the information and obligations assumed may go beyond the fees received (Strange, 1996).

The accounting services market is composed of companies of different sizes, national and / or multinational in origin, which are large employers and serve clients of different segments and sizes, and there is no limitation to this outsourced service (IAB, 2015a, 2015b, 2015c; Suddaby, Cooper, & Greenwood, 2007). With these characteristics, the uncertainties present in these relationships and the lack of compliance can generate penalties linked to the financial transactions of the client companies, which can lead to discontinuity of the business of the accounting firm.

In this scenario, based on the premise that e-government and risk management are systems present in the enterprise system, the following research problem is elaborated: How does the relationship between e-government and risk management systems in an accounting services company occur? As a general objective to evaluate the interaction between e-government and risk management systems.

2. Propositions Theoretical

The company is an open and alive system, which seeks to maintain its equilibrium and its functioning in the face of the constant interferences of the environment where it is and of all the systems that make up (Martinelli, Ventura, Liboni, & Martins, 2012; Mele et al., 2010). The general systems theory provides mechanisms for the understanding of this process: homeostasis, self-regulation, balance / balancing, equifinality, common purpose and autopoiesis.

The mechanism called homeostasis, which reveals that the system, while seeking to ensure its internal and dynamic equilibrium, seeks to absorb, react and adapt to interactions with the external environment (Beer, 1979; Mele et al., 2010). In a constant search for survival and to keep on operating, the first theoretical proposition of this article (P1), defines that: E-government and risk management systems exchange information with the external environment and adapt to keep in balance with over time. In this process of adaptation, they interact with each other.

Both open and closed systems may have mechanisms to function that provide for re-entrance stage to continue to operate normally, which characterizes a process of self-regulation (Beer, 1979; Martinelli et al., 2012; Mele et al., 2010). In seeking to rebalance and maintain their working conditions, the systems use self-regulation, which thus defines the second theoretical proposition of this article (P2): To maintain equilibrium, within the limits of the structure and with the exchange of information, e-government and risk management systems are adapted using self-regulatory mechanisms.

The systems have ability and attitude of equilibrium or balancing, and thus assists other systems and subsystems (components) to meet their needs for the perfect functioning (Beer, 1979; Mele et al., 2010). This characteristic supports the third theoretical proposition of this article (P3): Risk management system contributes to the balance of the e-government system supplying its needs.

Open systems seek to achieve the purpose for which they were established. Subjected to different directions and/or conditions, they will undergo adaptations and achieve their purposes (Bertalanffy, 2012; Mele et al., 2010). This principle is called equifinality and guides the fourth theoretical proposition of this article (P4): E-government systems and risk management, under different conditions and or directions, reach the same final state.

The system and its subsystems interact in an organized and managed way to achieve a common purpose, pursuing the same purpose (Bertalanffy, 2012; Mele et al., 2010). Hence, the fifth theoretical proposition of this article (P5): For the survival of e-government systems and risk management, its parts (environment, resources, components, administration and objectives) within an organization interact with each other, organized and managed to achieve the same end goal.

Within a complex perspective, where its internal and external elements have several interactions, the system searches for autopoiesis, a characteristic of self-organization, using learning mechanisms, to keep itself in proper functioning. The system behaves as a producer and product, generator and consumer of its resources (Mele et al., 2010; Varela et al., 1974). From this characteristic of the systems comes the sixth theoretical proposition of this article (P6): E-

government and risk management systems organize themselves to align with internal complexity and the complex environment.

3. Method and Research Procedures

In this article, the problem will be addressed by the qualitative perspective (Cervo, Bervian, & Silva, 2007; Martins & Theóphilo, 2007; Yin, 2015). Already the objectives will be treated by means of two research methods: exploratory and descriptive (Cervo et al., 2007). As the research method - in the theoretical as in the operational aspect - must be related to the object to be investigated (Cervo et al., 2007; Martins & Theóphilo, 2007; Yin, 2015), this research embraced the case study as a methodological strategy. In Yin (2015, p. 18), we find the characteristics of this mode of observation.

Mazars Brasil is the company under study and was chosen for being one of the largest in the industry (accounting services) in Brazil and because 70% of its total revenue comes from outsourced accounting services. In addition, the fact that the company in question has a risk management structure was also decisive, since, at the time of the study object selection, two other large companies in the sector were verified and it was verified that there was no structure - or even a policy - of risk management.

In order to choose the 11 interviewees, the company was asked to indicate the managers who work with e-government or risk management tools. From the request, the interviewees were selected in a meeting with the responsible partner. The managers interviewed also represent all sectors of the company that work with e-government and risk management. The interviews were fully transcribed. They were then coded and grouped for content analysis and lexical analysis. Content analysis comes to be, according to Bardin (2011, p. 37), "a set of techniques for analyzing communications". During the data collection, the Free and Informed Consent Term (FICT) was presented, at which time the interviewees were elucidated about the free participation in the research and, after, they consented to participate.

4. Interaction of Electronic Government and Risk Management Systems

The elements of the system have different behaviors when interacting with other elements and other systems occurs (Mele et al., 2010). To maintain balance and adapt to change, interactions need negotiation and conciliation (Bausch, 2002; Martinelli et al., 2012). The construct proposed for this study presented five dimensions - environment, resources, components, administration and objectives - to understand e-government systems and risk management.

E-government and risk management systems interact in the macro environment with the emergence of standards and laws, where in addition to regulating the EGOV modules also establish rules and obligations to keep operations in line. The interviewees confirmed the impacts of the norms and their evolutionary process, with the implementation in stages and the integration of the different users (governments, taxpayers, accounting). The company has created a department (DETEP) to be this link between the external environment and the two systems.

Another interaction occurs in the demographic aspect, where the difficulty of the company with the shortage of skilled labour, both for EGOV and risk management, seeks to overcome this problem with intensive internal training.

In the micro-environment, e-government and risk management systems interact in the technological category when the technical instructions (IT) are adapted to the EGOV routines and to reflect the risk management policies: New equipment (second monitor) and software (GED, E-audit) allow to treat the electronic documents in an optimized way and to cross all the information generated in the system EGOV and to verify the fulfilment of the established goals and norms. In the educational aspect, interaction is constant, both in the definition of minimum formal education requirements for employees and in the establishment of training policies to meet the need for adequate labour to meet all EGOV demands as well as to have the quality established in the management of risk.

Thus, homeostasis occurs (Beer, 1979; Mele et al., 2010) according to the first theoretical proposition of this article, e-government and risk management systems exchange information with the external environment and adapt to remain in balance over time. In this process of adaptation, they interact with each other.

The e-government and risk management systems interact in the financial resource with the reduction of expenses with penalties of penalties, from 5% of total expenses to 1.25%. In Human Resources, where the people operate the systems, the configuration of the departments was changed to increase the interaction between the operators. This started in the Fiscal Department the creation of a specific unit for the operations of EGOV. The Material Resources interacted with the acquisition of new computer equipment to improve the processing of the data generated in the systems, and new software, both for storage (GED) of everything that is generated in the electronic government system and used to attest the compliance in the system of risk management, as well as system for processing compliance audits. With the implementation of EGOV modules in Brazil, the tendency is for information resources to be integrated and automated, reduce rework and minimize risks with document typing. Products and services as outputs of the e-government system are the reports and receipts of ancillary obligations, which are stored in the GED serving as input resources for the risk management system.

As stated in the second theoretical proposition of this article, self-regulation (Beer, 1979; Mele et al., 2010), to keep in a balanced condition, within the limits of structure and with information exchange, e-government and risk management systems are adapted using self-regulation mechanisms.

E-government and risk management systems interact in the strategic component The quantification of the volume of work generated by each client and the complexity of the information define the organization's billing and guide the elaboration of the strategies. In the technical component, which is responsible for the operationalization of the system, the risk management system is guiding the tasks of the e-government system. Anselmo (2005) shows that, in the technical subsystem, the processes of development of new technologies occur - in the company being investigated, DETEP is responsible for this action, when it receives new

information from the environment (for example, a new ancillary obligation), verifies all impacts, suggests changes in tasks or creates new ones and, after approval, includes in routine company. According to the third theoretical proposition of this article, equilibrium (Beer, 1979; Mele et al., 2010), the risk management system contributes to the e-government system balance by addressing its needs.

The controls that management uses in e-government and risk management systems share information. In the e-government system, the indicator used is the one that measures the fines for failures in ancillary obligations and the quality and compliance are measured through Book Accounting. In the risk management system, three indicators are integrated with EGOV: on-time delivery of bonds, bond fines, and bond quality.

In the company surveyed, the implementation of EGOV caused the reimplantation of risk management, changing the organization. In the process of technological advancement, the company is introducing a second monitor for operators to handle documents in digital format.

In the company studied, the purpose set for e-government is to ensure compliance of all its customers' ancillary obligations. The objective of risk management is to protect the equity and the name of the company, measuring and mitigating the risks and, with that, to provide compliance and to promote the quality of the services offered. Confirming the equifinality (Bertalanffy, 2012; Mele et al., 2010) manifested in the fourth theoretical proposition of this article, the systems of electronic government and risk management, under different conditions and or directions, reach the same final state.

The two objectives interact by seeking compliance, common purpose (Bertalanffy, 2012; Mele et al., 2010), as in the fifth proposition of this article: For the survival of e-government systems and risk management, its parts (environment, resources, components, administration and objectives) interact among themselves, organized and managed to achieve the same end goal. Gil-García and Pardo (2005) put the guarantee of quality and compliance as a success factor for E-GOV. Hasseldine et al. (2011) expose accounting firms as mediators of tax knowledge where their clients seek compliance both with their tax obligations and with tax risk management. This shows differences with Grecco (2014) research - carried out with smaller accounting firms and that does not have risk management as an implanted system - where the culture of compliance is a mitigation measure presented by specialists, but that the accounting firms do not apply.

To meet the objectives, the principal decision-maker of the e-government and risk management systems in the researched company knows the functioning of every organization and has technical knowledge of the E-GOV tools. In order to measure the effectiveness of the systems, it uses the indicators of "fine for non-delivery" and "losses", which attest to the conformity or not of the operations. The choice of the system-users is also linked to the knowledge, technical capacity and zeal of the employees towards the information generated. Therefore, autopoiesis (Varela et al., 1974) confirms the sixth proposition of this article, that e-government and risk management systems organize themselves to align with internal complexity and the complex environment.

The systemic map of all interactions of e-government and risk management systems, where they are influenced by homeostasis, self-regulation, balance, equifinality, common purpose, and autopoiesis (Bertalanffy, 2012; Kast & Rosenzweig, 1979; Mele et al., 2010), e-government and risk management are subsystems of the company system corroborating the article: Due to the complexity of interconnections and interrelations, the insertion of the electronic government system in accounting service companies demands changes in the risk management system.

5. Conclusion and Discussions

The present case study aimed to evaluate how the relationship between e-government and risk management systems in an accounting services company occurs. The study sought to contribute to the research on e-government and corporate risk management using the general system theory to analyze and interpret the interaction between these systems in the accounting services business segment. We chose a unique case study with a qualitative approach in Mazars Brasil, one of the largest accounting organizations in Brazil and with a significant presence in the world market.

The first proposition was confirmed; the company studied has created a department - DETEP - that is responsible for homeostasis. The second proposition was also confirmed; the company studied uses two software - GED, E-audit - who perform this role. The third proposition was confirmed with DETEP, department allocated in the structure within the risk management system. The fourth proposition was confirmed through the search for conformity and quality of operations. In the fifth proposition, it is understood that the central point of the two systems is the conformity of every process. The sixth proposition was confirmed; in this case, autopoiesis occurred when changes brought about by the e-government system recreated the risk management system.

Based on the observation of the interaction of e-government and risk management systems in accounting services companies, it is recommended for future research: To study the problem with other theoretical perspectives, emphasizing the contingency and institutional theories as very proficient for the analysis of the studied subject; quantitative research to verify if the findings can be generalized.

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The Digital Divide: The Impact of Internet Price-Quality on Online Service Use in Europe since 2008

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Abstract: This research paper explores the following question: What is the influence of the relative price-quality ratio of Internet access in Europe and does this affect the use of Internet content like online commerce, Internet banking, and public-sector service offers online? To answer this question, the paper uses ITU data from 34 European countries between 2008 and 2015, to run a number of correlations. The aim is to grasp the potential tendencies and associations between aspects which could affect the digital divide and Internet usage. The correlation coefficients show that the persistent digital divide is caused by the relative price of the Internet access, thus confirming previous analysis on the divide between regions, countries and socio-economic groups. For the broadband policy in Europe, this emphasises that broadband access and infrastructure provision may require a different level of spending, as Internet usage is less sensitive with higher speed. Fostering Internet usage (e.g., for government online services) may require relatively lower speed level, with mobile Internet being a substitute. It also indicates the need to better perform Public-Private-Partnerships (PPP) for the deployment of mobile infrastructures so that public services delivery can be accessed through mobile. While focusing on Europe, the results bring nuances to past research and is relevant to developing countries.

Keywords: digital divide, access, use, price, speed, quality

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1. Introduction

In relation to the United Nations (UN) Sustainable Development Goals (SDGs) (Assembly, 2015), the United Nations University Operating Unit on Policy-Driven Electronic Governance (UNU-

EGOV) is carrying out research to answer two overarching questions: *First, how to better bridge the digital divide? Second, what are the most influential factors on digital divide, especially in Internet usage, beyond mere access?*

For the purpose of this paper, the definition of the digital divide used in past analysis is reused. In this respect, the digital divide consists of five key elements: physical access (i.e., availability of physical infrastructure to connect to the Internet), digital skills (i.e., the skills set required to use the Internet and understand its content), motivation (i.e., perceived added value of the content by the user), financial accessibility (i.e., relative cost), and actual use (i.e., use of the Internet and its content) (Helbig, Gil-García & Ferro, 2009; Kiiski & Pohjola, 2002; Meyerhoff Nielsen, Rohman & Lopes, 2018). While semantics and focus may differ, this definition is in line with those of the United States (U.S.) Department of Commerce, National Telecommunications and Information Administration (NTIA) (1995a), the Organisation for Economic Co-operation and Development (OECD) (Negreiro, 2015), the International Telecommunications Union (ITU) (2016), and authors like Van Dijk (2012). In relation to the specific research question of this paper, the focus is on the latter two elements, i.e., on financial accessibility and on the actual use of the Internet, its content, and its services.

The digital divide between and within a country in turn refers to inequalities between individuals, households, businesses, or geographic areas. This is usually seen in relation to different socio-economic levels or other demographic categories. The divide between countries or regions of the world is referred to as the global digital divide (Norris, 2001; NTIA - National Telecommunications and Information Administration, 1995; Van Deursen & Van Dijk, 2014; Van Dijk, 2006). In this paper, the geographical focus will be on European countries in particular.

To date, research on the digital divide has been studied at various levels. This includes individual (Agarwal, Animesh & Prasad, 2009; Akiyoshi & Ono, 2008; Chen, 2013) and household (Van Dijk, 2006) characteristics such as gender, age, ethnicity (Millard et al., 2009; Mossberger, Tolbert & McNeal, 2007; Niehaves & Plattfaut, 2014), employment status, income, and educational attainment levels (Helbig et al., 2009; Hilding-Hamann, Meyerhoff Nielsen & Pedersen, 2008; Van Dijk, 2012; Mossberger et al., 2007; Pick & Sarkar, 2016) (Norris & Conceição, 2004). Other authors have focused on specific services, such as online banking (Gorbacheva, Niehaves, Plattfaut & Becker, 2011), have focused on specific geographical (Grubestic, 2006; Nishida, Pick & Sarkar, 2014) or urban-rural contexts (Kvasny & Keil, 2006; Norris & Conceição, 2004), micro-regional (Kvasny & Keil, 2006; Lentz & Oden, 2001), national (Chen, 2013; Pick, Nishida & Zhang, 2013; Van Dijk, Peters & Ebberts, 2008), and sub-national level, such as local or regional (Grubestic, 2006; Lentz & Oden, 2001; Nishida et al., 2014; Pick, Nishida & Sarkar, 2014; Pick, Sarkar & Johnson, 2015), multi-country or even global studies (Corrocher & Ordanini, 2002; Dada, 2006; Lentz & Oden, 2001; Pick et al., 2015; Skaletsky, Soremekun & Galliers, 2014).

In a European context, Table 1 summaries the relationship between the use of eCommerce, eBanking, government online service offers and fixed-line household access and the speed of said connection. A year on year Spearman regression analysis of 2008-2016 data for 34 European countries, highlight that the quality and speed of Internet seemingly have no effect on the take-up of eCommerce and eBanking. The correlation between broadband speed and take-up for

eCommerce and eBanking is also negligible, especially as high-frequency, high-volume private sector services do not require super-fast broadband. The relationship between speed and quality of Internet connections and the use of government eServices the data analysis shows a slightly higher correlation compared with the use of government websites. The greater correlation for two-way transactional services is expected as two-way transactional services require more bandwidth and reliability than the use of a simple website.

Table 1: Summary of Spearman Year on Year Regressions for Connection Type and Speed for 34 European Countries, 2008-2016.

Activity type	Connectivity type (fixed vs. broadband), speed and household connectivity)			
	Fixed broadband connection	Mobile broadband connection	Broadband speed	Households with Internet connection
eCommerce	81.37%	65.31%	8.83%	87.38%
eBanking	83.87%	64.45%	3.51%	86.56%
Interacting with government online	81.88%	61.65%	-0.66%	86.69%
Use of government websites to find information	79.32%	58.14%	-12.28%	82.49%
Use government eService	76.62%	61.09%	10.25%	76.08%

While traditional divides such as physical access to Internet infrastructure and digital literacy should not be ignored, the relatively high cost of Internet access was found to be a key reason on why low-income countries and regions are exhibiting very low increases in the number of Internet users and broadband subscribers. This paper, therefore, sets out to answer a more narrowly defined sub-question in relation to Internet take-up and online service offers to citizens, that is: *What is the influence of the relative price-quality ratio of Internet access on the use of Internet content like online commerce, banking, and public-sector service offers in Europe?*

To answer this narrow research question in a European context, this paper is structured as follows: Section 2 outlines the methodology and data used, while section 3 highlights the empirical findings, and section 4 concludes the paper, summarizing the key findings, their potential importance, and identifying where further analysis is required.

2. Methodology

This article looks at 34 countries that are mainly European. Of those 34 countries, 28 are members of the European Union (EU), three (i.e., Iceland, Norway, and Switzerland) are members of the European Economic Area, and three (i.e., Montenegro, Serbia, and Turkey) have other forms of

association agreements with the EU. The countries represent a mix of centralised and federal administrative structures, population size, and levels of gross domestic product. These countries are mostly considered as high-income countries, although the Gross Domestic Product varies dramatically from US\$ 4.4 billion (Republic of Macedonia) in 2017 to US\$ 3.7 trillion (Germany)¹. Among the countries, Croatia, Republic of Macedonia, Romania, and Turkey are the only countries that do not belong to the group of high-income countries, but are “upper middle-income countries”. Similarly, the industrial compositions vary, as do urbanisation rates and average age. Generally, all countries have literate and, by international standards, well-educated populations. In terms of the national strategic focus in each of the 34 countries, all of them are closely following the strategic policy directions set by the EU particularly (European Commission, 2018).

Three main data sources are used in this study. The main source of data is the International Telecommunication Union (ITU) World Telecommunications Statistics. The ITU database covers annual ICT indicators, such as fixed telephone networks, mobile cellular telephone subscriptions, quality of service, fixed and mobile broadband subscription data, traffic, staff, prices, revenue, and investment. Unfortunately, the availability of specific datasets has different indicators and the years vary. ITU data used in this paper includes fixed and mobile subscribers, 2008-2015; quality of broadband connection (speed level), 2008-2015, and; households with Internet, 2008-2015.

As the geographical focus of this study is the European area, the selected variables related with Internet usage, i.e., online transactions on online commerce (eCommerce), online banking (eBanking), and online public services (eService), have been collected from the Eurostat database. Data is provided by national statistical institutes following Eurostat’s annual model questionnaires for ICT usage in households and by individuals. The data analysed for the purpose of this article includes: 1) eBanking and eCommerce [isoc_bde15cbc] and 2) individuals using the Internet for interacting with public authorities [isoc_bde15ei], including: Internet use: interaction with public authorities (last 12 months); Internet use: obtaining information from public authorities’ websites (last 12 months); Internet use: sending filled forms (last 12 months).

In practice, all dependent variables involving fixed and mobile subscribers, broadband connections, and the number of households with Internet are always obtained from the ITU database. This enables the establishment of a seven-year pattern for the period between 2008 and 2015. For objective variables, i.e., variables to assess eCommerce, eBanking, and eServices, they have been collected from the Eurostat ICT household survey, as the ITU collection of this date ended in 2015. Again, the correlation between the dependent and objective variables covers the period between 2008 and 2015². Data for correlations involving price, i.e., the relationship between

¹ Based on the World Bank database and analytical classification of the world's economies in terms of Gross National Income (GNI) per capita. As of 1 July 2016, low-income economies are defined as those with a GNI per capita, calculated using the World Bank Atlas method, of US\$1,025 or less in 2015; lower middle-income economies between US\$1,026 and US\$4,035; upper middle-income economies between US\$4,036 and US\$12,475; high-income economies US\$12,476 or more.

² To better picture the mobile subscriptions pattern, the active mobile subscriptions are chosen in the analysis. Based on ITU definition, active mobile broadband subscriptions are wireless broadband Internet subscriptions using

price and eCommerce, eBanking and eService use is based on Eurostat data. Unfortunately, pricing data from European broadband portal is only available for 2016 and is, therefore, a single year correlation. The correlation coefficient (r) between two variables X and Y is defined as:

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{n}}{\sqrt{\sum (X - \bar{X})^2 \sum (Y - \bar{Y})^2}}$$

Where X and Y are the variable to be tested, n is the number of observation, \bar{X} and \bar{Y} are the average of X and Y variable respectively. The coefficient correlation (r) ranges between 0 and 1. As the data sets are relatively small (i.e., the number of countries analysed) and consist of mainly dependent variables traditional f-test and t-fit are not appropriate. Similarly, an initial analysis of the data show that the data distribution is not normal, so the application of parametrical statistical method is not ideal as there are potentially too many variables in the individual countries in play. Thus, a Spearman correlation test is run year on year to identify any relevant relationships between the different variables.

3. Empirical Analysis

This section runs a number of correlations to identify the actual influence of relative speed, quality, and price of Internet access on a number of activities related to private and public sector Internet services. That is, eCommerce, online banking activities and citizens' interaction with the government, use of public sector websites, and online transactional services.

3.1. The Impact of Pricing

Broadband price is problematic as pricing is based on a practically unlimited number of different service bundles and price baskets. Additional elements of price complexity, bundles of services e.g., internet plus call time, cable TV and/or programme packages. Similarly, the question becomes whether to focus on cheap, median or high price baskets. With this in mind, the European broadband portal (<https://ec.europa.eu/digital-single-market/en/broadband-europe>) is chosen as the source of price data. Only cheap product bundles offered by all operators, i.e., the standard product bundle offered by all operators in all 34 countries - with and without fixed line Internet is used for the analysis. Telecom operators pricing data is, unfortunately, only available for 2016. The subsequent empirical analysis and correlations will be therefore based on a single year only.

terrestrial mobile connections. Prepaid mobile broadband plans require use in the last three months if there is no monthly subscription. Satellite and terrestrial fixed wireless broadband subscriptions are not included. However, ITU still defines a bit rate of at lower speed to be considered as broadband (at least 256 kbit/s as broadband). This might lead to spurious information in our analysis that in most cases mobile broadband correlates less with the objective variables.

3.2. Internet Price and E-Commerce Usage

Based on a standard 8-12 Mbit/s Internet package with a fixed telephone landline offer, the empirical analysis shows that the general law of demand holds. That is, with higher internet price, actual use of eCommerce services will be lower, as illustrated by the -12.28% correlation (see Table 1). Running the same Spearman year on year correlation for a similar service bundle but with a standard 12-30 Mbit/s Internet connection, the law of demand does not hold, as illustrated by a positive coefficient correlation of 10.66%. This implies that people subscribing to the higher speed and better-quality Internet packages are less price sensitive. This may indicate that subscribers to higher speed packages are also in an economically better position, thus indicating that their use of online services is less sensitive to price changes. On its own, this may be surprising, but this should be considered in light of a negative relationship between the connection price and the frequency of using the online transaction service.

3.3. Internet Prices and Online Banking Use

As seen in the previous analysis, based on a standard 8-12 Mbit/s Internet package with a fixed telephone landline offer, the empirical analysis shows that the general law of demand also holds. In fact, the analysis shows that there is a high level of price, as illustrated by the -31.90% correlation. Running the Spearman correlation for a similar service bundle, but with a standard 12-30 Mbit/s Internet connection, the law of demand does not hold, as illustrated by the 2.09% correlation result. Again, the implication is that people subscribing to the higher speed and quality Internet packages are less price sensitive. This result could be the result of personal preferences and the potential higher personal value people associate with online shopping, and the often lower prices of goods and services bought online. Again, these findings support the lack of correlation on speed and quality seen in the previous sections.

3.4. Internet Prices and Level of Interaction with Government Online

As in the previous sections, the analysis is broken down into three parts, which correspond to the ways citizens can interact with the government, that is general interaction with the government online, the use of government websites, and transactional services. For the interaction with the government online, the empirical analysis shows that the law of demand holds for a standard 8-12 Mbit/s Internet package with a fixed telephone landline. With a correlation of -20.55%, price sensitivity is even higher than for eCommerce or eBanking. Running the Spearman year on year correlation for a similar service bundle, but with a standard 12-30 Mbit/s Internet connection, the law of demand does not hold, as illustrated by the -6.8% correlation. These findings support the lack of correlation on speed and quality seen in the previous sections.

In relation to the propensity to use government websites, the empirical analysis shows that the law of demand once again holds for a standard 8-12 Mbit/s Internet package with a fixed telephone landline. With a correlation of -20.19% for a similar service bundle, but with a standard 12-30 Mbit/s Internet connection, the law of demand once more does not hold, as illustrated by the -2.34 correlations. These findings support the lack of correlation on speed and quality seen in the previous sections. It is nonetheless interesting that the price sensitivity for a standard 8-12 Mbit/s

Internet package is almost identical when it comes to general interaction with government online and the use of government websites (i.e., -20.55% and -20.19%), while it is proportionally different when it comes to the 12-30 Mbit/s package (i.e., - 6.8% and -2.34%).

In relation to the propensity to use government eServices, the empirical analysis shows that the law of demand holds for a standard 8-12 Mbit/s Internet package with a fixed telephone landline. With a correlation of -25.06%, it is higher than for the use of government websites. For a similar service bundle, but with a standard 12-30 Mbit/s Internet connection, the law of demand once more does not hold, as illustrated by the 11.05% correlation. Again, these findings support the lack of correlation on speed and quality seen in the previous sections. That said, price sensitivity for a standard 8-12 Mbit/s Internet package increases in relation to the propensity to use government eServices, compared to other forms of interaction with the government online, increases slightly. Yet more interesting is the proportionally higher lack of price sensitivity for 12-30 Mbit/s Internet packages in relation to the actual use of public sector transactional services online.

The lack of price sensitivity of higher speed Internet packages may partly be explained by the fact that all 34 European countries, on which this paper's analysis is based, are considered high-income countries in international terms. That is, price sensitivity is relatively low for middle- and high-income consumers, which constitutes the majority of European consumers. Similarly, the proliferation and popularity of high definition, on-demand streaming services, and digital TV may also be an explanatory factor for the lack of price sensitivity for 12-30 Mbit/s Internet packages. Lastly, the increased level of competition in national markets and the abolishment of roaming on data within the EU have generally led to improved Internet speeds and quality, while decreasing relative cost in the period analysed.

4. Conclusions

This paper sets out to shed light on the possible reasons behind the usage of Internet services, particularly one-way or two-way government services, eCommerce, and eBanking solutions. An empirical analysis on infrastructure type (i.e., fixed line and mobile broadband), speed and quality of the Internet, and Internet prices was carried out. A Spearman year on year regression analysis was run on multiple aspects and using different angles of analysis.

As part of a larger research study aiming to identify the most influential factors in relation to the digital divide, the results of this paper stress the influence of relative price. Internet access remains a precondition for the actual use of eServices. In the context of the 34 European countries analysed, fixed line broadband Internet access is found to be the key facilitator of peoples' propensity to use public and private services online. This finding supports the current policy focus pursued by the EU and most European governments in relation to increased broadband access and price competition. The empirical analysis confirms a number of general patterns for the 2008-2015 period. First, in a European context, household Internet access is still important and fixed Internet has a greater coefficient than mobile Internet for peoples' propensity to use services like eCommerce, eBanking, and public-sector services offers like websites and transactional services. This pattern supports current policy focus on broadband infrastructure roll-out. That said,

broadband Internet access is not statistically significant for peoples' propensity to use eServices, whether public or private. This finding seems reasonable, as the majority of these online services do not require much bandwidth.

Second, the relative price of Internet access is still a central issue when it comes to Internet use. In policy terms, this is particularly interesting. Standard Internet packages are highly price sensitive. Thus, policies and regulations should target increased competition to decrease the relative price of the Internet, rather than broadband. This approach will, according to the findings of this paper, facilitate the access and use of both public and private services online, but particularly governments online services offers - a factor relevant to the SDG objectives on increased access to services and potentially on governments internal productivity levels and cost-efficiency (as ICT facilitated service production and delivery is cheaper than analogue forms). This is relevant in the European context, but it is particularly worthwhile investigating in the context of emerging economics and SDGs too.

Third, the quality of the Internet, as defined by speed, does not have a particularly large impact on peoples' propensity to use private or public-sector eServices. Based on pricing data from the European Broadband portal, this paper identifies the minimum 8-12 Mbit/s interval as a precondition for Europeans' use of eServices. This support the Chalmers University and Erikson study (Little, 2011), which highlighted that each Internet speed interval has different impacts on people's chosen Internet activities. In policy terms, regulations should target price and affordability of Internet packages, to optimize the use of eServices, in particular, those provided by the government.

The combined findings add support to previous research findings by Meyerhoff Nielsen, Rohman, & Lopes (2018) and the importance of ensuring Internet access at competitive prices no matter the technical choice of infrastructure. Albeit exclusively focusing on the European context, these findings also reinforce past findings on the importance of how to bridge the general digital divide through increased access to the Internet and its importance for the use of public online services (Negreiro, 2015; Norris, 2001; OECD, 2001; Srinuan, Rohman, Srinuan, & Bohlin, 2010).

As this paper is based on an empirical correlation analysis, little is evidence of the association between the different variables is offered. Future research employing a more robust econometric model would be beneficial in order to isolate the impact of different policy variables, such as access and pricing on people's propensity to use online services, particularly those provided by the public sector. In this context, a two-stage least square approach would avoid endogeneity problem (Mariscal, 2005; Srinuan et al. , 2010). This is particularly important as Internet pricing and access may themselves be affected by other variables, including the level of competition in the telecommunication industry, institutional variables (e.g., degree of independency of regulatory authority), economic variables (such as GDP), and other control mechanisms.

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Government Engagement with the Civic Tech Community on Twitter: The Case of the New York City School of Data.

Government Engagement with the Civic Tech Community on Twitter: The Case of the New York City School of Data

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Abstract: Social media have become spaces for engagement and interactions between government agencies, citizens, businesses, and civic organizations. Even in exchanges not created by government agencies, they might play important roles and affect opinions and actions of multiple social actors. However, there is little empirical evidence on the role of local governments in social media networks not initiated by them. Based on social network analysis and content analysis about the New York City School of Data, this study characterizes how governments engage with the civic tech community using Twitter. The overall purpose is to reconceptualize the opportunities and constraints of democracy, which can provide lessons on expanding opportunities for participation. Preliminary results indicate that the local government plays a relatively prominent role in the network, interacting with actors from multiple sectors. Next steps in this study include extending and refining the initial social network analysis and adding the content analysis as a way to understand different strategies for engagement and interactions.

Keywords: social media, community engagement, deliberative democracy, electronic participation, social network analysis

Track: The General E-Democracy & e-Participation Track

1. Introduction

Social media in government has been “defined as a group of technologies that allow public agencies to foster engagement with citizens and other organizations” (Criado et al., 2013, p. 320). It has been researched as a way for public organizations to innovate, share information, and build relationships (Criado et al., 2013, p. 319). In the Information Age, it is important for government to keep moving forward in its information policies and technologies. Part of the salience of studying government use of social media is that it is increasingly a place where political and social activism occurs or begins (Sandoval-Almazan & Ramon Gil-Garcia, 2014; Sørensen, 2016). One final aspect

of social media use by government and the public is trust; civic engagement through social media may build trust in institutions (Warren et al., 2014). This current context provides us with the impetus for the study discussed in this paper.

This study aims to answer the question: What role does government play in public deliberation about civic tech on Twitter? This question is grounded in developments in the field of deliberative democracy. This is also a timely question, since the internet and social media are ubiquitous. While there are studies on social media (Ediger et al., 2010; Huberman et al., 2008; Marinelli & Gregori, 2015) as well as studies that apply deliberative democracy to the case of social media (Heatherly et al., 2016; Sørensen, 2016; Wiklund, 2005), there is more work to be done in unpacking the nuances of the theory and of using social media applications in government. So far studies and theoretical debates have stayed at the macro level, trying to test the public discourse argument as a whole. This means that it is necessary to apply deliberative democracy to the micro level of how government agencies can adapt their social media to facilitate deliberative democracy and unpack the nuances of the language used in social media posts according to the normative deliberative standard of public communication.

This study uses the case of a Twitter network of actors who used a specific hashtag, #NYCSaData, while attending and discussing a conference on topics in civic tech. The data collected includes retweets, mentions, profile information, as well as the texts of the tweets, which is what allows for a content analysis. The focus of this paper is on the preliminary results of the social network analysis. The operationalizations of the social network analysis measures used to answer the research question are informed by the dialogic perspective, integrated as a complementary framework from the field of Communication, as well as a previous similar study done by Rethemeyer & Hatmaker (2008) on emails between actors in multiple sectors. Preliminary results indicate that local government plays a relatively prominent role in the network, interacting with actors from multiple sectors. These results lead to questions about how government participation in the online sphere might impact the traditional public sphere.

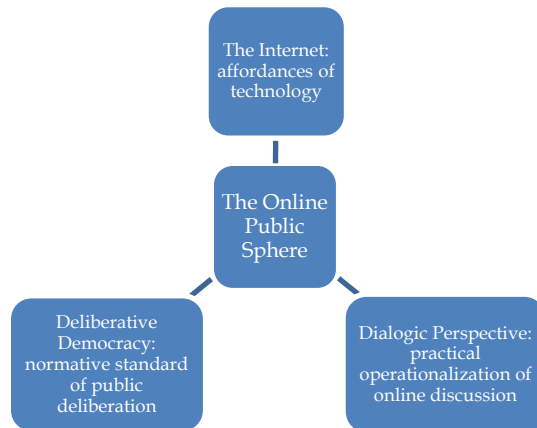
This five-part paper continues in the second section with an overview of the recent theoretical developments in deliberative democracy, focusing on the application of the dialogic perspective. The dialogic perspective distinguishes between one-way and two-way types of online communication, and the implications those differences may have in practice and online discussion. The third section explains the social network analysis methods, content analysis methods, and case. The mixed-method research design will allow us to gain a more comprehensive understanding of the structure of the network and the relative position of government, and to understand some of the nuances of the interactions and how different actors used the content of the Twitter posts to engage with each other. The fourth section discusses the preliminary results of the social network analysis. The fifth section concludes with next steps.

2. Theoretical Framework

This section discusses some of the recent developments in deliberative democracy in the online context and explains the application of the dialogic perspective (see Figure 1). The application of

deliberative democracy to the internet, social, and digital media has been discussed in communication and media literature.

Figure 1: Theoretical Framework



2.1. Deliberative Democracy

Deliberative democracy appears to be a contentious theory in the literature across disciplines. This seems to be partly due to its normative nature and partly because the original scholars that made it well known did not explicitly connect it to online contexts. One of the main assumptions of the deliberative democracy literature is “that vigorous, engaged conversation on matters of public concern is an essential input for healthy democracy” (Freelon, 2010, p. 1172–1173; Kreide, 2016; Shah, 2016; Wiklund, 2005, p. 706). Related to this assumption is a more contemporary assumption that the internet is “the great equalizer,” providing a means by which to strengthen and extend democracy (Baek et al., 2012, p. 364, 366; Dahlberg, 2001, p. 158).

One of the points of criticism of deliberative democracy is that the “digital turn” (referring to the internet and social media) has fragmented the public sphere by trapping people in “filter bubbles” that discourage the kind of connection and communication the theory prescribes (Baek et al., 2012, p. 367; Heatherly et al., 2016, p. 1274–1275; Kreide, 2016, p. 480–481). However, the internet (especially social media) exhibits the Habermasian criteria for a well-functioning public sphere even considering the digital divide: “free access, no thematic restrictions, equality among participants and no limits on the number of participants” (Kreide, 2016, p. 481; Shah, p. 12). Social media have contributed to large social movements like the Arab Spring, have helped raise political awareness, make users more interested in politics, and get them to debate political issues (Sørensen, 2016, p. 665).

2.2. The Dialogic Perspective

The dialogic perspective is more practical. Social media is a relatively cost-effective way for organizations to connect with constituents, advertise, and build relationships (Svensson et al., 2015, p. 1087). One-way communication is defined as organizations posting information, i.e. through their website (Svensson et al., 2015, p. 1087). On the other hand, two-way communication is defined as organizations sending and receiving information (p. 1087). These terms are useful for

an analysis of social media use and allow for a discussion of the practical implications of such an analysis.

Within this perspective, Lovejoy & Saxton (2012) created a theoretical framework that categorizes tweets by organizations into three different functions: tweets that share information via one-way communication, tweets that encourage two-way communication, and tweets that inspire their followers to take action. This framework has become known as the ICA (information-community-action) framework (Lovejoy & Saxton, 2012; Svensson et al., 2015, p. 1090; Huang et al., 2016, p. 540). Lovejoy & Saxton argue that these three types of tweets are a hierarchy of increasing engagement among stakeholders. In other words, one-way information-focused tweets are the least engaging while action-focused tweets are the most engaging. Therefore, the dialogic perspective provides useful operationalizations for this study.

3. Research Design and Methods

This study uses a mixed-method research design. First, we use social network analysis (SNA) to describe the network, how the actors are connected, and what the role of government is in the network. Then, we will complement and enrich the SNA by doing a content analysis of the tweets included in the data.

3.1. Social Network Analysis

The social network analysis done for this study is similar to that done in a study by Rethemeyer & Hatmaker (2008). These authors describe their network as a policy and collaborative network that spans multiple sectors (p. 618-20). For the purposes of this analysis, we are attempting to answer questions such as: Are government organizations most central in this network? In which measures?

We use Twitter accounts tweeting using the hashtag #NYCSaData. The accounts using that hashtag attended, followed, or discussed topics surrounding a conference called the New York City School of Data. We are interested in collaborative, specifically information sharing, relations. The data collected represent these relationships on Twitter. These are Twitter mentions, which are tweets directed at an account by linking its username in the tweet via the @screenname function, and retweets, which are tweets that are shared on another account that directly repeat the original post (also linking the username). The decision was made not to include follow relations in the data, as they seem to be much less meaningful than mentions and retweets, since they do not have any text accompanying the follow that gives the context of the relation (as mentions and retweets do). We are primarily interested in organizations tweeting using the specified hashtag and the focus is the whole network. R's "twitteR" package was used to extract information on the accounts using the specified hashtag (i.e. profile description, number of posts, number of followers, location, etc.). OpenRefine was used to extract retweet and mention data (i.e. the text of the retweets and mentions) and to construct the edge list used for analysis. Spam accounts were removed from the data.

3.2. Content Analysis

Through the content analysis we are able to explore the different types of “engagement” occurring in the network. Here, the term “engagement” refers to using Twitter’s affordances (i.e. mentions, retweets, use of hashtags) as well as what the content of the tweets indicate (see Figure 1). Evans et al. (2016) define affordances as “the ‘multifaceted relational structure’...between an object/technology and the user that enables or constrains potential behavioral outcomes in a particular context” (p. 2). They provide three criteria for a relational structure to qualify as an affordance: 1) it is neither the object nor a feature of the object (p. 2-3, 5), 2) it is not an outcome (p. 3, 6), and 3) if the purported relationship has variability (p. 3, 6). They also provide some examples of affordances: anonymity, persistence (durability, recordability, archivability), and visibility (p. 7-9). In the context of Twitter, using hashtags, retweeting, mentioning users and replying to tweets can be considered affordances; they illustrate the “networked-informed associating” named as a social media affordance on page 6. While it is possible to be anonymous on Twitter, many of the actors in the community we are studying choose to identify themselves. Analyzing the tweets will help us understand where each of the interactions fall in the realm of engagement. To support this analysis process, we included codes that represent the types of engagement present in the network.

4. Preliminary Results

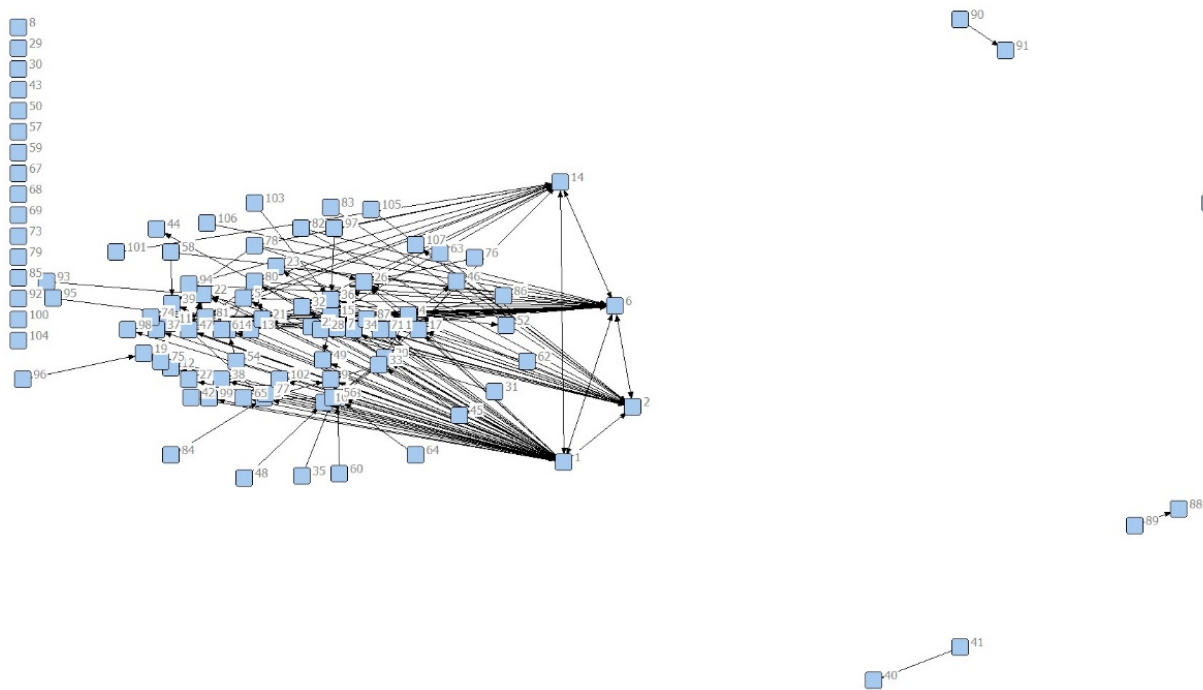
This section discusses the preliminary results of this study. First, we provide some descriptive statistics. Then, we briefly describe and explain the initial results of the social network analysis.

The dataset has 438 actors and over 2,000 unique relations. Fifty-six percent of actors (244) are either affiliated with an organization or represent an organization. Specifically, 24% (103) represent an organization, 32% (141) are affiliated with an organization, and the other 44% (194) are unaffiliated individuals. Based on these descriptive statistics the data already appears to support a core-periphery structure, with less than a quarter of the actors being organizations. Out of the 103 accounts representing organizations, 37 were in the nonprofit sector, 30 were in the business sector, 15 were in the government sector, 5 were in the education sector, 15 were in the media sector, and 1 was multi-coded (in multiple sectors, specifically business and government). Affiliated accounts present similar numbers (54 nonprofit, 42 business, and 16 government-related accounts), only different in that there are more school-related accounts (17) than media (4).

Since we are interested in deliberation, which includes information sharing, we ran measures of degree and betweenness centrality. Betweenness centrality is an appropriate measure for studying a network that relates based on information sharing, as it is a helpful indicator of where the information is flowing (Borgatti & Everett, 2000). Rethemeyer & Hatmaker (2008) used structural equivalence and found a core-periphery structure in their study (p. 629). We replicate this by also using structural equivalence and similarity. We ran a preliminary analysis of the network, which indicated that the network falls into a core-periphery structure.

Part of our preliminary analysis was to run a density measure of the network. The network has a density of 0.007, with 1932 ties and an average degree of 3.68. Next, we did the blockmodeling analysis. The network of over 400 actors was condensed into 107 groups, having anywhere from one to over five actors each. The density of the groups ranged from zero to over 0.83. In developing the image matrix, we chose a threshold of 25%, which resulted in an image matrix with a density of 0.0168, more than twice that of the initial network density (0.007). The visualization of the image matrix (see Figure 2) confirms our hypothesis that this network forms a core-periphery structure: it shows a core, many isolates, and five isolated pairs.

Figure 2: Image Matrix



Of the 107 groups formed by this analysis, ten had high betweenness centrality scores, ranging from 106 to 2006. Only five groups had high in-degree ties, ranging from ten to 22. Four groups had both high betweenness and high in-degree ties: 1, 2, 6, and 14 (pulled out in Figure 2). Groups 1 and 2 represent the nonprofit sector, group 6 represents the business sector, and group 14 represents the government sector. This means that government Twitter accounts are among those most interacted with in this network.

5. Final Comments and Next Steps

These preliminary results indicate that government plays a prominent role in the network studied. Government organizations are not the most central actors in this network, but they are one of the four most central groups in terms of both betweenness and in-degree measures, which indicates the prominent role of government even in conversations not lead by government agencies. The in-degree measures indicate one-way communication, while betweenness arguably indicates two-way communication. There are similar communities to this one all over the world, and social

network analysis can provide both a useful perspective on the nature of the flow of information as well as unique information on the structure of the network. As next steps, we will further our analysis of the network and begin the content analysis to better understand different strategies for engagement and interaction. This will enhance our findings and expand on the theoretical and practical implications of this study.

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VR-Participation: A Gateway to More Engaged and More Trusted Digital Democracy

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Abstract: With the advent of Virtual-Reality-supported social media, an opportunity arises for emerging next-gen e-Participation platforms to benefit from the new qualities, in terms of trust and citizen-engagement, brought by the VR technologies. In this paper we discuss how immersive VR experiences can help to alleviate some of the classic e-Participation issues. We present a gradient of VR experiences of different levels of immersion and set of potential benefits for e-Participation. We provide empirical evidence supporting the thesis of improved trust through increased immersion in digital communication in case of Virtual Reality-powered discussion spaces. We conclude with recommendations for improved base architecture for vr-Participation.

Keywords: vr-participation, e-participation, social media

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1. Introduction

The textual digital communication tools such as email, websites, blogs, forums, and social media have been the major form of remote interpersonal communication. The ubiquity and simplicity of those channels made them the primary choice for e-Participation services. The same channels have been challenged in the literature (Bos, 2002) to be of low perceived trust that technically renders them not suitable for the specific type of serious communication required for e-Participation. The limitations of textual channels lead to disturbed communication and often inflict discussion polarization that results in the lack of constructive outcomes, especially in the case of political debates (Sia, 2002). The enhancement of textual communication with limited non-verbal communication substituted by quasi-nonverbal cues such as "emoticons" (Lo, 2008) have been shown to deliver insufficient expressiveness and introduce ambiguity, and because of its colloquial nature, appear unsuitable for serious communication in e-Participation. Even though those obstacles are well-documented in the literature, text prolongs as the major tool for serious communication in the context of e-Participation in the year 2018, and platforms continue to apply textual tools for all the aspects of participation. The next-gen e-Participation integrates social

media channels to e-Participation platforms; however, that approach inherits the same challenges of textual communication. The introduction of the online video teleconferencing (though with a limited number of participants) has shown to improve the sense of social presence and to ensure that communication is more explicit (Sallnäs, 2005). Nevertheless, due to technical and logical limitations, teleconferencing has failed to rise to the same level of adoption and ubiquity as the textual channels and its role is currently limited to supporting closed, remote business meetings. In the light of slow evolution of teleconferencing solutions and the perpetual, "textual monopoly", the last decade brought a lot of innovation to communication technologies with the emergence of new digital social interaction capabilities - Virtual Reality (VR). VR technologies offer simulated collaborative environments, often referred to in the past as the form of "telepresence" (Steuer, 1992). Thanks to effective implementation of the VR-"telepresence", already well-defined in the 90s, the high interactivity and increased immersion capabilities, of the contemporary VR experiences gets closer to real face-to-face communication than ever before (Loomis, 2016). We argue that VR creates new opportunities for communications in terms of improving trust through stronger immersion, hence supporting more effective participation. In this work we attempt to explain the relation between the potential of improved immersion in e-Participation discussions hosted in VR environments and improved trust between serious discussion participants. Therefore, we argue that VR-supported e-Participation - vr-Participation, has a chance to significantly improve the effectiveness of the state of the art e-Participation and progress the digital, participatory democracy.

2. Background

One of the main e-Participation challenges is the lack of engagement by citizens. That flaw is expressed both by relative low number of contributions and low user activity (OECD, 2009)(Porwol, 2016). Citizens choose social-media over dedicated e-Participation platforms to communicate their political views and engage with decision makers as social-media proven to be more attractive and more accessible(Macintosh, 2009; Porwol, 2017). Nevertheless, the discussions both on dedicated text-based e-Participation platforms and social-media often lack focus that renders the discussions less constructive and leads to polarization of the hosted debates (Sia, 2002). The immersive VR enables users to stay focused on the discussion through greater "outer-world" isolation, while supporting users to be more conscious of the interpersonal communication. That is emphasized by earlier VR research by (Sanchez-vives, 2005) who explains the phenomena of presence through mobility of participant-consciousness: "The phenomenon of presence is based on a transportation of consciousness into an alternative virtual reality. In a way then, presence is consciousness in that virtual reality". The studies in other domain, such as journalism, corroborate those findings, pointing to more user engagement and immersion that outperforms any textual form of storytelling and communication (S. Shyam Sundar, 2017). In this context Sudar et al. refers to VR as "empathy machine" enabling participants to be more connected with the subjects presented through VR. Therefore, we argue, that in the advent of new affordable and immersive VR solutions (Boas, 2013) an opportunity emerges for researchers and e-Participation owners to experiment with more effective means of digital communication for e-Participation purposes.

In 2003, the SecondLife¹ 3D desktop platform already proved that many of the real-world communication scenarios, especially in the education and public meeting domain, can be effectively simulated in a computer-generated environment (Livingstone, 2008; Boulos, 2007). Nevertheless, the desktop-based solutions, suffer from so called "screen barrier" introduced by using the computer monitor as the VR- interface. That setup decreases significantly the overall user-immersion. The issue of "screen barrier" was already researched in the 90s and considered a challenge, contributing to low inclusiveness. The emerging VR technologies were anticipated to become the solution, which was particularly emphasized by Bricken et al. (Bricken, 1991): "Using a head-mounted display (HMD)" - a VR headset, "allows us to move through the screen's barrier, to interact directly with various information forms in an inclusive environment". That is corroborated by Bowman et al. who argues that immersive VR indeed provides different experience to desktop VR-applications but also points out to the challenge that is the cost of expensive VR headsets (Bowman, 2007). In this context, the last decade brought entirely new generation of highly-affordable consumer VR headsets such as Oculus Rift, Samsung Gear VR, HTC Vive, Google Daydream, Google Cardboard and Microsoft Mixed Reality and Xiaomi. VR. That new generation of headsets, released commercially to end-users just 3-5 years ago to a large extent enables the use of VR manipulators (pointers, wands, hands) and provide positional, surround and proximity-dependent audio (Shinn-Cunningham, 2005) (whispering and directed speech) that contributes towards more immersive all-around-user-wrapping interactive environments. Moreover, the new virtual environments offer simulated collaboration tools such as shared interactive screens and whiteboards. Those tools combined with real-world-like manipulators in form of movement-tracked pointers and wands that facilitate interactivity with virtual environment create truly immersive and effective collaboration space (Papaefthymiou, 2015). The premises discussed in this section led us to investigate whether new affordable consumer VR technologies, thanks to increased immersion can create more inclusive and trustful virtual public discussion spaces for next-gen vr-Participation.

3. Methodology

In this paper we attempt to answer the research question: Can the VR-improved audiovisual immersion and the sense of presence translate into more trustful e-Participation discussions? Our methodology combines our past e-Participation research and desk research in VR domain, followed by active empirical investigation and a survey as data collection tool. In particular the experienced e-Participation researcher engaged with VR-community via popular cross-platform social-VR application - AltspaceVR². The choice of AltspaceVR (AVR) platform was dictated by state-of-the art investigation in which AVR emerged as the only large-group social-VR solution to be currently available for all major platforms: 1) Desktop (PC and Mac), 2) Mobile 2D, 3) Major mobile VR and PC-connected headsets. That is particularly important in terms of accessibility and

¹ <http://secondlife.com/>

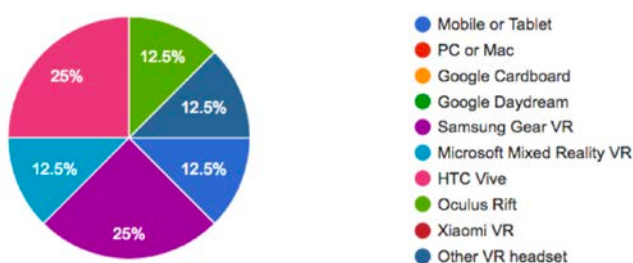
² <https://altvr.com/>

inclusion in digital participation. AVR platform ensures inclusion of wide spectrum of digitally enabled users that can engage through the newest VR technologies as well as through legacy 2D interfaces (offering similar experience to SecondLife interface) on PC or mobile devices. The extra motivation for choosing the AVR platform was recent experiment with serious communication in banking sector in Ireland³. The argumentation given by the bank for using AVR for the first experiments with VR serious discussions corroborate our findings presented in the background sections. Moreover, AVR platform has a nature of a sandbox and Software Development Kit (SDK) that can be easily modified and extended to severe some specific meeting scene arrangement needs. In particular, AVR uses standard web infrastructure to load its code, models, and textures which ensures maximum compatibility between different client applications. The researcher engaged with the platform using three distinct setups: 1) Desktop VR application 2) Mobile VR app 3) VR headset - Samsung Gear VR (fully-immersive VR vision & audio with VR-wand controller input). The researcher explored all the advanced features of the platform, including shared online browsing, virtual gestures, virtual pointers and positional audio and used available protocols of communication to investigate the relevance of the technology to e-Participation. The engagement took one week with average 2 h per day of social interaction. The engagement was followed by a survey sent to AVR community (via social-media AVR Facebook page and Twitter account). The survey had a form of an anonymous Google Form with 53 simple choice questions followed by open questions for further, optional explanations.

4. Experimentation

After the researcher's engagement in various discussions on AVR, a survey has been sent to AVR community channels to collect tangible feedback on VR-discussions. We have received limited explicit, written response in form of eight questionnaires completed in full. However, we would like to make a point that the results presented go beyond those eight explicit responses and are put in the context of statements collected from over 40 individuals with whom the researcher engaged. Despite lacking explicit user-data, we decided to publish those results as we believe that sample already provides interesting insights into the various aspects of VR- hosted public discussions.

Fig. 1. Question: Which VR-interfaces the AltSpaceVR Discussion Space Participants Prefer?



³ <https://www.wsj.com/articles/virtual-reality-takes-on-the-videoconference-1474250761>

We started our engagements and the questionnaire by explaining the purpose of the research and asking about the participant experience with VR on a scale 1-5 where 1 meant not experienced and 5-highly experienced. The respondents were of diverse experience with distribution - 1 (25%), 2 (12.5%), 3(25%), 4 (12.5%) and 5 (25%). In terms of the distribution of various VR-interfaces used by the respondents, presented in Fig. 1, we noted a similar level of diversity. That number reflects well the broader verbal response from other AltSpaceVR participants (beyond the eight full, written responses). The final conclusion from those results is that high accessibility ensured by diverse VR-interfaces' types supported by AVR platform, the virtual meetings have low entry barrier and are accessible to people not very familiar with VR.

4.1. Immersion

Following the basic information about the user profile, we asked the AVR users how immersive the VR discussion experience is in comparison to other media like textual communication and teleconferencing. Majority of the participants shared the opinion that VR delivers a much higher level of immersion. With result falling between three to five (3 - 25%, 4- 62.5% and 5 - 12.5%) that result was significantly higher than for text and teleconferencing where people were rating those channels between one to three. The results were corroborated by broader participants' response coming from other individuals. Users argued that by applying fully enveloping audiovisuals, VR strongly isolates participants from the surrounding environment so that participants are focused on the discussion. Our findings corroborate the research by [16] recalled in the Background section and the thesis of participant "consciousness being transported" into virtual space. Therefore, we argue that VR-discussion achieves significantly stronger immersion than discussion hosted on digital forums, social media or via teleconferencing software.

4.2. Trust

Another important aspect of the study is if better immersion of VR discussion participants can improve the trust to fellow participants. Half of the respondents said that they would surely trust fellow VR participants more than on other channels (37.5% said they would not trust and 12.5% said they do not know). That was corroborated by their opinions of ease of making a strong social bond through VR-discussions where the majority (62.5%) said they found it easier to engage into meaningful relations in VR environment (37.5 % said they do not know and nobody provided a negative answer). When it comes to broader response (beyond the full survey responses), users provided mixed opinions. Some users were more careful in their opinion and said that the "time will tell" if VR discussion spaces can be trusted. However, an indirect premise of higher trust was found during the experimental discussions as it was often experienced by the researcher in VR discussions that people spoke about their very personal problems and challenges openly (like physical or mental health issues) and that implies higher trust to fellow discussion-participants. Users converged on the opinion that building stronger social bonds in VR is easier than using other popular digital communication channels.

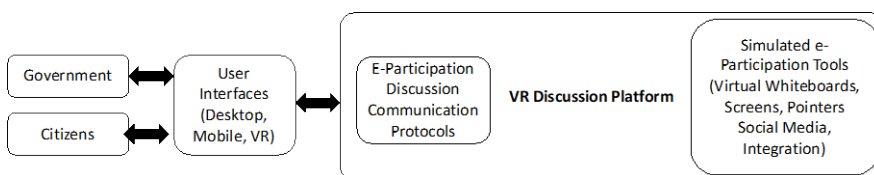
4.3. E-Participation

The final part of the investigation dealt with the potential of using social-VR discussion platforms like AVR for e-Participation. Half of the participants declared that they would engage with e-Participation through VR if vr-Participation was available (37.5% said they would not engage, and 12.5% said they do not know). That was corroborated by the broader set of participants who envisaged vr-Participation as a future of democracy. Users did not spare concerns over using VR for democratic purposes; some consider VR a new "government free" space and would rather keep it away from serious applications. Nevertheless, users shared an opinion that the VR experience, thanks to higher-immersion, is well suited for trusted, serious discussions, unlike using textual channels where the "screen barrier" and anonymity often causes significant discussion polarization. Participants also expressed the need for specific tools to be provided in vr-Participation to ensure effective participation. Among the highest mentioned tools (85.7%) was Voting Option tool. This was followed by special Moderator Role (57.1%) to be assigned to the lead participant and enforced by special discussion protocol (28.6%) to ensure effective and constructive debate. Also features like queuing a citizen question (42.9%) to the host or decision-maker as well as social media channels integration (42.9%) was seen as desired for vr-Participation.

4.4. VR-Participation Architecture

Driven by the results, we have designed a base vr-Participation architecture (Fig 2). The pivotal element of the architecture is the immersive, multi-interface social-VR platform (like AVR) that serves as a base for VR discussions. That platform requires to be enhanced with dedicated e-Participation discussion protocols (with explicit moderation and queueing) and user-roles and collaboration tools (whiteboards, screens and manipulators – pointers) for best possible serious discussion results. Finally, some integration with external tools such as class e-Participation platforms and social media, via shared screens should be provided.

Fig. 2. VR-Participation Architecture



5. Discussion

In this paper, we presented one of the very first works in the domain of e-Participation, attempting to investigate the feasibility of using emerging social-VR discussion platforms as a possible solution to major challenges with e-Participation citizen-engagement. In particular, we attempted to study the social-VR immersion as a tool to deliver more trusted and engaged participation through more trust among the discussion participants. We studied the related literature and evaluated relevant VR-technology that led to empirically verified hypotheses of "participant consciousness transportation" in virtual discussion space. Our research delivers

evidence for the premise of superior VR-discussion immersion in comparison to other digital communication channels in particular to text and video conferencing. Our study corroborates the findings in the literature and indicates a possible correlation between improved immersion of contemporary VR solutions and better trust in discussion in virtual discussion spaces. Further research is required to determine the degree of the correlation and possible impacts of VR-technology on specific e-Participation discussion cases. Also, relevant comparisons should be made between the existing e-Participation discussions and VR-hosted social engagements. The study presented is limited in terms of timing and size of the sample - 40 individuals engaged in conversations with the lead researcher with only eight full, written responses. However, we claim sufficient evidence for potential extra value and applicability of VR to e-Participation to motivate further studies. We proposed a base vr-Participation architecture for prototype vr-Participation implementations. We believe our work is a good starting point for further, more extensive studies and broader e-Participation and e-Government community discussion on the applicability of the emerging VR technologies to the future e-Participation solutions.

6. Conclusions

In this paper, we discussed the applicability of VR technologies to providing more trusted e-Participation. The tentative study presented, based on the premises from literature that have been verified against empirical study supports the thesis of greater trust among VR discussion participants. The immersion in virtual discussion helps participants to stay focused on the discussion and supports more constructive debates. The social VR participants show more freedom in expressing themselves on difficult topics without prejudice and judgment. vr-Participation certainly would not replace the existing e-Participation in the near future, due to novelty of the technology and the range of users who are among the technology innovation early adopters. Nevertheless, the incredible pace of VR-technologies development and significant VR-technology investments made by major digital communication players like Facebook or Microsoft gives a hope for improved VR-technology ubiquity in the near future. The pioneering AVR platform (lately acquired by Microsoft) which has been built as a sandbox solution for social-VR already provides an impressive set of capabilities that delivers immersive VR-discussion environment and could be considered a starting point for developing next-gen vr-Participation environments. The expandable cross-platform solution and availability of major affordable VR hardware creates a solid base for future vr-Participation developments. Our future works will be focused on organizing real political debates on AVR platform. We intend to invite politicians to discuss important matters with VR-enabled citizens and identify the key challenges in enabling fully-fledged e-Participation in VR discussion spaces. The vr-Participation experimental sessions will be followed by an attempt to provide a set of extensions to AVR platform, accordingly to the designed base architecture, to satisfy identified vr-Participation needs.

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Page Owner Comments on Page User Posts. A Pilot Study of Three Swedish Municipalities

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Abstract: In this paper, we present a pilot study of page owner comments on page user posts. Analysed data consist of the page user posts on three Swedish municipalities Facebook pages in one month. In general, it can be concluded that all three municipalities comment on page user posts to quite a large or even large extent (92%, 69% and 52%). The 42-page user posts that were left uncommented mainly belong to the categories of expressing an opinion, sharing information and requesting information. Taken together, these categories were identified in 76 percent of the analysed page user posts. Because they are also the top three categories for user posts in general, further questions are prompted as to where municipalities satisfy requests for information or if other users provide answers.

Keywords: social media, Facebook, page owner comments, page user posts, content analysis

1. Introduction

The adoption and use of social media by municipalities and local governments have been significant in the last decade. For instance, Norris and Reddick (2013, p. 170) mention that almost 70% “of local governments had adopted at least one social medium” in the USA already in 2011. Kaplan and Haenlein (2010, p. 61) describe social media as “a group of the Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content”.

If we consider Facebook’s mission to “Give people the power to build community and bring the world closer together” (Facebook n.d.), clearly Facebook should be a preferred social media option. For instance, Mossberger et al. (2013) point out that of the 75 largest cities in the U.S. only 13% had a Facebook page in 2009, which only two years later had increased to nearly 87%. Hofmann et al. (2013) mention that in 2012 48% of local governments in Germany had a Facebook page which according to Bonsón et al. (2015) had increased to 100% just a few years later. Looking at Sweden, we can conclude that in 2015 over 70% of the municipalities were using Facebook for the organization as such, and over 95% were using Facebook for some specific area such as tourism and library services (SKL 2015).

Several explanations of the increased usage of Facebook by municipalities and local governments have been mentioned and argued for in the literature. For instance, Hanna et al. (2011) observe that organizations, including local governments and municipalities, want to “reach consumers where they ‘live’ online” (p. 265). Similarly, in Leighninger (2011), the author argues that to communicate with citizens an organization needs to understand “Where they are online” (p. 3), “How they prefer to be engaged” (p. 3) and “What they expect from government” (p. 3).

In the case of the usage of the Internet and Facebook as such in Sweden, Davidsson and Thoresson (2017) found that 95% of all citizens have access to the Internet from their home. However, the most common way to access the Internet is via a mobile phone. Davidsson and Thoresson also found that 74% of Swedish Internet users use Facebook now and then and 53% use it daily.

A study conducted in 2016 claims that Facebook is now treated as a news channel of more importance than the local newspaper for Swedish municipalities (Kreafon 2016). In a recent article by Medaglia and Zheng (2017), the authors point out that most published research in government use of social media focuses on the municipality and concentrates on quantitative aspects. Medaglia and Zheng also show that quantitative aspects are in focus in research addressing citizen usage of government social media sites.

Some municipalities have a rather active user-base for their Facebook pages. Some are eager to promote discussion while others have been more restrictive, fearing negative spirals of comments. We have previously shown that users moderate negative comments from other users (Bellström et al. 2016). Moreover, we have elaborated a framework to categorize the content of page owners and user posts. Yet, it remains to be investigated to what extent municipalities themselves comment on user posts, which categories of posts are answered, and which categories are left uncommented by the page owner.

We define a *page owner post* (in Facebook’s own terminology, a Post) as a message posted by the municipality (the page owner), which can include text, links, pictures and videos. A *page user post* (in Facebook’s own terminology, a Visitor Post) is a message posted by a citizen or a company and can have the same content as a page owner post. The main difference between a page owner post and a page user post is who is posting the message and where it is shown on the municipality’s Facebook page. What Facebook calls Comment we split into two definitions. A *page owner comment* is a message posted and published in relation to a page owner post or page user post. A Facebook *page user comment* is also a message posted and published in relation to a page owner post or user post. The difference between page owner comment and a page user comment is who is posting the message.

For this pilot study, we focused on the uncommented posts, as these have not received much attention in the e-Government research. It is easy to extend this study by also analyzing the content of the user posts that the municipalities do comment on, thus addressing questions such as “Do the two kinds of user posts differ?” and “Do comments by municipalities contain the same kind of content as posts by the municipalities themselves?” However, as such extensions are quite

laborious due to the time-consuming nature of content analysis, we have performed this pilot study to get an understanding of uncommented posts in relation to previous results on user posts.

This narrow scope prompts the following three research questions:

RQ1: To what extent do municipalities leave Facebook page user posts uncommented?

RQ2: Which types of content categories are represented among the uncommented Facebook page user posts?

RQ3: Do the content categories of uncommented Facebook page user posts differ from what is normally posted by Facebook page users?

Next, we address related studies, followed by presentations of the research method for the pilot, results, conclusions, and finally, the paper ends with discussion and suggestion for future studies.

2. Related Studies

In this section, we address related studies of interaction and engagement in social media with a focus on the usage of Facebook in municipalities. We also discuss and describe related studies of the content of page user posts on municipalities Facebook pages.

2.1. Interaction and Engagement in Social Media

Mergel (2013) has suggested a framework that “traces online interactions to mission support and the resulting social media tactics” (p. 327). This framework is based on three missions: transparency, participation and collaboration, which are all mapped to goals, tactics, social media mechanisms and outcome (see the overview table on page 332). According to the author, the goals of transparency are information and education, the tactic is one-way push, and to indicate the level of transparency the number of Facebook likes can be measured. The goal of participation is engagement, the tactic is two-way pull, and to indicate the level of participation the number of Facebook comments can be measured. Finally, the goals of collaboration, which in Mergel’s framework is the highest level of engagement, are cross-boundary action and two-way interactive, tactics are networking and co-design of services, and to indicate the level of collaboration the number of Facebook shares can be measured. The author concludes that “government is currently focusing mostly on push techniques and uses social media channels to provide information that is recycled from other government communication channels” (p. 332). That is, the studied governments’ tactic is one-way push indicating transparency, which is the lowest level of interaction (mission).

Mossberger et al. (2013) have investigated “the use of social networks and other interactive tools in the 75 largest U.S. cities between 2009 and 2011” (p. 351). Based on their empirical study, the authors concluded, in line with Mergel (2013), that local governments were mostly using the one-way push tactic but some indications for moving towards the higher level of Mergel’s framework did exist. Bonsón et al. (2015) have measured “the impact of media and content types on stakeholders’ engagement on Western European local governments’ Facebook pages” (p. 52).

Bonsón and co-workers concluded that content as well as media types affected engagement on Facebook. The authors also pointed out that liking a post is still the most common way of interaction, followed by sharing a post and commenting on a post.

2.2. Content of Page User Posts

Bellström et al. (2016) continued a project started in Magnusson et al. (2012) by analysing page owner posts as well as page user posts for a period of three months from a municipality in Sweden. Two content category schemata presented by Magnusson et al. (2012) were revised resulting in a content schema for page owner posts consisting of eleven categories for page owner posts and thirteen categories for page user posts. The latter were labeled as follows (in descending order by number of posts in each category): requesting information, sharing information, expressing opinion, reporting service breakdown, praising the municipality, complaining about the municipality, requesting existing service, automatic Facebook postings, marketing event, identity or community building, requesting future service, informing about service and marketing service. Finally, in order to understand what the users were asking about in posts categorized as “requesting information”, Bellström (2017) analyzed the posts and found that page users are first of all asking questions about infrastructure, sports and leisure, and services. Put together, these three categories were identified in 52% of the analyzed user posts.

3. Research Method

A qualitative content analysis (Krippendorff 2013), sometimes referred to as directed content analysis (Hsieh and Shannon 2005), or a deductive approach (Elo and Kyngäs 2008) to content analysis, was applied in this paper to analyse the content of uncommented user posts. This was motivated since “A deductive approach is useful if the general aim was to test a previous theory in a different situation [...]” (Elo and Kyngäs 2008, p. 107). In this paper two of the research questions (RQ2 & RQ3) addressed a specific content schema (Bellström et al. 2016) in a new and different situation.

3.1. The Empirical Cases of the Study

In this study we have used and analyzed page user posts from three municipality Facebook pages, hereafter referred to as M1, M2 and M3. M1 was chosen because it is a smaller municipality (< 25000 citizens) and its Facebook page has many engaged followers. M2 was chosen because it is small (< 100000 citizens) but substantially larger than M1 and on its Facebook page this municipality has not only many likes but also many followers. Finally, M3 was chosen as constituting a somewhat larger municipality (< 250000 citizens), which is often argued to be an influencing factor for adopting new technologies (e.g. Bonsón et al. 2015; Mossberger et al. 2013).

3.2. Data Collection and Coding

In the beginning of July 2017, posts by page owners and page users for July 2016 to June 2017 were collected and downloaded using the Netvizz Facebook service v. 1.44 (Reider 2013). Since this paper only deals with page user posts, the page owner posts are not further discussed. For this

pilot study, we limited the sample to one month: we randomized a number between one and twelve resulting in a four. Thus, page user posts and page owner comments from April 2017 were selected for analysis.

We manually went through all page users posts and tagged the posts that were left uncommented by the municipality. In doing so, we were, in this pilot, only looking for first-order comments, that is, a direct comment on a user post. This means that the municipality comment does not necessarily need to be the first comment since comments might also be made by other page users. This also means that a page user post left uncommented might have a municipality comment on a follow-up comment submitted by either the user who submitted the post or another user submitting a comment on the page user post; in such a case, we have failed to identify the municipality comment.

The total number of page user posts included for analysis, that is, all the user posts from April 2017, were 88 for M2, 29 for M3 and 13 for M1. The page user posts marked as uncommented were further analyzed using a content analysis approach as explained above. During the analysis, we used the page user post content schema presented in Bellström et al. (2016). Due to the limited number of uncommented page user posts, we decided to work with them as one dataset. The coding process, including reading and placing each user post in one content category, was performed by one of the authors in several iterations and with the support of the NVivo (n.d.) research tool.

We acknowledge the ethical issues and challenges of doing research on and with the Internet. For instance, in AoIR (2012) the authors address that it is important not only to consider ethics before conducting a research project but also during and after the research has taken place. In line with this, we have considered ethical issues and challenges before, during and while finalizing this paper. Two results of these deliberations were not naming the municipalities (in the text the municipalities are referred to as M1, M2 and M3) and due to the limited number of uncommented page user posts, we worked with the data as one dataset while conducting the content analysis. For a later study based on the above 12 months sample, this might not be the appropriate procedure if interesting differences can be detected between municipalities.

4. Results

In total, we scanned 88-page user posts from M2, 29-page user posts from M3 and 13 posts from M1 municipality to find the “first-order” comments by the municipalities. Out of these page user posts, 27 from M2, 14 from M3 and one from M1 had been left uncommented. As a second step, the uncommented user posts were analyzed and categorized in line with the aforementioned content schema.

The most common category identified among uncommented posts was “Expressing opinion”, a content category described as a citizen “stating his/her opinion on a municipality matter” (Bellström et al. 2016 p. 559). Out of the 42 uncommented user posts, 17 were coded in this category, that is, just above 40 percent. The second most common category identified was “Sharing

information”, described by Bellström et al. (2016) as a citizen or organization “sharing some information” (p. 559). In total 9 user posts were coded in this category, 21 percent. The third most common category identified was “Requesting information”, described as a citizen or organization asking “a question to the municipality or other users” (Bellström et al. 2016 p. 559). In total 6 posts, 14 percent, were coded into this category. The remaining user posts were distributed as follows: 3 posts as “Praising the municipality”, 2 posts as “Identity or community building” and 2 others as “Reporting service breakdown” and finally, 1 post each as “Complaining about the municipality”, “Marketing event” and “Requesting existing service”.

It can be noted that no post contained multiple messages, that is, no post content had to be split up into two or more content categories. It can also be noted that four content categories presented in Bellström et al. (2016) were not identified at all in the uncommented user posts, which may not be representative due to the small sample size.

5. Conclusions

In this pilot study, the answer to RQ1 about the extent to which municipalities leave Facebook page user posts uncommented is that municipalities do comment on Facebook user posts to a large extent, but in terms of the proportion of user posts it decreases with increasing size of the municipality (not with increasing number of posts). The smallest municipality, M1, commented on 12 of the 13 user posts made during the sample month, while M2 commented on 69%, 61 of 88, user posts. The largest municipality, M3, did not receive posts to its page in proportion to its size and was not overly eager to comment on them. Only half of the user posts received a page owner comment, 15 of the 29 users posts to be precise.

The answer to RQ2 is that almost all the content categories presented in Bellström et al. (2016) are represented among the uncommented page user posts. In descending order, “Expressing opinion” (17-page user posts), “Sharing information” (nine-page user posts) and “Requesting information” (six-page user posts) were coded as the three most common categories in the data. In total, these three categories were identified in 76% of all analyzed users’ posts.

Finally, the answer to RQ3, Does the represented content categories differ from what is normally posted by Facebook page users? – is in line with the result presented in Bellström et al. (2016), where the three most common content categories normally posted by page users were found to be (in descending order): “Requesting information”, “Sharing information” and “Expressing opinion” (as this result was already available we did not check the commented posts for April 2017).

6. Discussion and Future Research

The answer to RQ3 is simply that there does not seem to be much difference between user posts in general and user posts that do not receive a direct comment from the municipality. Thus, it remains to be investigated where municipalities provide answers to demands for information if their Facebook pages *Comment* function is not used for this or if other users comment on posts

make up for this lack of page owner response. It would also be interesting to know more about how shared information is received by other users. In 3.2 we mentioned the limitation to “first-order” comments, that is, that this pilot investigation neglected all possible comments on comments. There are more severe problems connected to the analysis of “comments”. Facebook users do not always restrict themselves to commenting via the comment function of each post. Instead, they may comment in a new post or comment while writing in the comment text field of another post thread. Thus, a great deal of detangling of all texts entered may be required to say which comments are comments on what.

On the other hand, for the purpose to see the content types of different municipalities’ text production (page owner posts vs. comments on page users posts), the method applied here is more or less by definition sufficient even if the sample could have been bigger to yield more conclusive answers to RQ2 and RQ3. The sample month might include an untypical peak regarding the most common content category identified in the data. For example, at the end of April 2017 in the municipality with most user posts, there was a proposal to develop and change a recreation area. This specific proposal attracted much attention involving many users posting their opinions on the proposal (“Expressing option”) on the municipality Facebook page.

We plan to extend this pilot study with an analysis of the larger dataset mentioned of page user posts and page owner comments on page user posts for all three municipalities. In doing so, it should be possible to obtain more exhaustive and conclusive answers to all three research questions stated in the introduction. We also plan to study the social media guidelines of the three municipalities and to conduct interviews with municipality staff that are dealing with social media. There might also be a need to include some more small municipalities because the ones chosen by many active followers might not be representative.

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A New Paradigm for Digital Collaboration in the Toy Industry: Empowering User Co-Creation through Social Media Channels

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Abstract: Although almost all toy manufacturing companies are SMEs, the toy market is dominated by a few global brands. For the early stages of product development, SMEs do not possess the same tools to perform market analyses as global brands. This paper presents work from the European funded research project, ToyLabs, that aims to create a multi-stakeholder network and collaboration platform to come up with new and innovative toys. Part of the methodology involves taking advantage of social media channels to uncover public opinion on products and brands in the toy industry. ToyLabs project takes advantage of social media channels, where through data mining and sentiment analysis techniques attempts to uncover public sentiment and gain feedback about concepts, products, and brands. This paper presents the current status of media co-creation in the toy industry as well as ToyLabs' approach in using social media channels to enhance the concept formation.

Keywords: co-creation, digital collaboration, social media, data mining, sentiment analysis

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1. Introduction

In an environment of ever-changing demand, the need for innovation, driven by the short product lifecycle of toys, is necessary for toy manufacturers to maintain a competitive advantage. The production of a toy must answer to a clear market demand and follow current trends to be successful. Although this observation (Toy & Game Manufacturing Report Summary) concerns all toy manufacturers, regardless of size, large companies more easily survive in heavily competitive environments, since they have the capacity to buy and implement extensive market researches, offer a wide selection of toys, and target multiple markets. However, this is not the case for SMEs, who constitute 99% percent of toy manufacturers (Linders 2013). In an electronic survey performed by the ToyLabs project with stakeholders of the toy industry, 12/43 toy companies claimed that they need support in the stage of idea generation. SMEs in the toy industry face difficulties in retrieving information/data that will help them uncover current trends to conceptualise new ideas/products and receive feedback on them.

In that view, the ToyLabs project develops a Market Trends and Social Feedback Analysis tool, specifically tailored/trained for the toy industry, to be used by SMEs as a means to validate new ideas in the market, seek out trends, find market gaps, and evaluate the users' experience. The system/tool will then be tested by two different pilots, each one interconnecting an SME manufacturer with two FabLabs. Each manufacturer and respective pilot case aims to capture a different market segment relevant to the toy industry; the first deals with Mechanical Puzzle Toys addressed to children over 10 years old as well as to teenagers and even adults, whereas the second with dolls and accessories, addressed to toddlers and children up to 12 years old.

2. Relation to Existing Practices

In this chapter, a review has been carried out on practices that attempt to discover trends and feedback in social media as well as practices that take advantage of such knowledge for new product development.

2.1. Discovering Public Opinion in Social Media Channels: Current Practices

Organisations that can harness the innate human ability to manage social knowledge will be able to lower transaction costs and become more profitable. Nowadays, this knowledge largely resides online in social networks such as Facebook and Twitter and other websites such as blogs where users voice their opinions. This kind of social feedback is essential to the formation of a digital reputation and it allows users to rate the contributions of others (Brown 2017). Innovation can be encouraged by monitoring customer communications, feedback, and opinions (Matuszak 2007; Tapscott 2006). A brand is defined as "the consumer perception and interpretation of a cluster of associated attributes, benefits and values" (Batey 2008) and these communities are better known as virtual brand communities, which are defined as "specialised, non-geographically bound, online communities, based on social communications and relationships among a brand's consumers" (Valck et al. 2009).

Even though there is no strict way to define what is trending and what is not, as well as the fact that a trend is inherently changing, it is necessary to find an approach to model the problem of trend identification in a way that will render trends easily detectable by specialised methods for a large volume of web data. Although there are such approaches in the academic literature, they are not univocal and are based on each specific application area. Most common applications that track trends use a keyword-based approach and provide output in the form of simple terms, hashtags or term n-grams (Lau 2012). Many already implemented algorithms exploit hidden Markov models (Stieglitz 2013); these models are utilised to train topic observation mechanisms, which are stored for future predictions.

2.2. Media Co-Creation in New Product Development

In new product development, media co-creation focuses on very specific stages of the procedure, mainly the immersion/conceptual design of a product as well as in finding efficient marketing channels for its commercialisation. The true power of social media resides in the prediction of trends and the potential to know whether an idea/concept/product has the potential to succeed according to the views of people. As a result, media co-creation in new product development, includes the methodologies and technological tools that are being used to a) extract public opinion from social media channels, b) analyse said opinions to extract conclusions and c) take advantage of this new knowledge to develop products that respond to a clear market demand and improve their brand image.

Despite the capabilities that such tools can offer to a manufacturer, most approaches that have been developed are not ready to be implemented in real life solutions and offer a fraction of these functionalities. Sentiment analysis has been used to extract opinions and sentiments about product reviews in Greek and in English recognising the power of online reviews/feedback about a product for business and marketing professionals (Giatsoglou 2017). Kumar attempted to analyse the health of brands by content analysis of the consumer feedback present on a brand's Facebook page and categorisation of the feedback based on benefits consumers derive (Kumar 2013).

3. Innovation Approach

Overall, ToyLabs is a multi-featured collaboration and product co-creation methodology and platform. The collaboration aspect in the design processes and the new product development activities are not examined in the context of this paper (Michalitsi-Psarrou, et al., 2018). Instead, the focus in this paper is answering the following research question: How can "harnessing the wisdom of the crowd" be used to aid new product design in the toy industry by collecting already existing data from the bottom up?

3.1. Incentive: The Power of the Crowd in the Toy Industry SMEs

Even though toy manufacturers consider user feedback to be particularly important for optimising procedures and making improvements on their products, they mainly revolve around their client's opinions, collected in retail, completed feedback forms, and sales analyses. Toy industry's stakeholders are particularly varied in that there is a difficulty in identifying its customers, who

are ranging from actual end users (i.e., children), to parents, teachers; all of them influencing buying behaviour. While children are increasingly exposed to social media from an early age, parents and teachers are engaging in blogs and targeted sites to create communities and discuss issues related to their children. This diverse audience creates an unprecedented opportunity to explore and exploit user-generated feedback stemming from indirect feedback mechanisms as generated through social media, blogs, and other web sources and attempt to merge it for use in a single solution.

3.2. Description of the Methodology Employed

The methodology being implemented for the needs of the ToyLabs project is presented along the following lines, based on the need to capture crowd perception on user-owned or competitive products, product categories and brands, reflect also future trends in the toy industry. Therefore, the methodology is separated in two independent but technically interconnected flows, as follows:

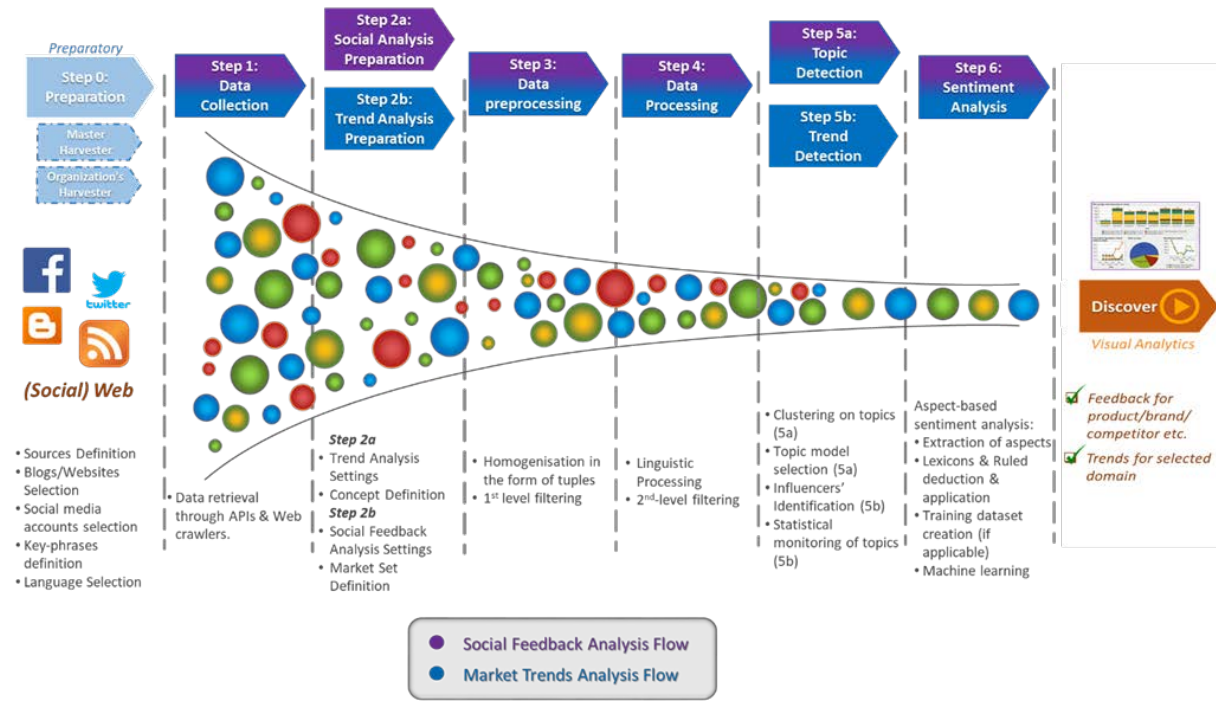
- 1) The **social feedback management and analysis flow** for a selected brand/product /competitor/etc. The objective of this workflow is to give to the user of the platform insights on his brand image and the crowd perception about his products, as well as the opportunity to make comparisons on the appeal of his brand/products and his competitors'. Both the frequency of social mentions about specified brands/products and the sentiment implied in them are being monitored and compared.
- 2) The **market trend detection and analysis flow** for a specific toy domain of interest (e.g., dolls, puzzles, etc.). According to this flow, a relevant toy domain is specified and analysed exploiting the vivid discussions in social media and web sources in order to detect relevant concepts and the sentiment of their mentions, reveal hidden dependencies, and come up with potentially unknown future trends for a specified domain of interest. Furthermore, insights can also be gained into the expected adoption of a new toy design by a somewhat uninvolved crowd, i.e., a diverse crowd that was not specifically questioned to provide opinions on specific ideas.

These two flows are further analysed in six core steps and one preparatory step, depicted in Figure 1.

During the first, preparatory step (Step 0 in Figure 1), the ground is prepared appropriately for the analysis that follows, taking into consideration the toy manufacturer's needs and the industry/product type he represents. It contains two sequential steps; the preparation of the Master Harvester and the preparation of the Organisation's Harvester, with the first being mandatory and the second one an optional step. The Master Harvester applies collection methods that are generally applicable to most toy manufacturers. The sources and key-phrases defined are generic, characterising the toy industry, defined by a toy industry ontology generated for the needs of this methodology, which is constantly updated by the pilot partners of the ToyLabs project and their network. On the other hand, the Organisation Harvester is optional, giving the product designer the opportunity to further expand and target his domains of interest for the analyses. The existence of a preconfigured Master Harvester was considered imperative to provide an easier to use tool for untrained users, that has already set reasonable boundaries to the data that are being collected, and which has been collecting data long before an analysis has been requested.

Both harvesters are set up by defining social media accounts and websites/blogs/forms to be tracked, applying weights to different sources, key phrases, and languages.

Figure 1: Market Trends and Social Feedback Analysis Flows



Afterwards, data collection takes place. This step (Step 1) is responsible for data retrieval and storage, based on the settings of the previous step where identified search keywords, known user accounts of the domain, and preselected blogs are determining the data to be retrieved. Standard approaches for data retrieval are used, using the APIs of the chosen social media platforms (e.g., Twitter API) and configured web crawlers in the case of blogs and portals.

The following step (Step 2) is divided into two sub-steps, Social Analysis Preparation and Trend Analysis Preparation. According to the first sub-step and respective workflow, the settings for the purposes of the specific social feedback analysis to follow are set (i.e., timeframe, sources, language, influencers, and specific keywords or hashtags), defining a subset from the data set collected during data collection. Apart from these settings, the concept of "Market Set" is introduced to enable the user to define his "universe"; his brand, his products and his competitors' brands, and products and all possible ways one may refer to them. This "micro-universe" is defined as a market set for the toy manufacturer where he may define different market sets according to the analysis he wants to implement. According to the second sub-step, Trend Analysis, the configuration settings are the same as previously (i.e., timeframe, sources, language), but they also include configuration based on defined concepts and parameters. A concept, in that sense, is a meaningful combination of words (i.e., key-phrases and hashtags) that are of interest (e.g., baby dolls) for the toy manufacturer's analysis, while the parameters refer to dimensions on which the concepts are being analysed and compared (e.g., colours or materials).

When the settings are ready, a data pre-processing (Step 3) is initiated to homogenise the diverse input types coming from the used social media platforms, blogs, portals. To implement feature-level sentiment analysis, processing a blog post is inherently different from processing a 140-(or 280-) character tweet. Although the latter may contain equally strong and important opinion expressions, its size inevitably reduces its scope, whereas the first may mention multiple toy features and even hold contradictory statements. Therefore, in this step, social media content is retrieved and normalised, to include at least the following information: the core textual part of each main piece of data, the opinion holder, the timestamp of its publishing, the source of the retrieved data, and the importance indicator, namely an additional indicator measuring the text importance and influential power of the given text extracted from source-specific information that will be excluded from the next processing step. As an example, an influencer identification algorithm based on PageRank is applied (Puigbò, Sanchez-Hernandez, Cadabayo, & Agell, 2014) for social media sources as a first importance indicator to outline the expected impact of a given piece of information, while in the case of blog posts and portals, properties indicating the discussion's liveliness, such as the length of comments, their number and the discussion growth rate, are defining the importance indicator. Certain additional simple transformations are applied, such as removal of text considered as noise, removal of malicious content or text sanitisation (i.e., locating and removing sensitive data).

After this first-level processing, the main data processing should take place, being a step (Step 4) responsible for converting the text that expresses an opinion, an idea, a potential trend. in an appropriate representation for the analysis that will follow in the next steps. Therefore, depending on the type of data and data sources, multiple NLP techniques should be employed (i.e., tokenisation, stop-words removal, POS tagging, stemming) to determine the features discussed or implied in a given piece of text and transform unstructured text into vectors. Apart from these linguistic techniques for NLP, other techniques should be considered depending on the case, such html elements removal, hashtag extraction removal, exclusion of textual inputs that do not meet certain criteria (e.g., use of a lot of symbols, posts without hashtags), to come up with text's best representation in the vector space.

The next step of the methodology (Step 5) is that of Topic & Trend Detection, implemented either in parallel or sequentially, starting from Topic Detection. In the case of Topic Detection, two high-level categories of processes have been identified, that of: (a) Topic model algorithms used in social media to define the main topic of the examined posts. LDA (Latent Dirichlet Allocation (Viegas et al. 2006; Wei et al. 2010) is distinguished from the available options to be used for ToyLabs since it can be used uniformly regardless of the data source, (b) Clustering in broader topics/categories, referring to the grouping of posts/texts/etc. into broader topics in order to detect hidden similarities or correlations among entities and identify potentially hidden topics that are associated with specific products and toy categories/entities. The Trend Detection Step is only considered as a step in the case of Market Trends Analysis flow. According to this approach for trend detection, two methods are delineated: (a) Statistical monitoring of the identified topics over time, comparing them with previous periods that will ensure capturing of the emerging topics, (b) Identification of influencers of a specific domain of interest, to be used as a weighting strategy that

will help toy manufacturers and other interested parties understand how important a particular opinion is.

In the case of Social Feedback Analysis Flow, the methodology's workflow concludes with sentiment analysis (Step 6), that provides a social sentiment indicator towards the expressed ideas in social media posts/blogs/etc. as well as an aggregated sentiment for a "topic" representing a product, a brand or anything else worth monitoring. In the case of the Market Trends Analysis Flow, sentiment analysis, not really met in the standard approaches encountered in the academic literature, aims to capture approval or disapproval regarding trending topics, as well as the intensity of this sentiment. Feature-level, aspect-based sentiment analysis is performed, emphasising on the opinion/sentiment target, aiming at giving explicit insights into what the opinion holder liked or disliked instead of attributing a positive or a negative sentiment in a whole language construct (i.e. document, paragraph, sentence or phrase). It should be stressed that the definition for an aspect is something to be determined upon further experimentation with real data on the toy industry domain, varying possibly on each case (e.g., its design, its resistance, its quality).

The output of the methodology is finally provided with the support of visual analytics, at which concluded after iterative discussions with the ToyLabs pilot partners, reflecting the information a toy manufacturer needs to see. Among them, an indicative list of the information a user will see on the Analysis Dashboard when initiating a new analysis is the following: hidden, previously unknown correlations among concepts of interest using concept maps, predominant emotion on each examined toy features/concepts using bubble plots, comparison of predominant emotions among brands and toy products using bar charts, occurrence of certain search terms across time using time-series, most frequently occurring terms across all monitored sources using tag clouds. Gradual and iterative information filtering can reveal hidden relations among products and sentiment patterns and on-the-fly computations, offered in the form of interactive entity selection help gain instant insights into anything that draws the user's attention.

4. Conclusions and Future Work

A possible means to help SMEs become more competitive comes from creating partnerships and collaborating as well as sharing resources, expertise, and data. A review on the topic of applying social network analysis for trends detection and feedback management leaves a lot to be desired, especially regarding new product design. This becomes even more apparent when considering SME manufacturers, whose lack of resources and position on the supply chain places them too far away from the market to have a clear picture of its needs.

Trying to fill in this gap, ToyLabs creates a collaborative design and product co-creation platform, which enhances toy manufacturer's business processes by bringing them closer to end-users from the early stages of new product development and providing them with a co-managed and ever-evolving data mining and sentiment analysis tool tailor-made for the toy sector. This approach is currently being implemented and tested in the EU co-funded project ToyLabs, which is in its pilot operation phase. Specifically, the ToyLabs Collaboration Platform's Market Trends

and Social Feedback Analysis tool is being trained with datasets coming from social media relating to the toy industry. Only public sources are being used for the formulation of the datasets, while no data are being kept as-is, but only in an aggregated form to draw conclusions about brands, products and design ideas and never the data subjects themselves. The methodology is then applied, and the tool is used in two real-life pilot cases, as mentioned before, on mechanical puzzle toys and dolls and accessories. These pilots aim to exploit the ToyLabs co-creation process from conceptualisation to production and commercialisation, to reengineer their new toy design processes. The next research question that ToyLabs aims to answer is in which extent this design co-creation methodology supports SMEs in the toy industry compared to the current, traditional approach for toy design. After the end of the pilot operation and the end of this cycle of training of the Market Trends and Social Feedback Analysis tool, more definitive results on the methodology's applicability will be produced.

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Innovative Public Participation in the Twenty-first Century: Assessing Initiatives with the I-Participation Index Based on Cases from Municipalities in the Netherlands

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Abstract: Innovative public participation has increased in importance in the 21st century. A large amount of research has been conducted on the subject of eParticipation. However, there is a lack of literature regarding comprehensive comparison and assessment of such practices. We introduce the I-Participation Index, which is a framework for public professionals to indicate, compare and assess their own innovative participatory initiatives. The framework has been developed as a tool for assessing and comparing innovative participation initiatives including but not limited to eParticipation. Based on the guidelines from design science research, the I-Participation index is grounded in a theoretical study and is validated by conducting eight empirical case studies at municipalities in the Netherlands. Six categories of critical success factors for digital participatory initiatives form the backbone of the index. The study delivered a new index, including a spider-web scoring method that potentially can grow into a valuable tool for self-assessment of municipalities and thorough comparison.

Keywords: public participation, participation evaluation, innovation, eParticipation, electronic participation; e-participation; political engagement; impact assessment; evaluation framework; logical model; intervention logic; eGovernance; electronic governance; e-governance.

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1. Introduction

In the Netherlands, there is a national policy to reinforce citizen participation in local policies. Many local municipal participation initiatives are developed and implemented. Although some of these initiatives are promising and others are not, they contribute to a network society (Castells, 2009; Van Dijk, 2006) in which digital technologies play a major role. There are many innovative choices made and people participate from various roles in initiatives depending on, for instance, interest. Furthermore, with the rise of smart city plans, increasing engagement of the public is key (Effing & Groot, 2016). What insights can we derive from all these lessons learned? It is quite hard to evaluate eParticipation, because there is little understanding of what works and what does not (Smith, Macintosh, & Millard, 2011). To learn and to disseminate these lessons from new innovative participation practices in the Netherlands, we developed the I-Participation Index. This index is developed as a practical index for public professionals to indicate, compare and assess their own innovative participatory initiatives. The central component of the index is an online assessment instrument for municipalities based on theoretical insights about success characteristics of participation practices.

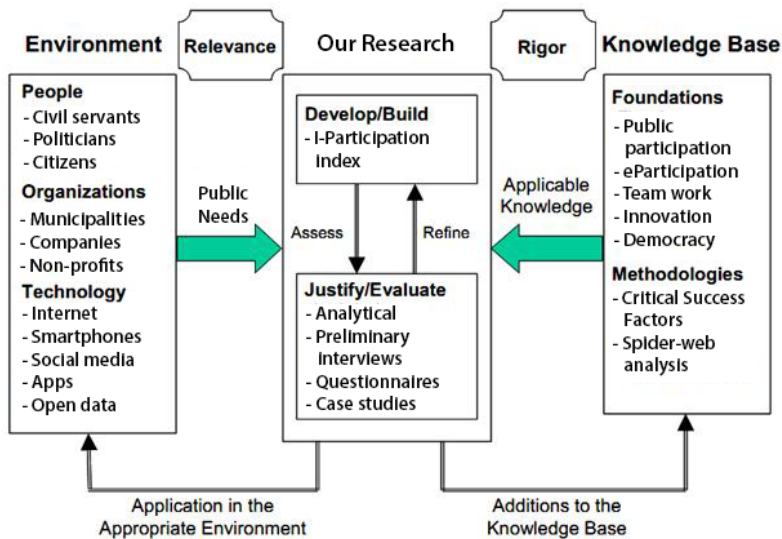
We apply this index to describe, understand, benchmark, and to support these innovative participation initiatives, contributing to more effective development of public participation. The question answered in this paper is: What is a useful I-Participation index that enables us to develop insights in the development and impact of participation initiatives? While the fields of democratic participation and eParticipation are well established (Panopoulou, Tambouris, & Tarabanis, 2014), there are not many integral theoretical tools available to monitor and assess innovative participatory initiatives (Loukis, 2012). There are many descriptive frameworks indicating levels of participation (Grönlund, 2009), but these are in general one-dimensional. Public participation is defined here as “the practice of consulting and involving members of the public in the agenda-setting, decision-making and policy forming activities of organisations or institutions responsible for policy development” (Rowe & Frewer, 2005). However, the challenge of participation is a difficult one to solve. Democratically chosen leaders are not always open to more opportunities for the public to collaborate. Furthermore, some public professionals would like to do their tasks without contacting citizens at all. And many citizens could not care less about working together with the government. New technologies such as social media do not necessarily increase interest in collaboration and participation (Effing, Huibers & Hillegersberg, 2013). A local public participation initiative is any local practice where the lowest governmental layer (i.e., a municipality) aims to work together with or get input from relevant local citizens or companies. We chose seven participation initiatives in one province in the Netherlands and added a control case from another Dutch province.

The remainder of this paper is structured as follows. In section 2, we describe the applied design science research framework. Section 3 presents the I-Participation Index based on a literature study. We used the index to describe and compare eight local citizen participation initiatives at different municipalities. We present the results in section 4. Section 5 concludes with a discussion about limitations and with recommendations for the continuous development and application of the index.

2. Method

To design the index, we applied the design science research framework of Hevner, March and Park (2004). Figure 1 shows how we tailored the framework to our specific design.

Figure 1: The Design Science Research Framework for this Study Derived from Hevner et al., 2004



Both the theoretical backgrounds of participation theory from the field of governance and recent findings regarding electronic and digital forms of participation have provided us with a knowledge base. We have elaborated on our earlier research (e.g., Effing, 2014). We justify and evaluate the index by validating it in eight cases and conducting qualitative interviews with participants as well as with municipality stakeholders (Yin, 2009). By applying it in a real 'initiative context of municipalities' we learn from the application in a real-world domain (Environment section in the figure) (Yin, 2009). The most important part here is that the index is built to serve a real need in the municipalities. It is important that initiative participants and municipality stakeholders experience added value from the use of the index.

In order to apply the Design Science principles, we have followed the following steps in our research. First, theoretical foundations, which are of possible influence on citizen participation, digital cooperation and team building, have been selected from the literature. We used meta-studies and overview articles from the fields of participation and eParticipation in order to identify articles. Participatory initiatives often contain characteristics of teamwork. After all, it pivots upon a group of people who strive after a shared goal, to be reached in collaboration. Regarding the literature review, we raised the following question: What are relevant innovation dimensions to describe citizen I-Participation Initiatives? The preliminary index was checked on completeness by evaluating all relevant information from literature and whether or not it is present in the framework underpinning the index. In the second stage, we selected key factors from relevant theories that contribute to effective (digital) citizen participation. These key success factors were subsequently categorised and similar factors were categorised into six I-participation dimensions after various analysis sessions. These six dimensions constitute the theoretical framework behind

the index. The index is based on these six dimensions of critical success factors and presents results in a spider-web scoring instruction. Based on the index, comparative analytics are possible. The index can further be used to grasp weak spots in the design of the participatory initiative and to do a pre-scan before, for instance, further in-depth qualitative interviews are held. A preliminary version of the index was further validated through an online instrument with which public professionals (civil servants) from selected municipalities scored one of their municipal participation initiatives. The outcomes formed the basis for one to two hours during qualitative interviews with each professional, which were conducted afterwards (Oct 2017 – Dec 2017). Next cycles in the study will further improve this instrument in order to enhance its rigour (validity and reliability on the one hand and its relevance on the other).

3. Theoretical Background and Preliminary I-Participation Framework

Based on our literature review, we distinguish six innovative participation dimensions: issue, involved parties, goal, communication, trajectory, and impact. For each of the dimensions, we present theoretical backgrounds and derive critical success factors.

3.1. The Issue of the Participation Initiative

Literature shows that around the ‘issue’ of the participatory initiative multiple issues are of importance. As stated earlier, participatory initiatives are essentially groups of people with a common goal. Much research has been done on these groups, such as on teams and their successes, e.g., by Levi and Slem (1995) and Hackman (Levi & Slem, 1995). Factors that persist are: goals/target (Katzenbach & Smith, 1993), leadership (Manz & Sims, 1987), suited task for team work by Safizadeh (Levi & Slem, 1995), resources by Moran and Musselwhite (Levi & Slem, 1995) and supportive organisation (Manz, Keating, & Donnellon, 1990). Safizadeh (Levi & Slem, 1995) states that the issue should be complex, important and challenging. In this way, the need is created to work with more people on a case because it is undoable for one individual.

Table 1: Critical Success Factors of the Issue of Participation

Critical Success Factors	
- Complexity of content	- Impact on direct environment
- High relevance	- Freedom to change scope
- Novelty of the issue	- Geographic boundaries

According to Row and Frewer (2005), civil servants should have a certain degree of freedom of policy/politics with the issue at hand, because then citizens really have options when participating. Irvin and Stansbury (2004) state that the geographical scope of the issue should be small enough to facilitate participants to come together. The other way around: The further people live away from each other, the smaller the chance that they will attend a participation meeting. Another aspect is that the issue should not be too complex (Irvin & Stansbury, 2004). Bingham, Nabatchi en O’Leary (2005) indicate the importance of making sure that win-lose scenarios have to be avoided in participatory issues (zero-sum). If possible, issues deliver potential acceptance of

outcomes of all involved stakeholders. The ACTIE model (Denters, Tonkens, Verhoeven, & Bakker, 2013) has been developed to be able to review citizen initiatives from an open-minded view from the aspects of spirit, contact, equipment/resources, embedding and empathy. It does not judge, but merely points out relevant issues for professionals (civil servants). The idea behind the ACTIE instrument is to review every citizen initiative on its merits, thus without a clearly defined blueprint to which the initiative should meet. According to Denters, the most important question a civil servant often has to deal with: “how can we, as a municipality, connect with this initiative and offer proper support?” (Denters et al., 2013). After analysis of the insights of above we have derived the critical success factors shown in table 1 around the dimension of issue in the framework. The focus is on the issue of the participation initiative.

3.2. The Parties Involved in the Participation Trajectory

The second part of the framework considers the parties or stakeholders involved in the participation trajectory. The IAP2 (participation ladder of the International Association of Public Participation) provides guidelines for throughout the policy process: for stakeholders involved in the participation trajectory should be determined who has power, interests and legitimacy around an issue (Grönlund, 2009). Who has contact with whom and are their interests the same or different? Are there any ambassadors, e.g., on social media? We enriched the knowledge base with literature about team collaboration since a group of people (citizens, civil servants and other involved starting a participation trajectory together) can also be seen as a (self-managing) team. We consider ‘collaboration and cooperation’ as one of the fundamental aspects of the participation initiatives, in particular because of the network society aspect (Castells, 2009).

Table 2: Critical Success Factors of the Parties Involved in Participation

Critical Success Factors	
- Other parties interests	- Interests are similar
- Other parties having right to speak	- Presence of ambassadors
- Intense relationship network	- Rules of engagement are known

The parties involved in the process are mentioned in multiple ways in the ACTIE model (Denters et al., 2013). The contacts with neighbours, organisations in the neighbourhood and authorities are relevant. Bingham, Nabatchi en O’Leary (Bingham et al., 2005) stress the importance of analysis of potentially conflicting interests in the stakeholder analysis. Ann Macintosh (2004) developed an electronic participation ladder in which three levels of participation are discerned but limits herself to the relationship between the government and the public. Effing and Groot (2016) make clear that the government-citizen relationship is too one-dimensional for a network society. Increasingly, they stress, it is important to include local businesses, organisations and non-profits into the scope of participation. Table 2 shows the critical success factors that can be derived for the dimension of parties involved.

3.3. The Goal of the Participation Process

Without a clearly identified goal individuals working together lack synergy. With a clearly defined and shared goal, shared commitment is raised (Katzenbach & Smith, 1993). Hence, a distinct formulated target is of crucial importance for a successful cooperation process.

Table 3: Critical Success Factors of the Goal of Participation

Critical Success Factors	
- Reach and inform	- Clear targets
- Consult	- Political scope
- Collaborate and co-decide	- Relation to regular policy making

In May 2011, the Dutch government published a report to help the Netherlands with the determination of new strategies for vitalising the policies for living environment and make them future proof (Hajer, 2011). Inhabitants of the Netherlands, as well as citizens worldwide, together with administrations and other parties such as companies, will have to provide in “enough (and affordable) raw materials, food and energy”. Under the denominator of radical incrementalism, a control model is being proposed for sustainable policy-making and governmental control. The society and participation initiatives are explicitly mentioned. With regard to the goal of a project. Hajer states sustainable policy is being realized as the goal is distinctly described but offers sufficient room for experiment (Hajer, 2011). A goal is preferably formulated broadly. The goal of the process can be broader than just the mere goal. According to Rowe (2005), issues such as political scope to make substantial choices and the relation to regular and possible parallel processes are of importance. Ambiguity on this theme can disturb the process. The six critical success factors that are part of the goal of the participation process can be found in table 3.

3.4. Digital Communication in the Participation Trajectory

The great importance of clear communication and promotion plans within and about any participation trajectory is widely recognized in the literature (Loukis, 2012; Panopoulou et al., 2014). Essential in this is a proper strategy, thought through on beforehand.

Table 4: Critical Success Factors of Communication in Participation

Critical Success Factors	
- (Digital) strategies are present	- Capacity for carrying out (digital) strategies
- (Digital) strategies conform with goal, issue and target audience	- Knowledge of new means of digital communication
- (Digital) strategies are clearly formulated	- Knowledge of the use of (open) data sets

In digital participation processes, besides a clearly defined communication strategy, also the presence of sufficient knowledge on digital communication skills and data analysis skills is of importance (Spil, Effing, & Kwast, 2017). Not to be underestimated is the fact that communication costs time and thus manpower. Therefore, it is stressed that there is sufficient budget for

communication (Spil et al., 2017). Governments face an environment that is increasingly digital. The rise of smartphone usage, social media, and smart city applications have reshaped the way governments can interact with their citizens (Zavattaro & Sementelli, 2014). Especially the local layers of government, such as municipalities, have to rethink the way they interact with their citizens. In recent years, in Western Europe, the challenge to reach, engage, collaborate, and empower citizens has not become easier (Smith, 2009). The promise of the internet and social media have only partly come true (Effing, Van Hillegersberg, & Huibers, 2013). Local governments invest in digital initiatives, but most initiatives fail due to lack of trust, digital divide, poor implementation, and other reasons (Van Deursen & Van Dijk, 2013). The role of communication and digital strategy in participation trajectories has been digested in the framework by the six critical success factors of this dimension of communication as shown in table 4.

3.5. The Participation Trajectory

Various sources in the literature give handles and constraints for (digital) participation trajectories, concerning the actual process that is being followed in the participation initiative.

Table 5: Critical Success Factors of the Trajectory of Participation

Critical Success Factors	
- Self-managing team	- Sufficient time
- Control possibilities in running the process	- Expertise
- Sufficient financial and material resources	- Training

In a study on management and leadership of groups of people, Manz and Sims (1987) state that a leader who is able to let a group lead itself contributes to a more effective team. In an ideal situation there is a leader within the team who also works along and a coordinator outside the team who maintains relationships with the world outside. Therefore, stimulating a team to be self-managing can improve the efficiency and the success of the team. The ACTIE model (Denters et al., 2013) stresses that unnecessary constraints, which could hinder citizen initiatives, should be averted. The better an organisation is equipped to support citizen initiatives, the more chance of succeeding of the citizen initiative. The availability of sufficient resources within the participation trajectory is important. On resources, Moran and Musselwhite (Levi & Slem, 1995) state that teams should be equipped with the necessary resources to be successful, as well in materials as in personnel. Spil, Effing & Kwast (2017) summarize various aspects of the participation initiative under the concept of enabling. This also includes training: Can they perform the task asked? Denters et al. (2013) elaborate on this under equipment/resources and embedding. Which need for support do the initiators have (in money, time, knowledge, and skills)? And do the supporters and/or initiators have the need for policy and rules on money, time, knowledge and skills? This led to the six critical success factors regarding the participation trajectory as shown in table 5.

3.6. The Impact of the Participation Trajectory

After the preparation and the execution of the (digital) participation initiative, the focus is on the impact of the project or the process.

Table 6: Critical Success Factors of the Impact of Participation

Critical Success Factors	
- Outcome is valuable	- Target audience reached
- Visibility of own input the process	- Regular interaction with target audience
- Argumentation of final decision is clear	- Perceived threat of loss of power

According to Loukis (2012), many efforts in eParticipation projects are made but are not sufficiently evaluated: “in government practice, limited evaluation of public participation projects is conducted” (Loukis, 2012). According to Wolters (2012), expectations play a crucial role in increasing the involvement and the confidence of citizens - expectations that are not always pronounced explicitly. In her study, Wolters asked all 415 Dutch municipalities whether or not they had evaluation reports of participatory trajectories. 116 municipalities responded, 40 of them actually had evaluation reports. By far the most often factor mentioned determining the success of participation trajectories is the final result. Wolters found out these are mostly (66%) not composed. In case criteria were composed on beforehand, it mostly concerned the overall satisfaction. This did not consider the success of the project, or the municipality being satisfied, but the absence of complaints. Spil, Effing and Kwast (2017) show that evaluation of impact is not well developed in three European Smart city cases that were aimed at creating new ways of participation. Another view is that the existence of the participatory project is already a change in itself and therefore has impact. However, municipalities often have trouble in formulating criteria for successful participation. One should look at (the extent to which) targets are achieved instead of satisfaction (Wolters, 2012). These targets however, should be clearly defined. Aspects contributing to this are elaborated on earlier in this article. “At the end of the evaluation, only a third of the municipalities reflect on the targets set and the extent to which these are met” (Wolters, 2012). Table 6 shows the six critical success factors.

4. Application of the I-Participation Index

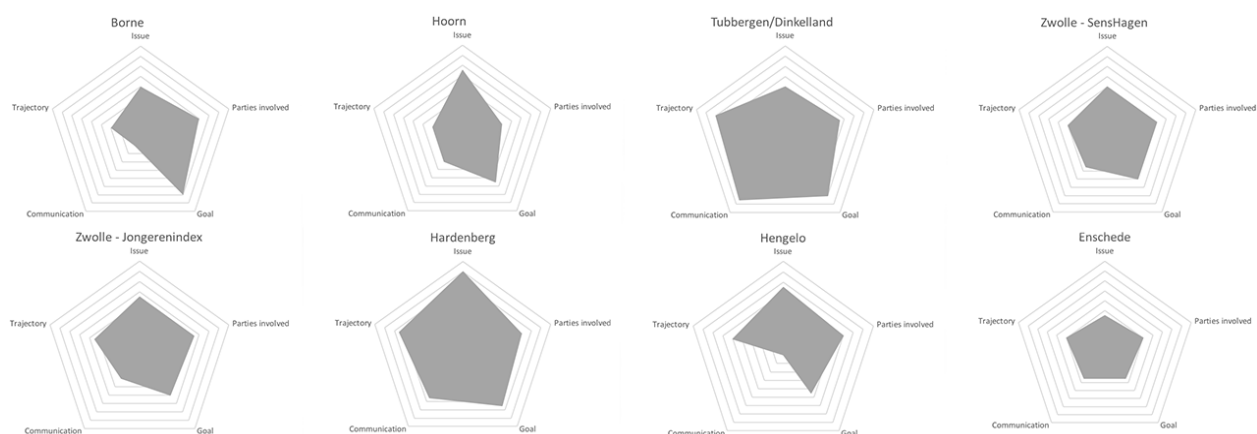
We applied the I-Participation Index in eight cases. For each dimension and critical success factor of the preliminary I-Participation Index, a statement was derived from each success factor (36 in total). After a survey, we scored them on a four-point Likert scale. This four-point scale forces the respondents to really make a choice (avoiding leaning towards no preference), since there is no middle option. The framework provides a global image on the extent to which the participation initiative is based -according to theoretical background- on key factors of digital participation initiatives.

Table 7: I-Participation Index Scores Based on Cases from the Netherlands (on a Scale from 0 - 18)

	Borne	Hoorn	Tubbergen	Zwolle S.H.	Zwolle J.I.	Hardenberg	Hengelo	Enschede
Issue	10	13	10	10	11	16	13	7
Parties involved	12	8	11	10	11	12	12	8
Goal	14	11	14	10	10	13	9	7
Communication	2	6	15	7	6	11	0	7
Trajectory	6	6	14	8	9	13	10	8
Impact	0	17	12	0	10	8	9	4

Table 7 shows the scores per municipality on each of the six dimensions via the spider-web method for analysing. As stated before, each dimension of the I-participation index is analysed by looking at six statements for each critical success factor. Scores are translated as 0, 1, 2 or 3 points, which leads to a maximum of 18 points for each dimension. Figure 2 displays the scores for each municipality in a spider-web diagram. The sixth category, impact of participation initiatives, is left out, because all initiatives concerned are ongoing projects, while the impact can only be measured afterwards. On the basis of the outcomes of the surveys, qualitative face-to-face interviews were conducted with the civil professionals who filled in the surveys. The overall consensus from the interviewees was that our proposed index is very useful for them to highlight strengths and weaknesses in the design of their innovative participation initiatives. The index also helped to deepen the contents of the interviews, partly because it was possible to better prepare the interviews.

Figure 2: I-Participation Spider-Web Diagrams for Each of the Cases from the Validation



5. Discussion

We have introduced, tested, and analysed the I-Participation Index, which consists of 36 statements based on the 36 critical success factors. Based on our first empirical validation with public professionals from municipalities in the Netherlands and additional case study research, we have designed a valuable and useful tool. Professionals considered it valuable, while it enables them to learn from their own case and others. The usefulness of the I-Participation Index is shown in various ways. Every interviewee stated the index provides a comprehensive picture of the participation initiative at hand. Furthermore, the index helps to identify weak spots in the participation initiative. As one of the interviewees says: “the questionnaire was a big confrontation”. In general, the index helped to find points of attention that have led to immediate action such as improving communication plans and the need for social network analyses. There are limitations. First, the sample of cases used in the validation was quite limited. While the sample was useful to test our preliminary version of the I-Participation Index, larger samples can help to test the validity of the underlying framework. A second limitation is that all cases were Dutch. We advise to evaluate whether the validity of the instrument varies per country. Thirdly, the critical success factors are based on theoretical assumptions and there is only limited empirical proof yet. As a final limitation, we stress that more design science loops are still necessary to improve the framework, instrument and scoring instructions. We will develop a software tool and website for the instrument (www.socialsmartgovernance.com) in order to make it publicly accessible for both practitioners from the public sector and the scientific community. Future quantitative research and statistics can help to improve the statements that are part of the instrument and its scale. The study delivered a new framework, an online testing instrument and scoring method that together form the I-Participation Index that potentially can grow into a valuable tool for self-assessment of municipalities and thorough comparison. The relevancy is high, and our first cases in the Netherlands showed the relevance of developing such a tool. It can help to make participatory initiatives based on digital channels more effective, as it helps to save time and investments from local governments.

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Leveraging Capabilities in Smart City Initiatives. The Case of London City Data

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Abstract: Smart city data infrastructures are gaining much attention internationally. Local authorities involved in such initiatives have to overcome technical and managerial challenges related to interorganisational collaborations, stakeholder and public engagement, opening data and many others. This research in progress examines the case of London's city data through the lens of leveraging which refers to transferring resources and capabilities. Since 2010, the gradual development of two complex data platforms by the Greater London Authority (London DataStore and City DataStore) illustrates how leveraging mechanisms can be critical in the deployment of integrated city data infrastructures. Lessons from this study can be important for other smart city and digital government projects where effective leveraging mechanisms can reduce reliance on external capabilities and improve consolidation of existing ones.

Keywords: smart cities, data infrastructures, leveraging, dynamic capabilities.

1. Introduction

Integrated city data infrastructures represent a popular initiative under the umbrella of smart cities in many parts of the world. City data broadly refers to social media data, crowdsourced data, open government data, sensory data, and other relevant forms (Greater London Authority, 2016; Hashem *et al.*, 2016). City data infrastructures intend to exploit this heterogeneous composition of 'city data' by making it widely accessible to local stakeholders and/or the general public. As a strategic resource, "city data is that which is held by any organisation..... bearing on local populations and the functioning of that place. It can be static, near-real time or in the future, real time, descriptive or operational." (European Innovation Partnership on Smart Cities and British Standards Institute, 2016, p.6)

There is generally lack of research addressing issues of capability development in smart city management (Meijer, Gil-Garcia and Rodríguez Bolívar, 2016; Gupta, Panagiotopoulos and Bowen, 2017; Sutherland and Cook, 2017). City data infrastructures in particular, require consolidation of resources and capabilities by the local authorities involved to resolve technical and operational data challenges, facilitate collaboration between involved actors (e.g., developers, data officers),

and stimulate activities necessary for public value creation from city data (Dameri and Benevolo, 2016; Hashem *et al.*, 2016). Leveraging, a concept related to development of dynamic capabilities, is a mechanism that depicts the use (transfer) and reuse (reconfiguration) of existing resources for replication from one area of application to another (Teece, 2007). Capability development is an important dimension of digital government research in topics such as open government data (Jetzek, Avital and Bjørn-Andersen, 2013), social media monitoring (Estévez-Ortiz *et al.*, 2016), collaborative governance using crowdsourced data (Panagiotopoulos, Bowen and Brooker, 2017), and interoperability capabilities (Nam and Pardo, 2014).

To improve our understanding of capability development in city data infrastructures, this paper focuses on the case of London's city data; namely the London DataStore and City DataStore platforms developed by the Greater London Authority (GLA) since 2010. The study draws on the concept of *leveraging* that is introduced in the next section. In the case of London's city data, leveraging mechanisms were important to stimulate engagement with local communities of developers, integrate data sharing capabilities with existing institutional structures, and re-leverage resources as GLA's data initiatives progressed through different stages of implementation.

With the aim to contribute to the managerial theory and implications for the same, the research question is: *'How can leveraging mechanisms enable systematic capability development in city data infrastructures?'* The analysis shows how effective mechanisms related to dynamic capabilities can enable local authorities to address the commonly fragmented nature of smart city initiatives.

2. The Perspective of Leveraging in Managing Resources and Capabilities

Originating from the resource-based view of the firm, dynamic capabilities refer to several ways in which organisations can reconfigure their existing resources and capabilities to adapt to changing environments (Teece, 2007; Kor and Mesko, 2013). Dynamic capabilities are also relevant to the management of digital government projects where studies have looked at capability development in terms of resource complementarities using stage models (Klievink and Janssen, 2009) as well as the absorptive capacity of organisations when they attempt to assimilate new knowledge from the environment (Pablo *et al.*, 2007).

All the above perspectives refer to processes by which government organisations acquire resources from the external environment and develop new capabilities. In contrast, the concept of leveraging refers to processes that involve the transfer of resources and capabilities across different parts of the organisation (Hamel and Prahalad, 1993). Sirmon *et al.*, (2007) see leveraging as mobilising, co-ordinating and deploying of resources, whereas Eriksson, (2014) state leveraging as a form of reconfiguration of capabilities. Teece (2007) posits leveraging as one of the micro-foundations of dynamic capabilities to seize opportunities from one application to another; whereas Ambrosini *et al.*(2009) define leveraging as a mechanism of renewing and regenerative capabilities concerned with adapting the resource base as per the changing environmental conditions of an organisation. In a meticulous study, Hamel and Prahalad explicitly see leveraging as a *"continual search for new, less resource intensive means of achieving strategic objective."*(Hamel and

Prahalad, 1993, p.8). On the empirical side, a number of studies examine relational capabilities to leverage new knowledge as means to facilitate innovation (Lorenzoni and Lipparini, 1999; Capaldo, 2007; Martins, 2016).

Building on this, leveraging can be approached as being more productive with existing and available resources and capabilities - "*do more with less*" (Hamel and Prahalad, 1993, p.6) - and replicating this success to "*new areas of application*" (Teece, 2007, p.1326). The latter further affects the organisation's ability to sense opportunities (Macpherson, Jones and Zhang, 2004), thereby indirectly impacting capability development. In particular, leveraging is a mechanism of developing capabilities internally within the organisation by replicating existing ones.

The research agenda of this study is that city data is increasingly the medium by which knowledge and value flow in cities; making city data infrastructure an integral part of co-creating public services in smart cities. In this context, digital government initiatives tend to be isolated from each other and transfer of capabilities is generally difficult to achieve (Nam and Pardo, 2014; Sutherland and Cook, 2017). The aim is to address how leveraging of existing resources and capabilities can facilitate systematic capability development by public authorities in implementing such data infrastructures, as more initiatives like London's city data reach a good maturity level.

3. Research Design and Analysis

In addressing the research question, the study aims to explore and illustrate how public authorities deploy and transfer their capabilities and resources, to create integrated smart city data infrastructures. For this purpose, a qualitative case study research methodology is adopted, which is a useful approach when addressing 'how' questions of a contemporary phenomenon (Yin, 2017). This study is designed as a single case where the unit of analysis is the leveraging mechanisms in London's City data infrastructures. London has been at the forefront of marshalling data in unique ways to deliver tangible outcomes and generate insights, hence making this a rather unique case (Yin, 2017). The level of observations lies across the various entities involved in London's city data, including institutional actors (the metropolitan Greater London Authority (GLA) and 33 London Boroughs or city councils), London's extensive developer community; think tanks, non-profits and other community organisations that work in partnerships with local authorities on data-related initiatives - like Future Cities Catapult, the Open Data Institute (ODI) and the innovation foundation Nesta.

The findings reported here are based on an analysis of secondary sources of data, used to overview developments within the London city data landscape. This source of data does not involve direct accounts from the actors involved but allows the observation of important decisions related to the evolution of London's city data platforms since their beginning. Secondary sources of data included policy and practitioner reports (e.g., Coleman, 2013; Copeland, 2015; Greater London Authority, 2016; Kleinman, 2016; Scott and Copeland, 2016); smart city standards specifications (British Standards Institution, 2014, 2017; European Innovation Partnership on Smart Cities and British Standards Institute, 2016). Overall, the data collected included 45 blogposts by authorities and practitioners in GLA, ODI, Nesta and Future Cities Catapult; 12 academic articles;

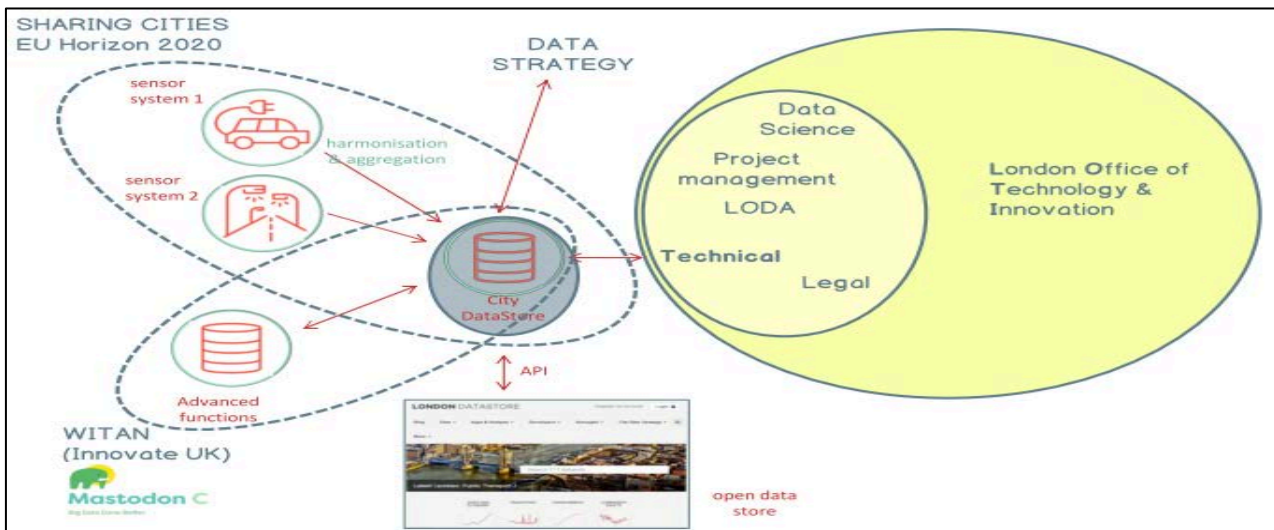
27 policy documents and 6 news articles. The secondary sources of data were qualitatively analysed using Nvivo 11 to uncover the ways in which the resources/capabilities were leveraged in London's city data initiatives. Inductive reasoning based on thematic analysis was adopted to identify and outline mechanisms of leveraging (Braun and Clarke, 2006). Specifically, the analysis sought to identify which resources and capabilities was transferred and the underlying process that guided this transfer. This analysis resulted in three forms of leveraging that are reported next, following a brief case background.

4. Findings

4.1. Brief Case Background - London City Data Infrastructures

London Data Infrastructure comprises of the London DataStore (LDS) and the recently launched City DataStore (CDS) in November 2017. While LDS remains a static open government data publishing platform making data available to citizens and businesses, CDS is an integrated citywide data infrastructure. CDS enables the secure storage and sharing of confidential data between London's public and private organisations, charities and research organisations - Figure 1. Over the past eight years, there have been a number of transitions in the development of LDS and CDS. Initially launched in 2010 and revamped in 2014, LDS was one of the first portals in the world to make public data open. Presently with 696 datasets, it has over 4000 plus registered users and an approximate 50,000 visitors every month (*London DataStore: Smart London*, no date).

Figure 1: London City Data Infrastructure (Greater London Authority, 2017)



As expected, several challenges are involved in London's data landscape. London is structurally complex with 33 boroughs, one pan-city planning authority - GLA, and multiple public bodies, making it difficult to systematically collect data in standardised forms (Washington and Morar, 2017). The use of different IT system within organisations and lack of data sharing culture further aggravates the problem of data interoperability (Copeland, 2015b). Privacy and ethical issues are also critical challenges for maintaining accountability of public authorities (Park and Gil-Garcia,

2017). Furthermore, all local authorities in the UK are involved in extensive cutback management and scaling down of services in the past few years (e.g., Scott and Copeland, 2016).

4.2. Analysis: Forms of Leveraging in London's City Data

4.2.1. Leveraging Institutional Coordination Capabilities

The leveraging of institutional coordination capability within London's city data landscape is evident from instances during its different stages of development. Strong mechanisms of institutional collaboration were in place across London local authorities and they were transferred into the city data initiatives from the very beginning. In early 2010, GLA leveraged its existing institutional structure by extending its application to develop the LDS. Local government in London has a decentralised structure with administration at two tiers. While GLA has strategic city wide administrative authority, its powers are devolved to 33 London Boroughs for administration at a local tier. Specifically, in the initial phases of LDS, most of the datasets released were by GLA and its four functional bodies- Transport for London (TfL), London Development Agency, London Fire and Emergency Planning Authority and the Metropolitan Police Services. In particular, the release of transport datasets by TfL mobilised London's extensive developer community and boosted economic growth. E.g., Citymapper application which is now exported to most parts of the world.

Expediting on the success of developers and the proven value case of open government data, GLA institutionalised new ways to work around city data and driving an open data culture within London Boroughs. In effect, it consolidated London's institutional structure by establishing new social institutions. Joint initiatives, like Smart Borough Partnership in 2014, enabled cooperation amongst people with similar job titles within each 33 boroughs addressing similar public service tasks. Further, cross-sector collaborations, like London Ventures, continue to institutionalise the creation of shared services, co-ordination, and pooling of skills. In addition, new institutional structures were set-up to ease workflows within local government for governance of data and to move toward open data culture. In this frame, since 2014 GLA is committed to publishing all the data under the ODI certificate scheme, so that users have confidence of data quality and its provenance. Leveraging this institutional coordination capability, GLA published the first city data strategy "Data for London" in March 2016.

4.2.2. Leveraging Data Analytics Capabilities

The London Office of Data Analytics (LODA) pilot, under implementation since 2016, illustrates how GLA leveraged existing capabilities in data analytics by extending it to new areas of application, namely machine learning and predictive analytics. Where initially the data experts within local authorities were mainly involved in aggregating, cleaning, and tagging data; the GLA redeveloped these capabilities to areas of predictive data analytics within London's public services. To achieve this, the data science skills and capabilities present within London Boroughs and the GLA intelligence unit were consolidated by LODA.

With the aim to identify and address critical issues within London, the LODA collects, combines, interrogates and analyses datasets from local authorities, translates between different

data formats and eventually shares insights with all city stakeholders. This helps to predict key problematic areas, target resources and co-ordinate activities across teams in London's Boroughs. In addition to establishing a structure for sharing insights, the aim is to make better use of resources in delivering public services. An illustrative example is the identification of unlicensed HMO's (house with multiple occupancy) within London Boroughs. The pilot has focused on using data to predict the location of properties rented out to multiple tenants where the landlord has failed to obtain the correct license. There are estimated to be tens of thousands of these unlicensed HMOs across London, but only a small minority are correctly licensed, representing a loss of revenue for local authorities and often presenting dangerous living conditions for vulnerable tenants.

4.2.3. Leveraging Collaborative Capabilities

With the scoping exercise that begun in November 2017, the London Office for Technology Innovation (LOTI), illustrates how GLA leverages London's collaborative capabilities to regenerate capabilities in addressing the dynamically changing technological environment. By leveraging collaborative innovation capabilities in data, digital, and technology, LOTI aims to increase sharing of best practice and encourage the development and adoption of common standards and approaches from data to service design.

By focusing on orchestrating the technology and non-technology factors, LOTI intends to pitch the demands of public services to the technology ecosystem. In this context, the LOTI aims to encourage technology preparedness of the public sector for talks with private sector technology vendors, avoid vendor lock-ins, and lastly encourage partnerships with private technology companies to create rich government technology. An important aspect of LOTI is that it allows public authorities to take an anticipatory approach to disruptive technologies and address the balance between technology, financial imperatives, and business models that stack up against each other.

5. Concluding Remarks

In developing integrated city data infrastructures, local authorities face numerous challenges like siloed operations, limited resources, and lack of data sharing culture. This paper focuses on how smart city initiatives can leverage existing resources and capabilities. The analysis of London's city data platforms facilitates the identification of three forms of leveraging over a period of a few years. Acting as a convening hub, the London DataStore has facilitated the implementation of data policies, pilot projects, and eventually the development of an integrated and interoperable City DataStore. In the case of London's city data, leveraging mechanisms were important to stimulate engagement with a local communities of developers, integrate data sharing capabilities with existing institutional structures, and re-leverage resources as GLA's data initiatives progressed through different stages of implementation. The analysis suggests that the goal was engagement within the city data community and not just opening up of datasets on the platform. Following the establishment of the key collaborations, described in the findings, GLA was able to focus on issues of data harvesting and aggregation, and other data analytic capabilities in the next phase, with the

more recently launched City DataStore. The analysis highlighted that consensus building amongst the city data community is essential to mobilise smart city data innovations. This can be achieved when multiple actors have the opportunity to get involved with the initiative and add value. Further, the transfer of capabilities to new areas of application, as described in the findings, reflects sustainable use of resources by GLA in developing the city data infrastructure, which is one of the key aspects of leveraging (Hamel and Prahalad, 1993; Teece, 2007).

Certainly, the context of the case is highly linked to these conclusions. London's authorities and local communities have a considerable amount of resources and capabilities that can potentially be leveraged into the city's data platforms. The scale of the initiatives themselves and challenges that the city faces both enable and necessitate these rather advanced forms of dynamic capability development. Nevertheless, these observations can be beneficial to other smart city data initiatives where either there are similar capabilities to be leveraged or developed through other mechanisms. As such, the study can contribute to capability development within the public sector and digital government projects. In the context of smart cities in particular, this can contribute to current efforts of standard development (e.g., British Standards Institute PAS 183 - a decision-making framework for sharing data and information services). While the findings are at a preliminary stage, there is much scope for future research to elaborate on mechanisms of leveraging and examine them in conjunction with other important mechanisms of systematic capability development like reconfiguration and learning (Ambrosini, Bowman and Collier, 2009).

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Using Chatbots and Semantics to Exploit Public Sector Information

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Abstract: During the past 20 years, electronic Government (eGov) has become a political priority worldwide. A part of eGov concerns providing Public Sector Information (PSI), lately as open data, to reduce red tape, empower citizens and facilitate economic growth. Recently, a number of standards (namely Core Vocabularies) have been proposed for PSI provision but remain unexploited. Emerging technologies including Big, Open, Linked Data (BOLD) and chatbots provide a fertile ground for improving PSI provision. In this context, the aim of this paper is two-fold. First, to motivate the use of chatbots for providing PSI published according to the Core Vocabularies as BOLD. Second, to develop an architecture blueprint and usage scenarios thus suggesting the use of chatbots is feasible and useful. The ultimate aim of this research is to enable citizens to obtain personalised, easy-to-use PSI, resulting in red tape reduction for citizens and businesses.

Keywords: chatbot, core vocabularies, CPSV, PSI

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1. Introduction

During the past 20 years, electronic Government (eGov) has become a political priority worldwide (EC, 2010; USA 2009). Large amounts of funding have been and are still allocated in Public Service and Public Sector Information (PSI) provision (Gartner, 2011). Lately, PSI is also provided widely as Open Data (Janssen et al., 2012).

At the same time, technology and policies evolve rapidly. An emerging area is the Semantic Web and particularly Big, Open, Linked Data (BOLD) PSI (Janssen et al., 2015). BOLD PSI enables machine-understandable data that can be linked with other data on the Web. In addition, recently, EU standards (namely Core Vocabularies) have been proposed for providing BOLD PSI but have

not been yet fully exploited. Another rapidly evolving area is chatbots, which are increasingly used to facilitate interaction and PSI provision (Shawar & Atwell, 2007). However, although research on integrating chatbots and linked data exists (Augello et al., 2009), in our knowledge, there are still no chatbots that exploit BOLD PSI based on Core Vocabularies. This can be particularly useful for young people as they spent significant time in texting using their smartphones. Social media data value and impact (Panagiotopoulos et al., 2017; Isett et al., 2017) could be further increased.

In summary, despite technological advances, citizens and businesses are spending considerable time in obtaining PSI while public servants in many public authorities are still overwhelmed with providing information rather than exploiting their knowledge skills.

The aim of this paper is two-fold. First, to motivate the use of chatbots for providing PSI published according to the Core Vocabularies as BOLD. Second, to develop an architecture blueprint and usage scenarios thus suggesting the use of chatbots is feasible and useful. The ultimate aim of this research is to enable citizens to obtain personalised, easy-to-use PSI, resulting in red tape reduction for citizens and businesses.

The rest of this paper is organised as follows. In Section 2, we present background material on Public Service Provision to motivate the use of chatbots for providing PSI. In Section 3, we present an architecture blueprint along with usage scenarios thus suggesting the use of chatbots is feasible and useful. Finally, in Section 4, we present the conclusions and future work.

2. Public Service Provision Informative Phase

To a large extent, eGov refers to the provision of better public services using ICTs. Consequently, Public Service Provision (PSP) is at the heart of many eGov initiatives. In this section, we outline main developments in PSP in three areas, namely stages, information systems and supporting models to motivate the use of chatbots for providing PSI published according to the Core Vocabularies.

2.1. Stages

Public Service Provision (PSP) can be divided into two stages (Peristeras, 2006). The first is the *informative stage* and includes all interactions between a potential service consumer (usually citizen or business) and a service provider (public authority) aiming to inform the former about service details. During this phase, the citizen/business asks questions like *Why? What? Who? Where? When? How?* about a public service. This information can specify whether or not a citizen is eligible to execute a service, the input (e.g., administrative documents) that must be submitted for the service to be invoked, the costs related to the execution of the service.

When the answers to these questions have been provided, this phase is completed, and the citizen/business usually proceeds to the *performative phase* i.e., *service invocation*. This phase involves all actions relevant to the execution of a public service.

The informative phase is very important for public administration efficiency and citizen/business satisfaction (Tambouris et al., 2012). Despite its importance, however, it is often overlooked by governments. In addition, it is often considered straightforward to provide information online. This is reflected in various stage models that suggest “information provision” is the first stage of sophistication and can be fully accomplished simply by “providing information online”, e.g., as plain text in a website. On the other hand, targetization (often perceived as the ultimate stage of sophistication), is related to providing personalisation during the performative phase. Personalisation however is also highly relevant to the informative phase particularly since public services often have numerous versions depending on a number of factors. For example, issuing a driving license has many versions depending on factors such as age, whether the application is for a new license or renewing a license or replacing a lost license. In each version, the input documents that should be submitted may be different whereas the cost may differ as well. Therefore, we believe that obtaining personalised information is highly relevant to the informative phase.

In this paper, we concentrate on the informative stage that commonly includes providing online public service descriptions and other relevant information.

2.2. Information Systems

The majority of national eGov portals provide public service descriptions. These are often in the form of public service catalogues. In previous research, three different ways used for providing public service descriptions were identified, namely unstructured websites, structured websites and dialogue-based systems (Tambouris et al., 2012).

Unstructured websites contain information about public service(s) in the form of text. The text can be excessive however there is no structure in the content other than the menu of the website. Structured websites also contain information about public service(s) in the form of text. This time, however, information is provided according to a template that is common for all public services. Finally, dialogue-based systems guide the visitor through a number of online questions. The visitor answers questions and, at the end of the dialogue, is provided with personalized information, e.g., on whether they are eligible for a public service (e.g., social benefit), the required input documents, costs, responsible authority. These platforms can be similar regarding visitor experience but may differ on the underlying technologies used. An academic example is a prototype that has been developed using open source technologies that enable citizens to get informed on the required documents for declaring their properties in a cadastral (Tambouris et al., 2009).

An illustrative practical example of dialogue-based systems is [benefits.gov](https://www.benefits.gov/)¹. This website includes an online tool, called “benefit finder”. Benefit finder enters an online dialogue with the citizen asking a number of questions, with some of them depending on the citizen’s answer in a

¹ <https://www.benefits.gov/>

previous question. In this way, the citizen's circumstances are explicitly considered. The end-result is a list of benefits that the citizen is entitled to along with the list of organisations that provide these benefits. The use of a dialogue-based system has some profound advantages over the use of long texts: the former is easier to use, faster, and more accurate.

Chatbots is another promising technology (Jurafsky & Martin, 2017) for interacting with public authorities anytime, anywhere to obtain detailed, personalised, and accurate information. Chatbots are not new but have recently attracted considerable attention. Examples include chatbots for: (a) providing information on password retrieval and supporting asylum seekers by helping immigrants to complete the appropriate form with the right data (USA); (b) leading citizens to the right office (Mexico); (c) helping parliament's offices to answer citizens' questions (Japan); (d) providing digital assistance (Singapore); (e) answering questions about the city by employing IBM Watson (New York) (Shawar & Atwell, 2007; Boten et al., 2006).

2.3. Models

Structured websites and dialogue-based systems are often based on a public service model. Many public service models have been proposed in the scientific literature as well as by national initiatives and eGov interoperability frameworks (Peristeras et al., 2009). Despite these efforts, until recently no model has been universally accepted.

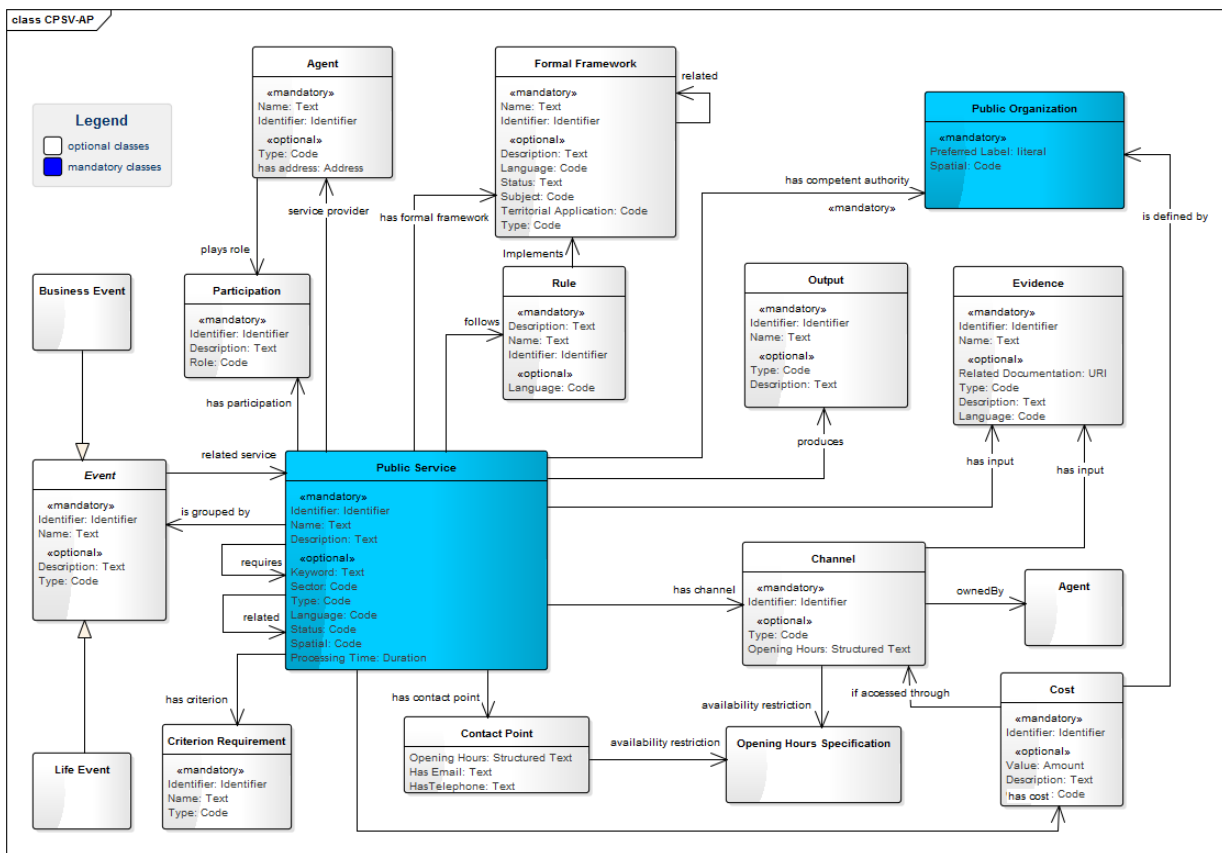
Recently, the European Union has launched the Core Vocabularies, an initiative aiming to overcome interoperability problems by introducing simple models for important entities, which are adopted in all Member States. Core Vocabularies developed so far include, amongst others, the Core Person (EC, 2012), Core Organisation (EC, 2016a), and Core Public Service (EC, 2016b).

The Core Public Service Vocabulary (CPSV) captures the fundamental characteristics of a service offered by a public administration. Lately, the CPSV Application Profile (CPSV-AP) ver. 2 has been launched that specifies a Linked Open Data (LOD) of CPSV. This is illustrated in Figure 1 using UML notation. Some Member States (e.g., Italy²) have used CPSV as a basis to develop their own models for public service, which covers national needs but still remains compatible with CPSV.

The CPSV-AP can be used, amongst others, to enable public authorities to publish descriptions of their public services using Linked Open Data (LOD). The use of LOD suggests service descriptions can be linked to other data hence providing more rich information. Recent research reports challenges when publishing public service descriptions using CPSV-AP (Gerontas et al., 2018). The results reveal CPSV-AP is promising; however, there is a lack of a coherent method for using CPSV-AP including supporting ICT tools.

² <http://www.essepuntato.it/lode/owlapi/lang=en/http://www.dati.gov.it/onto/cpsvapit>

Figure 1: UML diagram of the CPSV-AP 2.0 (from [European Commission 2016b])



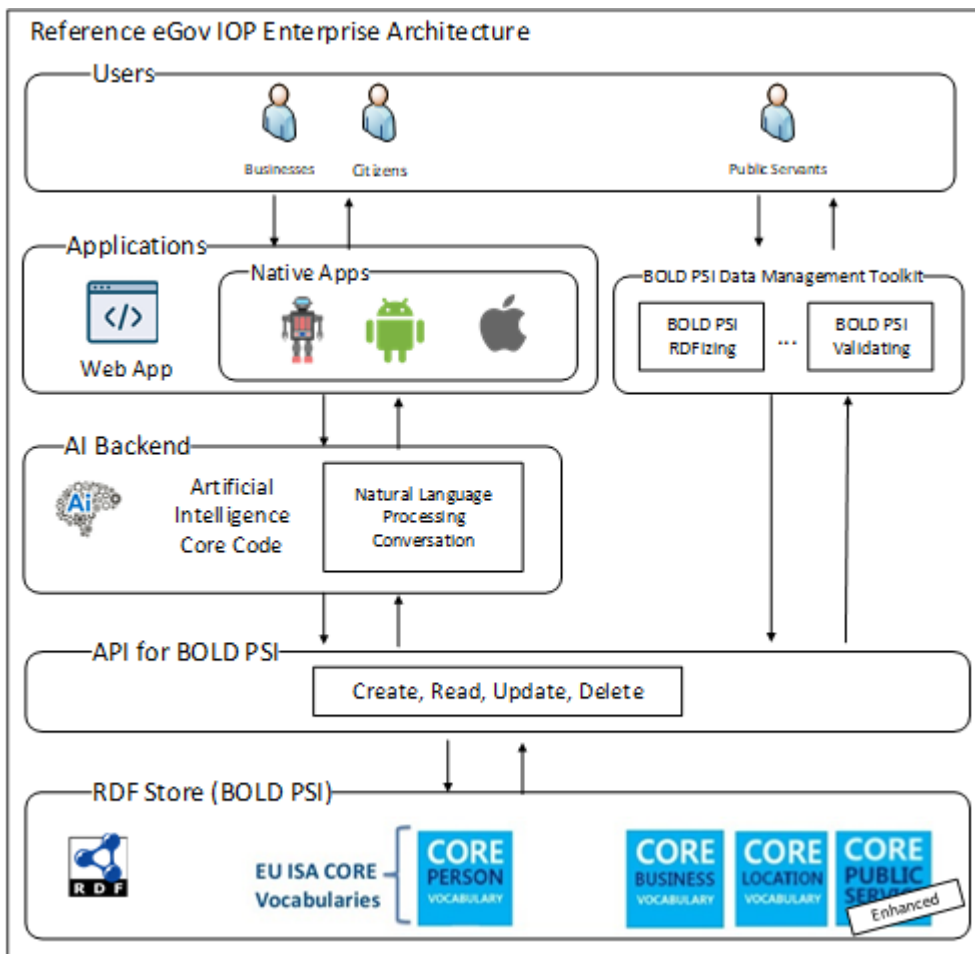
3. Using Chatbots on Top of CPSV-AP

Up to now, there is no implementation of chatbots that consume linked data published according to the Core Vocabularies. In this section, we present an architectural blueprint of a system enabling the use of chatbots to interact with public service descriptions published using CPSV-AP. In Figure 2, users can be citizens and businesses in need or PSI (such as details about public authorities and public services, e.g., contact details, costs, relevant legislation) and public servants maintaining the relevant data.

The users will be able to interact with the system using different Applications. We expect that the Web will be the main interface. However, we will also experiment with other environments, such as iOS, Android devices and actual robots. The users will employ in a dialogue with the chatbot through speaking or typing. The system will accept the input as Natural Language and respond accordingly. For this purpose, we will experiment with a number of existing backend platforms, libraries, and open resources for chatbots supporting multiple languages, if needed.

The actual information to be provided to users will be stored as Linked Data (i.e., RDF) following the Core Vocabularies and similar standards. For managing the data, we will improve existing tools and develop new ones. The resulting BOLD PSI Data Management Toolkit will support all stages of the publication process.

Figure 2: Architecture Blueprint



Using this infrastructure, users (citizens and/or business) will be able to ask and obtain answers about any Public-Sector Information, which is structured and stored according to the Core Vocabularies standards as RDF.

For example, *citizens and businesses* will be able to obtain information about the cost of services, administrative documents to be provided, contact points, and opening hours. In addition, *policy-makers* will be able to investigate different process reengineering and simplification scenarios, e.g., which public services will be affected if one administrative document is abolished.

In order to facilitate the communication between the backend components and the RDF store we will specify and develop an API. This API for BOLD PSI will enable programmers without RDF knowledge to process the RDF Store.

4. Conclusions and Future Work

Recently, the Core Vocabularies have been introduced as light, standard models that can be used by public authorities when providing information or developing systems. In addition, linked open data versions of Core Vocabularies also have been agreed upon by European Union Member

States. At the same time, chatbots is a technology with high potential in the public sector. Integrating chatbots with linked data has started to attract attention due to the combined benefits of the fields (Augello et al., 2009).

Integrating chatbots with BOLD PSI is a promising but also ambitious step. The results could potentially be significant for the public sector in many perspectives. Citizens and businesses could have easy to use application for obtaining PSI their fingertips. This would make compliance to legislation easier for citizens and businesses hence reducing administrative burden, which is an EU strategic goal. The use of chatbots through dedicated web pages but also applications like Facebook and Twitter could significantly change the way we communicate with the public sector to obtain information. Public servants who are currently working on providing information will be able to concentrate on jobs where their skills are better exploited.

In this paper, we presented the motivation and architecture blueprint of a project aiming to develop chatbots on top of Public Sector Information that is published according to the Core Public Service Vocabulary - Application Profile (CPSV-AP) standard. The next steps of the project involve designing and implementing the software following an agile development methodology, hence having many small development cycles, involving relevant stakeholders, and regularly evaluating progress and results.

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Sentiment in Citizen Feedback: Exploration by Supervised Learning

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Abstract: Web-based citizen feedback systems have become commonplace in cities around the world, resulting in vast amounts of data. Recent advances in machine learning and natural language processing enable novel and practical ways of analysing it as big data. This paper reports an explorative case study of sentiment analysis of citizen feedback (in Finnish) by means of annotation with custom categories (Positive, Neutral, Negative, Angry, Constructive and Unsafe) and predictive modelling. We analyse the results quantitatively and qualitatively, illustrate the benefits of such an approach, and discuss the use of machine learning in the context of studying citizen feedback. Custom annotation is a laborious process, but it offers task-specific adaptation and enables empirically grounded analysis. In this study, annotation was carried out at a moderate scale. The resulting model performed well in the most frequent categories, while the infrequent ones remained a challenge. Nonetheless, this kind of approach has promising features for developing automated systems of processing textual citizen feedback.

Keywords: e-participation, machine learning, big data, sentiment analysis

1. Introduction

Web-based e-participation tools have become a conventional way for citizens to voice their initiatives and concerns to city administrations in many cities around the world. These tools range from specific map-based questionnaires (Kahila-Tani 2015) to general citizen feedback services allowing citizens to submit messages to the local government (Evans-Cowley and Hollander 2010). Consequently, volunteered geographic information on the urban environment is generated and saved in vast amounts on the back-end. It is generally used by city officials only once (i.e., further, iterative analysis is conducted but rarely). One reason for this has been the unsuitability of any conventional methods of text analysis, due to the very large size (and continued rapid growth) of the data. Therefore, there has been a great interest in applying advanced computational methods with a data-driven approach (Münster et al. 2017).

In this paper, we explore the tone and sentiment of citizen feedback data, collected from a particular service by means of supervised machine learning regularly used in Turku (Finland) since 2012. We combine the viewpoints of computer science and social sciences, taking an explorative approach. We use a supervised learning method developed in the field of natural language processing, and we analyse the results qualitatively to evaluate the outcome. The corpus of the data consists of various types of citizen feedback regarding the urban environment and place-based development. In a broader research project, of which this study is a part, the sentiments and thematic information are integrated with location-based analysis.

We explore the data using a custom scheme of sentiment categories deemed appropriate in the context of citizen participation in urban planning. The expression of sentiments is highly context-dependent, meaning that sentiment analysis tools may work well only within specific domains. Therefore, creating a dataset customized to the domain and task at hand may provide more accurate and meaningful results. Custom annotation of data may also be necessary in order to process text in non-major languages (such as Finnish) that lack available linguistic resources. Using an empirical approach to modelling allows for exploration of the material, which may reveal unanticipated patterns of expression of sentiments by citizens.

Analysing the sentiment, tone and expression of emotions in texts has also been of interest in previous e-participation research (Liu 2012; DiMaggio 2015). In particular, sentiment analysis on public social media platforms has been found as a way of measuring public opinion (Thelwall 2014; Gonzalez-Bailon and Paltoglou 2015). Sentiment in social media communication has been examined in relation to citizen participation and popular attitudes toward government and policy (see, e.g., Zavattaro et al. 2015 and Arunachalam & Sarkar 2013). Focusing particularly on citizen participation in urban planning, Münster et al. (2017, 2400–2401) have highlighted the challenges of extracting relevant information through sentiment analysis and other computational text-analysis methods.

Methodologically, many previous studies rely on dictionaries of sentiment-bearing words, which have been considered insufficient in capturing the broad variety of how sentiments are commonly expressed (Liu 2012). In fact, methods based on word frequencies and dictionaries have been used in text analysis for quite some time (Gonzalez-Bailon and Paltoglou 2015; Rykov et al. 2016). Another method is to use a data-driven, empirical approach to discover unanticipated information and ways of expression, such as through analysis of patterns of word frequencies (DiMaggio 2015). However, neutral sentences that contain sentiment words or opinionated sentences that lack clear sentiment words are problematic (Liu 2012). Furthermore, while dictionaries may be a quick way to find meaningful information, their use relies on the knowledge and intuition of the person(s) constructing the resource, which limits the coverage. Another problem with both types of analysis is that they operate on the level of individual words, largely disregarding meaning in context. By treating words as distinct symbols, these methods may also have difficulty in conveying the prevalent variant in language usage. A more reliable – albeit more laborious – approach, applied in this paper, is to instead annotate the text containing expressions of sentiment, using machine learning to infer how different sentiments are expressed.

In the last few years, neural networks and deep learning have emerged as particularly promising methods for many tasks of pattern recognition and artificial intelligence, including computational text analysis (Schmidhuber 2015). Neural networks, a type of machine learning, have become widely popular in natural language processing due to their ability to flexibly and more accurately model semantically meaningful patterns in text.

The two main types of machine learning are supervised and unsupervised learning. In supervised learning, the aim is to train a model that can estimate a certain variable based on other information in the data, such as positive or negative sentiments of a comment, based on its words. This requires data where the target variable has been labelled for several instances, which can be used to train the model and evaluate its predictive performance. In order to obtain such data, it is often necessary to manually annotate the set. In text analysis, annotating a corpus oneself allows modelling of a particular type of material or aspect, and it may lead to more targeted and meaningful analysis, but it is also a laborious process. Unsupervised learning does not require labelled data but instead aims at identifying naturally occurring patterns, and it can be used to model semantics in large corpora and improve prediction when annotated examples are relatively scarce.

In the rest of the paper, we describe the data and the process of annotating a citizen feedback corpus, present a machine-learning model trained to evaluate it, demonstrate how the model performed, and conclude by discussing the methodological challenges of this approach.

2. Research Data and Methods

The research data consists of 22,000 “messages” (i.e., textual feedback written by citizens, drawn from Turku’s official web-based feedback channel (<https://opaskartta.turku.fi/eFeedback/>)). The messages analysed were submitted between January 2012 and April 2017. During that time period, a total of circa 70,000 messages were submitted, from which we categorically selected messages focusing on the urban environment or place-based development; they also had either GPS coordinates or an address. The issues typically not related to spatial development, such as feedback on healthcare services or educational institutions, were excluded. Moreover, we did not include messages not made public by the users.

Over the years, the feedback webpage has been developed from having a relatively open-ended design to a more structured service where the user is expected to categorize the feedback and encouraged to provide a location. The design encourages reporting of specific issues rather than giving general ideas, and the messages submitted are mostly short. The data were processed to identify and delete outliers (e.g., duplicates and false categorizations), as these messages could have a negative impact on the accuracy of the model.

For the purpose of this study, we annotated part of the data manually with a system of codes used for model training and evaluation. The annotated categories consisted of sentiment/tone (Positive, Neutral, Negative, Angry and Constructive). For further analysis, we also annotated a thematic tone category of (people arguing something to be) unsafe. We chose to take an

empirically grounded, data-driven approach to the material. The data were coded in three phases. The material was first explored with some descriptive analyses (word frequencies and keywords) to obtain an overview. Furthermore, we also explored it using existing thematic structures (i.e., categorizations provided by the municipality) in order to assure its usability (in further analysis). We coded a substantial amount of training data (n=1779) in this way, guided by the codebook shown in Table 1. In the second phase, we coded one thematic category (Unsafe) automatically based on codewords (n=1452). In the third phase, we extended the set by 750 randomly sampled messages and coded them in order to improve coverage and model performance for the less frequent categories. The resulting 3981 messages used in our reported experiments were shuffled and split into a training set (70%) and a test set (30%).

Table 1. Codebook

Code	Description	Example
Positive	The message reports that something positive has occurred.	The streetlight was fixed. Thank you!
Negative	The message conveys that something is wrong and implies that someone is to blame.	Despite my earlier messages, the streetlight is still not working (implying it should have been fixed).
Neutral	The message does not contain any sentiment.	This streetlight does not work.
Angry	The message contains strong language.	The streetlight is still not working. Why don't you fix it, you lazy bastards!?!
Constructive	The message contains a suggestion of how to improve something that works or fix something that is broken.	The streetlight broke five times during the last year. The municipality should switch to LED lights, which are much more durable.
Unsafe	The argument in the message reports that something in the urban environment is unsafe or dangerous.	A lot of dangerous situations happen because of a streetlight not working. One cannot see anything!

The annotation codes for the categories were defined according to a scheme based on the implicit and explicit content of the messages (see Table 1). These categories were chosen, as they provide insight into the ways that citizens use this type of channel to communicate issues. We expanded the conventional categorization of positive, negative and neutral sentiments to include analysis of angry and constructive messages, as well as messages containing wording implying an unsafe situation. The Constructive category indicates that the person providing the feedback also wanted to contribute to solving the problem or improving a working system. This sentiment or tone implies a higher level of agency, compared to the other categories. The Angry category informs how much of the feedback contained hateful or aggressive language. The semantic category labelled Unsafe was coded for all messages containing a comment on something being an

issue because of safety concerns. The categories were coded non-exclusively (i.e., a message could belong to several categories at the same time).

We constructed a neural network as a predictive model, consisting of multiple interconnected layers where information is passing from input to output while being transformed according to trainable parameters adjusted through supervised learning. We adjusted these internal parameters in order to achieve optimal correspondence between the output of the network model and the labels of the data. The network consists of the following layers: 1) an input layer (representing input words as discrete symbols), 2) an embedding layer (providing continuous vector representation of word meaning), 3) a recurrent layer (traversing words in sequence and providing a single vector representation of a whole comment, implemented using Bidirectional Long Short-Term Memory (Graves and Schmidhuber 2005)), and 4) an output layer (transforming vector representation into probabilities over the target variable labels, using sigmoid activation). The parameters of the embedding layer were initialized through unsupervised learning, namely by word vector representations obtained by applying the word2vec skip-gram algorithm (Mikolov et al. 2013) on the whole corpus, as well as on other unannotated texts in the same language. This provides better coverage and generalization of word meanings in the model. The rest of the network was trained on the annotated comments and provides a baseline that can demonstrate how the corpus is able to support analysis of sentiment and themes in any similar text.

3. Results

Having trained the predictive model, we evaluated it quantitatively by means of the test set to assess how well it learned to recognize the coded categories for the held-out data. This provided quality assurance based on a larger number of messages. After that, we continued by analysing the output qualitatively, in order to evaluate how the model performed.

3.1. Quantitative Evaluation Results of the Model

The results are presented in Table 2 with a breakdown per category. The *F1-score* represents a harmonic mean of *precision* (correctness rate of identifications) and *recall* (rate of actual categorizations identified), whereas *support* shows the number of positive examples of each category in the test set. The substantial variation of the frequency per the categories is largely correlated with the predictive performance, as more training examples let the model generalize better to a specific category. In particular, the model performs well for the Unsafe, Negative and Neutral categories with F1-scores above 60 percent, and the Angry category is also well recognized, although infrequent in the data, due to explicit expressions. Overall, the model can predict with an F1-score of 70 percent (88.4% accuracy).

Table 2. Predictive Performance of the Model on the Test Set

F1-score	Precision	Recall	Support	Category
17.7%	100%	9.7%	31	Positive
63.5%	61.1%	66.1%	221	Neutral
64.5%	58.4%	72%	382	Negative
40%	57.1%	30.8%	26	Angry
30.7%	38.5%	25.5%	98	Constructive
84%	76.8%	92.8%	553	Unsafe
70%	66.4%	74%	-	Overall

3.2. Qualitative Analysis of Representative Cases and Distinctive Keywords

The categorization provided by the model on unannotated data was used to expand and organize the material for qualitative analysis. By categorizing the rest of the material, we extracted keywords to describe each category based on more examples (using word-frequency-based TF*IDF weighting). We also used the model to select representative messages for each comment, based on the model's confidence in its decision (posterior probability for the selected class), presented in Table 3.

Table 3. Examples of Representative Cases Retrieved by the Model (Authors' Translation)

Sentiment	Retrieved comment	Confidence
Positive	"It was nice to note that in Huhkola the walking path between the Hiihtomajapolku road and Näädänkatu was sanded and the area was cleaned. Thank you!"	0.725
Neutral	"Next to the jogging track (on the right side when coming from the underpass), a big pine tree is leaning somewhat over the jogging track. It is quite close to the speed bump sign on Aurakatu."	0.929
Negative	"In Marinkatu, Vaala, no sand has been removed from the sidewalk or street despite the city's maintenance decision, of which the residents have been informed in a notice dated 13 May 2011. In addition, in the whole area - Marinkatu, Ugrinkatu, Mordvankatu and Vatjankatu - no sand has been removed. The snow has melted a long time ago and from nearly everywhere else it has already been removed! Why is this residential area always the last one to get the maintenance service of the streets?"	0.999
Angry	"Outrageous! Bus no. 30, at the intersection of Merimiehenkatu and Stålarinkatu (Stop 101), to the city, at 9:34 am!! The driver did not take my daughter, who was going to school, nor anyone else at the stop waving at the bus!! She went to school in the rain and was late! CELL PHONES SHOULD BE REMOVED FROM THE DRIVERS! That driver was talking on a cell phone. IT IS NOT THE FIRST TIME THAT THE CUSTOMERS ARE LEFT TO WAIT FOR THE NEXT BUS OR THE BUS DOES NOT STOP TO LET YOU OUT!"	0.864

Sentiment	Retrieved comment	Confidence
Constructive	“Would it be possible to get some kind of lights for Barker's playground? The park is very popular in the evenings and the streetlights on the promenade do not illuminate the play area adequately. The fastest solution would be to attach the lights to the streetlight poles at the end of the park by Rantakatu and turn them to face the playground. Thank you for the good playgrounds in the city centre!”	0.883
Unsafe	“By Myllylahti, the zebra crossing between the overhead bridge and the tunnel causes many dangerous incidents. A three-lane road, lots of traffic and a small schoolboy on the edge of the road wanting to cross the road. Impossible for drivers to have visibility of the pedestrian from the lane furthest away. Is it necessary to have a zebra crossing in this place when there is an overpass for pedestrians before the tunnel, and after a tunnel there are crossroads which naturally have a zebra crossing? However, if this zebra crossing is necessary, it would be an absolute priority, especially for improving road safety for schoolchildren, to install flashing lights at the zebra crossing, as elsewhere.	0.999

We also identified the most distinctive keywords in each category, based on the model's prediction. The keywords were used to support a qualitative reading of 10 comments of each category to confirm that the model works reasonably well, at least in the case of comments with a relatively high level of confidence (0.72 or higher).

The Positive category performed relatively well, based on the qualitative reading. All comments selected by the model (except one) contained a positive sentiment. The wording in that one comment was positive, but the meaning was sarcastic. The most distinctive words confirmed that the category works relatively well, as ten out of fifteen were clearly positive. Interestingly, the Neutral category had the weakest results when analysing the output qualitatively, although it performed quite well quantitatively. This was confirmed by the most distinctive keywords, where, for instance, street names appeared. This type of occurrence indicates that either the training data had too few examples annotated in this category or the annotation was not done very consistently. The choice to work within the structure of the data in the first phase of the annotation process may have resulted in skewed annotation data. However, the problem seems to have been limited to this one category. The Negative category performed very well, with all the comments containing clearly negative sentiments. This was confirmed by the most distinctive keywords, where the most frequent word was translated as “not taken care of” (230 cases). In the Angry category, all comments included some form of strong language, and most of them also contained other ways of expressing strong sentiment, such as use of the caps lock or exclamation marks. The distinctive keywords were almost exclusively comprised of swearing. The Constructive category also performed well, with the most distinctive keyword being translated as “would it be possible”. Finally, the Unsafe category, which was the most frequently coded in the material, performed flawlessly from a qualitative perspective. The overall conclusion of the qualitative reading is that although the model performs relatively well, annotation of an even larger set of training data

would be required to obtain satisfactory performance, especially in less frequent categories. The laborious process of annotating the corpora is justified, as the approach could pay off in the long run for the purposes of developing automated monitoring systems or conducting large-scale research.

4. Discussion and Conclusion

In e-participation, a crucial question is how to enable the ideas, thoughts and experiences of citizens to be aggregated into a format that can be easily taken into consideration in the decision-making processes. The methods from computer science and natural language processing have a lot to contribute, both in terms of research and for developing the use of participatory data in local governance. Thanks to the implementation of various easy-to-use e-participation tools, the amount of citizen feedback received by municipalities has been growing exponentially. Furthermore, citizen feedback is also provided on social media and microblogging platforms, apart from formal participation channels.

Currently, city officials tend to process all citizen feedback on a one-off basis. However, by approaching it also as big data, planners would benefit from a plenitude of analytic perspectives making use of sentiments, thematic categories, spatial locations and time periods. Indeed, the smart city paradigm, involving the vision of real-time aggregated data analytics, should also include data collected through citizen participation.

Automated text analysis can serve as a useful tool in handling this mass of information. To obtain this goal, high reliability of the model's accuracy is required, combined with channelling unclear cases to a human moderator. Explorative studies, such as this one, can have both analytical relevance for method development (Bone et al. 2016) and practical benefits for improving processing of citizen feedback.

The performance of a machine-learning algorithm is directly connected to the extent and quality of the training data, as any skew will be replicated by the model. The results can be improved by annotating more material and running qualitative follow-up studies, like those presented in this paper. E-participation research has much to gain from this type of method, yet significant resources are required to construct sufficiently well-performing models. Moreover, alternative machine-learning approaches based on representations in vector space, rather than dictionaries, can achieve more nuanced output. In that case, too, the robustness of the training data and the scope of the annotations required need to be substantial in order for the model to also perform well with less frequent categories.

When employing the model in practice, the risk of misclassification should be accounted for, as well as attention to minimizing either false positives or false negatives. For example, sarcasm is a type of sentiment that is particularly tricky to identify, and it illustrates the difficulty of processing human language with great accuracy. Considering these issues, machine-learning methods best serve as a means of assisting in data analysis, rather than replacing the need for qualitative reading by officials themselves.

Our study has shown that an empirically grounded approach has the potential to achieve a good level of accuracy, as it is able to capture varying patterns of actual language use. Further annotation of the material is only expected to increase the performance quality of the less frequent categories, but it is still very laborious. Nonetheless, the predictive model can provide a starting point for exploratory and qualitative analysis of big data sets. Machine-learning methods have enormous potential in this regard, although further research is needed to improve methodological frameworks and practices before machine learning can become a standard part of research designs. Nevertheless, this type of model has promising features for developing automated systems of processing textual citizen feedback.

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Limitations of Legal Warranty in Trade of Data

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Research on novel marketplaces like the Data Market Austria is increasing, along with the importance the European Commission attaches to the development of the European Data Economy. This leads to the anticipation that boosting the Data Economy may reveal new issues of contractual interpretation. Interpretation is generally the central question where performance does not reflect the beneficiary's picture of the contract's execution. The focus of this paper is to consider the application of some warranty principles to the trade of data and the associated data quality properties. Difficulties arise because those principles often originate in context of material goods. The main contribution is the identification of some examples for data quality properties, which can be relevant for determining defects of data within the Austrian legal framework. The paper further aims to stimulate academic discussion on the entanglement of technical and legal competences.

Keywords: data contracts, data ecosystem, data quality

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1. Introduction

In the context of the Digital Single Market Strategy, the European Commission recognizes the development of the European Data Economy as one of three emerging challenges. Often, making economic use of data is seen from an "access"-perspective. Barriers hindering the economy to flourish include f.i. local differences in contractual and copyright law affecting cross-border trade in data (Burri 2017). This paper will not focus on finding reasons for reservedness of European actors but will emphasise the next step. We assume that the data provider and customer have already concluded a contract and focus on what characterizes a proper performance of data.

This paper was spawned from the authors' work on the Data Market Austria (DMA) – an e-Governance project creating a technological, economic and regulatory basis for a data-services

ecosystem in Austria, facilitating the trade of data between entities, such as between state and businesses amongst others. As an example demonstrated by one of its piloting work packages (Kaltenböck and Niedermayer 2017), DMA allows ZAMG¹, a subunit of the Austrian Federal Ministry of Science, Research and Economy to sell weather data it provides, upon which to build complex, data-driven services. As part of their work on the DMA, the authors examined the topic of smart contracting in the trade of data, which lead to the topic at hand.

2. Theoretical Background

Broadly speaking, warranty provides remedies where at the time of handover the performance does not correspond to what was agreed upon. The time of handover as well as what is expressly or otherwise agreed upon is crucial in order to determine if a party is entitled to warranty claims.²

2.1. Relevant Time

The relevant time for the comparison of the agreement with the actual performance is dependent on the type of contract. Generally, it is relevant when the beneficiary gains authority to dispose about the subject matter of the contract. To achieve this, a handover, a physical transfer to the beneficiary, can be a suitable method. Indicators for an acceptance other than a handover can be the use of the work and the payment of the workers' wages (see OGH 25 February 1997 1Ob2005/96a). This is clearer in case of a purchase and download than where streaming or cloud computing is concerned. According to Schmitt, it is appropriate to apply the law of contracts for work and services to streaming because the party offering the streaming decides about granting access to the content (Schmitt 2017: 16). Schmitt recommends to include details on the acceptance of the work (when and how) in contracts about cloud-computing (Schmitt 2017: 22). Applying this generally to contracts on digital goods may enhance legal certainty.

2.2. Owed Performance versus Defective Performance

§ 922 (1) ABGB³ assumes that the performance owed has the usually expected characteristics and can be used as pursuant to the nature of the transaction or agreement (OGH 11 November 2016, 10 Ob72/16k). Without a contradicting agreement, it is agreed upon the performance owed having the usually expected characteristics and being usable in accordance with the nature of the transaction or in line with the agreement (OGH 19 December 2013 2Ob196/13g).

Legal warranty prescribes responsibility of the obligor for defects of quality and defects of title that affect the performance object at the time of rendering the performance (RIS-Justiz RS0018474). A defect of quality affects the material of the performance object itself, while a defect of title

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² Some cases meet the requirements for more than one legal remedy (Welser and Zöchling-Jud 2015, mn 199 and 414).

³ ABGB (Austrian Civil Code) Allgemeines bürgerliches Gesetzbuch für die gesamten deutschen Erbländer der Oesterreichischen Monarchie StF JGS 946/1811 last amended by BGBl I 161/2017.

hinders the provision of the owed legal position (e.g., ownership). According to the Austrian Supreme Court (hereinafter referred to as OGH), defectiveness is a qualitative or quantitative deviation of the performance from the performance owed according to the contractual obligation (OGH 28 July 2010 9Ob50/10h). This judgement points to three determinants influencing this contractually owed performance: usually expected characteristics, expressly guaranteed characteristics and implicitly guaranteed characteristics. Expressly guaranteed characteristics are straightforward to determine, being based on a written contract. Usually expected characteristics or implicitly guaranteed characteristics may pose a bigger challenge.

2.2.1. Usually Expected Characteristics

In the assessment of whether a characteristic is usually expected, it is not the intention of the person making a statement that is relevant, but it is relevant what the recipient in good faith may gather from the statement. The yardstick for assessing whether the recipient's expectation is justified is the generally prevailing opinion of the public concerned (24 October 2000 RS0114333).

Examples for usually expected characteristics are the lack of harmful substances in an apartment for residential use (OGH 22 June 2011 2Ob176/10m), the lack of massive contamination of a property hindering the purchaser for years from construction work (OGH 25. January 2000, 5 Ob 104/99a), and operational safety of electronic installations. A purchaser of an apartment "not renovated", who knows the apartment located within a building constructed in the timeframe 1942-1945, cannot reasonably expect electronic installation to be according to the state-of-the-art in 2012 (OGH 28 September 2016, 7 Ob 156/16s). Another example refers to the purchase of a used car. In this case, the purchaser has to accept certain characteristics resulting e.g., from the age of the car. Nonetheless, the information given can lead to the implicit guarantee of operational safety (OGH 28 September 2016, 7 Ob 156/16s with further references, NZ 2016/151). On the other hand, colour fastness of a dark coloured leather sofa placed 25cm in front of a glass front is not a usually expected characteristic for the average purchaser, as the sofa cannot be expected to withstand direct sunlight without fading (see OGH 11 November 2016, 10 Ob72/16k).

2.2.2. Implicitly Guaranteed Characteristics

For determining whether characteristics were implicitly guaranteed, it is relevant what the recipient of the declaration could deduce from the declaration in good faith (see OGH 28 July 2010 9Ob50/10h). To determine whether expectations lead to implicitly guaranteed characteristics, reasonability of the expectations in question is assessed by comparing them to the generally prevailing opinion of the public concerned (see OGH 27 September 2017 9Ob45/17h).

Examples for reasonable expectations and implicit guarantees are naturally grown ground of a property which turned out to have been a former gravel pit (OGH 28 July 2010, 9 Ob 50/10h,

JusGuide 2010/44/8068 (OGH)⁴ and a second-hand tractor bought from a commercial trader being in running order (OGH 16 February 2006 6 Ob 272/05a). The purchase of a second-hand car from a private individual and the acceptance of a waiver of warranty rights only after a technical inspection of the car with regard to traffic and operational safety lead to an implicit guarantee that the car is in running order. The purchaser did not lose the warranty rights for the latent defect, which resulted in engine damage (OGH 24 February 2009 9Ob3/09w).

If the seller from the perspective of the purchaser either knows or should know the purchaser expects a specific characteristic, the omission of clarification on the unsuitability of the performance leads to the characteristic being qualified as implicitly guaranteed. Exemplifying this, a second-hand vehicle is undoubtedly, and for the seller noticeably, expected to be in running order. There is a lack of this implicitly guaranteed characteristic of the car to be in running order if the amount of brake fluid is so little that after a short driving time brakes fail totally. As the seller was carrying out a business requiring special domain expertise, he would have had to notice this significant defect (20 September 1990 7Ob23/90).

2.3. Limitation of Warranty

Typically, providers and customers pursue different interests, also regarding the extent of warranty. According to § 9 KSchG,⁵ consumers' warranty rights generally cannot be limited before they are aware of the defect. Where consumer protection is not applicable, contractual limitation of the legal warranty is possible as a rule, but still needs to meet requirements like adherence to certain accepted principles of morality (see RIS-Justiz, RS0038178) in order to be lawful. The Data Market Austria concept provides a B2B relationship between the data provider and customer (see Rinnerbauer et al. 2017) and thus enables more restriction.

A waiver of warranty rights regarding secret defects and defects that concern usually expected characteristics is admissible but is interpreted restrictively (OGH 16 February 2006 6Ob272/05a). The extent of the limitation is generally determined through interpretation of the contractual agreement. A waiver of warranty rights cannot admissibly cover defects which a party maliciously did not disclose (OGH 4 March 1982, 7 Ob 575/81) or defects that make the object totally useless from the start⁶ (OGH 30 June 1988, 7 Ob 537/88), or a lack of expressly or implicitly guaranteed characteristics (OGH 16 February 2006 6Ob272/05a, OGH 28 July 2010 9Ob50/10h).

⁴ It is commonly known that the condition of the ground is important for the purchaser. From the view of the purchaser, the fact that the vendor did not inform the purchaser on the condition of the ground, leads to the qualification of the characteristic of natural growth of the ground as implicitly guaranteed characteristic, see OGH 28 July 2010, 9 Ob 50/10h.

⁵ KSchG (Austrian Consumer Protection Act) Bundesgesetz vom 8. März 1979, mit dem Bestimmungen zum Schutz der Verbraucher getroffen werden (Konsumentenschutzgesetz – KSchG) StF BGBl 140/1979 last amended by BGBl I 50/2017.

⁶ A second-hand car is for instance not useless from the beginning if the party was able to drive 14.000 or 15.000 km with this car (OGH 18 October 2007, 2 Ob 189/07v).

3. Reasonable Expectations Regarding Data from a Technical View

The following section provides assumptions and estimations regarding dimensions to be considered in the trade of data. As a plethora of dimensions and metrics to be considered regarding the quality of data exists, the authors are not proposing a new framework. Instead, a careful selection of basic relevant dimensions (see e.g., Cai & Zhu, 2015; Zaveri et al., 2016) within data quality assessment is provided. The identified characteristics are also frequently used in comprehensive frameworks and are presented as a brief overview in Table 1.

Table 1: Overview of characteristics of Data in Trading Scenarios

#	Name	Short description
1	Machine-readability	Data can be automatically processed.
2	Correctness	Data are factually correct.
3	Temporal relevance	Data are temporally relevant to an explicitly stated or implied time frame.
4	File format	Data file format is of a contemporary file format that has open specifications.
5	Backups	Data can be replicated for data security means.
6	Completeness	Data are complete metadata- and content-wise.
7	Integrity	Data are integers and the bit pattern is not corrupted.
8	Reliable network	Data stream is delivered to the customer continuously and on-time.
9	Availability	Data streaming is available in the agreed upon period.
10	Velocity	The lower, as well as the upper limit of data stream velocity are met.

In the case of *machine-readable* textual and structured data, unless explicitly stated, the data customer can reasonably expect textual and structured data being provided in a machine-readable format (e.g., JSON, XML, and CSV). It is implied by the following purposes: Text can be parsed, analysed, and edited with common tools, such as word processors, while structured data can be imported into spreadsheet-based applications (e.g., MS Excel) or tabular-based databases. However, an image representing text, or a scanned table contained within a PDF file cannot be parsed by standard word processors or database management software.

Data customers can reasonably assume the factual *correctness* of data they purchase. The responsibility of factual correctness of data lies with the data provider. Factually incorrect data may diminish its value and may cause further damage to the customer e.g., in case purchased data are used for business decision making.

In cases where the data provider gives no explicit indication regarding the *temporal relevance* of purchased data, the customer may make assumptions about the timeliness of the data. In cases where a dataset's temporal relevance is described only in relevant terms (e.g., "Last month's weather data"), the customer may rightfully assume the reference point as the current date, for

lack of explicit data indicated. A missing or misleading temporal description may render the data worthless for data customers.

Unless otherwise noted, data customers may assume data files they purchase to be of a relevant contemporary *file format* of open specification. Contemporary file format implies that the file can be opened or parsed with software that corresponds to current industry standards, e.g., if the customer purchases archive satellite images from 1980's, unless explicitly noted, they may assume that the images will ship in TIFF or JPG and not the obsolete image file format originally used on IBM mainframes.⁷ Furthermore, the open specification requirement aims to avoid vendor lock-in, where the file format may be contemporary and industry standard, and it can only be opened or parsed with software (and hardware) of one vendor. For instance if the customer purchases lossless digital photographs that are shipped (without explicitly noting) in the digital camera's native, closed specification raw format, it will be usable only with the camera vendor's software. For instance, where the customer purchases video data that is delivered in Apple's proprietary, closed specification Final Cut Pro project file format, with the video resources embedded in the file, this video can only be processed using Apple products, potentially causing the customer thousands of euros of additional expenses.

Another characteristic assumed when buying data comes in form of the possibility to create *backups* of these data for data loss prevention. Data loss can occur for several reasons, starting with hardware failure (e.g., corrupted memory) and user failure (e.g., unintended deletion of data), up to external environmental impacts (e.g., EMP, water, power surges). Backups depend on the volume of data as well as potential digital rights management (DRM) measures being in place (see e.g., Subramanya and Yi 2006). Depending on the concrete measures, these can limit the possibility of backups or even completely deny any actions in that regard. For example, the DRM measure would require the connection to an online service, which is not available anymore, or a certain type of medium would be required on which to store the data, which is technically outdated and thus hardly available. Furthermore, in the case of a one-time download, the threat of data loss exists as during the download of the dataset, the data could become corrupted and thus even a backup could not help. Therefore, the authors suggest the provision of a certain grace period, which would allow for sufficient time to check the integrity of the data as well as to produce a copy of it.

When acquiring data, an essential characteristic of a dataset is *completeness*. The completeness extends over metadata as well as the actual data. In the case of metadata, e.g., either all existing fields regarding the applied standard should be filled, or at least those that are essential to understanding the content, the extent, and the context of the data contained within the dataset (Pipino et al. 2002). Considering the acquisition of data in CSV format, the complementary JSON

⁷ In context of a termination of a contract leading to the return of data, the file format is also regulated in the way that the recipient cannot choose the format of the data, but it has to be a common format, e.g. PDF or TXT (OGH 15 April 2010,6 Ob 40/10s).

format as part of the CSV on the Web standard by the W3C⁸ could serve as a way to provide completeness in terms of the required metadata. This format provides additional information about the associated CSV file, such as title, description, or, creator, as well as detailed information about the data within the file, including the datatype of the content (e.g., string, integer) and the associated range (e.g., 0 - 10).

The *integrity* of data, besides the aforementioned correctness of data, describes an important aspect in trading data. This characteristic describes the fact that the data should be complete and coherent from a structural perspective (i.e., the bit patterns comprising the data are complete and correct). Issues regarding this structural integrity can arise during the creation of the data or during transmission of the data from the data provider to the customer. A way of verification can be provided by delivering not only the data themselves but also an associated hash value, e.g., a MD5 hash (Cao and Yang 2010), which enables the customer to identify any changes of the original dataset, either through tampering with the data or due to issues arising during transfer from the data provider to the customer.

In case of streaming data – unlike data in downloaded files –, the process of data handover (i.e., transfer) cannot be separated from the characteristics of the data, therefore the handover characteristics must also be considered. Regarding the technical difference between streaming and static data, three characteristics - network reliability, availability and velocity - should be taken into account.

Data customers can reasonably expect *reliable network* speed on the streaming provider's side. The streaming provider must employ a network connection that can appropriately serve the data stream, based upon the stream's characteristics as agreed upon in the contract, guaranteeing that the data stream is delivered to the customer continuously and on-time. Issues with the speed of data streaming on the data provider's side may cause delayed or non-continuous data delivery. Delayed or non-continuous data transfer may diminish the value of the data for the customer, especially when the data stream forms the basis of real-time, low latency decision-making, e.g., in case of real-time stock market data.

Customers of data streaming services can reasonably expect that the data streaming is *available* in the agreed upon period. Due to the stream provider's technical or organizational failure, a data stream might suffer outages where, during a period of time, no data get transferred to the user. Streaming outages may diminish the value of the data even in use cases that are otherwise resilient to unreliable network conditions, e.g., in case streaming data are stored to be analysed later.

Finally, to appropriate infrastructure of the stream provider, the data customer must also have adequate technical infrastructure at their disposal to guarantee successful transmission. Securing adequate infrastructure for receiving streaming data is naturally the customer's responsibility, however, only to the extent of the characteristics of the data that were agreed upon in the contract.

⁸ CSV on the Web: A Primer. <https://www.w3.org/TR/tabular-data-primer/>, last accessed 2018/03/15.

If the data provider increases the *velocity* (Gandomi and Haider 2015) of the data stream significantly over the contractual value, the customer may not have the resources to appropriately receive the stream, potentially leading to data loss or even systemic errors beyond data retrieval. Data customers have no control over streaming velocity; therefore, guaranteeing not only the lower, but also the upper limit of data velocity is the stream provider's responsibility.

4. Discussion and Limitations

This paper has drawn attention to additional challenges of applying legal principles to emerging technologies. Against the background of the examples provided for usually expected and implicitly guaranteed characteristics, the authors combine a legal and a technical view with the aim of reflecting legal examples in technical understanding. As a result, the authors present dimensions of data quality, which are relevant when considering if data is defective and which can support legal practitioners where warranty in trade of data is the subject of discussion. Of course, the presented results are somewhat limited legally and technically. Specifically, they take only the Austrian legal framework into account and the limited inference of processes and best practices for day-to-day use. Consequently, individual agreements have to be the starting point for an in-depth analysis on a per-case basis.

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Open Data Education: Curriculum, Course Models and Learning Model

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Abstract: Open Data has promised to provide a variety of benefits to society such as to stimulate innovation and contribute to economic growth. However, the successful exploitation of Open Data is still insufficient. A possible factor is the lack of in-depth knowledge and a wide range of skills that are required in order to produce added value with Open Data. This paper presents a curriculum structure with a variety of skills and knowledge that aim to cover existing needs on Open Data education, as well as a data-driven Problem Based Learning model that aims to support need-oriented and interactive Open Data course design. Furthermore, two-course models and learning content are proposed that aim to facilitate university and VET courses design and delivery. Finally, the application of the above in a university is presented.

Keywords: open data, course models, problem-based learning

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¹ <http://www.odedu-project.eu>

1. Introduction

Open Data initiatives worldwide are boosting with an aim to increase transparency and contribute to economic growth (Burdon, 2009). However, existing efforts in effectively exploiting Open Data and publishing new Open Data are still limited to experts in the field (Janssen et al., 2012). A contributing factor is insufficient training on Open Data of interested stakeholders in all sectors (academia, business, public sector) that could unleash Open Data's potential and contribute to economic growth and societal improvement (Heidorn, 2008). Existing Open Data education initiatives funded towards providing knowledge on Open Data for non-experts (e.g., citizens, scientists, SMEs, entrepreneurs) are currently lacking, leaving only limited IT experts and the Open Data research community to benefit from the field.

Additionally, Open Data courses are not linked to existing problems of society and economy and do not exploit existing datasets. Active involvement and experimentation with data could lead to the identification of innovative solutions, services or start-ups. This could be reinforced if courses are structured based on pedagogical models that foster engaging learning activities such as Problem Based Learning (PBL) (Ferrari et al., 2009).

To this end, we designed a curriculum structure that covers skills and knowledge on Open Data, as well as two-course models and learning content that aims to facilitate university and VET courses design and delivery. We further propose a data-driven PBL model that aims to support innovative Open Data course design. Finally, we show the application of the above in university settings.

The rest of the paper is organized as follows. Section 2 presents the methodology followed. Section 3 presents the curriculum designed for Open Data education while Section 4 describes the designed PBL model. Section 5 presents the university and VET course models and learning content created. Section 6 describes the usage of the above in a university setting, while Section 7 presents the conclusions and future work.

2. Methodology

The methodology followed for the design of Open Data courses was adopted the instructional design model RASE (Resources Activity Support Evaluation) (Churchill, 2013), which aims to guide the design of student-centered technology enhanced courses, and thus is in accordance with our objectives. More specifically, the methodology followed is shown in Table 1.

Table 1: Methodology of Research

RASE model concepts	Research output	Methods
Resources	Open Data curriculum structure and content	Curriculum structure: literature review, 36 interviews, eight focus groups and a survey answered by 196 individuals on skills and knowledge needed for Open Data education. Open Data content: A review on Open Data lifecycle and existing Open Data trainings.
Activity	Course PBL model	Literature review on PBL, existing Open Data trainings and 15 interviews with Open Data educators and trainers.
Support / Evaluation	Course models	Combination of curriculum structure, content and PBL model.

3. Open Data Curriculum Structure

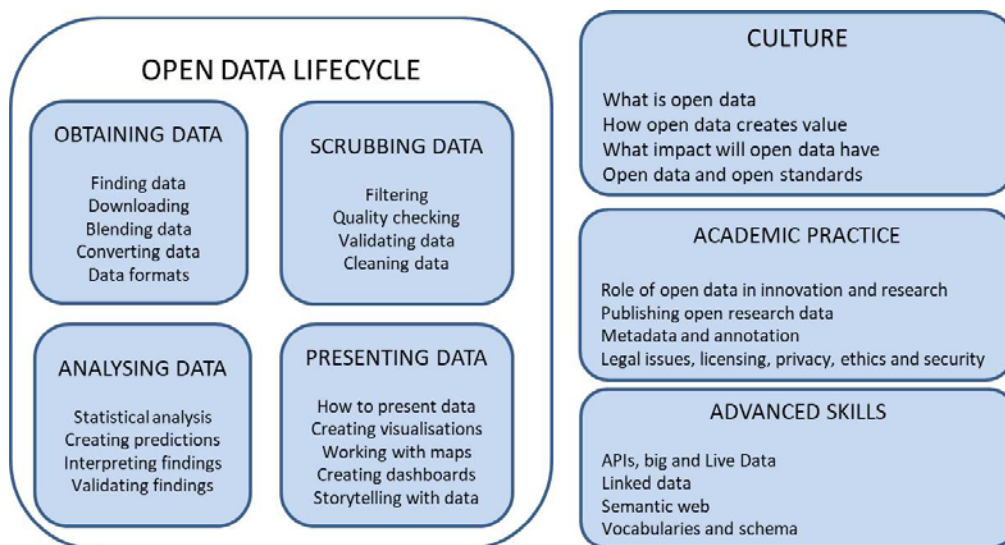
The initial work regards the identification of the knowledge and skills that can support university students, private employees, and public servants to productively exploit Open Data. This was built based on a) a literature review on existing Open Data trainings and b) data collected through 36 interviews and eight focus groups with people who have experience with Open Data from academia, business, and the public sector. An online survey was also launched and disseminated, where 196 individuals provided feedback on if Open Data experts and non-experts are interested in working with Open Data and what they believe are the current needs in the area.

The research carried out resulted in a curriculum structure that consists of seven key areas of Open Data knowledge and skills including culture, academic practice, obtaining data, scrubbing data, analysing data, presenting data, and advanced technical skills. For these areas, 110 related knowledge elements and 90 skills were documented, which represent units of learning needed for successful Open Data education.

Table 2: Example of Open Data Curriculum Structure

Unit of learning (need)	Skill / Knowledge	Private sector	Public sector	Student
what open data is	K	✓	✓	✓
how to analyse data	S	✓	✓	✓

Figure 1: Open Data Curriculum Categories and Needs



Based on the feedback gathered, each need was mapped to a relevant key area and assigned the knowledge and skills required to be included in an Open Data course in order to cover the need in question. Table 2 shows an example of this work assigned per target group, while Figure shows the categories identified and the mapping of needs in each category. The above aim to provide educators with a comprehensive guide on the learning objectives and outcomes they can include in their Open Data courses.

4. Data-Driven PBL Model

The data-driven PBL (DD_PBL) model aims to assist Open Data course design and address issues identified in existing educational efforts. Existing Open Data courses in universities are very rare, and trainings are carried out mostly as seminars and workshops that usually include content in slides and occasionally quiz tests (e.g., Open Data Support, Open Knowledge Foundation etc.). However, these are not structured based on pedagogical models that would foster engaging activities and do not employ learning systems and analytics technologies to provide flexible and adaptable learning². The enrichment of an Open Data course with a pedagogical model such as PBL that allows students to actively participate in the learning process could more effectively support them in developing skills and experimenting with real Open Data while solving problems.

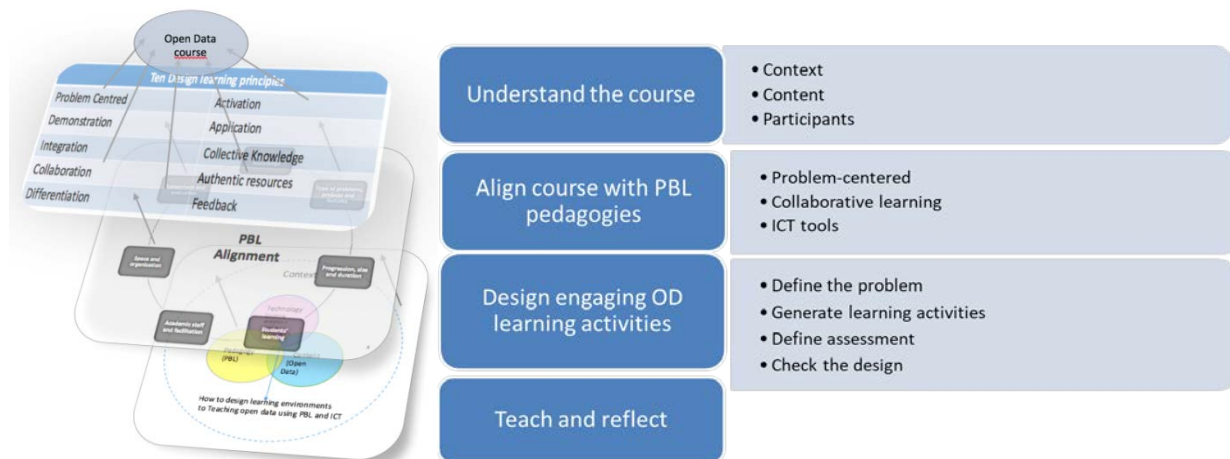
The model is based on PBL and Learning Analytics (LA). PBL is a learning strategy that aims to support active participation, learning by doing and transversal skills development (Savery, 2015). The active participation of learners is usually supported by technologies and leads to the generation of large amounts of educational data (Palaigeorgiou et al, 2007). This data can be exploited

² "Open Data, Open Society" Project: Open Data: Emerging trends, issues and best practices http://www.lem.sssup.it/WPLem/odos/odos_2.html

through novel technologies such as LA and produce meaningful insights for educators into learners' performances (Siemens et al., 2011). Aiming to capitulate on the benefits of PBL and LA in order to improve existing Open Data education, we designed the proposed learning model, based on a) a literature review on PBL and b) data collected from current Open Data training activities. Fifteen interviews were carried out with educators of Open Data courses across different educational institutions in order to retrieve feedback on current practices in Open Data courses.

The model comprises four layers that aim to produce an effective learning environment, as shown in Figure 2. The first layer represents the need to combine content, technology, and pedagogy to design learning environments. Educators can use the technological-pedagogical content knowledge (TPACK) model (Koehler & Mishra, 2009) to maintain a balance between these three aspects. The second layer refers to the alignment of the PBL principles in an Open Data course, with the use of the model for a problem and project-based alignment (Kolmos et al., 2009). This includes decision-making on the objectives and knowledge, types of problems, size of activities, assessment through evaluations and LA. The third layer refers to the instructional design of educational activities. We recommend using the 10 principles of the instructional design quality (e.g., problem-centred, demonstration, collaboration, authentic resources) (Margaryan et al., 2015). The fourth layer aims to support educators to effectively design PBL learning activities. This can be supported through presentations on PBL designs as initial templates they can base their course designs on.

Figure 2: DD_PBL Model Layers and Design Steps



This model guides educators who want to incorporate PBL into their Open Data courses by following specific steps, as shown in Figure 2. The first step corresponds to the first layer of the DD_PBL model, which encourages educators to understand their course. This includes identifying the content to be taught (from the Open Data curriculum structure), the context (i.e., university course, duration) and who the participants are (e.g., undergraduate students, private employees). The transformation of a traditional course into a PBL course also requires adhering to specific principles as mentioned in the second layer of the model, like structuring the course around a problem, supporting collaboration amongst students, and including tools to encourage participation. Another important change is the creation of engaging learning activities which will

allow students to interact with each other and with existing data. The last step is the actual course delivery, where educators apply their course designs, reflect on their course and make any necessary improvements.

5. Open Data Course Models

Two models were constructed to provide guidance for delivering Open Data courses in higher education and vocational training. The course models aim to provide a foundation of well-structured courses that can be adopted as-is or adapted according to each course's specificities.

5.1. University Course Model

The University course model proposes the coverage of all the key areas of Open Data knowledge and skills as shown in Figure 1. Two ways of structuring a university course are proposed; one university module and one living lab. In both cases, learners will be working in small teams and provided with regular mentoring from tutors by consulting LA insights.

The course model for the university will allow learners to gain problem solving skills that are required in order to identify interesting problems, research Open Data, and develop innovative solutions. The main features of the course that will incorporate the DD_PBL model and allow the acquisition of the knowledge and skills from the Open Data curriculum structure include:

- Form groups. Students form groups based on their own criteria
- Define problem: set by the students. This will test their ability not only to solve a problem, but to scope, research and define the problem in the first place.
- Learn theory in the first few weeks: key Open Data knowledge from curriculum
- Collaborate: "solve" the problem by experimenting with existing Open Data
- Scaffold: consult LA insights to adapt the course accordingly

The living lab model has been designed to enable Open Data skills to be integrated into existing courses through the running of a shorter living lab. The living lab covers four practical pillars (obtaining, scrubbing, analysing, and presenting data). The main features of the living lab are similar to those of the university course model, except for the following:

- Define problem: set by the learners. Learners will be able to solve complex, abstract problems in a specialised field of work.
- Three day period: maximum two days of teaching and a day that follows a "hackathon" format, where the problem solving takes place.

In both cases, institutions will be expected to define the assessment criteria for the evaluation of the learners' solutions and performances within the different demands of that institution.

5.2. VET Course Model

The VET course model was designed based on a semi-synchronous approach. This combines tutored online discussion with online materials that learners can study in their own time. The course is comprised of eight key lessons and five problems. Each lesson is designed to be two hours long,

bringing the total contact time to 16 hours. The recommended length for the VET course model is eight or 16 weeks. The course model is designed to incorporate the key principles of PBL: collaborative learning, critical thinking, self-directed learning and reflection. In the VET course learners do not design and set up their own problem.

As new content, learners use the reference content that focuses on the new problem set each week. As the course progresses, learners use skills that they have developed in previous weeks.

5.3. Open Data Learning Content

The Open Data Institute used the curriculum to develop 40 units of learning that map directly to the needs identified. These are designed to be used as reference materials for students on the VET and university course models. Designed using the latest technologies, each unit is interactive, visually appealing and contains short quizzes for students to reinforce and check their learning at each stage.

The units map to each curriculum area and can be remixed to build different curricula as required. In order to help with reuse, new content created by the ODEdu project will be available from the ODEdu project website under an open licence, for anyone to access use and share.

6. Open Data PBL-Based Education in Practice

The DD_PBL model and Open Data content were used in an elective course of the BSc in the Applied Informatics department at the University of Macedonia, Thessaloniki, Greece. The course was supported by a Moodle installation, which was set up to support DD_PBL. For that purpose, the page included activities suggested by the model (e.g., forum, mind maps, shared directories). The decisions on the course structure were made based on the university course model (e.g., number and duration of lectures, Open Data content) The content was translated and localised to accommodate the needs and interests of students. The course included 13 lectures on Open Data, workshops on the use of various data visualisation, and analysis tools as well as a group project. The project runs throughout the semester, and each group has to identify one or more interesting open datasets, obtain them, visualise them, perform data analysis, and write an interesting story about these data, which should be subsequently posted in a blog of their choice.

At the end of the semester, an independent expert interviewed students and the lecturer based on an assessment method that was developed within the ODEdu project. The evaluation data are currently under examination and are expected to be published soon. Nevertheless, the first feedback suggests there is room for improvement in better informing students about PBL and the used Moodle platform. Once finalised, the assessment results will guide the forthcoming pilots during next semester.

7. Conclusions

Open Data has promised to provide significant benefits to society such as stimulating innovation and contribute to economic growth. The effective and wide exploitation of Open Data by any stakeholder could be realized through need-oriented and interactive Open Data courses.

Towards this end, this paper presents a curriculum structure that covers all major concepts of Open Data for academia, business, and the public sector. The curriculum consists of seven main categories: culture, academic practice, obtaining data, scrubbing data, visualizing data, presenting data, and advanced technical skills. For these categories, needs were linked with knowledge and skills items that cover all the phases of the Open Data lifecycle. A learning model was also presented that is focused on the PBL strategy and the exploitation of the generated educational data with LA. This model, namely DD_PBL, aims to support the design of Open Data courses so that learners can experiment actively with existing datasets, identify existing economic and societal issues that can be solved with Open Data and produce innovative solutions.

Finally, two-course models were presented that have been designed for university and VET courses on Open Data based on the DD_PBL model, as well as learning content that corresponds to the knowledge and skills identified in the curriculum. Educators and trainers can make decisions on delivering courses based on the proposed models, such as the number of lectures, duration, competencies linked with Open Data content.

An initial application of the above in a university course was also presented. Early feedback suggests the educational material and tools used are interesting; however, the PBL method and e-learning platform used to support the course should be better explained to students.

Future work in the area includes the further usage of the learning content, course models, and learning model in university courses and trainings with business members and public employees across multiple European countries.

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A Framework for Analyzing How Governments Open Their Data: Institution, Technology, and Process Aspects Influencing Decision-Making

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Abstract: Factors like the involvement of many actors and their interests, regulations, knowledge, availability of infrastructure, and skills are influencing the decision-making process for opening data. Yet there is no overview of factors nor framework to analyze decision-making to open data. The objective of the research presented in this paper is to develop a framework to analyze how governments decide to open their data. A framework consisting of institutional, process, and technological aspects is proposed. The Institutional Decision-Making Framework (IDMF) is used in an in-depth case study to comprehend the decision-making processes to open data. Politics, norms, regulations, multi-actors, and cultures were found to play a role in showing the complexity of such decision-making process. For the further research, we recommend using different case studies to discover a deeper understanding of the decision-making in opening data.

Keywords: open government data, framework, institutional, technology, process,

1. Introduction

The releasing data by governments are able to improve their reputations by declaring that they are an open organization (Janssen, Charalabidis, & Zuiderwijk, 2012; Luthfi & Janssen, 2017). The disclosure of the data ultimately expected to improve decision-making by both the government and the society (Ubaldi, 2013; Zuiderwijk & Janssen, 2013). Society, furthermore, expects governments to open their data for some kinds of purposes. Hence, governments need to have a strong and stable decision-making process to serve the availability and accessibility of data for the society.

However, to re-redesign a government's organization process is not an easy way. There are some barriers that should be considered to re-construct the decision-making processes as follows

(Klijn & Koppenjan, 2001, 2006; Koppenjan & Groenewegen, 2005; Schalkwyk, Willmers, & Schonwetter, 2016; Scott, 2004):

- 1) multi-actors involvement to take a decision in opening data can induce the multi-views or multi perceptions among the policy makers,
- 2) strict regulations are sometimes can make inflexible bureaucracy,
- 3) insufficient knowledge of the government agencies can lead the wrong interpretation of the decision-making process,
- 4) lack of budget allocation to develop new infrastructures, and
- 5) limited number of the availability of high-skilled human resources.

Several of such deficiencies are the outcome of a lack of translating about the causal and relationship among technologies, information process, organizational elements, institutional regulation, or socio-economic forms, resulting divergences and unexpected expectation (Luna-Reyes & Garcia-Gill, 2011; Schalkwyk et al., 2016).

The objective of the research presented in this paper is to develop a framework for analyzing how governments decide to open their data. A broad range of factors influence the decision-making process (Jabeen & Rafiuddin, 2015; Kamal, Bigdeli, Themistocleous, & Morabito, 2015). We use technological, institutional, and process elements to categorize and to understand the variety of factors (Klijn & Koppenjan, 2006; Koppenjan & Groenewegen, 2005). Technological factors refer to the system backbone that requires the sophisticated and complex design to support open government data initiatives including the demarcation, components, relations, and the process of the system (Klijn & Koppenjan, 2001, 2006; Koppenjan & Groenewegen, 2005). The involvement of information technology is able to provide the implementation to redesign governmental organization progressively (Bretschneider, 2003). Institutional aspects refer to the arrangement processes between some types of actors that regulate their relationship, tasks, responsibilities, the nature of property rights, allocation of cost, benefits and risks, and juridical codification of agreement (Albano & Reinhard, 2014; J. M. Alonso, Boyera, Grewal, Iglesias, & Pawelke, 2013; M. J. Alonso, 2011). Finally, process aspects refer to who participates (multi-actors), their interests, and what are the conditions and rules to improve the process by structuring it to become more sufficiently (Koppenjan & Groenewegen, 2005).

The scientific contribution is to develop a conceptual framework for opening data. The purpose of the framework is to improve the understanding of how governments decide to open their data. The main outcome is a hierarchy of aspects and factors to keep in mind during the decision-making process. In order to describe the existing procedure on how the governments decided to open their data, we conducted a case study in Bandung City (Indonesia). An explanatory case study was carried out to explore any phenomenon in the data which serves as a point of interest on this research (Yin, 1984). The case study is performed to determine which factors influence the decision of governments to open or not to open their data and to see if the framework can be used for mapping the factors.

2. Towards a Framework for Analyzing the Opening of Data

Although an institution is claimed to have strong levels of stability and predictability, it does not mean they cannot be changed (Koppenjan & Groenewegen, 2005). Multi-actors involvement, for instance, in the institutional environment can lead to relatively low stability and predictability (Buuren & Koppenjan, 2003; Klijn & Koppenjan, 2006; Koppenjan & Groenewegen, 2005). In addition, datasets originate from data providers located in various departments, such as municipalities, health, education, or ministerial departments. Often multiple parties are involved, which makes it complex. The data steward, the data portal operators, and policy-makers might have other ideas about the opening of data.

2.1. Institutional Aspects

Institutional aspects can be analyzed by distinguishing four levels of analysis and design related to the functionality and complexity of the system. The most important roles of this institutional design level is to explicitly keep the interaction between the actors as well as the technology parts to ensure that the system is well established. The four levels of institutional design are described as follows (Klijn & Koppenjan, 2006; Koppenjan & Groenewegen, 2005):

- 1) Individual actors' interaction consists of the internal structure that coordinates interaction based on their rules and hierarchy process.
- 2) Institutional arrangements consist of the agents that coordinate specific transactions among multiple actors.
- 3) Formal rules or legal aspects consist of the legal positions of the key actors and the mechanism available to coordinate transaction among them.
- 4) Culture, values, norms, and attitudes consist of the informal rules of the systems, but they have an essential influence on the insights or perceptions of agents or key actors with respect to the problems they identify and solutions they consider feasible.

2.2. Technology Aspects

The technology aspect is one of the important components to determine the functioning of the system in institutional level (Butler, 2011; Buuren & Koppenjan, 2003; Klijn & Koppenjan, 2001; Koppenjan & Groenewegen, 2005). However, there are some factors that might influence the stability and reliability of the design process such as development of demand, costs, competition, regulation, and the behavior of the actors (Koppenjan & Groenewegen, 2005). Therefore, we need to define the suitable technological design to cover the uncertainty problem during the decision-making process (Klijn & Koppenjan, 2006; Koppenjan & Groenewegen, 2005).

2.3. Change Process Aspects

Process aspect is focusing on the how to enhance to a process by massive efforts and strong stakeholder commitment to structure the institutional more sufficiently (Buuren & Koppenjan, 2003; Klijn & Koppenjan, 2006; Koppenjan & Groenewegen, 2005). Process aspect, hence, is concerned with designing the decision-making process (Klijn & Koppenjan, 2006; Koppenjan & Groenewegen, 2005; Scott, 2004). Attention is given to (1) who ought to be involved in the design

process, (2) how this involvement must take place, (3) what rules are relevant, (4) what subjects are to be considered, (5) what auxiliary conditions must be met, and (5) how the process should be supervised. A process design consists of the whole of agreements and provisions aimed at the organization of the design process (Klijn & Koppenjan, 2006).

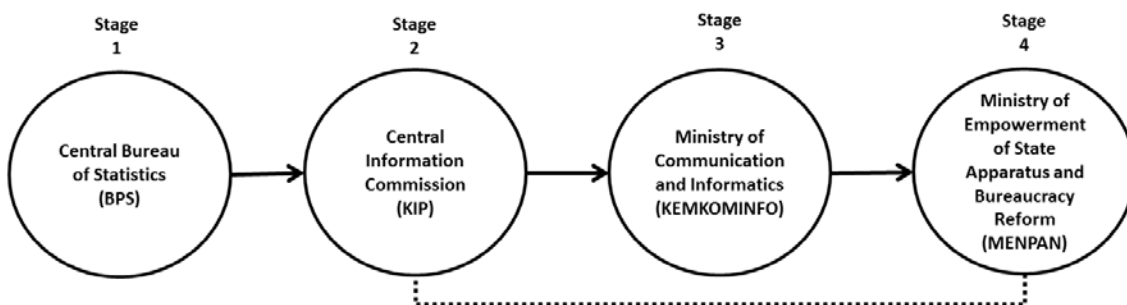
3. Case Study

The case study is executed by reading reports and conducting interviews in Bandung City (Indonesia). The IDMF was used to derive factors influencing decision-making, specific attention was given to (1) how are the different departments involved in the decision to open government data, (2) what is the process or procedure to open datasets, and (3) how the government design the classification of the datasets as the alternative decisions.

3.1. Decision-Making Process

There are four main stages in which the government decide to open their datasets as visualized in Figure 1.

Figure 1: The Four Stages of How the Government Decides to Open Data



- Stage 1. In this step, BPS collects raw datasets from the regional government agency (SKPD) by doing a survey in various departments. For example, health, education, and social to name a few. BPS formulates population standard and samples of the datasets and defines the statistical data format.
- Stage 2. KIP evaluates and assess datasets based on the public information and decides to open or not to open the datasets. In some cases, KIP has an important role to resolve a public information dispute.
- Stage 3. KEMKOMINFO prepared and created the infrastructure of open government data and visualizes the datasets to be accessed by the public including its maintaining.
- Stage 4. MENPAN supervises the implementation of the open government data and gives a recommendation to KIP to make the decision to open or not to open a dataset.

3.2. Outcome of the Decision-Making Process

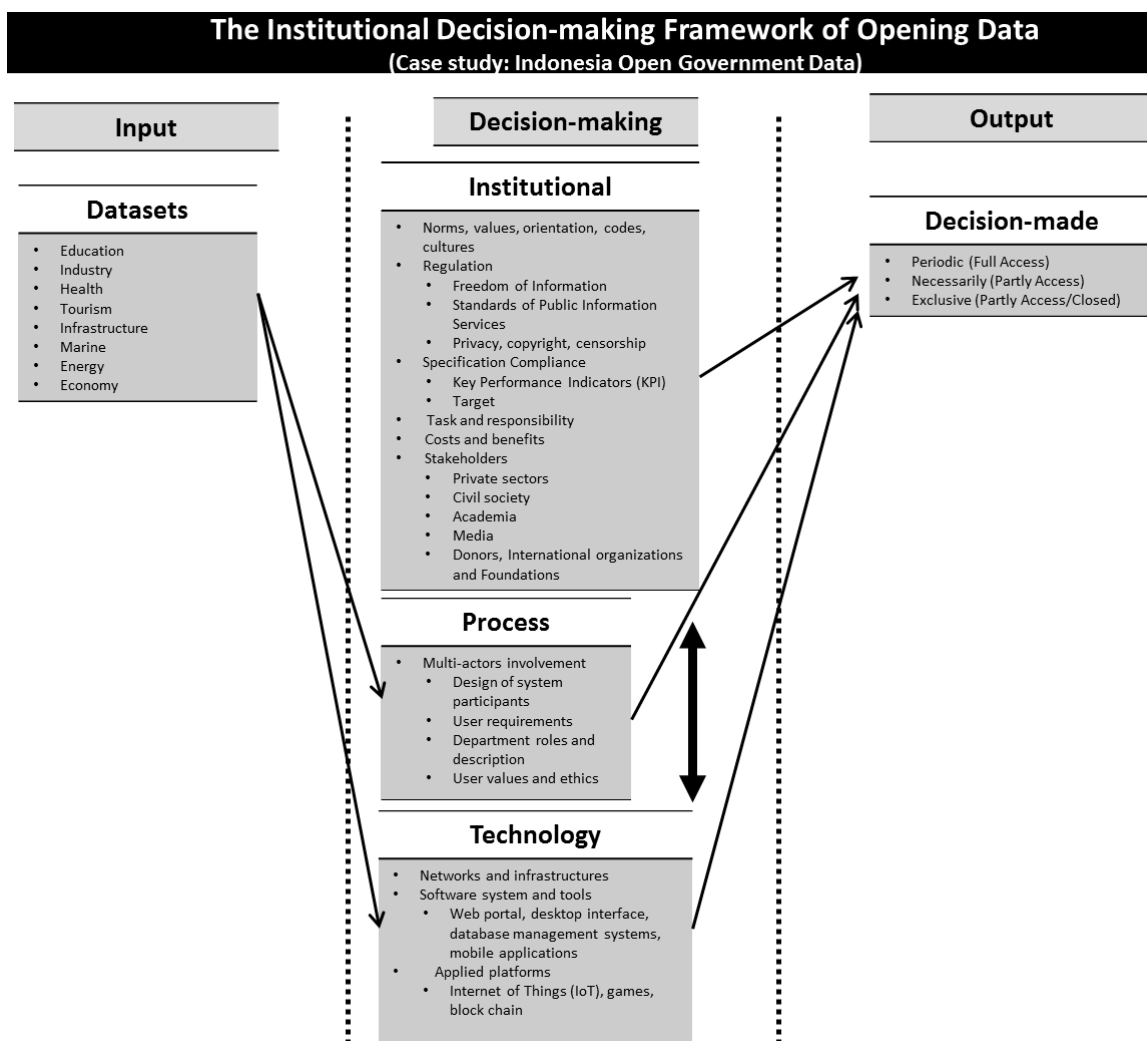
Based on the interview sections, KIP divided the alternative of decision-related to open the datasets into three parts, as follows:

- Periodic release (Full Access). Datasets are opened to the public in a certain period of time in the form of a resume report. The periodic resume is also known as Appendix 1.
- Necessarily (Partly Access). Datasets are opened based on the special request of departments, public bodies, or communities by taking communication with KEMKOMINFO, KIP, and MENPAN.
- Exclusive (Partly Access or Closed). Datasets are opened and provided only to the particular institutions like law enforcement apparatus (police, judiciary, or corruption eradication commission) to accelerate the law enforcement investigation.

4. Findings: Overview of Factors

In order to present the final results of institutional decision-making in this research, we designed the comprehensive overview on how the Indonesian government open their data from the insight of institutional, process, and technology design as illustrated in Figure 2.

Figure 2: Factors Found in the Case Study Plotted in the IDMF



In Figure 2, the three main elements of the process are described more detail.

- 1) Input. The government collect datasets in various formats from different department such as education, industry, health, tourism, infrastructure, marine, energy, and economy as available in the Indonesia Open Government Data portal (<https://data.go.id/>).
- 2) Decision-making. In this process, the theory of institutional design and the case study result to represent how the institutional, process, and technology can relate to each other in framing the government open their data.
 - Institutional aspect. There are six important components that should be considered to be noticed, as follows:
 - Norms, values, orientation, codes, and cultures. The culture is traditional risks averse and in doubt datasets will not be opened.
 - Regulation including the (1) information freedom standards of public information services, (2) privacy issues like copyrights and censorship. The regulations are aimed at opening data, at the same time the data protection act prevent the opening of personal data.
 - Specification compliance including key performance indicators and target.
 - Task and responsibility of the departments involved. The process looks well-defined, however, not always the tasks and responsibilities were clear in the process. For example, some departments developed their own support, whereas this should be done by KEMKOMINFO.
 - Cost and benefits that need to be considered by the government. Often the cost of opening is not known as these are made by other organization than the one releasing the datasets. Also, the benefits are largely unknown
 - Stakeholders who are required and involved in the open data initiative like private sectors, civil society, academia, media, donors, international organizations, and foundations. These stakeholders ask for the release of data and create a kind of urgency.
 - Process aspect which is functioning to develop the multi-actors' involvement in the open government data initiatives. There are four essential elements. (1) Many participants were involved which makes this a complex field. (2) The user requirements varied and are often not known and not asked for. (3) Due to the complexity department roles and job descriptions are not always well defined. (4) The outcome of the decision-making process for the users including the values and their ethics also needs to be considered.
 - Technology aspect. The system backbone requires the sophisticated and complex design to support open government data initiatives. There are various components that should be well configured to support and maintain the decision-making process in opening data. We divided the technology aspect into three groups, namely: (1) Networks and infrastructure are required to make the system connected and able to transform the data to every department. (2) Software system and tools including a web portal, desktop interface, database management systems, and mobile applications. These systems are aimed to stimulate citizen engagement in opening data. (3) Applied platforms, such as the Internet of Things (IoT), games, and blockchain as the supplement technologies to encourage and improve the society involvement in accessing the government's datasets.

- Output. In the final process, the role of the decision-making system is needed to classify the alternative decision to release the data. The decisions might be referred to the three possible options namely (1) periodically for releasing the full access of the datasets to the public, (2) necessarily for the particular institution based on the request to partly access the datasets, and (3) exclusively for the law enforcement to accelerate the investigation process regarding some data violation issues like privacy, copyrights, or transnational crimes.

5. Conclusion

Decision-making processes are institutionalized in procedures and processes within organizations and guided by procedures, norms, policies and cultures and supported by technology. Decision-making processes to open data have not been investigated yet. In this paper we derived an institutional decision-making framework to analyze open data decision-making processes and used this to investigate an in-depth case study. The framework consist of three parts. (1) Input. A set of datasets from data providers having various qualities and formats are used as the input for starting the decision-making. (2) Decision-making process. There are three essential aspects Institutional, Process, and Technology which influence decision-making. The institutional aspect provide the regulations and cultures, while the process determines the tasks and stakeholders and technologies provides support for arriving at decisions. (3) Output. This component is a system to support the decision-maker to decide by taking into account the alternatives and criteria of the opening data. Politics, norms, regulations, multi-actors and their interests, cultures, decision-making authorities, technology requirements all played a role in our case study influencing decision-making. The many aspects show the inherent complexity of deciding which datasets to open.

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Open Source Urbanism: Requirements for an Open Design Platform to Support an Emerging Concept

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Abstract: Citizens interested in the democratization of urban development processes experiment with the co-creation of public spaces. Some of them collect, improve, and share design blueprints and manuals of their projects on the internet with help of free and open source tools. As a result, they produce open source design manuals that can be used freely, modified, and developed further. However, such attempts at opening urban design are still uncoordinated, atomized, and dispersed, and therefore fail to create the value that a more concerted effort might. We argue that open source urbanism practices would benefit from open design platforms that are purposefully designed for the complex domain of urbanism. As a first step, this paper identifies the requirements that such platform should meet. As there are currently no examples of such a platform, we analyze the platforms that are there and partially satisfy the demand to extract the shared underlying requirements.

Keywords: open source, urban design, commons, co-production, open design platforms

1. Introduction

Who has the right to decide upon shape and functions of our cities? The increasingly popular answer among municipality officials, urban professionals, and citizens is: 'citizens do'. Theoretical proclamations, however, still have to meet the reality through technologies, policies, and methods of citizen participation and co-creation. Urban professionals, however, rarely or only selectively seek public involvement and are regularly ineffective in collaborating with local communities (Gunder, 2011).

The use of ICT in smart cities changes the role of citizens, allowing them to be more active in urban design, planning, and management (Gagliardi et al., 2015). Nevertheless, a purely technological approach that seems to dominate many current smart city visions, has been criticized as a 'neoliberal agenda' of corporations aiming to take future of cities under control (Meijer & Thaens, 2016). Recently, the interest of tech-industry giants in urban innovation developed from purely technological smart city solutions, such as IoT and ICTs, to urban design and planning (see e.g., <https://sidewalktoronto.ca/>).

As Zhilin, Klievink, and De Jong (2018) argue, some cities focus on governments or businesses and a technology-driven strategy for smart city innovations whereas others focus on the importance of the 'human touch' in urban innovation. The latter encourage urban activism, a 'maker culture', and other community self-governance practices. The phenomenon of *open source urbanism* (OSU) combines both socially and technologically driven citizen-led innovations, e.g., Do-It-Yourself (DIY) urban design and commons-based peer production. The term 'urban commons' refers to spaces that are designed and governed by citizens in order to satisfy needs and desires of the local community. Bradley (2015) argues these are often experiments in the public space by citizens interested in the democratization of urban development processes. Some activists collect, improve, and share design blueprints and manuals of their projects on the Internet using free and open source tools, e.g., Wiki and GitHub. As a result, they produce *open source urban commons* - urban design manuals that can be freely used, modified, and developed anywhere by anyone.

There are many initiatives to open-up urban design. However, they are atomized and dispersed, therefore unable to scale-up to create more or more wide-spread public value. Open source urbanism initiatives might be more successful if they were organized on a bigger scale as with a social movement. Baibarac and Petrescu (2017) propose a platform for 'open source resilience' to 're-appropriate and re-frame' ICT solutions to satisfy the needs of the local activists. Inspired by that debate, we argue that OSU-practices require an open, collaborative platform that is purposefully designed for a complex domain such as urbanism, in an attempt for OSU to repeat the success of Open Source Software movement. This study aims to identify requirements for an online Open Source Urbanism platform. To achieve this, we observe open design platforms that contain urban design projects and we discuss their features in order to elaborate functional requirements of an OSU-platform.

The paper is organized as follows. In the second section, we conceptualize open source urbanism by describing three aspects that co-occur in OSU: Urban design, Open Source Innovation, and Commons. In the third section, we briefly describe the research approach and the observed platforms. In section four, we present the results of the study in the form of requirements for a potential online OSU-platform. In section five, we present findings and conclusions.

2. Background

Technological innovations, such as open source innovation (OSI) along with the notion of the commons, have recently redrawn scholarly attention and led to tools for web-based decentralized self-organization and peer production (Benkler, 2016). Open source design of both tangible and intangible goods is gaining popularity due to a reinvented 'maker culture', with a new flavor of co-production (Raasch, Herstatt, & Balka, 2009). Open Source Urban design (or Open Source Urbanism), however, is still in the emerging phase. We conceptualize the phenomenon at the intersection of three topics that we discuss here: Do-It-Yourself (DIY) urban design, open source innovation, and the commons.

2.1. DIY Urban Design

Gunder (2011) summarizes that current urban design practices, despite a widely accepted discourse of citizen engagement, rarely seeks public participation, consultation, or any other form of public involvement, and moreover are regularly ineffective in ‘addressing underlying social issues’ in collaboration with communities. He identifies an inattentiveness to citizen opinion. In combination with e.g., gentrification, commodification, and uneven community investment, this forces citizens to resolve their urban environment issues without professional support and, sometimes, even without permission (Douglas, 2014).

DIY sidewalk furniture or illegal bike lanes, - all these civic-minded public space alterations exemplify Do-It-Yourself (DIY) Urbanism. This refers to typically small-scale, unauthorized yet functional improvements of public spaces (Douglas, 2014). They challenge the existing planning paradigms by exploring and developing a collaborative urban design approach. Furthermore, it demands that citizens be equal partners in an urban development process. According to Douglas (2014), a significant number of DIY-urbanism activists display noticeable knowledge of urban planning mechanisms. Moreover, some of them contribute towards specific city goals.

2.2. The Commons

The term ‘commons’ was popularized by Elinor Ostrom (1990) in the light of studying natural common pool resources. Hess (2008) defines a commons as “a resource shared by a group where the resource is vulnerable to enclosure, overuse and social dilemmas. Unlike a public good, it requires management and protection in order to sustain it” (Hess, 2008, p. 37). By this definition, Hess stresses the primary importance of resource governance and its protection from a possible enclosure, which is also relevant for urban commons, e.g., as public space.

Some argue that more important than a shared resource is the social practice of commoning. Commoning is a flexible and sensitive social relation between a self-organized community and aspects of their urban environment (existing or required) that crucial for their well-being. A commoning practice should be both collective and not a subject of market logic where any resource is commodified off-limits. Scholars highlight the importance of the process of commoning as a claim of the ‘right to the city’ and accentuate ongoing sociospatial transformation accompanying that process (Harvey, 2014).

2.3. Open Source Innovation

Open source is increasingly popular, not only in the software industry but also in other domains, where opening-up using the internet leads to a trend of ‘open everything’ (Tooze et al., 2014). The basic organizing principle of open source is that the ‘source code’ is open or free in terms of use and ownership, for example, via open source licenses such as the Creative Commons licenses (Hansen & Howard, 2013). Raasch et al. (2009) propose the term Open Source Innovation (OSI) in order to generalize the OS model: “OSI is characterized by the free revealing of information on a new design with the intention of collaborative development of a single design or a limited number of related designs for market or non- market exploitation” (p. 383). It then applies to both tangible and intangible objects: respectively open content and open design. Open content deals with digital

realm and its objects (e.g., GitHub), while open design describes hardware and other physical objects (e.g., WikiHouse). In case of open design, a significant part of the design process can be performed digitally, but the main goal is physical object production (Raasch et al., 2009). Bonvoisin & Boujut (2015) claim that such projects do not match conventional design approaches but call for new types of digital platforms in order to further develop open design paradigm. Benkler (2003) argues that open source projects indicate the beginning of a social, technological, organizational, and economic transformation of society towards a new mode of value creation: commons-based peer production.

2.4. Open Source Urbanism

Bradley (2015) perceives Open Source Urbanism as the open source co-production of urban commons. She argues that “open source urbanism embodies a critique of both government and privately led urban development and is advancing a form of post-capitalist urban development that may, however, be supported by the public sector” (p. 6). The results of this practice are ‘spatial commons’ that are designed and managed collaboratively by citizens in order to satisfy their needs, not to produce profits. She summarizes characteristics of open source urban commons, namely a) based on contributions, b) transparent code, c) motivated by fulfilling needs or desires, d) conducted as peers, and e) based on an ethic of sharing. By using Open Source Innovation, designs could be re-used and further developed in other places. Similar, Baibarac and Petrescu (Baibarac & Petrescu, 2017, p. 230) argue that application of open source technologies and commoning in community-driven urban design may help to achieve a radical urban transformation so that “new civic, cultural and economic practices, involving ethical, ecological and equitable uses of urban resources, can emerge”.

For the purpose of this study, we define Open Source Urbanism as citizen-driven commons-based peer production of open source urban design, aimed at urban transformation and innovation. The concept of Open Source Urbanism is a grassroots community practice that can be assisted by a web-based platform for urban design co-production. Online platforms play a crucial role in such relations by offering tools for communication, collaboration, and knowledge sharing for the geographically distributed members of a community. While there are several open design platforms that seem partially suitable for OSU-projects, none of them are fully designed for this specific domain.

3. Research Approach and Observed Platforms

To find open design platforms that are partially suitable for an OSU-practice, we used following search term in Scopus: (TITLE-ABS-KEY (open) OR TITLE-ABS-KEY ("open source") AND TITLE-ABS-KEY ("design platform")). Among 115 resulting academic journal papers, we have selected five web-based open design platforms that contain projects matching the definition and characteristics of open source urbanism stated in section 2.4. For each platform, we considered the following questions: How does the platform work? (i.e., who shares; what shared; the level of usage) What the licenses and Free/Open Source Software (F/OSS) have been used for platform development?

Does the platform able to support OSU-practice? Finally, we discuss the observations in order to elaborate features required for an OSU-platform.

Open Source Ecology aims to develop set of open source industrial machines allowing to build ‘small sustainable civilization with modern comforts’. The platform is open for contribution from specialists (i.e., engineers, architects, designers). The website serves as a display that contains project vision, description, and showcases. Wiki-engine is used for specifications of products, and design logbooks. Latest activities (i.e., news, workshops) are dated November 2017 and the platform seems inactive since then.

WikiHouse is dedicated to building comprehensive and modular blueprints of affordable and energy-efficient homes under Creative Commons license. The community consists of professional architects and engineers. The website is an interface to a GitHub repository to disseminates blueprints. Co-creation is assisted by GitHub and chat app Slack. The project is in active development.

Wevolver is a platform dedicated to DIY-hardware enthusiasts and contains mostly blueprints of robots and computer hardware. Licenses might vary and are set by project owners. It has the basic functionality of Github i.e., version control, collaborative work, and showcasing. The platform itself is not for urban design, yet some of the projects might be. For example, ‘FarmBot’ is a project that fully automatizes urban farming on a small piece of land. The platform is active but contains a few projects most of which are not related to the urban topic.

Instructables is an online platform for the community of DIY-makers that has no specific domain of use: food, costumes, furniture, electronics, for example. Instructions are step-by-step texts with free format graphical and video-content. One is free to set a production workflow and no meta-information (i.e., materials, tools) are required. The content is licensed as Creative Commons for non-commercial use. The platform is active and has a great number of DIY-urbanism projects, mostly related to urban farming and public art. Found urban design projects mostly created by communities of urban activists and their profiles often contain only one project. Moreover, no or little communication happens on the platform. Basically, Instructables serves as a channel of sharing, not co-creation, of design manuals.

Intelligencia Collectiva is a group of architects and designers based in Spain. Since 2011 until 2016, they co-designed, with local communities, several blueprints of urban hardware and furniture. Their knowledge is stored on the website powered by blog engine WordPress in a free format of entries containing text, pictures and some meta-information (purpose, location, materials needed). The stated license is Creative Commons. The shared projects can be used rather as a source of inspiration than full manuals due to the inconsistent structure of design knowledge and lack of details.

Neither of observed platforms could fully support OSU-practice. WikiHouse and Open Source Ecology communities focus on specific products and provide no possibility to add new projects. Wevolver allows to freely add projects but specialized in hardware projects. Intelligencia Collectiva is a collective blog of a local community of urban designers. Instructables represents a

warehouse of all kinds of DIY-projects and searching for projects specifically related to urban design is difficult. Besides that, all observed platforms provide little or no mechanisms for collaborative production; therefore, no cross-fertilization of ideas and no further project improvements are made. Basically, the design manuals are published for possible consumption while co-creation processes take place 'backstage'. Finally, the observed platforms have no emphasis on urban topic; therefore, their features not suitable for urban design communities.

4. Requirements for OSU Platform

Bonvoisin and Boujut (2015) claim that an open design platform has to provide features in four crucial dimensions in order to fulfill requirements of user communities, namely community management, product development process, knowledge management, and supporting co-creation. We discuss requirements for an OSU-platform according to the dimensions along with its core aspect i.e., openness. This gives directions for possible platform designs as a specific implementation depends on the plethora of factors including but not limited to design team's competencies, timeframe, and budget.

Openness. Licensing urban design knowledge as Creative Commons can protect it from a possible enclosure. Observed platforms show that is possible to make a well-functioning platform based on F/OSS. This is advantageous because the platform itself would be digital commons and might be remixed and repurposed according to needs of various design communities.

Community management. The social network functionality (e.g., user profiles and groups, private messages, calendars) is desirable for networking and community building purposes. Project showcasing is useful to draw attention and engage users in platform activity. Unification of showcasing interface is challenging due to the variety of possible urban design projects; however, it is possible to standardize project meta-information, such as objectives, required materials, and team competencies.

Product development. The platform must provide various project roles and tasks according to participant competencies in order to achieve a better design quality. DIY-projects designed by citizens are often low in quality due to lacking professional design skills. More complex projects developed by or with help of urban practitioners. Thus, an OSU-platform must facilitate the participation of peers of different level qualification while keeping acceptable design quality.

Knowledge management and **Supporting co-creation** features are crucial for commons-based peer production, therefore they must be well elaborated. For instance, GitHub repositories and Wiki-engine might facilitate version control of designs, documents, and logbooks. Channels for communication (e.g., commenting, forums, chats) would support communication of geographically distributed peers.

5. Conclusion and Discussion

Open source urbanism explores and develops community-driven urban design approach in which citizens are to be equal partners in city development. It is a promising practice that democratizes urban development by including citizens in co-production of their urban habitat. By using Open Source Innovation, such initiatives may be copied, enhanced and developed in different locales, as urban commons. Although many (anecdotal) examples are available in the literature, most initiatives do not scale due to a lack of tools allowing coordination and sharing of the plethora of bottom-up projects.

An online platform purposefully designed to facilitate open source urbanism can bring together disperse urban initiatives into a movement that spreads the ideas of the urban commons and claims more open and democratic approach in urban development. It requires fewer 'hardware-oriented' features (e.g., workflows, support of design tools, testing) than other open design platforms as the complexity and city context-specificity of urban initiatives make it hard to generalize these into a standardized workflow. However, it does call for a differentiation of roles based on the skills and competencies of citizens involved in project implementation. Finally, a platform that is partially or fully developed on the basis of existing F/OSS might have a bigger social impact due to open source nature of the platform, allowing activists freely modify and enhance it for the specific needs of a community.

Initial requirements elaborated in this study do not represent an exhaustive list of features that should be implemented in an open source urbanism platform; they may serve as a starting point for a design science research approach and should be refined and validated during the design science process. As an open source urbanism implies citizen-driven approach, the platform could be co-created with urban activists using Living Lab method or Action Design Research in order to satisfy actual needs and desires of the community. The further design of a platform, as well as the testing thereof for real urbanism communities, are on our research agenda.

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Stakeholders Engagement to Simplify Communication of Administrative Procedures in the Field of Immigration: Experimentation of Methods and Tools.

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Abstract: In this paper, we will present a collaborative method to support public officers in the process of simplification of informative contents on the administrative procedures relating to immigration. This objective was pursued by developing a specific methodology that, on the one hand, took into account theoretical tools for clear and effective administrative writing and to make the web contents usable and on the other provided data from focus groups conducted. The paper describes briefly also a collaborative web platform supporting civil servants in the application of the guidelines.

Keywords: public web portal, plain language, public communication, cross-cultural communication, cooperative web platform

1. General Description of the Research

Currently, Public Administration in Italy works in an intercultural context, given that immigration is growing and an increasing percentage of users who interact with the public offices are foreign nationals. For this reason, it is important that public institutions learn to communicate with all their users in an effective and appropriate way and to ensure all citizens the right to information (Ciancio 2014; Ducci, 2006; Foti, 2014).

To inform citizens about their rights and duties it is important to use the right type of language, especially in relation to clarity and comprehensibility. In addition, public communication takes place almost exclusively through the Web, and the language used should be appropriate to this means of communication.

The aim of this research is to develop a collaborative method to support public officers in simplifying information content about administrative procedures relating to immigration. The research

has been conducted as part of the PAeSI¹ project of the Tuscan Regional Administration, which provides an immigration law database² and a database of information sheets describing the different procedures on immigration in Italy Through the web portal (www.immigrazione.regione.toscana.it). These fact sheets were originally designed for domain expert users and they were therefore too complex for citizens.

2. Objectives and Theoretical Background

The objective of this research is to develop a participatory model for the simplification of administrative language in the specific domain of immigration procedures and to produce support tools. These are guidelines, rules and suggestions that can be used for the drafting of clear institutional texts comprehensible in cross-cultural contexts and also be implemented through automatic drafting tools.

This objective was pursued by developing a specific methodology that, on the one hand, took into account theoretical tools for clear, effective and cross-cultural (Bennett, 2015) administrative writing and to make the web contents usable and, on the other hand, provided data from focus groups and interviews conducted (Morgan, 1996).

The research is part of the studies on simplification and clarity of administrative language that have been carried out for years, not only in Italy (for Italy, see the studies of De Mauro, 1980, Piemontese, 1997, Cortelazzo, 1999, Fioritto, 1997) and the directives issued by the Ministry of Public Administration in 2004 and 2005.

Lack of understanding of the bureaucratic language is not only related to basic knowledge of the Italian language, but it is also due to different cultural backgrounds and to the complexity of Italian immigration law.

For this reason, in the theoretical simplification activity, we used both tools that concern simplification of the bureaucratic language (1, 2, 5) and tools regarding “cross-cultural” simplification (3, 4), indicated below:

- 1) The “Guida all’uso delle parole” (Word Usage Guide) (De Mauro, 1980);
- 2) The “Guida alla redazione degli atti amministrativi. Regole e suggerimenti” (Guide for administrative acts drafting. Rules and suggestions edited by ITTIG and Accademia della Crusca, 2011);
- 3) Rules and standards for plain language adopted by foreigner public administrations³;
- 4) An “Index of discriminatory terms” (Fioravanti, Romano, 2014)⁴;

¹ Pubblica Amministrazione e Stranieri Immigrati (Public Administration and Foreign Immigrants).

² ITTIG is also developing systems to update semi-automatically law databases. In fact, ITTIG is planning a control system able to send a warning to the managers of legal information systems, in cases where the regulation of a certain domain undergoes amendments.

³ As an example of guidelines used see: New York Mayor's Office of Immigrant Affairs, Easy-to-Read NYC Guidelines for Clear and Effective Communication, 2009.

- 5) Web usability guidelines (Nielsen, 1994); (Preece J., Rogers Y., Sharp H., 2002); (Nielsen, Loranger, 2010).

3. Methodology

Our methodology work was carried out according to the following steps:

- 1) Selection of PAeSI web Portal information sheets on administrative procedures that needed to be simplified;
- 2) Verification and rewriting of difficult terms using automated tools for readability (Brunato, Venturi, 2014);
- 3) Simplification of syntactical structure;
- 4) Modification of text structure;
- 5) Legal verification of the new simplified content produced;
- 6) Supervision of focus groups with public officers, linguistic-cultural mediators, teachers of Italian as a second language and foreign users and results analysis;
- 7) Release of guidelines, rules and tips for writing simplified administrative content in an intercultural context.

3.1. Participatory Phase

The aim of the participatory phase (step 6 of the work methodology) was to verify the comprehensibility and the adequacy for the final users of the information sheets simplified in the previous phase. For this purpose, we conducted a series of focus group discussions with migrants (final users of the administrative communication in this field) and different kinds of actors that represent the “stakeholders” in our research. This phase is necessary in order to obtain a usable product (ISO 9241 standard) according to the user-centered design approach⁵ whose design focus is represented by the needs of the users who will use it and for this reason the recipients of the product and stakeholders are directly involved in the design process.

To acquire additional guidelines and specific guidance to improve the comprehensibility of such content for target users, research activities were carried out involving four categories: linguistic-cultural mediators, immigration front-office civil servants, teachers of Italian as a second language and third-country nationals resident in Italy.

The first group of stakeholders consisted of Linguistic-cultural mediators working at the Prefecture of Florence. We considered their contribution very important because mediators are familiar with the peculiarities of a certain language group, they know well how legal concepts can vary from country to country and they are not “bureaucrats”.

⁴ This index has been tested through focus groups conducted with cultural linguistic mediators of the Prefecture of Florence (Fioravanti, Romano, 2018).

⁵ The user-centered design (UCD) technique was described for the first time by Norman and Draper (1986) and subsequently regulated by the ISO 13407 standard.

The second group of stakeholders was composed of civil servants working in the City of Florence's immigration office who are in daily contact with migrants, know the complexity of immigration procedures and the complexity of bureaucratic language.

The third group consisted of teachers of Italian as a second language of the "Centro La Pira", Italian Language School, based in Florence. Their involvement was considered very important because they understand the progressive stages of learning Italian as a second language and the language structures that create the most difficulties for foreign nationals.

The last group of participants was composed of third-country nationals resident in Italy, final users of our simplified information sheets. They were from different countries and of different age groups and they had various reasons for being in Italy and different levels of knowledge of the Italian language.

We conducted seven focus groups (one for each category of stakeholders and four with the category of foreign nationals) that involved 58 people for a total of 330 information sheets reviewed by participants.

4. Results

The activity has resulted in the acquisition of data and information, derived both from the application of theoretical tools to immigration procedures and from social research (focus groups). These data include:

- a table of difficult terms and related substitute terms;
- a table of discriminatory terms and related substitute terms;
- a table of difficult expressions and corresponding simplified rewriting;
- a strategy to facilitate understanding of institutional texts;
- a definition of the optimal structure of contents to foster understanding of the procedures (including the Web layout).

Most of the teachers evaluated the substituted terms "enough clear" (36,4%) or "very clear" (53,7%). More than 50% of the students did not understand 18 substituted terms (out of 90); more than 30% of them didn't understand 23 words (out of 90). The percentage of understood words decreased (from 32,1% to 24,3%) in relation to the knowledge level of the Italian language. The majority of civil servants considered the substituted terms "enough clear" (24,5%) or "very clear" (67,5%).

Stakeholders provided useful information to the research, but at the same time, they achieved awareness of the issue and of applicable tools for communicating with foreign citizens more effectively. This was another result of the activity.

4.1. Suggestions on the Use of Terms

The following are suggestions on terms used in the simplified sheets, according to the theoretical tools adopted, but which were considered difficult for a non-Italian user during the focus group session.

To simplify these terms stakeholders have suggested different approaches:

- 1) Always balance the need for simplification with the precision requirements. For instance, when replacing a technical term with another term, there is the risk of not communicating the correct content. This problem could also affect the quality of the translation in other languages;
- 2) Add explanations to technicalities that cannot be replaced with synonyms or explanatory phrases;
- 3) Use as a replacement technical terms when these terms are still well known by the foreign user;
- 4) Do not explain and do not replace technicalities when they are already very well known in the reference domain;
- 5) Do not use certain terms or generic terms but replace them with simplified paraphrases to spell out clearly the subject and the actions of a certain procedure;
- 6) In case of politically incorrect terms always make a balance between the needs to use a terminology that could be offensive to certain groups of users with the comprehensibility and clarity.

4.2. Content Structure Guidelines

The analysis of the focus group results allows to locate a first set of rules that can be considered real guidelines on how to structure clear contents relating to public administration procedures in a intercultural context:

- 1) Shape communication with respect to diverse types of users (such as EU citizens and non-EU or non-EU student graduates in Italy or who enter Italy to study);
- 2) Explain the procedures respecting the real chronological phases of the administrative procedure;
- 3) Do not give unnecessary information;
- 4) Use keywords that provide a first guidance on matters related to the administrative procedures described;
- 5) Provide guidance on the timing of certain actions adding examples (e.g., the expiration date of a certain procedure) due the fact that this information is often misunderstood;
- 6) Make clear the purpose of a certain procedure and the tasks of the different public bodies to ensure that the user does not perceive it as a vexatious request;
- 7) Consider the user's cultural background in setting the layout of information sheets;
- 8) Display in the printed version the linked information (e.g., timetables of the offices).

4.3. Validation of the Developed Guidelines

The simplified information sheets, revised on the basis of the guidelines developed during the previous research phase, were submitted to a representative group of linguistic-cultural mediators of the Prefecture of Florence, to be re-tested, according to the methodology described in paragraph three in order to verify the guidelines effectiveness.

Five different information sheets, corresponding to five different administrative procedures on immigration, were tested. Each fact sheet has been read and verified by 11 linguistic-cultural mediators for a total of 55 information sheets submitted for verification.

All the information sheets tested were considered clear, except for limited aspects listed below:

- 1) Identification of some terms still too complex for the target users;
- 2) The need to modify some elements in the text structure (it has been suggested to indicate, beyond the formal title of the procedure, an “explanatory subtitle” that introduces the concrete case).

Regarding the first problem, the terms suggested as simpler than those proposed in the information sheets have been included in the table of “difficult terms and related substitute terms”. Addressing the second aspect will constitute a further guideline about the optimal structure of the contents to foster understanding of the procedures (see section 4). This new test exemplifies the iterative nature of the proposed approach (user centred design) (see section 3.1) which, by its very nature, tends to produce better results at every test with a representative group of users giving suggestions to improve the product.

5. Technological Perspective

All the data obtained from the participatory phase of the research and in the previous simplification phases were then systematized to be suitable for their use through a collaborative platform. In practice, the platform is intended as a repository of the identified guidelines and the different types of “translation” tables of complex terms emerged during the research. For this purpose, it was considered appropriate to use a Wiki platform. The use of the Wiki, in fact, is indicated by the Italian Department of Civil Service as “a means that can facilitate the exchange of information, internal communication, knowledge sharing, teamwork and that can stimulate active participation by workers”. The platform, called WikiPAeSI, is currently being tested⁶ for a simplified glossary of administrative terms made collaboratively by civil servants and linguistic-cultural mediators who participated in the simplification process.

The results of the activity described may constitute further material for the development of applications in the field of legal information that would support, in automatic or semi-automatic ways, the simplification of the legal language used by public administration. We refer, for

⁶ Data on this test are not yet available.

example, to the designing of drafting tools for administrative documentation to be published on the Internet. These tools could be provided with specific libraries, retrieved from the indications of the domain stakeholders. An application could be the customization of the PADocs editor, an expert system for the drafting of administrative measures (Mercatali, Romano 2012).

The next development of this research concerns the transmission of information on administrative procedures on immigration, also using social networks (Di Costanzo 2017; Mergel, 2011; Sunstein 2017) as communication tools that are widely used by the target audience, foreign citizens residing in Italy. With this aim, specific guidelines for communication via social networks in this field will be developed in collaboration with stakeholders and foreign nationals.

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Reflections

Transparency Challenges in Blockchain

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Abstract: The increasing interest in crypto-coins has provided greater visibility of blockchain and started discussions on its application in different forms of inter-organizational cooperation. Such technology provides a growing record of all transactions that have occurred in a specific domain, thereby allowing for the stored information reliability and real-time access. The potential of blockchain for transparency promotion is recognized, but discussions about its use and impact still require more attention. This paper presents a preliminary discussion about the importance of thinking about transparency in blockchain, thus allowing to identify challenges and opportunities for its implementation in democratic environments.

Keywords: transparency, blockchain, Research challenges

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1. Introduction

Transparency International (2016) states that initiatives in transparency are more evident in countries that share key characteristics such as access to information and citizen participation. Access to information allows creating an open democratic society, providing citizens with tools to understand and use information, and stimulating critical thinking about the information and services provided (Fung et al, 2007; Harrison et al, 2011). For this reason, transparency, or lack thereof, has been widely discussed by both public/private organizations and academia, and its importance has been highlighted by the increasing demand for e-government provision (Denis et al, 2017; Holzner & Holzner, 2006). Initiatives such as the Brazilians laws of Access to Information (Brazil, 2011) and Transparency (Brazil, 2009), which state that data and information are public assets that should be available to society, have encouraged active transparency. It has resulted in greater availability of public information, thus enabling society's analysis and anomalies identification.

Blockchain has the potential to open information and contribute to transparency. The popularization of the crypto-coins provided a greater visibility of this technology and started

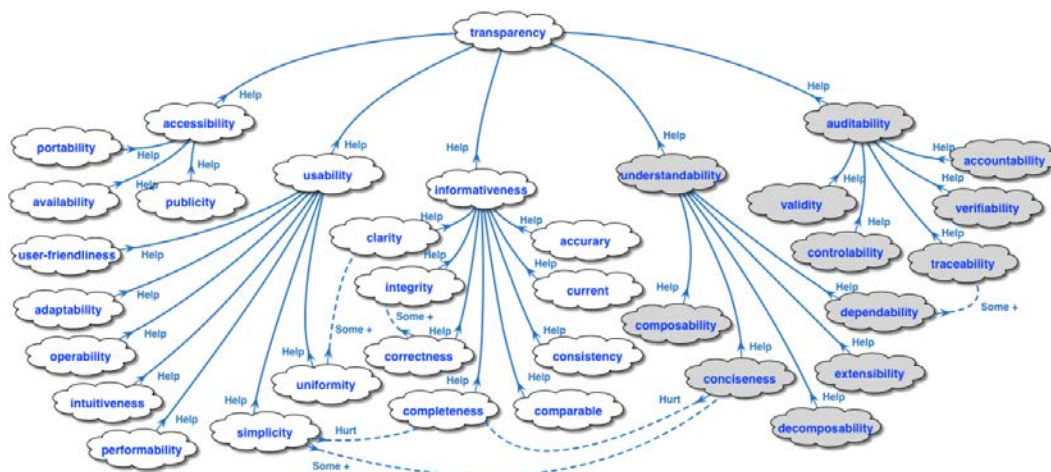
discussions on its application far beyond its original purpose in financial operations (Ølnes & Jansen, 2017; Tapscott & Tapscott, 2016). Blockchain provides a growing record of all transactions that have already occurred in a domain, which are protected from modification and adulteration, thereby allowing for the stored information reliability and real time access to these transactions (Deshpande et al, 2017; Lin & Liao, 2017). Despite information opening, discussions about blockchain use and impact to effectively support transparency in democratic environments still require further study. Moreover, it is important to understand how transparent blockchain can be.

This paper presents a preliminary discussion about the importance of thinking about transparency in blockchain, thus allowing the identification of challenges and opportunities for its implementation in democratic environments. For this, Section 2 discusses transparency, detailing different characteristics that need to be met to effectively achieve it; Section 3 introduces this concept in the context of blockchain; Section 4 presents challenges and opportunities for its implementation in democratic environments; Section 5 concludes the paper.

2. Transparency

Transparency has been a critical concern for modern society as it makes information about priorities, capabilities, and behaviour of powerful centers of authority widely available to the public (Fung et al, 2007; Holzner & Holzner, 2006). It can be defined as a set of characteristics that allow providing stakeholders with general information about (see Figure 1): *Accessibility*, the quality of being easy to deal with; *Usability*, the quality of providing good use; *Informativeness*, the quality of providing or conveying information; *Understandability*, the quality of comprehensible language; and *Auditability*, the ability to examine with the intent of verification (Leite & Cappelli, 2010).

Figure 1: Transparency Softgoal Interdependency Graph (Leite & Cappelli, 2010)



However, the implementation of this concept is difficult to achieve. As shown in Figure 1, the combination of these five characteristics creates the concept of transparency. Thus, these various characteristics must be considered so that a solution can be said to be effectively transparent. Moreover, transparency reaches different contexts, having as scope three levels (Leite & Cappelli,

2010): *organizational transparency*, which focuses on an organization’s stakeholders; *target transparency*, which aims at consumers of some service or goods; and *social transparency*, which is geared towards citizens. Nonetheless, what is observed in practice is the attempt of applying transparency to a limited extent, just following the practices demanded by regulatory instruments.

3. Transparency in Blockchain

Blockchain is a shared ledger that provides a growing record of all transactions that have already occurred in a specific domain. It represents a series of chained blocks in which, at each block, it is possible to access: (a) structured data about transactions; (b) creation date/time; and (c) reference to its previous block. This reference allows identifying these blocks order and navigating to the first element of the blockchain. Additionally, it ensures that information is protected from adulteration because any change leads to the reference modification. Moreover, a new transaction is only added to the blockchain after being validated by all nodes in this distributed ledger network. It allows the stored information reliability, besides real-time access to all transactions (Deshpande et al, 2017; Lin & Liao, 2017). All this shows the potential of blockchain to contribute to transparency, thus allowing governmental systems to combat public resources misuse, facilitate auditing process and avoid frauds (Ølnes & Jansen, 2017; Tapscott & Tapscott, 2016).

Despite this technology simplicity and its capability of opening reliable information, new challenges may be imposed for its effective support to transparency in democratic environments. Moreover, it is important to understand how transparent blockchain can be. For this, an analysis of this technology was made based on the characteristics presented in Figure 1(see Table 1).

Table 1: Blockchain Analysis Based on Transparency Characteristics

	Accessibility			Usability					Informativeness					Understandability			Auditability											
	Availability	Portability	Publicity	Adaptability	Intuitiveness	Operability	Performability	Simplicity	Uniformity	User-friendliness	Accuracy	Clarity	Comparable	Completeness	Consistency	Correctness	Current	Integrity	Composability	Conciseness	Decomposability	Dependability	Extensibility	Accountability	Controllability	Traceability	Validity	Verifiability
Blockchain support	±	√	-	±	-	√	√	-	√	±	√	-	√	√	±	±	±	√	±	√	±	√	±	-	√	√	√	√

√ Identified ± Partially identified - Not identified

Regarding *accessibility*, blockchain offers *availability* by enabling encrypted access to stored information by those who have access to it. This information is constantly available, as there are backups on multiple network nodes, also preventing any information loss. Blockchain also enables *portability*, allowing access through various sources as well as adoption of several programming languages. However, its high cost and energy expenditure can hinder its implementation, thus impacting *availability*. In addition, *publicity* is not supported by blockchain, with documentation being considered only during the creation of infrastructure that uses this ledger.

Regarding *usability*, blockchain offers *uniformity* by using standardizations and frameworks during its development. The *operability* and *performability* are served by the blockchain processing

power to carry out transactions validation in different network nodes, besides security and efficiency increase. *Adaptability* is also identified by using easy and open source technologies, applying different programming languages and creating forks in the chain that reflect necessary changes. In addition, *user-friendliness* is observed by having access to details of the information present in blocks. However, *simplicity*, *intuitiveness* and *user-friendliness* have challenges associated with the infrastructure that uses blockchain, thus requiring interfaces that highlight the most used operations and information; present simple ways to view and use smart contracts, and show visual details that facilitate use, clarity and with usual symbols/texts/metaphors. In addition, *adaptability* is impacted by the lack of a standard that guides the smart contract flexibilization.

Regarding *informativeness*, blockchain offers *completeness* since the information is permanently stored in blocks and any modification in such information leads to a new block, which references the block with the original information in the blockchain. It also ensures *current* and *integrity*. The *correctness*, *comparable*, *consistency*, and *accuracy* are observed by transactions being stored in blockchain only after their verification with other network nodes. However, the *correctness* can be compromised if it is not possible to guarantee that information and smart contract are correct. Associated with the *current*, it is also necessary to make the modification policy, such as update periods and dates for next updates, available to blockchain users. In addition, the infrastructure that uses blockchain is responsible to cover rules that ensure integrity, thus impacting *consistency*.

Regarding *understandability*, blockchain offers *conciseness* since it only stores information that is relevant to smart contracts and transactions contained in the blocks as well as necessary data for future validations. Frameworks also enable it as well as *extensibility*, which provides glossaries and rules for blockchain development. *Composability*, *decomposability*, and *dependability* also occur, with blocks linked to other blocks through a chain. However, the lack of a specification that identifies parts of code in a software or firmware can impact *composability* and *decomposability*. Moreover, the lack of obligation to explain the developed infrastructure can negatively impact *extensibility*.

Regarding *auditability*, blockchain guarantees *validity* through algorithms that prove conditions and requirements before adding new blocks to the chain. *Controllability* and *verifiability* are observed in this environment that allows errors and problems monitoring. Blockchain also makes it easier to *traceability* since information is permanently stored. However, it does not offer much advantage in *accountability* issues, such as the use of available resources, conditions for performing actions, information sources., which is just associated to the infrastructure that uses this ledger.

4. The Research Agenda of Transparency in Blockchain

The prior analysis shows that transparency characteristics are not fully met by blockchain. Thus, this research proposes an initial research agenda for exploring transparency in blockchain.

Blockchain high cost and energy expenditure can hinder its implementation. In addition, the ledger correctness can be compromised if it is not possible to guarantee that transactions verification and smart contract are correct. It is also necessary to make the modification policy available to blockchain users. Besides that, many issues are only addressed during the creation of

infrastructure that uses this ledger, such as documentation or interfaces that highlight the most used operations and information, present simple ways to view and use smart contracts, and show visual details that facilitate use and with usual symbols/texts/metaphors. Moreover, there is no obligation to explain this infrastructure, which leads to lack of documentation about the code in software or firmware, how to use the available resources, conditions for performing actions, information sources, rules and restrictions to ensure integrity. Thus, it is necessary that all these issues be considered during the infrastructure implementation so that blockchain is implemented in democratic environments and can effectively support transparency.

Therefore, a first initiative of blockchain as a support for transparency proposes the identification and evaluation of the main tools for its implementation. Based on this analysis, we aim to operationalize the transparency characteristics in the selected tool as well as its application in a democratic environment. It will allow a greater understanding of blockchain effective support for transparency as well as allowing observations that lead to future research

5. Final Considerations

This paper had presented a preliminary discussion about transparency in blockchain, thus highlighting challenges and opportunities for its implementation in democratic environments. It is possible to notice that blockchain brings advances in terms of transparency, which are mainly associated with how it was implemented. It ensures the constant availability of information about all transactions that have occurred in a domain, also including modifications made and backups on multiple network nodes. It makes easier for information traceability and ensures the existence of a complete transaction base. Additionally, by using great processing power to carry out transactions in different network nodes, it is guaranteed that the information is valid and correct before its permanent storing as well as enabling problems monitoring in this distributed environment. However, some challenges still need to be investigated and implemented in this technology, thus opening opportunities for papers that provides an in-depth analysis of the identified challenges.

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Global Challenge of Identity: Blockchain E-ID System for a Sustainable Development and Good Governance

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Abstract: This paper aims to present a first reflection on the analysis of Identity global challenges and the implications of adopting platforms technologies such as Blockchain. There is a significant challenge involved identity worldwide. The e-Id is often presented as a potential enabler for sustainability, inclusive society and better governance and e-governance. However, the management and organisation of e-Id remain a dominant issue particularly in the context of e-government and online public service delivery.

Keywords: identity, digital identity, blockchain, e-governance, policy

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1. Introduction

Civil identification is seen as a critical infrastructure encompassing information about “who we are, how many we are where we live, how old we are”. Identity is critical for government, public service, and for the society to function as a whole. Realizing the importance of identity, a legal identity is a Goal of the United Nations 2030 Agenda for Sustainable Development where one should always be born as a citizen as a basic right of each individual (Fonte, UNU-EGOV, 2017). It is a fundamental pillar of the goal 16 “promote peaceful and inclusive societies”. Providing legal identity and birth registration for all is part of basic human right and development programmes. Further, Fonte (2017) accentuate that the basic usability of civil identity registration systems might be used as the baseline data for citizenship (voting, travelling), planning (current status and trends, tackle problems in advance), fiscal contributors, social rights beneficiaries, military census and draft, and border security

The current systems of identification have always raised several issues including privacy, security, usability, and the risks related to the intermediation of third parties. They are typically time-consuming and may introduce inefficiency as well as errors. The importance of solving identity issues, particularly when involving people and communities from the most vulnerable groups worldwide, should be among primary consideration. However, even if the physical identity system remains challenging, there is no equivalent and relevant digital authentication of personal identities so far (Jacobovitz, 2016). The absence of an effective digital identity limits government digital transformation.

This paper aims to present a first reflection on the implications of adopting platforms technologies such as Blockchain. Is it a relevant alternative and a secure system that challenges the existing identity management systems? What is the socio-economic impact? In this essay, we are exploring the applications of blockchain technology to identify solutions and discuss its challenges and implications.

2. Identity a Global Challenge: Impact Assessment

Identity remains a global problem despite the efforts and the technological progress. To address the core research questions on how identity in general and electronic ID (or digital ID in particular) associated with socio-economic indicators, several secondary data is employed.

Two most relevant data are the World Bank ID4D and World Governance indicator. This data comprises two main elements: Quantitative data on the number of individuals without access to proof of legal identity split by country, region, and income level and qualitative data on the Ministries charged with identification and civil registration (CR); the status of enabling legal and regulatory frameworks; and ICT, e-government, and poverty indices used to cut the data in various ways. The governance data is derived from the World Governance Indicator. We hypothesize the existence of an association between ID policy and governance so that a simple correlation and scatter plots are shown to picture this tendency.

Based on the latest figure in 2017, the World Bank estimates there are still 1.1 billion people around the globe living without any ID. This lack of ID is the main barrier to access and exercise basic rights, increase the waste and leakage of public administration, reduce and limit the access, and the quality of public service delivery and people as well as gender inclusiveness and empowerment. One of several consequences is the economic cost of cyber-attacks in developing countries like Asia was about 81 billion USD (100 million USD per day) (GSMA, 2017).

Figure 1: Unregistered Population (World Bank, 2017)

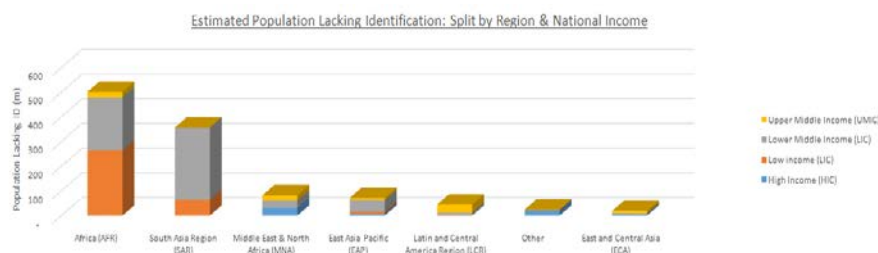


Figure 1 shows the aggregate figure of unregistered population in each region. Almost 550 million people in the African region turn out to be unregistered. Similarly, slightly over 400 million people in South Asia are not registered. Figure 2 shows that India, Nigeria, Pakistan, Ethiopia and Bangladesh are the countries contributing mostly to the number of unregistered population. These countries have contributed to more than 520 million populations. The number is equal to the whole EU population.

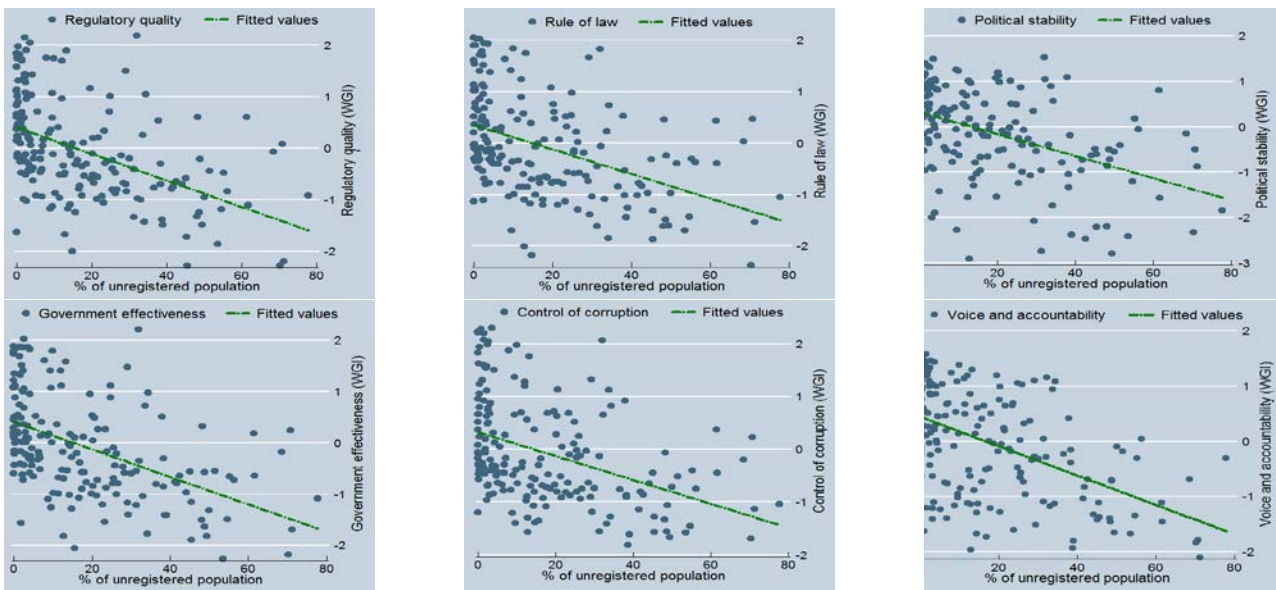
Figure 2: Unregistered Population Across Countries

#	Total Estimated Unidentified Population (k)	#	% Country Population without ID
1	India 209,753	1	Nigeria 77.77
2	Nigeria 149,196	2	Eritrea 71.28
3	Pakistan 83,686	3	Saudi Arabia 70.79
4	Ethiopia 64,362	4	Somalia 70.31
5	Bangladesh 42,060	5	Kuwait 68.50
6	Congo, Dem. Rep. 39,622	6	Monaco 63.18
7	Tanzania 29,311	7	Ethiopia 61.68
8	Indonesia 25,569	8	Oman 61.46
9	Saudi Arabia 23,179	9	Malawi 56.29
10	Uganda 20,324	10	Zambia 55.23
11	Kenya 18,594	11	Chad 54.67
12	Sudan 16,465	12	South Sudan 53.60
13	Philippines 14,483	13	Tanzania 51.53
14	Yemen 13,885	14	Liberia 50.06
15	Brazil 13,368	15	Yemen 49.38
16	South Africa 12,000	16	Uganda 48.79
17	Spain 11,436	17	Guinea-Bissau 48.76
18	Mozambique 11,323	18	Bahrain 48.31
19	Mexico 11,082	19	Congo, Dem. Rep. 48.18
20	Afghanistan 10,699	20	Libya 45.52

The next analysis is conducted to measure the correlation between unregistered populations. The WGI consist of six composite indicators: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. Figure 3 shows that all governance indicators have a negative association with the number of unregistered population. It means that a better ID policy might lead to better governance. Digital identity is considered and proposed as presented previously as a cornerstone of strong ID policy to strengthen governance but also, property rights, financial inclusion, civic engagement, and education.

Digital Identity is not something new. The objective is to simplify and enhance an already accessible service (Berkley, 2017). For the emerging world, the digital identity takes on a different dimension and might have a deeper effect on people life and access to basic public service. Despite the difference of impact, the gap between developed and developing is increasing at this level as well. UNDESA (2017) in the report on E-Government development index mention that digital-ID is one exemplifying the possible channel to connect citizen with the government.

Figure 3: Scatter Plot of the Relationship between ID and WGI Indicators



As one may predict, higher income countries offer several alternative tools that can be used by citizens to access public information and to connect with the government. In contrary, the low-income countries have less alternatives. In addition, out of 31 countries categorized as low income, there are only four countries currently offering digital ID. Furthermore, it might also be self-explanatory that countries offering digital ID have greater tendency to achieve a better EGDI rank.

Figure 4: Countries with and without Electronic ID

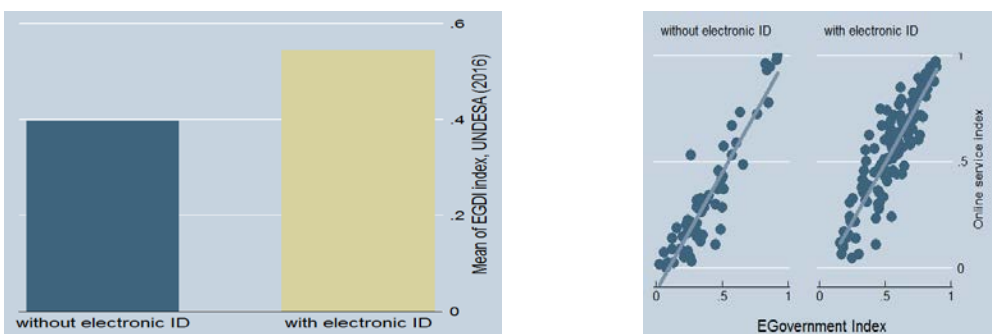


Figure 4 clearly shows that countries with electronic ID might have an association with a better e-gov index. The margin of mean between the two groups is about 15%, giving a greater edge for countries equipped with e-ID to have better performance. Similarly, the relationship between the e-gov index and the online index is also distinctive for countries with and without electronic ID, again signalling the important role of e-ID to leverage public service delivery.

In brief, the absence of ID is clearly a global challenge by making billions of people invisible, increasing their vulnerability, and excluding them from basic rights. A digital ID is considered as a potential solution. Research, however, showed that so far digital identity increases the gap more than it solved existing challenges. Indeed, from one side it increases the number of excluded one from the modern connected world. From another side, it created a new type of vulnerability related to privacy and security issues with consequently the cost and risks associated to it. To face

these new challenges, there is an increasing advocacy for adopting Blockchain platform for identity. In the following paragraph, we will explore the implications of blockchain based e-ID system.

3. Blockchain Platforms for Digital Identity

Blockchains technology consists of a distributed ledger technology (DLT) based on decentralization, peer-to-peer transmission, transparency, irreversible recording, and algorithmic logic (Murck, 2017; Friedlmaier, Tumasjan and Welp, 2017; Iansiti and Lakhani, 2017; Tapscott and Tapscott, 2016). DLTs have two main benefits: firstly, provide trust free transactions without reliance on third parties (e.g., governments and intermediaries) and secondly, a centralized unique ledger supersedes various private ledger that requires interoperability.

Increasing attention is being given to non-monetary applications of blockchain (Hileman and Rauchs, 2017), including identity-related problematics, to security, usability, and privacy (Jacobovitz, 2016). Blockchain applications can be leveraged for registration of digital identities, passports, e-residency, birth certificates, wedding certificates, ID's as well as online account logins (Mesropyan, 2017). Such applications could provide more control over the use, access, and diffusion of personal information (Bheemaiah, 2017, Jacobovitz, 2016). As presented in the first section, identity is a global problem that needs to be solved for including the most vulnerable of this world. Several projects using blockchain for identity management from the government, public service, and international organizations are already available more than 21 companies and projects leveraging blockchain technology for identity system management and online identity (Bitnation, ID2020, Estonian E-residency program, 2WAY. IO, Showcard, Uniquid, etc etc (Jacobovitz, 2016; Homes, 2016). Bond (2017). This seems to be promising, but it is important to question what the risks and the implications of an e-Id system before are championing this technology as a solution to reduce the Global identity issues.

The primary challenge for adoption of Blockchain technology for identification and authentication is regulation and lack of standards (Friedlmaier et al., 2017; Caytas, 2017). It is crucial for regulators and stakeholders to better understand both the technology, its limitations and risks, but also the opportunities it offers (Caytas, 2017). MIT report presents Blockchain technology as a relevant platform for compliance purpose and better verification of parties for a transaction, particularly with the KYC (Know Your Client) standard and AML (Anti-Money Laundering) regulation. However, these systems are provided by private companies, which might create more vulnerability.

Performance and scalability are two key technical challenges in terms of Blockchain adoption for identification and authentication. It refers to the ability of a system to sustain performance while growing and expanding. In this regard, the technology is not ready to support an adoption at a global scale (Shrier, Wu and Pentland, 2016).

Blockchain as a distributed ledger is designed to disclose more data to other participants than traditional centralized databases. Overcoming privacy and confidentiality issues constitutes one of

the biggest challenges to widespread DLT and Blockchain adoption (Hileman and Rauchs, 2017). Public institutions cannot afford to expose private data. With such transformative technology, it is still unclear how to ensure if citizens understand what they are agreeing to, the level of information they want to disclose and their legal rights in case of problems.

Most of the literature presents the socio-economic potential of blockchain technologies (Derose, 2015) Atziori, 2015; Davidson et al., 2016; Antonopoulos, 2014). It remains that the implications at this level are multiple and complex and most of them remain unknown.

4. Conclusion

Identity remains a global problem despite the technological progress and sophistication. About 1.1 billion people lack an official identity, much less a digital identity. There are direct and indirect impacts of ID policy: facilitating better governance and socio-economic progress. Better ID policy contributes to better governance and might mitigate a greater size of informality and increase business efficiency. The social, cultural, governance, economic, and institutional context could facilitate and provide the best conditions for benefiting from the adoption, implementation, and use of Blockchain or, on the contrary, can become the main source of risk. Finally, Blockchain technology needs to be further studied, but it presents a key enabler for an e-Id policy. However, at this stage, it is still raising more questions than solutions and its potential benefits are still to be observed and assessed.

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Pakistan Smart Cities Context: Lahore and Multan

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Abstract: This paper analyses the readiness of Lahore and Multan Pakistan cities for starting smart city (SC) transformation. The methodology used was a case-oriented comparative research drawn on a conceptual framework for facilitating the analysis. The findings indicate that both cities have strong grounds for SC transformations and that Pakistan is entering in the SC concept very slowly. This readiness exercise showed that Lahore is in better position for starting the transformation into an SC; Pakistan has a disintegrated governance model and the city governments do not have enough power to proceed alone with this giant task.

Keywords: smart governance, smart cities, pakistan cases

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1. Introduction

In this study we rely on UNU-EGOV definition of Smart Sustainable City (Estevez et. al., 2015), which is a "continuous transformative process of building different types of capacities, e.g., infrastructural, technical, human, institutional, and others in a city that contribute to improving quality of life of its residents, to achieving socio-economic development, and to protecting natural resources; conducted based on the stakeholder engagement and collaboration". The concept of smart cities can offer developing countries the opportunity to leapfrog their development and simultaneously deal with the challenges of rapid urbanization, which can have a bigger negative impact in countries with scarce resources. Nevertheless, it is exactly in developing countries where the subject of smart cities is being less studied as compared to developed countries (Vu & Hartley, 2017). In countries such as Pakistan, a developing country which is the sixth most populated country in the world, with 207.7 million population (World Population Review, 2018), the impact of rapid urbanization will be even stronger. Economic Survey 2016-2017 indicates that rapid urbanization in Pakistan (37.9 % in 2014 to 40.45% in 2017) has created under-resourced urban settlements causing unprecedented levels of economic, spatial, social, and infrastructural challenges (Government of Pakistan, 2017). Strong realization exists among policy-makers world

over for transforming the urban settlements into sustainable urban areas and Pakistan is no exception. Pakistan-Vision 2025 “seeks to ensure that Pakistan’s cities are digitally connected, equipped with wireless network sensors and there is e-connectivity in all parts where the free flow of information is possible, thereby laying the foundations for the cities of Pakistan to be smart and creative” (Government of Pakistan, 2017). Similarly, at provincial level “Punjab Growth Strategy 2018” resolves to develop the cities as “engines of growth”, referring to use of digital tools for solving the urban issues (Government of Pakistan, 2018). However, despite these policy level of commitments, a comprehensive understanding of smart cities is still missing in Pakistan (Government of the Punjab, 2018). Against this backdrop, this paper seeks to answer the following research questions:

- 1) What is the actual context of Lahore and Multan Pakistan cities to proceed with SC transformation?
- 2) Are Pakistani cities of Lahore and Multan ready for SC transformation?

The remaining part of the paper is structured as follows. Section 2 presents the methodology used in this study. Section 3 makes a comparative analysis of the cities against different components and draws the findings, whereas Section 4 presents the conclusions, limitations and future work.

2. Methodology

The research approach was to observe cases, compare, and interpret them using the UNU-EGOV framework (Estevez et. al., 2015). To be comparable, cases have been described using the same template composed by an introduction and Who, What, Where, Why, When and How questions related to the case. The qualitative method was the one selected to make the critical analysis (Kumar, 2014) because of the qualitative nature of the data and because it is the most suitable method for multi-disciplinary areas such as the smart cities. The four methodological steps which have been defined to find an answer to our research question are described below:

- 1) framework-aims at providing a case-oriented comparable research methodology for making critical analyses;
- 2) case studies-aims at describing the Lahore and Multan status in terms of framework components i.e., input, context, transformation and outcomes components;
- 3) analysis-aims at documenting the findings extracted by the qualitative analysis of the cases in the three framework components: input, context, and transformation and
- 4) conclusion-aims at summarizing the major remarks obtained from this work and grounded on the research findings outline some recommendations.

The selected cases for this study are Lahore and Multan. The research team selected the cases based on the criteria of having two cities with very distinct size, political, governmental, economic, infrastructural, and socio-cultural contexts in the Panjab, which is the biggest Pakistan province with one hundred million of inhabitants. The next sections describe the framework contextual parameters of Lahore and Multan cities. The information used to instantiate the framework for those two cases have been collected from several sources:

- 1) web portals of federal and provincial governments of Pakistan;
- 2) federal and provincial governments' policy/planning documents related to urban development, e-governance, etc.
- 3) research papers and books related to smart cities;
- 4) public reports and statistics, studies conducted by several organizations under different development initiatives, press reports and opinion articles.

3. Comparative Analysis

In this section we are going to analyse the two cases using the framework. Lahore is a metropolitan city and the capital of the Punjab province. It is second largest city of Pakistan with a population of about 11.126 million (Pakistan Bureau of Statistics, 2017). The city has been selected for study mainly due to its political, geographical, socio-cultural, and identity importance in the Pakistan environment. Multan is a historic city in South Punjab, Pakistan having population around 1.871 million (Pakistan Bureau of Statistics, 2017). Administratively the city is a Tehsil (Sub-District) of District Multan. For this study Multan has been selected because of its cultural identity, and socio-economic contrast with Lahore as historical development trends in the province remained inclined towards central and northern regions.

3.1. Input Component

Inputs refer to specific elements, which include technologies and tools that can be used to support and facilitate the transformation process of an SC initiative.

Table 1: Technologies and Tools Input Elements

	Lahore	Multan
ICTs	100% 3G & 4G Coverage; Broadband connectivity through fiber-optic	100% 3G & 4G Coverage; Broadband connectivity through fiber-optic
Hardware Tools	Mobile penetration; network of surveillance system; Hotspots on public places	Mobile phone penetration; Wi-Fi hotspots on public places;
Software Tools	Web presence of all government agencies, GIS technology/expertise, GIS mapping data of urban property	Limited web presence of government agencies; GIS technology and GIS mapping of urban property

Table 1 shows the inputs available for Lahore and Multan Smart Cities (SC). Lahore and Multan both have a good telecommunication infrastructure. Although, Lahore is better equipped with surveillance cameras, which can be used to sensor and collect data of the surrounding environment and help in the decision-making process in real-time. All governmental agencies of Lahore are present in the cyberspace whereas Multan has limited presence. The e-government and e-governance are essential requirements to have a smart governance (SG), thus we can say that Multan is more far way of achieving an SG.

3.2. Context Component

The context refers to specific features of the local environment that must be considered for the development of an SC, including different attributes that will affect the choices for planning and implementing SC initiatives, such as values, drivers, challenges, risks, and regions. Table 2 shows the Lahore and Multan, values, drivers, challenges, risks, and region contexts for SC.

Table 2: Lahore and Multan Context Elements

	Lahore	Multan
Values	Metropolitan city of 11.12 million heterogeneous population; business hub having multidimensional businesses ranging from traditional crafts to IT; strong economic value for province & country; historic city; strong socio-cultural values; potential of international tourism.	District headquarter with a population over 1.87 million people having a homogeneous background; business hub of south Punjab; special handicraft cottage industry and marketing of agriculture products of surrounding areas.
Drivers	Regeneration of city; enhancing liveability; developing business opportunities to make the city an international business; preserving historical & cultural identity	Regeneration of old city; revitalization of economy is a primary development driver; enhancing liveability of the city; promoting tourism in the city
Challenges	Disintegrated governance system with weak local government; limited financial resources; limited service delivery of the institutions; limited e-governance base; energy crises; air pollution issue mostly due to vehicular traffic.	Disintegrated governance with weak local government; limited financial resources; less acceptability to innovations; limited service delivery capacity of the institutions; limited e-governance base; energy crises; environment / air pollution
Risks	Unaffordability of cost; vendor driven techno-centred approach; hasty planning with focus on short-term objectives; social exclusion of IT illiterate citizens	Unaffordability of cost; vendor driven techno-centred approach; hasty planning with focus on short-term objectives; social exclusion
Region	Punjab surrounded by intermediary level cities with possibility of cluster formation	Southern Punjab surrounded by intermediary level cities with possibility of cluster formation

From Table 2 we can observe that the drivers such as enhancing livability, tourism, and economic development; challenges, such as disintegrated governance, weak local governmental power, limited financial resources and energy problems; risks such as unaffordability of cost, vendor driven, techno-centered approach and social exclusion and regions such as be surrounded by intermediary level cities with the possibility of cluster formations, contexts are pretty the same for both cities. The value context is the one that differentiates more from the others with Lahore showing a more heterogeneous population, multidimensional businesses and strong economic,

cultural and social values, whereas Multan has a more homogeneous population, little businesses diversity, basically handicraft cottage industry and agriculture business.

3.3. Transformation Component

The way how cities are transformed to be smarter may include the attributes like approaches, stakeholders, governance, and maturity models. Table 3 shows a comparison between transformation process of Lahore and Multan. As we can observe in Table 3, Lahore and Multan have similar approaches for SC interventions, a mix of both top-down and bottom-up, but the later with small-scale interventions. The stakeholders in Lahore are better represented and have more experience when compared to Multan. The proposed governance models are slightly different: both are led by the Chief Minister Panjab, however Lahore has authority whereas Multan has an SC Unit. Neither Lahore nor Multan have a maturity model for measuring the baseline state of an SC.

Table 3: Lahore and Multan Context Elements

	Lahore	Multan
Approaches	Mixed approach; starting from top-down, gradually generating space for bottom-up interventions on small-scale	Mixed approach; starting from top-down, gradually generating space for bottom-up interventions on small-scale
Stakeholders	Wide range of stakeholders; proactive media; growing ICT industry; potential investors/business partners;	Almost all categories of stakeholders as in Lahore but with limited exposure and previous experiences of collaboration
Governance	Two tiers: a high-level committee led by CM Punjab for developing vision, strategy, and deciding about financial resources/model for interventions; Autonomous body (SC Authority) for coordinating the execution of projects	Two tiers, but slightly different from Lahore: a high-level committee led by Punjab for developing vision, strategy, and financial resources/model for interventions; SC Unit within existing administrative under Mayor Multan
Maturity Models	Appropriate maturity model, preferably adoption of world Bank's suggested urban metabolism measurement tools	Appropriate maturity model, preferably adoption of world Bank's suggested urban metabolism measurement tools

3.4. Findings

Based on the description of the cases made in section 3 and in the analysis of section 4, this section presents the research findings and makes an attempt to examine apparent strengths and weaknesses of both the scenarios. Table 4 shows a comparison between strengths and weaknesses of both the cities for transformation process. In terms of strengths, Lahore is already at a point of urbanization where government and citizens have realized the need for putting the things in order. The investment and infrastructure development under CPEC like Orange Line Intracity train may provide better grounds for improving Lahore city as an SC of international level. In

terms of weakness, Lahore has multiple organizations working in the SC arena, so the work is dispersed and sometimes overlapped. Regarding the strengths of Multan, due to be a small city it easier to manage an SC project and have more proximity with local community.

Table 4: Lahore and Multan Strengths and Weaknesses

	Lahore	Multan
Strengths	Provincial capital, already in the news for SC transformation; ongoing initiatives like Safe City, GIS mapping of urban property; CPEC context; under construction infrastructure would support the SC interventions.	Smaller scale in comparison to Lahore; Space for developing a governance system closer to local government; ongoing initiatives like Safe City & GIS mapping of urban property; CPEC context
Weaknesses	In terms of weakness, Lahore has multiple organizations working in the SC arena, so the work is dispersed and sometimes overlapped	Comparatively less vibrant stakeholders: fewer universities; nominal IT industry; Comparatively financial constraints.

The Multan weakness are that comparatively to Lahore it has less vibrant stakeholders due to the fact that there are fewer universities with faculty and research facility on urban development and ICTs. Similarly, IT industry is also nominal which may affect the efforts for localized innovation and establishment of a living innovation lab. Moreover, comparatively Multan has more serious financial constraints. Comparison between Lahore and Multan reveals that both cities have strong grounds for SC transformations, with sound planning and risk mitigation approach; majority of attributes are similar. Lahore, the larger city having progressive trends and organizations already exposed to ICTs, provides better grounds for implementation. Multan is comparatively challenging case but it also provides an opportunity to revolutionize the area and break the local myth of “too close yet too far”, checking the talent flight to Lahore and Islamabad.

4. Conclusions

As conclusion we could say by our sample i.e., Lahore and Multan that Pakistan is entering in the SC world in a very timid way and at different speeds. Multan has a lot of potential to grow because of its historical and cultural importance of Walled City, monuments, and arts and crafts. In addition, the city can derive benefits from promoting trade of agriculture of South Punjab, especially cotton and mangos. Moreover, Multan is located in the middle Pakistan and is connected with all major cities and linked with main routes of China Pakistan Economic Corridor. This regional advantage is likely to enhance the economic activities and attract more visitors and investors, who, in addition to citizens, need a smart and livable city. The input component of the framework indicates that the telecommunications infrastructure is in place, but it is still missing to put the remaining public services like water, sewage, and energy into networks and integrated with technologies. The context component indicates that the values are little different but the drivers, challenges, risks, and region aspect are pretty the same. The transformation component is also very similar on both cities, although Lahore shows greater maturity for conducting the SC transformation. As recommendations we could say that SC transformation may be taken up as a

new venture and should not be mixed up with ongoing e-governance projects of a minor nature having no visible impact and effect on the lives of people. An independent authority should be set up to gauge the outcomes of the initiatives. Noteworthy, is that this research work does not cover all Pakistan provinces, only Panjab, and the recommendations made only reflect the view and perspective of the authors. Once we confirm, through further research, that some of the greatest challenges to Pakistani cities are the disintegrated governance system and a weak local government, we intend as future work to develop a smart governance model for cities transformation suitable for the Pakistani context.

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Smart City According to Whom? The Case of Armação dos Búzios, Brazil

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Abstract: The growth of the urban population is widely acknowledged to be a central trend that poses challenges for the administration of cities worldwide. In this context, several advances in information and communication technologies (ICTs) are being developed to gradually transform urban centres into smart cities. To contribute to the scholarly community discussions about smart cities, this article offers a case study on the implementation of a project aimed at transforming the municipality of Búzios in Brazil into a smart city. Our findings reveal that the provision of wealth, sustainability, and well-being by a smart city project require an approach that goes beyond technological innovation.

Keywords: smart city, urban development, Actor-Network Theory

1. Introduction

In recent decades, a growing trend in the world concerns the increasing concentration of populations in urban areas. In this context, several advances in information and communication technologies (ICT) have been proposed to alleviate such rapid and unplanned urban growth and transform urban centres into smart cities (Nam & Pardo, 2011). Fundamentally, the term smart city regards an environment where technology is embedded in the city, in synergy with its social components, to create public value (Hollands, 2008).

Even though the smart city idea has been mostly uncritically celebrated by the academic, policy-making and think-tank literature (Caragliu et al., 2011) there is an emerging body of literature that criticizes this optimistic version of the smart city (Hollands, 2008) and questions who are the real beneficiary from smart cities projects (March & Ribera-Fumaz, 2014). Nevertheless, this critical literature has a few shortcomings that inhibit making sense of and refashioning the smart city agenda (Kitchin, 2015) such as the absence of empirical case studies of specific smart city initiatives

(Bulkeley et al., 2016). Hence, this study seeks to answer the abovementioned call for solid empirical case studies of specific smart city initiatives by employing the Actor-Network Theory (ANT) to examine the different phases of a smart city project implemented in Brazil - named Cidade Inteligente Búzios (CIB).

2. Literature Review

2.1. Smart City

According to Nam and Pardo (2011), a smart city represents city innovation in management and policy as well as technology. As such, it regards a living laboratory as an experiment, which necessarily entails unavoidable risks. Similarly, Tironi and Sánchez Criado (2015) argue that the main development strategy of smart city projects consists of pilot studies, allowing large companies to test technological and service prototypes, carrying out different forms of “urban laboratories”.

Therefore, “despite the heavy corporate investment in promoting the concept, smart city business models and applications usually reveal far more uncertainties than certainties, its technological devices being more speculative and exploratory than decisive or definitive in character” (Tironi & Sánchez Criado, 2015). That is to say, the real benefits of smart city initiatives so far are inconclusive (Thrift, 2014).

2.2. Actor-Network Theory (ANT)

Typically, ANT portrays society as a socio-technical web (actor-network) where technical objects participate in constantly building heterogeneous networks that bring together actors (or actants) of all types (Latour, 2005). The concept of translation, widely used in ANT studies, “is the mechanism by which the social and natural worlds progressively take form” (Callon, 1986, p. 206). That is, the success in implementing some project is achieved by the translation of the various actors involved in such project into a common goal, called obligatory passage point (OPP) (Fornazin & Joia, 2015). According to Callon (1986), the translation process comprises four moments (problematization, *interessement*, enrolment and mobilization) that are required to stabilize the network.

Through problematization, the network initiator tries to become indispensable by signing a set of actors and defining their identities in such a way as to establish themselves an OPP in the network they want to create (Callon, 1986). At the *interessement* moment, the network initiator builds devices which can be placed between them (Fornazin & Joia, 2015). *Interessement* only reaches enrolment if it is successful. Through enrolment, actors lock others into their roles and networks so that their behaviour is channelled in the direction desired by the enrolling actor(s) (Callon, 1986). Finally, the mobilization encompasses the actions of actors so that the goal is reached (Fornazin & Joia, 2015).

3. Research Method

This research concerns a case study associated with the Actor-Network Theory. In short, a case study examines a phenomenon in its natural settings, employing multiples methods of data collection to gather information from one or more entities (Stake, 1998). Latour (2005) defines the working of ANT as follows: "Follow the actors in their weaving through things they have added to social skills so as to render more durable the constantly shifting interactions" (p. 68). Thus, while following the actors, an extensive empirical material was gathered. In total, 21 semi-structured interviews were conducted, including political leaders, civil society representatives, and researchers. Moreover, in case studies, data from multiple sources should be converged in the analysis process, rather than handled individually (Stake, 1998). Thus, techniques such as triangulating data sources and developing a code scheme were employed. Furthermore, ANT (the translation process) was used as our analytic device.

4. The Case: Cidade Inteligente Búzios (CIB)

Lying in the north of the state of Rio de Janeiro, the city of Armação dos Búzios, which is locally known as just "Búzios", comprises an area of 70,278 km² and a population of approximately 27,560 inhabitants (IBGE, 2010). In 2011, an electricity distribution dealer under the Enel Brasil holding, Ampla Energia e Serviços S.A, launched a project (Cidade Inteligente Búzios - CIB) that aimed at transforming Búzios into the first Latin American smart city. The CIB was carried out between November 2011 and October 2016 and costed approximately 20 million dollars. More than half of this amount was sponsored by the financial resources Ampla had to invest by the Brazilian law in R&D. To examine the CIB case, we adopt the four interrelated moments of translation (Callon, 1986).

4.1. Implementation of CIB via ANT

4.1.1. Problematization

Beyond complying with Brazilian law defining minimum R&D investment levels, Ampla's objectives with the CIB project also included taking advantage of the project's potential benefits (technical, financial, and operational), improving the company's technological capability and acquiring experiences, which could be replicated in other areas of Ampla's concession in Brazil. Through problematization phase, Ampla (the initiator) sought to define the interests and the roles of the following actors: Búzios' mayor, external institutions (universities and research centres) and city's inhabitants, who were also Amplas' customers.

Since the beginning, Ampla assumed that their project would make Búzios a living lab for tests and trials of new technologies and services. As such, Ampla intended to attract external research institutions interested in financial support and able to execute the technological developments proposed by the project. Furthermore, to implement the project in Búzios, Ampla would need some approvals and the engagement of the city's mayor. Meanwhile, Ampla hypothesized that, as a political leader, the mayor would want to be associated with the smart city project, as well as

with the benefits that it could bring to his voters. At last, Ampla also mapped Búzios' population as an actor. As explained by the Ampla's director of Socioeconomic Development and Sustainability sector: *"If these people, the community is not involved, they might reject it."*

Hence, Ampla defined CIB as an OPP, for which the other actors should move towards achieve their goals and, consequently, the successful implementation of the CIB.

4.1.2. Interessement

Ampla developed a series of *"interessement devices"* to convince the other actors that the interests defined by the company were in fact well in line with their own interests. First, Ampla's public relations engaged in announcing their intention of making Búzios the first smart city in Latin America. Soon, the CIB project and its potential outcomes were highlighted in the national media coverage. Given this positive visibility of the project, it was no surprise the mayor's intention to be associated with it. Moreover, to engage the external research institutions, Ampla sponsored researchers within the context of the smart city project. Lastly, to engage the population, Ampla hired an NGO named CIEDS to develop an *"interessement device"* namely the sustainable network of relationships. Such network would work as a channel of continuous communication and articulation around the issues concerning the development of Búzios as a smart city.

4.1.3. Enrolment

Ampla's assumption that the mayor would want to be involved in the CIB project was initially right. However, Ampla was not able to predict that the then mayor would not be re-elected at the 2012's elections, compromising the City Hall engagement achieved so far. As explained by the director of R&D and Innovation sector of Enel group in Brazil: *"The mayor who won the 2012's elections, was from the opposition party. So, to be honest, for him it would be good if the project had failed."*

Therefore, the new mayor refused the transaction by defining his identity and goal in another manner, requiring Ampla to restart a new series of negotiations. In addition, CIEDS was also working hard to engage the Búzios' citizens. As the CIEDS's person responsible by the CIB project remembered: *"At first, I noticed a mistrust among the people. But after some time, they start see the opportunities"*.

Regarding the technological research and the engagement of external institutions, Ampla assumed correctly that they would be interested in developing studies about the CIB project. They managed to engage 238 collaborators.

4.1.4. Mobilization

Ampla's association with the prior mayor harmed the project development. In order to establish a new relationship with the new mayor, the project managers started to define the smart city project as apolitical, aiming only to benefit of Búzios' population. In the end, they managed to have some City Hall acceptance, but not a full engagement as they initially had.

Regarding the population, CIEDS' efforts were not enough to spread the smart city idea and its benefits through the population. More than once we have asked people in Búzios about the CIB

project and they could not explain to us what it was. Finally, the external research institutions in the CIB project successfully assured the engagement of their collaborators. In a closing ceremony, the several tangible achievements were presented by Ampla.

5. Discussion of the Case

The CIB project regarded as a pilot study allowed a large company (Ampla) to test technological and service prototypes. Moreover, it was carried out as an urban laboratory to test and demonstrate the durability and social integration of their products and services, which involves unavoidable risks, generated by new, untested trials (Nam & Pardo, 2011). Consequently, during CIB's implementation, several controversies and situations not foreseen at the project planning stage emerged. Moreover, it was also observed that, while one actor (research institutions) kept intact its relationship and role as planned by Ampla, the others did not follow the company's lead through the entire implementation.

The company's objective of enriching their technological capability was met. However, their intention to improve their relationship with the population (Ampla's customers) seems to have failed. Moreover, despite the heavy corporate investment in promoting the CIB project and the numerous research findings, it remains unanswered whether Búzios has been transformed into a smart city. This is indeed a complex question regarding different points of view. Ampla would say yes. This company states through official documents that the project has brought many benefits to the city, enhancing Búzios' citizens' quality of life. On the other hand, by the end of the project, Búzios' public authorities do not truly recognize the whole project. They identify some Ampla's deeds that favored the city, but they do not call Búzios a smart city. Lastly, the citizens seemed to have stayed quite unaware of the project implementation.

6. Concluding Remarks

The history described in the CIB project case study in this article is a story about active builders of actor-networks and about how the actor-network grows, change, and stabilizes (or not) over time. Smart cities have been regarded as an innovative solution to solve contemporary cities' problems raised by the ever-increasing urban population. Nevertheless, the present study has shown that the real benefits of smart city initiatives are not clear-cut. Besides investing in technological improvements, public authorities, and the population representatives should also be active actors for a successful urban transformation, in order to render possible to build a sustainable smart city environment.

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Open Government in the OGPDE Matrix

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Abstract: The Federal Republic of Germany declared its participation in the Open Government Partnership in December 2016. This established the inter-institutional basis for concretizing and professionalizing open government in cooperation with the civil society. "Democracy means listening and reaching out", the Federal Minister of the Interior said. In this viewpoint, the ideas for open government of the civil society by March 2017 are discussed, which have been compiled in the framework of the dialogue with the Federal Government to design the first national action plan. The article reflects possible fields of action and topics for open government in the coming decades. Realistically, however, implementation of the OGPDE matrix can only be considered step by step. With 15 measures, the first national action plan of the German federal government for the open government partnership covers only parts of the spectrum outlined. Nevertheless, the OGPDE matrix is an important milestone for establishing Open Government in Germany and Europe.

Keywords: open government, Open Government Partnership, Germany, OGPDE, matrix

1. Open Government in Germany

Traditionally, approaches of the open civil society such as transparency, freedom of information, citizen participation and cooperation are summarized under the buzzword "open government". Over the past decades, these concepts have found their political way to Germany via Scandinavia and the European Union. Increasing digitalization acts as a catalyst for politics and administration. It generates new approaches to the opening of the state and administration but also opens up government's data treasures. In December 2016, the federal government officially announced Germany's participation in the Open Government Partnership (OGP). This is an important step on the German path to open government, which was agreed in the coalition agreement in 2013 (CDU/CSU/SPD, 2013, p. 153). The OGP is an international alliance of more than 75 states committed to the idea of open government and modern administration. Transparent processes, civil society involvement and the use of new technologies to solve social challenges are the focal points of this cooperation.

The strength of our democracy is based especially on our ability to listen. For me, open, cooperative cooperation between administration and population means open government and open administrative action. With our commitment to open government, we are making an important contribution to greater transparency, more participation and more innovation. Whether in strengthening civic

engagement, the use of new technologies or the implementation of security concerns. Germany's participation in the OGP initiative is an important step in this direction

said the Federal Minister of the Interior Dr. Thomas de Maizière (BMI, 2016, p.1). According to the ideas of the Federal Ministry of the Interior, which coordinates for the federal government, action plans should be drawn up regularly in the future with measures from various policy areas on several “future topics”. Together with civil society, these should be discussed and accompanied in order to trigger learning processes, build trust and make reform projects visible (BMI, 2016, p. 1). From January 2017 to August 2017, a first national action plan of the federal government was drawn up, which sets the framework for open government in Germany in the coming years. Until the end of April 2017, all federal ministries were invited to submit their own proposals for this action plan. In addition, a workshop with representatives of the civil society was organized in February 2017 by the federal government.

2. Ideas of the German Civil Society for the Open Government Partnership

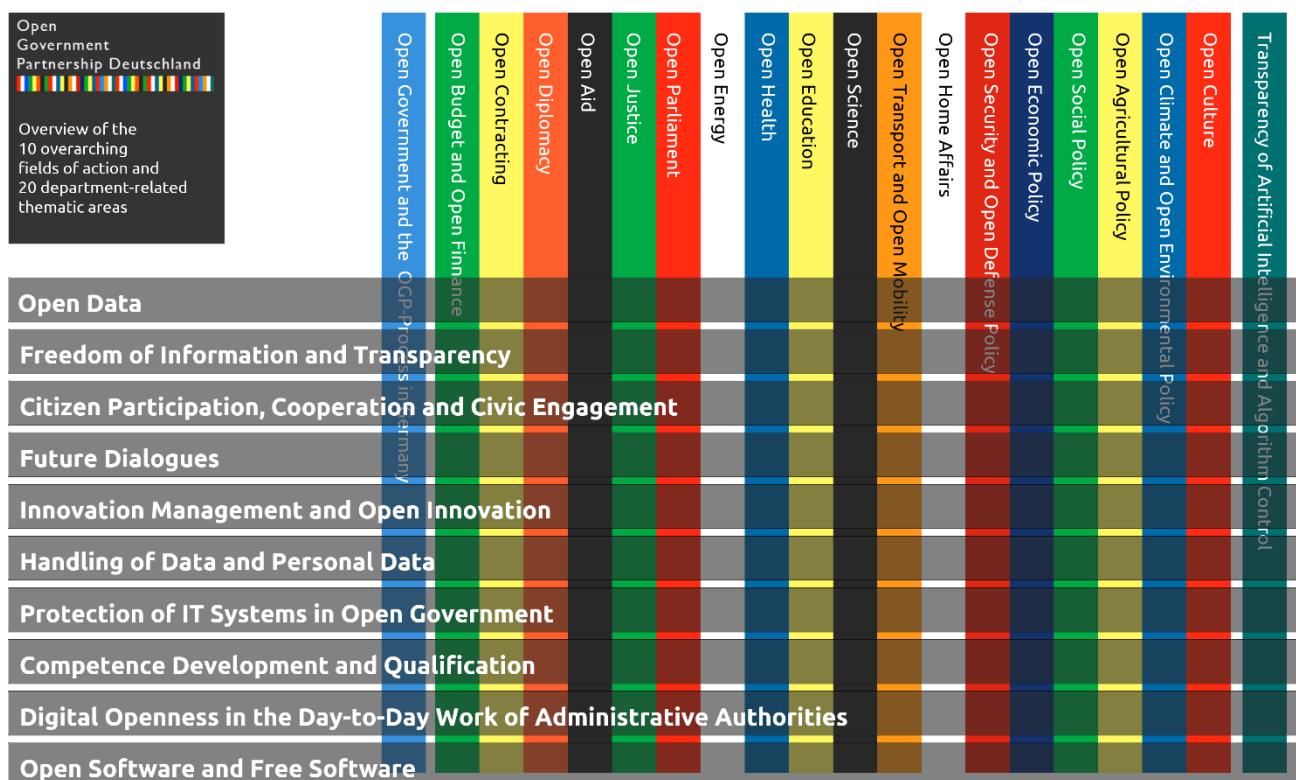
The Working Group Open Government Partnership Germany (Arbeitskreis Open Government Partnership Deutschland - AKOGP: <https://opengovpartnership.de>) is an open association of civil society organisations, scientific representatives and interested individuals who would like to work eye-to-eye with the federal government within the framework of the OGP. It was formed in 2011 and since then has brought together various voices of the German civil society. In February 2017, the Federal Ministry of the Interior, with the involvement of the working group, invited more than 80 representatives of the civil society to a workshop in Berlin to discuss activities based on the preparatory work and to obtain fresh ideas for measures. This meeting generated a considerable response from civil society. Following the kick-off workshop and an open online co-editing process in March 2017, the working group submitted 270 proposals from the civil society (OGPDE, 2017) to the Federal Ministry of the Interior with measures in ten overarching fields of action as well as in twenty department-related thematic areas (Figure 1).

The fields of action in the so-called OGPDE matrix include open data, freedom of information and transparency, citizen participation, cooperation and civic engagement, future dialogues, innovation management and open innovation, the handling of data and personal data, the protection of IT systems in open government, competence development and qualification, digital openness in the day-to-day work of administrative authorities as well as open software and free software. Open government and the OGP process must play an independent, driving role in times of digitization.

With their reflections, the representatives of civil society point out that “open government” must combine more approaches and subject areas than just open government data as it has been understood in Germany until 2016. First, the systematic opening of government data and administrative data must be promoted as well as data-driven innovations stimulated by new funding concepts. The aim is the establishment of a national data ecosystem based on open infrastructures. Transparency and freedom of information are basic preconditions for participation

in political processes. Citizen participation includes the phases of opinion and will formation, which are essentially supported by civic engagement. The participation and involvement of civil society, citizens and experts in setting agendas increase the capacity of society to solve problems and the legitimacy of political decisions. With cooperation and civic engagement, joint measures of implementation, monitoring and evaluation after the decision are defined. There are remarkable productivity potentials for government in opening, exchanging, sharing and cooperating (OGPDE, 2017, pp. 16-24).

Figure 1: OGPDE Matrix: 10 Overarching Fields of Action and 20 Department-Related Thematic Areas



Future dialogues on long-term challenges bring valuable perspectives from outside. Citizens can thus participate in open, complex questions and strategic debates. With innovation management and open innovation, it should be possible to sustainably develop creative minds and committed citizens as sources for the “innovative state”. When dealing with data and personal data, but also with trade and business secrets as well as state secrets, these must be used responsibly. This data must be protected from unauthorized third parties in an open environment, precisely because the risks of misuse increase with automatic data processing, automated linking and analysis of big data. In times of increasing digital threats, open government concepts for the protection of important IT systems must also function. Protective measures are to be taken to ensure that open government do not become a gateway for the enemies of open society to destroy it. For a sustainable implementation of these fields of action, federal, state and local authorities must develop competencies for open government. This requires training and education for the administration and the citizens. Digital openness also changes the day-to-day work of administrative authorities. These must be addressed in the context of the next update of the White

Paper on Work 4.0 (BMAS, 2017). The use of free and open software opens free reuse, independence, platform neutrality, transparency and participation through open source code (OGPDE, 2017, pp. 25-37).

The department-related thematic areas include open budget, open contracting, open diplomacy, open aid, open justice, open parliament, open energy, open health, open education, open science, open transport and open mobility, open home affairs, open security and defense policy, open economic policy, open social policy, open agricultural policy, open climate and open environmental policy and open culture. The transparency of artificial intelligence and algorithm control are also required as thematic areas.

With open budget, government can use the potential of civil society and technology to open budget procedures and expenditure evaluation. The intended publication of budget data enables global comparability and transnational learning processes. Opening contracts makes tenders and financial flows comprehensible and enables an impact/outcome evaluation of administrative actions. Openness and transparency are at odds with many of the principles of diplomacy and foreign policy that have been upheld for centuries. Nevertheless, in an increasingly open and transparent world with openness, transparency, citizen participation and cooperation in foreign policy, particularly in diplomacy, this opens windows of opportunity to carry out these public tasks more efficiently and effectively in the public interest. An open aid policy aims to increase the efficiency and effectiveness of the international development cooperation and to combat corruption through transparency and accountability. Open justice relies on the opening of judicial data and registers. This creates more transparency on legislation and judicial decisions and contributes to better judicial action. The demands for parliamentary openness and transparency are gaining momentum through the Krems Declaration (2013). An open energy policy contributes to mastering the challenges of the energy transition in dialogue with all the actors involved. Open health takes up approaches of openness to save lives and improve medical care without misusing these particularly sensitive personal medical data. Students benefit from open education. In addition to frontal teaching, they receive free access to current open educational resources (textbooks, educational films, learning platforms). With open science, scientists should make their knowledge, results and methods accessible to all citizens. Open mobility means opening transport and transport policy towards digitization, networking, intermodality and electromobility for the mobility of tomorrow. Open home affairs include the modernization of the administration, interoperability, and issues of state security and the protection of citizens in increasingly open structures. An open security and defence policy, as has been pursued by the Federal Republic of Germany since 1955, relies on cooperation with other states, both via NATO and other established partnerships as well as via the OGP, and on proven and innovative forms of cooperation with civil society, without endangering its own national security interests. Within the framework of an open economic policy, solutions must be found to create, and develop stable open markets in open digital structures and how a regulatory framework for digitization can be set up in order to enable as many successful innovations as possible and to minimize job losses. Open social policy should contribute to improve the situation of certain social groups through openness. An open agricultural policy is about transparent food production processes and the early involvement of consumers in production areas. Open climate and an open environmental policy help to inform the

population much better about air pollution and noise pollution and to involve them more directly in solution and design processes. One aim of open culture is to open and reuse cultural data in order to make it available to the general public, to science for research, teaching and education, to business and creative people for innovations, new works and new artefacts and for free use. With a view on the next development stages of smart government (with automated smart administrative files) and the increasing use of artificial intelligence in the tactile internet, a discussion on transparent artificial intelligence and algorithm control is also needed (OGPDE, 2017, pp. 38-92).

The goals to be pursued in these fields of action and topics are ambitious and measurably formulated. They were compiled by civil society on a voluntary basis within four weeks. At the same time, this compilation surveyed open government in Germany as if it were “new territory” (a popular quote by Chancellor Merkel). Many of these issues are actively pursued in other participating states of the OGP. Some approaches have been or, in some cases, had been practiced for decades, such as the “citizen in uniform”, without previously establishing a connection to “open government”. A discourse entanglement may make sense in this respect, without questioning existing dialogues or even wanting to replace them. With some topics, however, real unfamiliar territory is also being entered, which has only just been unsealed by science, civil society and government worldwide.

To develop these fields in their diversity, civil society has proposed the establishment of 30 specialist groups within the administration. These should enable federal, state and local governments to discuss current developments on a topic-related basis regularly. At the same time, they can gradually build up their own personnel and start to develop these fields across all administrative levels. At the same time, these meetings can be used to establish 30 additional forums for the professional exchange between the administration and civil society to jointly develop these areas. There is a need for action both in the context of the ten overarching fields of action and the 20 department-related thematic areas.

With its proposals, civil society signals to the federal government, to the state governments and to the local governments that it expects a professional entry into open government at all levels and in all departments. With the commitment to open government, its own experiences and its own impulses, Germany will be able to contribute in the future as an active member of the OGP to the further development of open government. At the same time, Germany will benefit from exchanges with representatives of government, administration and the civil society of other countries. Added value is also promised by the ambitious national action plans developed every two years together with civil society, their joint monitoring and their external evaluation by the OGP. This overall social process should be open and inclusive as well as agile and iterative (OGPDE, 2017, p. 87).

3. Germany's First OGP National Action Plan (NAP#1, 2017-19)

The fields of action and topics roughly outlined here are complex and demanding in their abundance. The 270 proposals made by the German civil society in March 2017 underline a desire for a substantial debate, appropriate reflection and fitting implementation. The numerous comments by the Federal Ministry of the Interior at the end of April 2017 underline this. However,

the proposals of civil society were only one source from which Germany's first national action plan for the federal government's OGP was derived. Parallel with the discussions with civil society, the federal ministries were also invited to consider contributions for the action plan. The federal government did not make any inquiry to the states and municipalities. A draft action plan was submitted for approval to the federal cabinet in June 2017. In August 2017, the first national action plan was finally published with 15 measures, none with political impetus, but all could be easily achieved with existing staff and budgetary resources. There are no plans to provide additional budgetary resources and staffing appropriate to the new tasks. The German Bundestag as legislature did not need to be consulted on the national action plan, because it is merely an executive measure with no impact on the budget and the human resources plan. The agreed measures will be implemented by June 2019. At the end of 2019, a self-assessment by the federal government and an external and independent evaluation by the OGP will take place.

An important finding can already be drawn by the German federal government, irrespective of the content. Many topics are still at a very early stage of development. They are still hardly tangible for the strategists and for implementation. More intensive discussion and implementation only make sense within the framework of the second national action plan (2019-21) or even the third national action plan (2021-23). This assessment is also in line with the expectations of the civil society.

The Federal Republic of Germany is comparatively late in dealing with open government. However, Germany can certainly benefit from its later start. Experiences from more than 75 other countries are already available. In times of open source and open programming environments, the open government wheel does not always have to be reinvented. Germany should learn from abroad but also give its own impetus. The cross-administrative data portal govdata.de and the future dialogues are impressive beacons of German origin. These are already setting trends in administrative modernization. With increasing commitment, the national dialogue on the OGP is maturing into its own resilient platform for administrative modernization and dialogue with the civil society. The administration can thus better prepare itself for the (digital) changes and take its employees and citizens with it. Knowledge, personnel, creative power and competence can be built up in a targeted manner. What already exists can be brought into structured digital form and thus be used together.

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ICTs and Opportunities of Empowerment in a Context of State-Sanctioned Homophobia: The case of the LGBTQI community in Kampala

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Abstract: After decades of growing acceptance of LGBTQI human rights in the West, Uganda began an African backlash in 2009, when it introduced an Anti-Homosexuality Bill. Even if the Bill was eventually defeated, it signalled the beginning of a new era of state-sponsored homophobia and wide-spread societal discrimination. State-sponsored persecution has however not silenced the Ugandan LGBTQI community. In the following reflections, we explore the Ugandan LGBTQI community's remarkable resilience and quest for change and in particular their use of ICTs for empowerment. Based on a pilot study conducted in November 2016, and ongoing online observations, tentative results are that the community organizes their communication practices around a division between intra-group organization (so-called deep information) and broadcasting and human-rights advocacy (surface information), due to perceived risks as well as opportunities of different communication modes and platforms.

Keywords: empowerment, homophobia, ICTs, LGBTQIs, Uganda

1. Introduction

In our ongoing research, we explore ICTs and empowerment within the LGBTQI (Lesbian, Gay, Bi-, Trans-, Queer and Intersexual) community in the Ugandan capital Kampala in their fight for basic human rights in an era of renewed state-sponsored homophobia. In these short reflections, we present the results of a pilot study and discuss our theoretical points of departure.

After decades of human rights gains for sexual minorities, there are worrying signs of a backlash. Instead of further expanding human rights protections of a historically extremely vulnerable group, some countries in Sub-Saharan Africa are opting for introducing or strengthening existing homophobic legislation or start implementing old colonial laws to legitimize the persecution of domestic LGBTQIs. For example, African nations attempted to remove Vitit Muntarhorn in 2016, who, at the time, was the newly appointed UN Human Rights Council independent expert on the Protection against Violence and Discrimination based on Sexual Orientation and Gender Identity. The resistance is rationalized by framing sexual minority

rights as Western imperialism and a frontal attack on African governments' right to self-determination in domestic matters.

Although this reversal of past decades of human right gains is present in multiple contexts, Uganda is of particular interest. Uganda gained international notoriety in 2009 for introducing one of the world's harshest Anti-Homosexuality Bills. The proposed Bill sought to strengthen already harsh laws by introducing the death penalty, life in prison, as well as introduce new laws against abetting and promoting homosexuality. Although the Bill was successfully challenged in the Constitutional Court in 2014, the human rights of sexual minorities have not improved. Human right abuse in the shape of extra-judicial violence and social discrimination, denial of due legal process in connection with abuse, denial of employment and housing, continues undiminished. Parts of the Ugandan tabloid media have actively engaged in increasing the community's vulnerability by outings of LGBTQIs, which includes publicizing pictures of alleged homosexuals, directions to their work and home addresses as well as instigation to violence through calling for their public hanging. Mainstream media have refrained from such outings, but pursues various degrees of silencing practices, i.e., excluding sexual minorities from coverage even when they are directly affected and key stakeholders.

Although state-sanctioned homophobia in Uganda dates to British colonial rule, it was the infamous Anti-Homosexuality Bill that appears to have sparked the last few years of academic output. Most studies focus on the roots of discrimination contemporary triggers and legal analysis (Boyd, 2013; Cheney, 2012; Tamale, 2009; Wahab, 2016). A literature review demonstrates that the agency of the LGBTQI community itself is a neglected area. An exception here is Strand's research. She found that local human rights defenders attempt to call attention to human rights concerns with the Bill were only acknowledged after being endorsed by international partners (Strand, 2011). Strand (2012) has also studied deeply rooted and even institutionalized silencing practices of Ugandan mass media.

As Uganda begun to intensify repression ten years back, it provides researchers with an opportunity to study, not only the acute phase of repression in 2009, but the formation and strategies of a countermovement, actors' responses to the years of systematic state-endorsed homophobia, as well as a return to low-grade systematic repression of sexual minorities. In this context, with a long and deep-rooted history of state-sanctioned persecution of sexual minorities and a media sphere reflective of institutional homophobia, ICTs (Information and Communication Technologies) could constitute an important tool for empowering the LGBTQI community. Indeed, ICTs have been hailed for improving access to information and providing space for communication as well as organization of collective action and social change. We believe that the Kampala LGBTQI community presents us with an unprecedented opportunity to empirically explore whether ICTs could contribute to empowerment and if so, in what ways.

Our research focuses on active appropriation of the community of ICTs as an important tool for empowerment. Furthermore, as we are also motivated by a humble wish to contribute to the struggle of the community for their basic human rights. In a time of global backlash, international human rights organizations' support of smaller partner organizations in the global South has unintentionally made them more vulnerable to the accusation of being Western imperialist cronies.

This development suggests that domestic human rights organizations are better served by further developing their own home-grown resistance, as opposed to embracing imported scripts on how to conduct their struggle for basic human rights.

This research project critically engages with the idea that ICTs enables and facilitate empowerment of marginalized groups in repressive contexts. We approach ICTs as part of a larger communication ecology, which in the Kampala context includes (among others) an important oral tradition, unfavourable representation in traditional media, state-sanctioned discrimination as well as religious re-colonialization by American conservative churches.

Our research questions are:

- 1) How does the community use ICTs in combination with other media and communication platforms and modes of communication, to sensitize, mobilize and coordinate activities?
- 2) How does the community understand ICTs affordances?
- 3) What communication practices are born out of the perceived affordances given the communication ecology and context of state-sanctioned homophobia in Uganda?

2. Theory

ICTs have been hailed for improving access to information and providing space for communication as well as the organization of collective action and social change. The fields of Information and Communication Technology for/and Development (ICT4D or just ICTD) have been home to many discussions concerning ICTs in the global South. We, however, prefer the concept of empowerment over development. Development has had a kind of West-is-the-best connotation to it (Servaes & Lie, 2015), assuming that so-called modern societies in the industrial globalised North are the model towards which more rural and traditional societies in the global South should develop towards (Nederveen Pietersee 2010: 21,23). Empowerment is, however, not an easy concept to adopt. A shared definition is absent (Choudhury, 2009: 343), and it has been considered fuzzy (Kabeer, 1999: 436) and elusive (Hill Collins, 2000: 19). In this project, empowerment is defined as those without power taking control over their life situation, destiny and environment. We suggest to study empowerment out of four inter-related levels (see Svensson, 2018 for the full account):

- a) *The intersectional level* concerns the roots of powerlessness in terms of intersecting structures of power such as, ethnicity, gender, class and sexuality. How are the powerless (here LGBTQIs in Kampala) situated in such large structures of power? Such an analysis should involve the standpoints of those under study for them to define their own realities on their own terms.
- b) *The contextual level* concerns the particular contexts of the community and how actions are situated in these contexts. For example, how do their contexts provide both opportunities and constraints (in terms of institutions, local community, local culture, economic and family arrangements to name a few)? Which configurations of resources, institutional arrangements and historical precedents exist?
- c) *The agency-level* concerns the capabilities of the community, their abilities to make choices and thus control their life situation, destiny and environment. What capabilities,

resources, agencies, skills, choices and achievements can be discerned? How critically conscious are the LGBTQIs of their situation? Do they have capability to imagine that change is possible? Does such critical consciousness lead to action/change?

- d) *The technological level* concerns the affordances of the communication platforms used by the community. What access to communication platforms do they have? How are their communication/ media literacy? How do they use these platforms? What affordances do they perceive these platforms to have, and do they find new affordances?

It is also important to underline that ICTs are also only one part of an overall communication ecology of a given community (Treré & Mattoni, 2015). Communication should be understood in a holistic and ecological manner (Tufte, 2017: 21) and not be studied in isolation.

3. Method

As described above, ICTs need to be analyzed and understood as part of a wider communication ecology departing from the users' unique perspective of his/her environment's constraints and opportunities, as well as an understanding of ICTs vis-à-vis the context. We are thus interested in the community's situated communication practices and will thus engage in an actor-centred analysis. An actor-centred analysis implies that actors in the community are our analytical entry point. The actors we have identified and been introduced to are: *SMUG*, *Icebreaker*, *FARUG*, *QueerYouthUganda*, *Spectrum* and *Kuchu Times*.

This is an exploratory study which includes a pilot on the ground conducted in November 2016 including five interviews, as well as "hanging around" (in an ethnographic understanding) which concretely resulted in a study visit to Icebreakers HIV prevention centre in Kampala and observations at the weekly bar night. To this pilot, we are in the process of conducting online observations of the actors mentioned above, their web pages and their social media presences. We are also keeping in touch and conducting informal interviews with participants via the dating app *Grindr*. To study how communities use ICTs in combination with other media and communication platforms and modes of communication (research question 1) requires both interviews and observations. To study how the community understands ICTs affordances (research question 2) requires interviews (online as well as offline). And to study what communication practices are born out of the perceived affordances (research question 3) requires observation and participation in the community, online as well as offline. The interview and observation guides revolve around the four inter-related levels of empowerment (presented above). The online study is ongoing, and we will return to Kampala autumn 2018 for more on the ground ethnography.

4. Preliminary Results and Tentative Conclusions

Even though state-sanctioned homophobia permeates many parts of the Ugandan society, our study reveals that the LGBTQI community has shown a remarkable resilience. After a brief period 2009-2010 when meeting in public was simply too dangerous, the community has re-established

public meeting spots (such as the weekly bar-night) and in 2012, the community organized its first Gay Pride event in Entebbe (a nearby recreational town) and has attempted to make this a yearly event.

Due to the restrictive context, the community has developed a healthy degree of suspicion to new-comers and are reluctant to interact with unknown individuals online. Access to participants are dependent on direct personal contacts or securing full endorsement and introduction by another trusted source within the network. It became clear to us that off-line encounters could at times only be secured through mutual friends on Facebook who could vouch for the newcomer being genuinely “gay” or sympathetic to the community’s concerns. Internet-mediated requests for meetings that had not been preceded by an introduction, preferably offline, would simply be ignored. Here the weekly bar night proved important for being introduced to key people in the LGBTQI advocacy groups included in this study. This is perhaps due to the importance of oral communication in Ugandan culture together with LGBTQIs being particularly aware of risks of surveillance using ICTs.

This highlights the importance of approaching ICTs as multi-layered sites where communicative practices are directly influenced by the restrictive context in Uganda. According to our participants, the community relies on what could be seen as ‘front stage’ ICTs such as Facebook and organizations’ websites which disseminate *surface information* (an expression used by one participant), i.e., non-sensitive and non-confrontational communication. This was combined with a more hidden communication network, intended to maintain the safety of the sender and the integrity of the content, which one participant labelled as *deep information*. To access these communication flows required an invitation (and being vetted (most often) offline). So far, having observed Facebook, Twitter, Instagram and websites of the identified key actors, this surface information tends to be focused on general human rights advocacy. Interestingly, information about events (such as 8th of March gatherings or workshops) is broadcasted only *after* the events have taken place, and not prior the events (as would have been expected to attract participation). According to our participants, this is due to being acutely aware of being monitored online and the risk of attacks if broadcasted to the general public. It is in the back regions of communication channels where more sensitive information is communicated. Here *WhatsApp* groups and the dating app *Grindr* seem to be where so-called deep information flows. No doubt the community uses different communication channels differently to navigate their specific situation.

In conclusion, concerning research question 1 – how the community use ICTs in combination with other media and communication platforms and modes of communication – we witness and intricate communication repertoire in which ICTs have used the combination with other communication modes to mobilize and coordinate their lives as well as to advocate for LGBTQI rights. This seems to be organised around a division between intragroup organisation and support (so-called deep information), and broadcasting and human-rights advocacy (surface information). This is most likely due to how the community understands different affordances as well as risks of different communication platforms (i.e. research question 2). This is a community that is highly aware of risks of surveillance using ICTs and thus different communication practices are born out of how they perceive different platforms and modes of communication given the communication

ecology and the context of state-sanctioned homophobia in which they find themselves (i.e., research question 3).

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A Proposed Framework for Engagement through Entertainment

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Abstract: Activating citizens to engage in public participation initiatives has remained a central challenge. An approach that has received a considerable amount of attention over the last decade is to borrow concepts from games and play. The idea is to foster public participation by making participation initiatives more entertaining and hence enjoyable. This research aims to investigate whether entertainment-related participation has so far delivered on these expectations. As a step towards this goal, this paper proposes a matrix-based framework to structure past and future entertainment-related participation approaches, namely the matrix for entertainment-related participation (MERP). The framework makes a point in distinguishing between game and play as well as between basing the participation initiative exclusively on game or play and incorporating only a selection of components of either game or play. With this framework, we hope to both uniform the terminology used in this context and identify opportunities for future research.

Keywords: gamified participation, entertainment, civic games, playful participation, toys.

1. Introduction

Trusting in its presumed potential to teach civic skills and attract previously less-engaged by making participation more enjoyable, a great variety of entertainment-related approaches to public participation has been documented over the last decade. We argue that after a considerable period of exploring entertainment-related participation, it is time to take stock and reflect on the potential of the various approaches to foster public participation. As a step towards this overall assessment, this paper proposes a framework to categorize entertainment-related participation approaches.

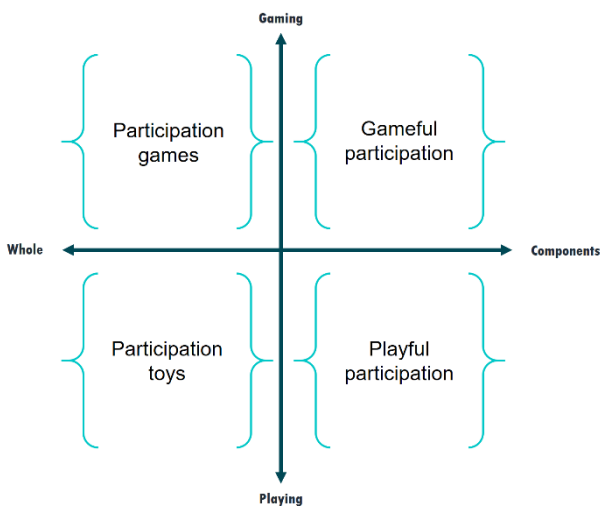
Previous work structuring the outcomes (i.e., applications, theories) of the intersection of games and public participation has reviewed (Thiel *et al.*, 2016), compared (Reinart and Poplin, 2014) and classified (Raphael *et al.*, 2010) such interventions before. Rather than providing an extensive overview of existing work, this paper aims to introduce a common terminology for referring to the various types of entertainment-related participation. The proposed framework can then be used to categorize existing work in this domain by reflecting the research-density indicate areas for future research.

To the best of our knowledge, our proposed framework is the first to categorize entertainment-related participation initiatives based on the type of entertainment they aim to implement. Our motivation to do so is two-fold. First, we aim to introduce a shared vocabulary to facilitate comparisons between individual works on the intersection of game research and public participation. Second, by classifying participation initiatives, we hope to help identify common patterns (e.g., pertaining results) as well as future areas of research.

2. Matrix of Entertainment-Related Participation

The proposed framework takes the shape of a matrix (see Figure 1) and has its origins in the matrix of entertainment design as used by Deterding et al. to delimit gamification (or gameful design) from play and games (Deterding *et al.*, 2011). Hence, the inferred name “matrix for entertainment-related participation” (MERP). The MERP framework is in line with Kapp’s (2012) distinction of three ways of capitalizing from games.

Figure 1: Visual Representation of the Matrix of Entertainment-Related Participation (MERP)



2.1. Axes of the Matrix

Based on the concepts represented by the poles of the two axes (game - play; whole - parts), the matrix divides works in the nexus of entertainment and participation into quadrants. Both axes of the matrix can be understood as a continuum.

The y-axis represents the continuum with gaming and playing as its respective poles. Play is essentially defined as a free activity (Huizinga, 1955). “Free” in the sense that one’s actions are based on self-initiative (Gilmore, 1971) and neither controlled nor directed by external variables. Play is seen as a set of activities that are not “done” but “played” (Huizinga, 1955) and is rarely associated with a desire to win, gain achievements or reach a goal (i.e., solving tasks). In contrast, games are defined by rules that give the game structure by specifying limitations and affordances (Juul, 2005). As rule-based systems, games almost always entail a strife towards discrete goals or quantifiable outcomes (Juul, 2005). We acknowledge that sometimes playful activities occur within

games and gameful activities are part of play. For the sake of clarity, we draw a sharp(er) line between the concepts of game and play. On a continuum (the y-axis in the matrix), play(ing) (third and fourth quadrant) defines free-form, exploratory and expressive behavior, whereas gaming (first and second quadrant) is characterized by structured, outcome or goal-oriented behavior.

The x-axis describes the extent to which elements from either gaming or playing are integrated into an intervention. When placed in either the first or fourth quadrant, the respective intervention merely employs a selection of game or play components (i.e., features, mechanics or design elements), making it either gameful or playful. With the boundary between games and (gameful) applications being both subjective and empirical (“use” vs. “play” an application (Deterding *et al.*, 2011)), an important distinction between games and gameful applications is their intention. While games usually seek to entertain the user, gameful applications ultimately serve another purpose such as conveying the importance of separating waste (= serious games), teaching a particular practice or concept (= edutainment) or motivating people to do and keep doing or certain activity (= gamification). Thus, in the MERP, applications should be categorized based on the developer’s/initiator’s intention and marketing.

Perpetuating the terminology used in the original matrix of entertainment-related design, participation initiatives that merely employ a selection of components characteristic to games (first quadrant; see Fig. 1) are referred to as *gameful participation* (or gamified participation; (Thiel *et al.*, 2016)). Those employing a selection of play-based components are referred to as *playful participation* (fourth quadrant). On the left side of the matrix, full-fledged games serving engagement purposes are denoted as *participation games* (referred to as civic games in previous works (Gordon, Michelson and Haas, 2016); second quadrant). Finally, interventions mainly encouraging play are referred to as *participation toys*.

2.2. Participation Games

Interventions falling under this category can be considered full-fledged games. They are structured to the extent that they either have explicit rules, goals that ought to be achieved or quantifiable outcomes. Most participation games have a defined end. Participation games can serve a variety of purposes. The majority of participation games has an educational focus (i.e., understand of concepts, foster civic skills); others are mainly deployed to raise awareness for a specific opportunity to engage. As with all games with a purpose, designers must master a tight-rope walk between making the game fun and achieving the underlying purpose.

Examples: Notable examples of digital participation games include *NextCampus* (Poplin, 2012). In this simulation game, players seek a suitable new location of a university campus. An example for role-playing games is *Participatory Chinatown* (Gordon and Schirra, 2011), where mechanics role-play are anticipated to achieve empathy and a better understanding of urban issues.

2.3. Gameful Participation

A gameful application is created by integrating components that are characteristic to games into “regular” applications while keeping the focus on the serious, non-game context (Deterding *et al.*, 2011). While at times blurry, the boundary between a game and a gameful application may be best

defined by the intended goals of the application and the respective activities (Wu, 2015). In contrast to games, where the (superficial) objective is to entertain players while engaging in public decision-making or conveying civic skills, the objective of gameful participation is foremost to attract users to opportunities of public participation and through game mechanics engage them (Wu, 2015). Their experience sought to be enhanced; ideally making them more willing to stay involved. Representing their core, mainly the game components determine the success of gameful applications. Before designing a gameful participation application it is hence vital to understand the impact of particular game components (Thiel and Ertiö, 2017).

Examples. *Täsä*. This mobile application follows a participatory sourcing approach and incorporates mainly reward-based game components (e.g., points, leaderboard) as well as a reputation system (Thiel and Ertiö, 2017). *TAB Sharing* is a web-based mobile application that allows to propose solutions to an issue within a community (Bianchini, Fogli and Ragazzi, 2016). It features game elements such as points, badges and levels.

2.4. Playful Participation

In contrast to gameful approaches, playful applications focus on free-play, where players may set their own goals and decide when they have accomplished one. Playful activities are said to develop on the spot (Fernaesus *et al.*, 2010). Hence, behavior within playful participation initiatives tends to be unpredictable allowing for unexpected uses and interpretations. This unpredictability might make it difficult to draw conclusions and action plans from playful participation applications (cf. (Poplin, 2012)). Yet, the exploratory nature of play allows for experimentation and helps understand broader concepts. Play enables people to express their opinion, views and ideas more adequately and truthfully (e.g., through toolboxes or building blocks (e.g., Minecraft¹)).

Examples: *NextSuisse* was a web-based initiative to inquire how the Swiss envision their cities in the future (Thiel, 2017). Via the “town configurator” users could drag and drop elements such as greenery, housing and infrastructure onto a faithful representation of their town. *B3- Design your marketplace!* follows a similar concept as *NextSuisse*, but focuses on a specific marketplace (Poplin, 2014). Users can create their design, share and discuss it with other users.

2.5. Participation Toys

As the facilitator of play in its purest form, toys are not bound by any rules and not restricted in their use (Newson and Newson, 1979). Toys can influence play (Varney, 1999); the design provides affordances that point to potential use/play scenarios (e.g., a detailed model of a firefighter truck). Toys aiming to promote public participation should be designed with a particular goal in mind and direct play while ideally still allowing free (re-)interpretation (Varney, 1999).

Designing toys requires imagination and inventiveness in a process that potentially challenges known constructs (i.e., social, economic, physical aspects of everyday life) (Provenzo and

¹ Minecraft - <https://minecraft.net/en-us/>

Provenzo, 1979). Such a process might prove useful when seeking novel ideas. To that end, participation toys developed by citizens themselves can be understood or appropriated as cultural or situational probes in order to encourage discussions or as inspiration to generate further ideas. Certainly, the concept of participation toys needs further developing and – ideally empirical – validation.

Examples: Albeit not enabling participation in public decision-making processes, the artefacts making up the ZWERM system (Laureyssens *et al.*, 2014), namely the tree and sparrow, can be seen as participation toys. Technically being parts in a game augmenting community participation, these artefacts alone may encourage communication between both citizens and authorities.

3. Conclusion

This paper introduces the matrix of entertainment-related participation MERP. This proposed framework offers a structured way to look at opportunities to introduce entertainment or entertaining elements to initiatives that seek to facilitate communication between official entities and citizens. By way of distinguishing between different types of entertainment, we hope to facilitate both comparisons of such participation initiatives and identifying opportunities for future research. As the next step in our research agenda, we plan to apply the MERP framework to create a structured overview of entertainment-related participation initiatives. The aggregated findings for the four types will then be compared to estimate the potential of individual entertainment participation approaches and rate the potential of identified gaps in current research.

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Bridging between Policy-Making and Academic Research: A Within-Case Analysis of the International Rankings for Justice

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Abstract: This paper aims to demonstrate the added value of academic and scientific research in policy-making through the presentation of a multidisciplinary mixed methodology. This approach is illustrated with a specific study on the judicial system as an enabler of economic development and growth. The purpose was to understand how judicial systems facilitate economic development and growth, identify the factors explaining this relationship, and act upon them in order to improve the ranking of a country in European and international Justice indexes. As such, our objective is to contribute to an ongoing reflection concerning innovative methodological approach and techniques anchored in multidisciplinary perspective for policy-driven research.

Keywords: academic research, research-driven policy, methodology, justice, economy

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1. Introduction

The practicality of scientific research for policy-making is not yet fully understood and explored. While there is significant evidence of contributions of scientific research for policy-making, researchers are still advocating the added value relying on rigorous methodologies and evidence-

based conclusions. In this paper, we argue that to bridge academic research and policy-making an effort is needed at the approach and methodology level. The purpose of this paper is to demonstrate the added value of academic and scientific research in policy-making by adopting a multidisciplinary mixed methodology. The rationale was to understand how judicial systems enable economic development and growth and what are the factors explaining this relationship.

This paper aims to contribute to an ongoing reflection concerning methodological approach and techniques anchored in multidisciplinary perspective for policy-driven research. The first section presents the case analysis of the justice for economic development and growth. The second section describes the methodology specifically developed and defined for policy purpose. The last section is a discussion of the approach and methodology developed as a bridge between scientific research and policymaking.

2. Justice for Economics: A Within-Case Analysis for Policy-Modelling

This section is dedicated to the description of the context and background of the country-case study. Firstly, we focus on the literature review on the topic of Justice for Economics, emphasizing the bidirectional relationship between these two fields. Secondly, we present the four main factors that explain the relationship between Justice and economic growth.

The scientific contributions allowed to better understand the relationship between Justice and economic growth that can be qualified as bi-directional depending on the school of thought. Justice and Economy share important relationships that are influential for countries, both at national and international levels. This is a relevant topic for most countries that are affected directly or indirectly by crises or difficult economic situations. In the economic literature, we find the suggestion that strong judicial systems, particularly effective, independent courts, promote investment and economic growth (Hasan, 2011; La Porta et al. 1999; Feld & Voigt, 2003; Klerman, 2007). For Hasan (2011), for example, rule of law and strong legal systems are considered a precondition for sustained economic growth. Feld & Voigt (2003) studied the relationship between legal enforcement and economic growth. Other studies (Acemoglu, Johnson & Robinson, 2005; Klerman, 2007; Hasan 2011; Bruinshoofd, 2016) demonstrate a reverse relationship. The effort to improve the quality of the judiciary and to strengthen the court system is presented as a consequence of the economic growth and not a cause. Basically, the researchers state that judicial independence may not be a cause of economic growth and some mechanisms exist to compensate for weak judicial independence. However, as soon as economic growth starts without a solid judicial infrastructure, it may demand a better judicial system and more quality in courts. In this matter, most of the studies recommend that the judiciary continues to support economic recovery, development, and growth.

The scientific literature allowed as well to identify and define important factors from the judicial system that directly impact the economic development and growth such as the Rule of Law, Legal Enforcement, Judicial Independence, and Institutional Performance.

The “Rule of Law” is defined as a “concept [that] seeks to ensure that government power is limited and that individual rights are protected. The essence of the rule of law is the sovereignty or supremacy of law over people and governments. [...] it is a guarantee of freedoms, human rights and equal treatment before the law” (Watson, 2003: 4). Independent, impartial and efficient judiciary contribute directly to improve and consolidate the rule of law. It is operationalized, for example, by the availability of ethical and well-paid judges, isolated from legislative and executives branches of the government, enough judges to avoid delay, advised by competent, well-paid and ethical lawyers (Posner, 1998; Hasan 2011).

The “Legal Enforcement” measures the time and cost for resolving a commercial dispute through a local first-instance court as well as the quality of judicial processes index, evaluating whether each economy has adopted a series of good practices that promote quality and efficiency in the court system. La Porta et al. (2001) argue that strong legal enforcement could be a substitute for weak rules and highlight the importance of mechanisms of contract enforcement. Indeed, clear and predictable rules, transparency in procedures, and third-party enforcement of the complex impersonal contractual relations are necessary for the expansion of markets and economic growth (Hasan, 2011).

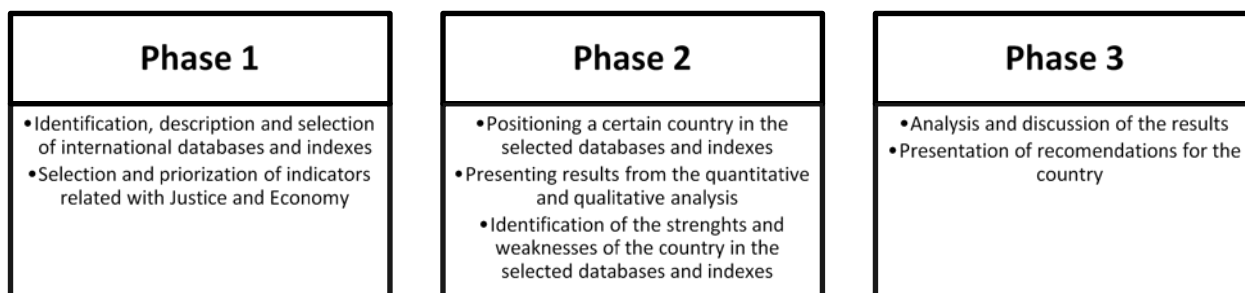
The “Judicial independence” is one the most cited factors when examining the relationship between Justice and Economy (Klerman, 2007). It is presented as one of the most important elements of justice effectiveness. It provides opportunities to the business world and investors and reassures that the court and the justice system will not systematically be in favour of the government. According to La Porta et al. (2004), countries with independent justice systems are more likely to strongly protect property rights and human and political rights that can boost economic development. Feld & Voigt (2003) divide it in *de facto* independence (encompassing variables like the average length of actual judicial service, whether salaries have been eroded by inflation, and how often laws relating to courts have been changed) and *de jure* independence (including variables as life tenure and appointment by professionals). They conclude that *de facto* independence is strongly correlated with economic growth.

The “Institutional Performance” is highlighted by the relationship between institutional quality and economic performance (North, 1990; Acemoglu, Johnson & Robinson, 2001, 2002, 2005; Easterly, 2003; Bruinshoofd, 2016). Clear interdependence and interrelationship exists between the two constructs. According to North (1990), institutional quality improves with limitations imposed on executive power, which may be either formal rules or informal constraints and their strength is shaped by the characteristics of enforcing them. That ensures individuals, entrepreneurs, and business to be protected by law in their ventures and their investments in capital as well as new technological endeavours. Bruinshoofd (2016) argues that institutional quality and economic development reinforce each other over the longer term, but the first “leads this virtuous circle”.

3. Research Methodology

In order to demonstrate how can scientific research be useful for policy-modelling and policy-making, this section is dedicated to the methodological approach developed. The steps leading the research are depicted in Figure 1.

Figure 1: Phases of the Study



The first phase consists of the research and identification of European and international databases and indexes related to the Justice sector. A database was developed to organize the collection and to describe the main characteristics of each of these databases and indexes. The indicators to be studied were classified by priority based on a set of criteria defined using a Delphi approach (obtained from consultation with a specialist in the economic area). This filtering process of indicators led to the focus on a set of representative databases: from the Council of Europe (European Commission for the Efficiency of Justice - CEPEJ), the European Commission (Justice Scoreboard), the World Economic Forum (Global Competitiveness - GCI) and from the World Bank (Doing Business and Worldwide Governance Indicators - WGI)¹.

The difference between purely scientific and policy-driven research arises in the tradeoff between the important set of data collected and the systematic analysis and realizing the strict deadlines of the policy approach. In this regard, we advocate for a leveraging combination of quantitative and qualitative methodology and techniques. In our case, an extensive quantitative analysis was performed on the data from WGI and consolidated with a qualitative analysis performed on the other data collected from CEPEJ, Justice Scoreboard, GCI, and Doing Business. This choice was facilitated by the completeness of the WGI database to cover the factors identified in the literature, as well as to the length of the observation and the coverage of the study. The data reports to governance indicators for over 200 countries and territories over the period 1996–2016, thus allowing us to implement a panel data analysis comprising both the time series (across the years) and cross section (across the country). An exhaustive quantitative analysis was performed including: (1) a factor analysis to select series of data; and (2) a Structural Equation Modelling

¹ For further information about the databases, see respectively: <https://www.coe.int/en/web/cepej/>; https://ec.europa.eu/info/strategy/justice-and-fundamental-rights/effective-justice/eu-justice-scoreboard_en; <https://www.weforum.org/reports/the-global-competitiveness-report-2017-2018>; <http://www.doingbusiness.org/>; <http://info.worldbank.org/governance/wgi/index.aspx#home>.

(SEM). The first method searches for joint variations in response to unobserved latent variables. Thus, from approximately 30 individual data sources (i.e., the sub-indexes), we were able to identify which factors have the greater uniqueness that should be taken into consideration. The SEM was then implemented to observe the relationship between the theoretical construct by presenting a path coefficient showing a structure for the covariance between the observed variables and latent variables (Hox & Bechger, 1995). In the context of this study, the purpose was to investigate which one among the policy variables (GCI, Doing Business index and WGI) was the most important for policy recommendations.

The second stage consists of determining how a country will improve its overall ranking. The purpose is to observe and draw the detailed portrait of a studied country, to position it and identify its strengths and weaknesses. The objective is to be able to identify and prioritize the most relevant indicators and to act upon them for a specific country. For that, qualitative tools and techniques (SWOT analysis, Justice process modelling, 5 Whys technique, issues registers, cause-effect analysis, etc.) and quantitative methods (factor analysis, Pareto analysis, regression analysis, SEM, etc.) are leveraged and adapted from different disciplines to support the classification of the factors that will provide the most important impact.

The third and final phase consists of benchmarking other countries for a potential solution as well as discussing the results obtained and focused on the presentation of recommendations resulting from the analysis. In policy-driven research, the recommendations have to take into consideration implementation factors such as time, performance and cost.

4. Findings and Discussion

Based on a specific study of improving justice for economic development and growth, we presented an approach on how to leverage and build on scientific and academic research to contribute to policy-modelling. Therefore, the process adopted allowed us to highlight the most important contributions that scientific research can bring to policy-makers by trying to bridge these two traditionally separated realities. First of all, scientific research is useful for policy-modelling by providing evidence-based contributions for a specific area. In this sense, by conducting a rigorous literature review, it is possible to identify the major factors that interact with each area on a certain topic. In the case presented, it leads to the identification of four most important factors (Rule of Law, Legal Enforcement, Judicial Independence, and Institutional Performance) that need to be considered when looking at the bilateral relationship between Justice and Economy. The scientific research facilitated to operationalize the factors and linking these variables to concrete measures in the databases. In addition, the methodology is built on a multi-disciplinary perspective, adopting and adapting tools and techniques from different approaches in order to reach the objectives. It enables to position and analyse in-depth a certain country in a series of databases and indexes with a literature review as a solid background for the selection. The data analysis, both with quantitative and qualitative approaches, enabled to prioritize the specific needs of the country under investigation. In fact, it provides concrete outputs that bring added value on a continuous basis and that are important in the long term, namely the full listing of relevant databases and indexes. This list provides relevant elements about each of them, including

information about the indicators that ground the international evaluations of the countries' performance. Moreover, the compilation of indicators provides a clear picture of which are included in the databases and indexes as well as which are most common when considering the evaluation of a certain area at the national level but with the international framework as background (as, in the Justice sector, elements such as courts budgets and expenses, disposition time, pending cases, to mention a few). After the analysis and discussion of the results, it is possible to draw recommendations that will be useful for policy-modelling and policy-making by providing clear guidance for specific objectives (such as improving the country's position in a certain ranking), integrating factors such as time, impact level, and cost. Last but not least, this paper aims at demonstrating the usefulness of scientific research for policy-makers departing from a case study. Nevertheless, the approach used to this end has the potential of being adapted to other fields and countries, as well as to cover other databases and indexes depending on the type of data available and the overall objectives of the study. Ultimately, the goal is to walk towards transparent, conscious, and accountable policy-modelling and policy-making by means of strengthening the ties between policy-makers and scientific researchers.

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Social Investors as Enablers of Social Innovation and Social Innovation Research

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Abstract: Social innovation requires traditional approaches to the generation of beneficial social and economic outcomes to be replaced by new practices. This challenging task has increased demand for research on how organizations can navigate their dual commercial and social identities. However, it is unclear whether such organizations can adequately satisfy the demands of both identities over time; past studies on the organizational outcomes of duality rely on smaller sample sizes and tend to focus on the impact of intra-organizational activities on duality. To potentially overcome these issues, we propose taking a social investor perspective when conducting research in this field. We provide an example of a study which takes the perspective of early-stage social investors. Inductive analysis of the venture-investor relationship in over 1,000 investment proposals over five years revealed how social investors increase social ventures' abilities to satisfy the demands of both identities over time.

Keywords: identity duality, hybrid organizing, impact investing, investor decision-making, case study

1. Social Innovation and Identity Duality

Identity duality—a type of organizational hybridity—occurs when organizations combine two or more identities which would not normally be expected to go together (Albert & Whetten, 1985; Battilana, Besharov, & Mitzinnneck, 2017; Pratt, 2016). While these types of organizations have existed for centuries, one type of organizational duality—combining a social welfare and commercial identity—has become particularly interesting to practitioners and scholars in recent decades (Battilana & Lee, 2014). Simultaneous changes in philanthropic (Mair & Hehenberger, 2014; Salamon, 1993) and business spheres (BlackRock, 2018; Margolis & Walsh, 2003) have pushed organizations in this space to propose new practices and adapt traditional approaches to the generation of positive social and economic outcomes (Austin, Stevenson, & Wei-Skillern, 2006; Baumol, 1990).

These developments have increased demand for research on how organizations navigate dual commercial and social identities. However, the literature does not converge on whether (1) dual-identity organizations can adequately and sustainably satisfy the demands of both identities, and

(2) whether dual-identity organizations are able to *improve* their ability to sustainably satisfy the demands of both identities over time.

One set of studies suggests that hosting two different identities within a single organization may lead to tension (Pratt & Rafaeli, 1997), conflict (Ashforth & Reingen, 2014; Glynn, 2000), hybridity collapse (Ebrahim, Battilana, & Mair, 2014; Yue, Wang, & Yang, 2018) or organizational failure (Tracey, Phillips, & Jarvis, 2011). Emerging research, on the other hand, suggests that duality may not always lead to discord (Kraatz & Block, 2008). For example, researchers found that dual identities might be both compatible and complementary (Besharov & Smith, 2014), helping to reinforce the dual identity of individuals in organizations (Besharov, 2014) and the organization as a whole (Jay, 2013; Murray, 2010). Duality within organizations may even facilitate growth, adaptation and innovative outcomes in the wider industry (Anthony & Tripsas, 2016; Haveman & Rao, 2006; Mair & Hehenberger, 2014; Rao, Monin, & Durand, 2003). As such, there is increasing evidence that some organizations proactively seek to introduce and maintain duality within their own organizations (Ramus, Vaccaro, & Brusoni, 2017; Smith & Besharov, forthcoming). But if organizations *are* intentionally developing and maintaining features of duality, what they perceive as an ideal model of duality—how organizations can adequately and sustainably satisfy the demands of dual identities—is still unclear.

2. Social Investors as a Window to Identity Duality

One reason for the conflicting findings on organizational duality may be the literature's reliance on conceptual work (Dacin, Dacin, & Tracey, 2011). Existing empirical studies on organizational duality are based on smaller sample sizes. Moreover, despite the fact that organizations depend on exchange relationships to survive, prior research tends to focus on the role of *intra*-organizational activities (for an exception, see: Glynn, 2000).

We propose that the perspective of *social investors* has the potential to provide insight on how to evaluate hybrid organizations' ability to adequately satisfy the demands of both identities over time. The perspective of these influential and experienced third-parties allows researchers to empirically observe, not only a great number and variety of dual-identity ventures but, a *complete* population of successful and unsuccessful ventures—those which received funding and those which did not. This provides a window into how different hybrid organizations in similar settings (the social ventures) manage and overcome the potential drawbacks of duality while avoiding survivorship and selection bias (Denrell, 2005). Furthermore, since social investors “provide capital and value-added activities” to “social enterprises which exhibit a potential for a high social impact” (Scarlata & Alemany, 2010: 123–124), the perspective of social investors provides more than a dualistic organization's perspective; it also provides the perspective of an organization which has developed expertise in evaluating hundreds of dual-identity organizations per year. Finally, funding outcomes in social investing can serve as a performance proxy since hybrid contexts make organizational success difficult to define and measure (Battilana & Lee, 2014).

3. Example Study: Evaluation Strategies of Social Investors

In this study, we sought to understand *how early-stage social investors evaluate and act upon investment proposals*. We negotiated access to a social investment firm based in a major city in Western Europe in the 2010s (hereafter: *the firm*). Interactions with the firm at associated conferences and analysis of their 15 portfolio companies suggested they sought equity investments in social ventures – young, growth-oriented companies which rely on commercial revenue models to pursue social and/or environmental missions (Randjelovic, O'Rourke, & Orsato, 2003; Santos, Pache, & Birkholz, 2015). This orientation suggested that they had developed expertise in assessing whether social ventures could adequately and sustainably satisfy the demands of both their commercial and social identities.

Due to the research topic's subtle and poorly understood nature, we adopted a longitudinal, inductive case study approach (Miles & Huberman, 1994; Yin, 2013). We followed the firm for 21 months, including 6 months of on-site fieldwork. Field notes and transcriptions from the fund's internal meetings served as our main data source, which we triangulated with interview data, archival data and third-party sources. Overall, we were able to access data on over 1,000 venture investment decisions. We analyzed this data in an iterative process, proceeding first with open coding and then to axial coding, allowing themes and categories to emerge from the data in dialogue with the literature (Corbin & Strauss, 2008; Gioia, Corley, & Hamilton, 2013).

We found that the firm exhibited behaviors which were both conventional and surprising. First of all, the firm upheld mandates of both identities, seeking investments in ventures that were more market-driven and growth-oriented than traditional nonprofits but more socially conscious than traditional businesses and with the potential to have profound impact on social issues through profitable sales of its product or services (Höchstädter & Scheck, 2015; TechCrunch, 2017). The firm avoided prioritizing social outcomes over commercial outcomes and vice versa, seeking organizations with the potential to adequately satisfy the demands of *both* identities over time.

What surprised us was the firm's intuitive application of varied engagement strategies. The firm developed language to describe ventures which the firm perceived as more vulnerable to prioritizing the needs of one identity over another and avoided investing in these. But the firm did *engage* with these ventures, implementing two strategies to decrease these ventures' trade-off hazard and *improve* these organizations' potential to adequately satisfy the demands of their dual identity over time. These two evaluation strategies were time- and social capital- intensive but helped firm to identify – and potentially, co-create – promising investment opportunities.

4. Study Takeaways

This study demonstrates how inter-organizational activities (between the firm and evaluated ventures) affect the formation and maintenance of dualistic identity in early-stage organizations, with implications for investors, dual-identity organizations, and other third-parties seeking to promote social innovation.

- *Investors*: Supporting ventures prior to making an investment decision in a less transactional way can help ventures, provide the investor access to exclusive deals, and play a vital role in building the venture-investor relationship (see, e.g, Huang & Knight, 2017)
- Dual-identity organizations: The right kind of strategies and support in early stages of the organization's life may help dual-identity organizations survive, avoid conflict and improve performance.
- Third-party support: Third-parties (with similar, aligned values) can help dual-identity organizations improve their ability to adequately and sustainably satisfy the demands of both identities over time.

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PhD Colloquium

An Integrative Look on Citizen Participation in E-Government

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Abstract: E-government historically refers to the use of information and communication technologies to improve the delivery of information and services by government to its users. However, in the last years, both research and practice have tried to identify what will be the “next stage” of e-government. Although some advocate for a continuous improvement of service delivery, others state that e-government should enable a governance shift and enable citizen participation. In recent years, there has been a profusion of research from diverse research fields about citizen participation (public administration, open government, smart city, ...). The goal of this thesis is to formalize participation categories, starting from these fields, and to integrate them into an evaluation framework: CitiVoice. Then, this thesis will propose a usable methodology for one specific category of CitiVoice: the Co-Creation of e-government Services.

Keywords: Citizen, Participation, e-Government, Integrative look

1. Introduction

Historically, e-government refers to the application of ICT to improve the delivery of services and information by the government to their users (citizens, businesses or other governmental bodies) (Andersen and Henriksen, 2006). However, the governance model in government has consequently also evolved: ICT empowered the citizens, often relegated to passive user status, to have more control in the decision-making process and more impact in the tasks of administrations. Indeed, e-government does not simply enable a better service delivery but also enables citizen participation. As Lawson-Body et al. (2014) already nicely expressed, there are two streams of research about the role of citizens in e-government. On the one hand, the electronic democratization theorists link e-government to e-participation and the electronic democratic process. On the other hand, the economics theorists focus on efficient and effective service delivery through electronic means. However, the consideration of citizens as participants is not limited to the e-government field but can be found in several research fields such as public administration, open government, e-participation and smart cities.

In this context, my thesis aims to formalize citizen participation categories from these research fields and to provide a usable methodology to enable this participation in the development of e-

government services. Therefore, this thesis seeks to answer two research questions (RQ): the high-level RQ of “How to structure the literature about citizen participation in e-government, taking into account related research fields?” and the operational RQ of “What are the most appropriate methods to include the citizens in the co-creation of e-government services?”. The remainder of the document is structured as follows. The “Related Work and Theory” Section exposes the most important concepts that will be used throughout this thesis. In the same section, I underline the potential relevance of this thesis for research by identifying research gaps. In the “Methodology” section, the overall methodology that guides this thesis is detailed. In the “Preliminary Results” section, I present the two main outputs of the thesis so far: the CitiVoice Framework structuring citizen participation and the Co-Creation Methodology, which takes the form of guidelines to include citizens in the development of e-government services. In the “Conclusion” section, I discuss possible implications for research and practice as well as expose some leads for further research.

2. Related Work and Theory

2.1. Background

The background evaluation reveals two conceptions of the citizens in e-government: some authors consider citizens as customers and some consider citizens as participants. This role of citizens as participants has often been characterized as “e-participation” in the e-government literature. However, e-participation is often reduced to the democratic participation of citizens in decision-making or policy design through ICT means. In this thesis, I advocate for a reconsideration of other under-investigated forms of participation and a refuelling of the e-participation field from different research fields. Medaglia (2011) contributes to the characterization of e-participation but clearly states as a limitation of his work that he focuses on issues of ICT for democratic decision-making and not on all participatory processes. In line with this goal of extending of citizen participation to other fields, some key research fields in literature can already be identified. In the public administration literature, there have been seminal attempts to define participation such as Arnstein (1969). Furthermore, the view of citizens as participants also heavily refers to the co-creation and coproduction concepts (Galvagno et al., 2014). In this perspective, Linders (2012) describes the re-emergence of citizen-coproduction through the introduction of new ICT possibilities. From an IT perspective, citizen participation in e-government heavily relates to the consideration of end-user involvement in the design, development and evaluation stage of an IT project as discussed by Gil-Garcia and Pardo (2005). In recent political trends, citizen participation is also closely related to the participation and collaboration concepts of the “Open Government” movement (Gil-Garcia and Pardo, 2005). The best advocate for an increased citizen participation resides in the smart city paradigm (Caragliu et al., 2011). Recently, smart cities have become more popular than ever because they provide new solutions in the domains of mobility, environment, economy, governance, quality of life, and education, through the innovative use of ICT (Caragliu et al., 2011). As Vivale Pereira et al (Viale Pereira et al., 2017) state, the defining difference between e-government and smart city concepts resides in the increased focus on stakeholder collaboration and participation. In their attempt to suggest a research agenda for smart government, Scholl and

Scholl (2014) also underline the need for the e-government paradigm to evolve and to integrate participation in order to tackle the challenges that modern cities aim to face.

To conclude this background, the concept of citizen participation is not exclusive to a specific research field, but each field can shed new light on this concept and provide new means to enable citizen participation.

2.2. Research Gaps

After performing the background evaluation described in the previous sub-section, I was able to identify research gaps that this thesis will attempt to fill by means of future research:

Gap 1 - Lack of a formalization of citizen participation categories: A major problem with the “citizen participation” research field is its lack of integrative analysis. Citizen participation refers to the participation of citizens in all forms but is often reduced to democratic participation (often referred to as e-participation or e-democracy). Further research should be conducted to determine other forms of participation, fuelled by insights of other research fields. Furthermore, the need for appropriate evaluation tools and metrics is emerging to structure and evaluate this participation, but there is still a gap in scientific literature regarding this emerging need.

Gap 2 - Lack of methodology and narrow scope for participation methods: Even though the necessary formalization discussed in Gap 1 can help to structure the exploration for enablers of citizen participation, it will not give complete information about the implementation of each participation category into participation methods. Through a literature analysis, I was able to identify a number of methods. However, these methods were not integrated into a complete methodology potentially usable by policy-makers. Furthermore, regarding the participation methods themselves, a striking observation is that almost all methods used to develop e-government services with citizens focus on small-scale participation with methods based on participatory design, user-centred design and user innovation. This finding has two implications. Firstly, regarding small-scale participation, there is only a limited consideration for other innovative methods to operate citizen participation in the e-government domain, such as creativity in requirements engineering, agile software development methods tailored to e-government, and gamification to name a few. Secondly, even though small-scale participation is necessary to define the research field, it is essential to enable large-scale participation due to the large heterogeneous user group in e-government.

Gap 3 - Lack of an understanding of “the citizens”: I adopt the point of view that there are four main groups of stakeholders in the citizen participation research field: public servants, political representatives, software developers, and citizens. In this thesis, I wish to analyse participation by integrating all stakeholders. However, the term “citizens” is often used without a proper definition. I suggest investigating this abstract term in future research. A taxonomy of the profiles of citizens and their importance in participation are necessary. A good start could be to determine at a larger scale how citizens would like to be considered in e-government (e.g., Do they care about participation or are they satisfied with an effective and efficient service delivery?). When the term “citizen” is used, it is often linked to the “end-user” concept. Regarding the

participation of citizens as end users, the question of “Who to include?” is crucial: their profile, their digital literacy, their skills or their representativeness are all issues that will impact the implementation of participation and the methods applied.

Gap 4 - Lack of consideration for all stakeholders: As stated above, citizens are essential within citizen participation, but public servants, software developers, and political representatives are also impacted by this change in governance. As little is known about their drivers, opinion, and operational barriers for participation, an extension of the research domain to all stakeholders would be beneficial to truly reach an integrative analysis. Furthermore, e-government research focuses on praising the benefits of citizen participation without mentioning the possible negative effects of this participation if not implemented properly by these stakeholders. Pre-conditions for participation are, in that respect, essential to tackle and could be identified by considering this extended group of stakeholders. This knowledge about pre-conditions will allow implementers to design a more integrative process for participation.

This thesis wishes to research citizen participation in e-government in an integrative manner in two main ways. First, I want to identify all means by which citizens can participate in e-government from different research fields (Gap 1 and Gap 2). This will mainly fuel the design of the CitiVoice Framework. Second, I want to perform this identification by integrating all stakeholders impacted by this participation (Gap 3 and Gap 4). Building on the participation categories and methods identified before, answering these two gaps will mainly fuel the co-creation process.

3. Methodology

In the research design of this thesis, I heavily rely on three different research methodologies; Design Research, Case Study and Action Research.

Fig. 1: Overall Methodology

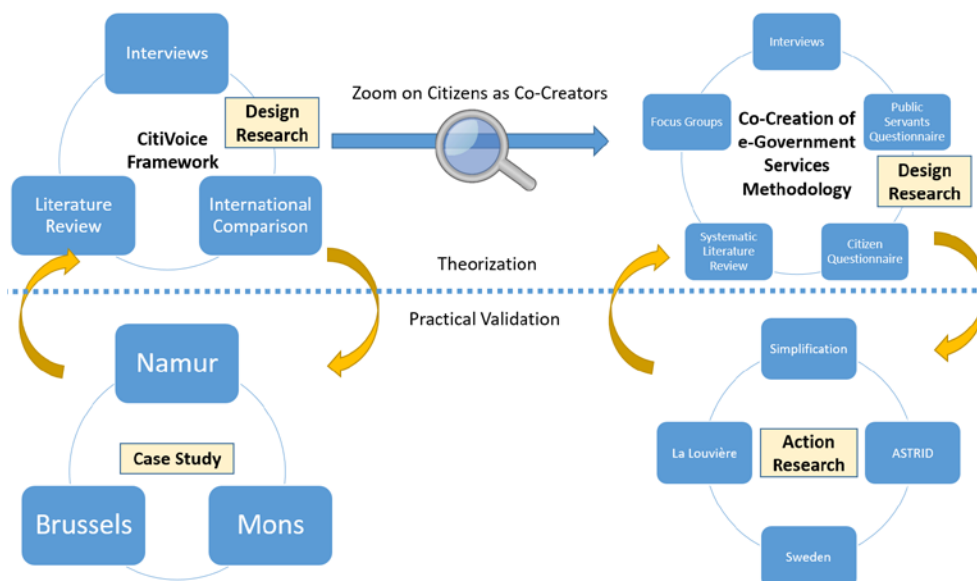


Figure 1 represents the overall methodology I intend to follow in this thesis.

Applying design research, I iteratively build the research outputs (CitiVoice and Co-Creation Process) through the iteration of different Design Cycles. To meet space restrictions, I do not expand here on the Relevance Cycle and the Rigor Cycle. Each performed Design Cycle allows refining the different artifacts (constructs, metrics or guidelines) of these results. Furthermore, several validation cycles of the design research rely on the testing of the results in a real-life environment through case studies and action research. For CitiVoice, the framework is iteratively tested through three case studies without intervention from the researcher. For the Co-Creation process, it is tested through four Action Research activities.

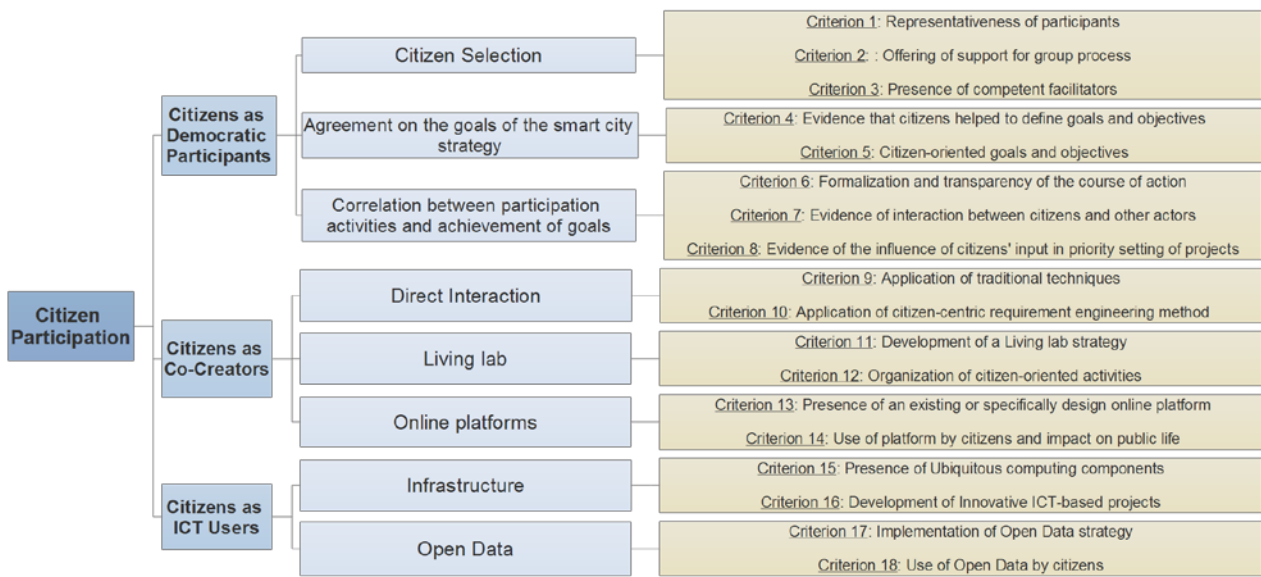
To sum it up, the research design consists of four main quadrants. In the first Phase of the research (Theorization of CitiVoice), I identify the different main participation categories and reorder them into the CitiVoice framework. The framework is built following design research with three design cycles: Literature Review, International Comparison and In-Depth Interviews. In the second Phase of the research (Validation of CitiVoice), I perform practical design cycles to iteratively improve CitiVoice through the case studies of Namur, Brussels and Mons. In the third Phase (Theorization of Co-Creation Process), I zoom on one specific participation category of CitiVoice: the citizens as co-creators of e-government services. This zoom allows aligning with operational considerations whereas the framework is more theoretical. Consistent with design research, the Co-Creation Process is iteratively built thanks to a cycle of several research activities: a systematic literature review, interviews and a questionnaire sent to public servants, and a questionnaire sent to citizens and focus groups. The fourth Phase of the research (Validation of Co-Creation Process) refers to the validation of the Co-Creation process thanks to its application to four action research activities where I will get the chance to test it in real-life conditions (in the city of La Louvière, the Walloon administration of eWBS, the federal emergency system ASTRID, and a potential research stay in Sweden).

4. Preliminary Results

4.1. CitiVoice Framework

The section summarizes the elements and uses of the CitiVoice framework. More details on the results can be found in (Simonofski et al., 2017a). CitiVoice consists of three main categories of citizen participation that I formalized through an extensive literature review from different research fields. Firstly, citizens can be democratic participants in the decision-making processes of the city. The criteria in this category aim to verify that citizens' opinions indeed have an impact on decision-making. Secondly, citizens can be co-creators in order to propose better solutions and ideas and to decrease the risk of failure early in the process. Finally, in the post-implementation phase, the citizens can also participate as ICT users by proactively using the smart city infrastructure to enable them to participate more easily. Figure 2 synthesizes CitiVoice, the three participation categories as well as their reflection into criteria.

Fig. 2: CitiVoice Framework



I improved CitiVoice by applying it to the designs of the smart city strategy of three cities that have undertaken citizen participation activities (Mons, Namur and Brussels). CitiVoice can be used ex-post as an evaluation tool to assess a smart city strategy. This evaluation refers to the analysis of the strategy of one city along all the criteria of the framework. It can be used ex-ante as a governance tool for government officials who want to invest a citizen-oriented smart city strategy. In that respect, the criteria can be considered as guidelines for implementation. It can be used as a comparison and creativity tool by enabling comparative analysis of best practices for one criterion or category across different smart cities. These comparisons allow differentiating by which means different smart city strategies can ensure citizen participation and designing new means based on this comparison. I will undertake further research to improve CitiVoice. On top of applying it to a higher number of cities, I wish to improve the metrics that evaluate citizen participation. Although the current simplicity (based on a 0/0,5/1 scale) facilitates the use of CitiVoice, it may be necessary to have individual and more precise metrics for each criterion to provide a more specific evaluation in order to limit threats to validity. This implies the further elaboration of theories on citizen participation, as no ready-made set of metrics is available today for all categories. The metrics could furthermore be improved according to a maturity model for evaluating each criterion.

4.2. Citizens as Co-Creators of E-Government Services

In this section, I focus on one specific participation category: citizens as co-creators. The goal is to provide a usable methodology to collect citizens' needs and requirements and to give a more operational contribution to the thesis. In order to align this methodology with stakeholders' needs as much as possible, I chose to take the specific case of the co-creation of e-government services.

Before designing the methodology, it is essential to focus on the context of the research and of practice by identifying the different stakeholders and their link with co-creation. In order to understand the context of research, I have conducted a Systematic Literature Review (SLR) to

summarize all existing information about the participation of citizens in e-government service development and to depict the ecosystem of stakeholders in this field (Simonofski et al., 2017b). In order to have the context of practice, I follow a multi-methods approach to gain insights from all stakeholders: in-depth interviews and two online questionnaires (one sent to public servants and the other sent to citizens). Thanks to the interviews and the questionnaire sent to public servants, I was able to discuss the methods, drivers and barriers of practitioners regarding co-creation. For the questionnaire sent to citizens, the goal was to understand which factors (such as age, employment, or digital literacy) influence the role citizens would like to have in e-government (co-creators, customer, democratic participants). This will allow understanding their preferred methods and drivers for co-creation. One of the findings of context analysis was that public organizations sometimes lack an ideal setting to enable citizen participation in e-government. In order to identify the domain-specific challenges emerging in the introduction of a governance-shifting methodology, I chose to take the example of Agile methods and examine how these methods are tailored in an e-government context and how they tackle the domain-specific challenges (such as number of users, organizational, or regulation) of this field. In order to reach that objective, I scheduled three focus groups to understand how they tailor these methods, focusing on user participation. After identifying the potential challenges emerging in the implementation of an innovative methodology, I dug deeper into agile methods by focusing on its user participation practices, or in this case, on the participation of citizens in the co-creation of e-government services. After having established an inventory of participation methods (as well as their use in practice and their preference by citizens), the next steps I intend to undertake will be to connect them to a concrete setting to evaluate how the different organizational cultures influence the choice for a specific method. Therefore, I intend to rely on an emerging body of research that has already started to discuss how public sector values the influence the development of e-government services (Karkin and Janssen, 2014). The main output of this research activity would take the form of a "Matrix" that compares the different methods in function of the cultural elements of an organization. The practitioners will thus be able to choose a method in a more straightforward manner. After putting the different participation methods in context, I will focus on one specific method to be investigated in-depth and then tested in practice. These methods will then be validated by means of Action Research use cases as described in Phase 4 of my research (cf. Section 3).

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About the Author

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Solving Adaption and Coordination Problems of Networked E-Government Systems using Platform Strategies

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Abstract: Platforms have become a prominent phenomenon in many industries with well-known examples such as Apple and Google dominating the smartphone sector with their ecosystems of complementary apps. Recent streams of research have highlighted distinct characteristics of platforms such as facilitating exchange between distinct sides such as consumers and producer, by using platforms as means of generating economies of scope and scale or being able to generate innovations more rapidly. This research focuses on the question whether platforms can solve adaption and coordination problems that occur to different stakeholders during the ongoing development of networked e-government systems.

Keywords: platforms, bounded rationality, Transaction Cost Theory, Resource-Based-View, Real Options Theory

1. Introduction: Economizing on Bounded Rationality as the Main Problem of Organisational Theory

The basic premise of this research can be summed up by the statement of Oliver Williamson that “first-order economizing”, which is the “effective adaptation and the elimination of waste”, is “the central economic problem”(Williamson, 1991). This statement can be derived implicitly from Herbert Simons concept of bounded rationality (BR) that humans act “intendedly rational, but only limitedly so” (Simon, 1945), because human information processing capacity is quite limited (Foss, 2003). Therefore humans are faced with uncertainty in their decision-making (Hallberg, 2015) and use heuristics in order to economize on this restricted information processing capacity and can be influenced by personal or organisational bias, both resulting in errors and adaption needs (Foss, 2003; Hallberg 2015; Foss & Weber, 2016). A special case of this problem is expressed by transaction cost theory (TCT), which is concerned with transactions between actors and the transaction cost occurred by defining and conducting the transaction under the condition of BR. Transaction costs can be understood as the cost of defining and negotiating transactions (ex-ante transaction costs) and the cost of monitoring and renegotiating transactions and the cost of

persistent maladaptation (ex-post transaction costs) (Williamson, 1987). Based on this basic premise, the main problems addressed in the research can be described in the following way:

- **Adaptability of investments:** Organisations need to organise investments in a flexible way that allows them to change their strategy in the face of new information, which reduce uncertainties surrounding the investment since the initial decision-making is faced by problems based on BR.
- **Arrangements allowing efficient adaption and coordination:** Organisations are faced with transaction cost when coordinating tasks across different actors (individuals, sub-units, different organisations). Agreements are costly to negotiate and often impossible to fully specify in the face of BR and uncertainty. Therefore, transactions should be organised in a way that reduces ex-post transaction costs by making adaption and coordination more efficient.

While the vast majority of research on these problems focuses on companies, these problems are also highly relevant for the public sector and the development of networked e-government systems, since this usually involves a fast number of organisational actors and due to BR and uncertainty, is constantly faced with adapting needs that have to be coordinated with these actors.

There are even some additional problems faced by the public sector. One problem has been researched by Scharpf and related researchers (Scharpf, 1992; Scharpf & Mohr, 1994), who highlight that actors in the public sector are often forced into horizontal coordination due to exclusive resources and decision rights in a policy area, while the use of hierarchy is politically costly thus preventing options such as vertical integration in the private sector. Another problem refers to the legal obligations of public agencies to provide public services and the challenges faced when outsourcing tasks to independent actors and then having to deal with co-specialized knowledge and assets and small numbers bargaining (Williamson, 1991; 1987). The legal obligation leads to an unfavourable position for the agency when issues of adaption or coordination arise, thus risking persistent maladaptation. While not directly referring to BR and TCT, the empirical findings of Dunleavy et al. (2006) on negative effects of certain IT-management and outsourcing practices on e-government performance and the government IT-provider market can be clearly attributed to the described adaption and coordination problems combined with legal obligations of service provision.

The main research question is, whether platform strategies can solve these adaption and coordination problems for networked e-government systems. While the empirical examples of platforms are quite diverse, ranging from the modular production of cars to the vast ecosystem of apps in mobile platforms, there is common conception among practice and academia that platforms represent a new way of organising economic activities in a distributed way that can outperform vertical integration or classical contracting. Due to this, some initial research on platforms has been conducted on government-to-business platforms and public-private cooperation (Bharosa et. al., 2013; Klievink et. al., 2016), and some papers describe platforms as new e-government paradigm with labels such as “lean government” (Janssen & Estevez, 2013) and “government as platform” (Brown et. al., 2017). The goal of this research is to broaden the platform thinking in e-government, to understand fundamental structural characteristics und functions of

platforms and to identify governance and architecture challenges that need to be addressed when applying different platform configurations in government.

2. Foundational Assumptions and Theories Applied in the Research Project

The research project uses TCT, Resource-Based-View (RBV) and Real Option Theory (ROT) as its core theories and BR and uncertainty as foundational assumptions. While BR has been sufficiently explained, some further remarks are being made with respect to uncertainty, since the concept of true uncertainty is being used. Hallberg (2015) defines true uncertainty as a situation “where parties lack common probabilistic knowledge of the future events and outcomes that may affect the exchange relationship” and are therefore forced, “in the absence of other means of estimating the likelihood and value of economic outcomes”, “to exercise judgment in order to improve their heterogeneous cognitive representations of the economic environment”, which is again influenced by the use of heuristics and cognitive bias.

This explicit statement of foundational assumptions has two reasons. The first being good research practice in making the choice of theories transparent, since all of the used theories use BR and uncertainty to some extent as their core assumptions, thus making them good complementary theories for research as the combination does not overly increase the number of theoretical constructs (for an empirical and theoretical assessment see for example Zenger et. al., 2011; Crook et. al., 2013). The other being that these assumptions have consequences for the application of the theories, as none of the theories used in the research project make full use of the assumptions BR and true uncertainty (Foss, 2003; Hallberg 2015; Foss & Weber, 2016). This last aspect is briefly highlighted for TCT.

TCT in this research is used for analysing the performance of coordination mechanisms based on transaction characteristics such as asset specificity and uncertainty, thus staying close to the original concept of Williamson (1991; 1987). But due to the full application of BR and true uncertainty, this research does not assume a rational choice of governance forms based on transaction costs, but influenced by incomplete information, the use of heuristics and bias and subsequently corrected by iterative learning processes.

TCT is complemented by RBV perspective that organisations want to organise unique asset bundles in a value-enhancing way, thus highlighting which assets should be safeguarded against high transaction costs (Argyres & Zenger, 2012). ROT adds the idea of organisations wanting to minimize the risk of investing in fixed assets that could be maladapted to future events resulting from external uncertainty, thus choosing an organisational arrangement that allows the disinvest or increase investment depending on the negative or positive information that reduces external uncertainty (Crook et.al., 2013).

3. Core Platform Concepts used in the Research Project

Due to the multifaceted nature of platforms in practice and research (Gawer, 2014; Thomas et. al, 2014), three core concepts are presented and defined: Platforms as the structure of organising diverse activities, platform ecosystems as the broader term encompassing both the platform, the roles and activities surrounding the platform, and platform governance as regulating and relational activities and decision rights allocation.

3.1. Platform

For an initial understanding, two definitions that respectively emphasize value generation and organisational implications of platforms are highlighted here. Smedlund et al. defined platforms as “any virtual or physical venue that enables all participating groups to co-create and co-capture value by interactions which result in offering a system of products, services or both”, thus highlighting that the components (products or services in the broadest sense) exhibit high complementarity and therefore allow a common value creation that is larger than the sum of the individual components and individual organisation delivering the components (Smedlund & Faghankhani, 2015). The definition of Gawer is focused more on the organisation of this co-creation and co-capturing of value, defining platforms “as evolving organisations or meta organisations that: (1) federate and coordinate constitutive agents who can innovate and compete; (2) create value by generating and harnessing economies of scope in supply or/and in demand; and (3) entail a modular technological architecture composed of a core and a periphery” (Gawer, 2014).

While these two definitions emphasize different aspects of a platform, there is a common definition of a platform based on two architectural features, which was first identified by Baldwin and Woodward (2009). The first aspect is the architectural division of the platform modules¹ in a core and periphery, with the platform core consisting of modules with a high level of reusability (referring to the use by other modules) and low variability (meaning that the function is realized by one type of module) and very stable interfaces between core and periphery. The second feature is design rules embedded in these interfaces, which constrain dependencies between modules to the interface specification, while other forms of dependencies are ruled out, thus reducing the coordination need between the core and periphery of the platform.

This research additionally uses an integrative platform view developed by Gawer that classifies platform types based on the degree of openness of the platform interface to external actors, differentiating between an internal platform open to internal units, a supply chain platform open to supply chain partners and multi-sided platforms² (MSP) open to independent organisations.

¹ Modules are being understood here as a collection of components that “are powerfully connected among themselves and relatively weakly connected to elements in other [components]” (Baldwin & Woodard, 2009).

² MSPs have the additional special characteristic that they exhibit indirect network effects or so-called cross network effects (Haigu & Wright, 2015; Haigu, 2009; Katz & Shapiro, 1994), which can be understood by the additional value of the platform from the perspective on one platform actor based on the number of other users of another distinct

This view is important for the research, not only because it describes the different organisational boundaries of platforms, but also because it highlights the respective coordination mechanisms (hierarchy, contract and platform governance respectively) between the platform owner and the platform participants. It should be noted that these different platform types are usually not conclusive and at least from the perspective of the platform owner more open platforms such as supply-chain platforms or MSP always exhibit characteristics and participants of more closed predecessors.

3.2. Platform Ecosystem and Ecosystem Roles

While no clear-cut definition of platform ecosystems has been identified in the literature that could be applied to the presented understanding of platforms³, a working definition based on Tiwana (2015) and Altman & Tushman (2017) and related literature on platform ecosystem roles (Smedlund & Faghankhani, 2015; Haigu & Wright, 2015; Evans et. al., 2006; Eisenmann et. al., 2009) can be presented:

Platform ecosystems encompass the focal platform core, including the platform owner, and platform periphery, with participants providing components of platform periphery and consuming bundles consisting of platform core and periphery⁴. Platform ecosystems can either be orchestrated by the platform owner or be organised in a decentralized self-organising way by using the platform architecture and governance as an overarching organisational structure. Actors in the platform ecosystem can fulfil multiple roles and can even be part of overlapping ecosystems.

3.3. Platform Governance

Besides the platform architecture that orchestrates the ecosystem by design rules embedded in its interface (Baldwin & Woodard, 2009; Baldwin & Clark, 2000; Tiwana et. al., 2010; Tiwana, 2014), platform governance is another mechanism of organising the platform ecosystem by using formal and informal instruments. Three formal governance areas specific to platforms can be identified (Tiwana et. al., 2010), being the allocation of decision rights concerning the core and periphery and the interfaces (Tiwana, 2014), control mechanisms such as output and process control that can be understood as a form of platform regulation (Boudreau & Haigu, 2008) and the question of proprietary and shared ownership of the platform (Eisenmann, 2008). Additionally, as an informal governance instrument, this research identifies relational governance as a concept that goes beyond the concept of clan control usually used in platform research and can be used in all relationships in the platform ecosystem complementing formal governance instruments (Weber & Mayer, 2014).

group in the platform. It is important to note that indirect network effects are solely limited to MSP, while direct network effects can also be exhibited by other platform types and even products.

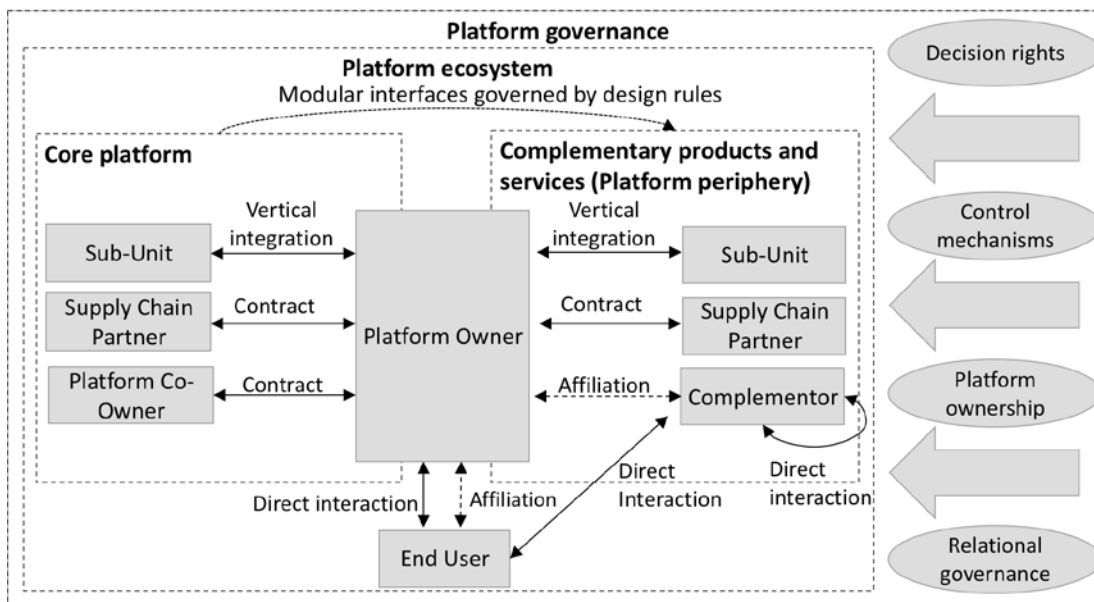
³ The problem being that these definitions either focus exclusively on MSP or on app-based ecosystems.

⁴ The literature (Smedlund & Faghankhani, 2015; Eisenmann et.al., 2006) calls these sides supply (suppliers and complementors of components or ideas) and demand side (consumers platform based bundles) based on the main functions fulfilled by the participants.

4. Initial Findings and Open Questions

The first major finding that can be seen as a novel contribution, not only to application on e-government, but also to platform research in general, is the conceptualization of a platform ecosystem with all platform types and their coordination mechanisms as an analytical instrument. This core aspects analytical model is depicted visually in figure 1.

Figure 1: Analytical Model of Platform and Embedded Coordination Mechanisms (Original Illustration)



Three main benefits for the analysis platforms and platform ecosystems can be derived from using this analytical model:

- The first benefit of raising awareness that independent of the platform type, the platform owner has to manage different coordination mechanisms. This coexistence of coordination mechanisms can generate new emergent characteristics on the ecosystem level and impose conflicting requirements on platform owner's orchestration of the platform ecosystem due to the different cognitive frames and incentives of the participants, which could offset platform benefits concerning adaption and coordination in individual relationships.
- A second benefit is positioning the efficient governance of the platform core as a core problem of platform research. This problem highlights interesting questions as the platform core can be structured in an integral rather than a modular fashion due to efficiency considerations and insufficient knowledge that makes a clear definition of modules difficult and adaption and coordination related risks can potentially scale up to the level of the platform ecosystem.
- The third benefit is making clear from an analytical perspective that the question of where to place components in the platform (core or periphery) and choosing the right coordination mechanisms each component can be analysed with the presented theories, thus transforming this question into an extended make, buy or ally problem.

The second major finding is a systematic and theoretically founded view on how platforms generate adaption and coordination advantages under BR and uncertainty considerations. These advantages are organised into three functional leverage areas based on Thomas et al. (2014) and are further explained with respect to the theories used in the research project:

- Leverage of scale and scope: Platforms give participants access to highly specialized components in platform core and allow efficient product variations in the platform periphery. This is made possible by the modular core and periphery architecture and modular interface that reduce transaction costs stemming from behavioural and certain technological uncertainty when combining assets.
- Leverage of innovation and complementary: From the perspective of RBV the platform core periphery architecture allows unique complementary asset bundles that allow new innovations. The stable interfaces allow not only self-interested participants of the platform to innovate independently, but to distribute innovation risks among innovating participants of the platform and allowing access to proven innovations and asset bundles once external uncertainty decreases, which is a recommendation of ROT.
- Transaction leverage: by enabling transactions between independent actors, which is achieved by regulating platform-based transactions and giving participants of the platform access to transaction relevant information such as participants, their history and components supplied.
- Additional to Thomas et al. this research identifies a risk leverage by applying both TCT and RBV for the platform owner of an MSP. While the platform owner profits from the sum of activities of independent complementors, which increase the total platform value, the economic risk of maladaptation is shifted to the complementor, thus reducing the coordination need in such situations. This aspect differentiates MSPs from other platforms where the risk of the platform bundle still lies with the platform owner and thus leads to hold-up situations in cases of maladaptation.

In addition to these major findings, two research areas are highlighted in this paper, where the research generated some findings, but the understanding is still incomplete.

The first research area refers to learning and adaptations in the process of organising an efficient platform governance and architecture. It is still unclear how BR influences these processes in detail, how certain dynamic capabilities such as architecture knowledge enable efficient results and how path dependencies may lock platforms and platform ecosystems in an inefficient arrangement. The second research area refers to the application of platforms to the public sector, differences to the private sector and special questions in the context of MSPs in intra government contexts. When establishing an MSP with independent agencies as complementor, it is reasonable to believe that this MSP will have a shared ownership and platform governance and the platform owner has a weak position in effectively regulating complementors, which may weaken the platform's effect on reducing adaption and coordination problems and even reintroduce new coordination problems. When opening such platforms to external private actors or even other states, it is unclear if structural and cultural problems further complicate the governance of the platform ecosystem.

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Supporting the Holistic Management of Public Sector Information Technology Using Enterprise Architecture

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Abstract: While people move to the internet, so do governmental agencies. This means new information systems, new services, and rapidly changing operational environment. Hence ever-increasing complexity and cost. To manage this complexity, a more holistic mind-set is required. With this intent, many public-sector organizations have adopted enterprise architecture (EA) to enable a fundamental change in the mind-set of the operations. The benefits have not followed though. Overall, more understanding is required for public sector organizations to be able to benefit from the opportunities of new information technologies. My dissertation will respond to this need by presenting insights from two case studies and two qualitative web-based surveys. The findings of the dissertation will increase the understanding related to the EA challenges. In addition, the dissertation will attempt to provide practical solutions and guidance to the public-sector organizations, which for now are struggling with EA and their digitalization efforts.

Keywords: enterprise architecture, information technology, public sector

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1. Introduction

Public sector organizations have long been under a pressure to improve services, increase efficiency and decrease costs. Now they are also expected to become digitalized, to achieve these objectives. However, instead of solving the existing problems, digitalization efforts have created new challenges, increasing the cost and complexity of information technology (IT).

For example, municipalities are struggling with the management of their IT resources. This is because the responsibilities of municipalities but also their information systems (IS) are divided between different sectors such as education and health care. Consequently, different sectors can have different systems for similar needs, resulting in duplicate systems and thus unnecessary costs. These however, could be avoided, if the municipalities had a more holistic comprehension of the organizational processes and the IT resources supporting those (Schneider et al. 2014).

Therefore, there is a need for a holistic management approach, which takes into consideration the IT but also its connection to the different business processes of the organization (Dang & Pekkola 2017a). For many countries, such as Finland (Lemmetti & Pekkola 2014), United States (Bellman & Rausch 2004), Vietnam (Dang & Pekkola 2016a), Denmark and the Netherlands (Janssen & Hjort-Madsen 2007), this approach has been enterprise architecture (EA) (Gregor et al. 2007; Tamm et al. 2011).

EA is a management approach that takes into consideration both the business and IT aspects of an organization. The objective is better business-IT alignment. (Dang & Pekkola 2017b) EA is heavily based on models depicting the organizational business processes, data, information systems and information technologies (Ahlemann et al. 2012), both in their as-is and to-be states (Bellman & Rausch 2004). With these organizations can use EA to guide the organizational IT development (Winter & Schelp 2008) and enable improved decision making, for example during IS acquisitions (Weiss et al. 2013).

However, in the public sector, EA initiatives have not been very successful (Seppanen et al. 2009), as instead of enabling the public sector organizations to be more equipped for digitalization, EA has mainly increased bureaucracy (Lemmetti & Pekkola 2012). Nonetheless, there is a clear need for a more holistic IT management approach in the public sector (Dang & Pekkola 2016a). Consequently, the problem is not necessarily the inadequacy of EA to respond to the existing need, instead the problem originates from the difficulty of implementing the holistic thinking prerequisite for EA. To solve this challenge we need more understanding on why transforming the IT management approach towards a more holistic one is so difficult, and how these difficulties can be solved.

2. Related Research

Since first introduced in 1987 (Zachman 1987) EA has been gaining popularity both in private and public sector (Simon et al. 2014; Dang & Pekkola 2016a). The growing interest can largely be explained with benefits EA implementation is expected to create. Overall, EA literature identifies multiple different benefits such as reduced complexity (Schneider et al. 2014); improved business processes; decreased costs (Tamm et al. 2011); better integration of different information systems (Isomäki & Liimatainen 2008); improved efficiency and better ability to react in changing circumstance (Schmidt & Buxmann 2010). Moreover, different benefit realization models have been created (Niemi 2016; Lange et al. 2012).

In practice however, organizations do not always obtain these desired benefits. (Lemmetti & Pekkola 2014; Bernard 2005). Consequently, EA is not a shortcut to success. To begin with, EA benefits tend to cumulate quite slowly and require continuous and often laborious efforts (Schmidt & Buxmann 2010; Niemi 2016). Additionally, organizations tend to face multiple challenges during EA implementation and execution, which for one can hinder the benefit realization (Banaeianjahromi & Smolander 2016; Olsen & Trelsgård 2016; Hauder et al. 2013; Lucke et al. 2010; Lux et al. 2010; Löhe & Legner 2014; Kaisler et al. 2005).

Certainly, various solutions to these challenges have been presented as well. These solutions however tend to focus on technical aspects although most of the EA related challenges are non-technical by nature (Smolander & Rossi 2008). Moreover, the offered solutions focus on solving easily identifiable issues and hence provide little understanding of the root causes of EA related problems. (Dang & Pekkola 2016b) Altogether, aspects such as EA acceptance in organizations are underrepresented in the EA literature (Hjort-Madsen 2006; Janssen & Hjort-Madsen 2007; Dang & Pekkola 2017b).

Overall, both the challenges and solutions in the EA literature tend to focus on research conducted in a private sector (Dang & Pekkola 2017b). EA however has gained interest also in the public sector (Lemmetti & Pekkola 2014; Bellman & Rausch 2004; Lee & Kwon 2013; Dang & Pekkola 2017a; Janssen & Hjort-Madsen 2007). For example in Finland, public sector organizations have been obliged to implement EA since 2011. Despite the good intentions behind the mandatory EA implementations, success stories from Finish public sector are few (Lemmetti & Pekkola 2012). This however cannot be explained solely with the findings from private sector (Dang & Pekkola 2017b).

Hence, when the challenges faced in practice are combined with the inadequate attention to the context of public sector in the existing literature, the need for further research is evident (Dang & Pekkola 2017b). Consequently, there is a clear need for increased understanding related to the ways public sector organizations should implement EA but especially how they could obtain more holistic approach to their IT resource management.

3. The Research Questions and Methodological Approach

3.1. The Objectives and Possible Contributions

The objective of this research is to increase the understanding about EA implementation and especially implementation of a holistic approach to IT management in public sector and especially in public sector IT departments. A need to increase this understanding has been identified in previous literature and indicated by practitioners. Hence, my dissertation strives to fulfill the research gap presented in the related research section but also improve the prospects of public sector organizations related to EA.

To achieve these objectives, my dissertation will answer to the following research questions

- Q1: What causes for the EA challenges in the public sector can be identified?
- Q1.1: What type of challenges municipality can face in its EA work?
- Q1.2: What is the role of laws and recommendations in relation to the issues faced by public sector organizations?
- Q1.3: How the skills of enterprise architects effect to the challenges of EA?
- Q2: How identified EA challenges can be solved?

By answering to these research questions my dissertation will increase the knowledge and understanding of EA initiatives in the public sector.

Findings of the question Q1 will increase understanding related to the implementation of holistic thinking in the IT-department with the means of EA. For now, EA literature has focused mainly on identifying singular issues and solving these instead of seeing the full operational context (Dang & Pekkola 2016b). By providing deeper understanding of EA related challenges and especially their root causes, my research will fill EA challenge related gap in the research.

Additionally, my research will provide concrete advice to the organizations working with EA. By answering to the research question Q1.1 my dissertation will increase knowledge and understanding of the root causes of the EA challenges municipalities are facing. The findings of the research question Q1.2 can potentially help to improve the work done related to EA recommendations, which are used to guide the EA work for example in Finnish municipalities. Therefore, my dissertation will enable improved governmental support of EA. The findings of Q1.3 will increase the understanding of EA skill requirements. Moreover, it will provide information about how these skills are realized in Finnish municipalities. EA skills have mostly been overlooked in previous research (Ylimäki & Halttunen 2005) and hence these findings provide a good addition to the EA literature.

On the other hand, the new understanding provided by the findings of my dissertation will also enable new approaches to solving EA related challenges. By answering to the research question Q2 my dissertation will increase the understanding on whether it would be more sensible to focus on changing the way IT departments operated instead of focusing simply on EA implementation. Consequently, my dissertation will provide new perspectives to the ongoing EA discussion.

3.2. The Research Methodology and Empirical Setting

In the dissertation, multiple different research methods will be utilized. The main method to be used is an interpretive case study (Yin 1994). Additionally, two qualitative web surveys are used to answer the research questions Q1.2 and Q1.3 (Jansen 2010). The methods and their connection to the research questions are presented in the Table 1.

Table 1: The Methods Used and their Connection to the Research Questions.

Method	Research question	Stage	Publications
Case study Vantaa	Q1, Q1.1, Q2	Stage 1, completed Stage 2, started Stage 3, begins fall 2018	Ylinen, M. & Pekkola, S. Enterprise Architecture as a Scapegoat for Difficulties in Public Sector Organizational Transformation (2018), SUBMITTED: International Conference on Information Systems (ICIS 2018)
Survey 1	Q1.2	Completed	Pekkola, S., Ylinen, M. & Dang, D. (2018). Taking the Law into Practice: A case study on how governmental ICT regulation is supposed to be implemented into public sector. Pre-ICIS workshop on egovernment.

Method	Research question	Stage	Publications
Survey 2	Q1.3	Stage 1, completed Stage 2, started	Ylinen, M. & Pekkola, S. (2018) Looking for a five-legged sheep: Identifying enterprise architects' skills and competencies. ACCEPTED: 19th Annual International Conference on Digital Government Research, Theme: Governance in the data age, 9 p.
Case study Tampere	Q1, Q1.1, Q2	Begins fall 2018	

Overall, the dissertation will contain findings from two case studies and two qualitative surveys, both of which will be conducted in large municipalities in Finland. The case studies focus on the EA challenges the organizations are struggling with and the ways they are trying to solve them. The first case was selected as the city of Vantaa was known to have issues with EA, but was also planning to reorganize its EA operations to solve these issues. The second case focuses more on development of digitalization processes, in which however the EA has a clear role in linking the digitalization efforts and the digitalization strategy.

The case study in the city of Vantaa started in the spring of 2017, when 13 people involved in the organizations EA operations were interviewed, with semi-structured interview approach (Myers & Newman 2007) to scan EA challenges. These already conducted interviews were analyzed with a paradox lens (Smith & Lewis 2011). The particular approach was selected as it provided new insights into the troublesome situation (Lüscher & Lewis 2008). Moreover, it enabled us to take into consideration the changings occurring in the organization and its operational environment. (Lüscher & Lewis 2008) Based on our findings we identified paradoxical tensions manifesting themselves as EA related issues and hence answered to the research questions Q1 and Q1.1.

As the city of Vantaa is currently executing an organizational change in response to the challenges of EA, but also to improve its ability to adjust to the new needs of digitalization, the case study will continue throughout the change process. In the next stage, the organizational change is studied in more detail and then in the third stage the effects of these organizational changes to the EA, will be analyzed. Also in the stages 2 and 3, the main source of data will be semi-structured interviews, though available documentation will be used as well (Klein & Myers 1999).

The other case study will be conducted in the IT-department of city of Tampere, where the objective is to analyze both EA related issues and benefits in the light of the organizations digitalization efforts. The data will be based on semi-structured interviews, which will be initialized in 2018.

In addition to the two case studies, data from two already executed qualitative web-surveys (Jansen 2010) will be used in the dissertation. In the first survey, the process of writing a governmental EA recommendation intended for the use of public sector organizations was studied

by surveying the views of the individuals who attended the recommendation writing process. In the second survey, the skill needs of enterprise architects were scanned in a LinkedIn group of EA professionals. This survey will be advanced from the preliminary findings during the 2018 to find out how the skill needs, emphasized by the EA professionals, are realized in Finnish municipalities.

Overall, the dissertation was started in the spring of 2017 and it is scheduled to be finished during the spring of 2020.

4. Conclusion

Overall, there is a clear need for a more holistic approach to IT management in the public sector. To fulfil this need public sector organizations have implemented EA in their IT management. EA implementations however have not provided the desired solutions. Instead, public sector organizations have transferred from struggling with IT complexity and cost to struggling with EA.

Even though a vast research exist about the EA challenges, these studies have not solved the practical issues faced by the public sector organizations implementing EA. Hence, there is a clear need for deeper understanding related to the way EA and holistic management of IT resources are implemented in the public sector IT departments. This is necessary, so that both the scientific discussion as well as public sector organizations could move beyond issue identification to solving the root causes of the issues. This is what I am aspiring to do in my dissertation.

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Smart Sustainable Cities Assessment Framework

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Abstract: As cities around the world become more populated, it will bring about challenges in urban infrastructure management. Hence, the growing need to study ways to improve the quality of life of citizens within cities. This has brought about the smart cities concept with the aim of improving the livability of cities by deploying Information and Communication Technologies (ICT). However, not all smart cities solutions are aligned with sustainability targets. Also, there is a need to evaluate the progress being made by cities in becoming smart and sustainable. This dissertation aims to explore the intersection between the smart cities concept and sustainable cities concept and assess European cities based on this intersection using multivariate statistical techniques.

Keywords: smart cities, sustainable cities, city indicators, urban analysis, urbanization

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1. Introduction

Cities are the bedrock of human civilization driving the industrial development of the world. They uniquely provide the density required for effective interaction and networking to generate wealth and improve living standards (Wolfe & Bramwell, 2016). However, in recent times, many urban centers are seeing an exponential growth in population, creating a pattern of rapid urbanization (UN-HABITAT, 2011). It is projected that a huge percentage of the world's population will live in cities by 2030 (United Nations, 2014). This rapid growth of cities will create unusual sustainability challenges both on infrastructures, citizens and the environment (David, 2017). These in turn will affect the quality of life of residents of the city as well as the efficiency of its operations (Degbelo, Granell Granell, et al., 2016). Some of these challenges are already being addressed through the development of intelligent technologies (Castán, Martínez, Menchaca, & Berrones, 2016). However, a lot of these smart solutions are not aligned with sustainability targets. For example, the explosive use of some of these intelligent technologies to improve livability in cities will, among other things, lead to more energy demand, which has an inevitable connection with the climate (Chourabi et al., 2011). Consequently, the concept of smart sustainable cities (SSC) was created (Ahvenniemi,

Huovila, Pinto-Seppa, & Airaksinen, 2017). “A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects” (UNECE, 2015). Various governments have set ambitious targets to transition their cities to being smart and sustainable using various initiatives and it is crucial that the performance of these ventures is measurable. One of the ways to go about this is to develop a framework that facilitates the tracking of the advancement of cities towards their smart-sustainable goals. The development of this framework demands an understanding of the various connecting factors linking a smart city model and a sustainable city and the relationship between them.

The rationale for this research is multifaceted. The development of smart cities models and sustainable cities models have always existed independently. Although these two models are related, they haven't been integrated. The integration of these 2 models will require a proper understanding of the theoretical components of each model and how the smart city approach can contribute to the advancement of sustainable development. Furthermore, there is no integrated smart sustainable city framework against which cities can be ranked and assessed with respect to their advancement of sustainability. Finally, a lot of conversations on the use of the smart cities concept to foster sustainability typically remains only at the discourse level without applied theoretical studies (Bibri & Krogstie, 2017b). Hence, there is a need for empirical studies that apply knowledge gained from understanding the connection between smart cities and sustainable cities and uses it to assess cities.

The main objective of the proposed dissertation will be to assess the relationship between smart and sustainable cities based on critical indicators acquired from extensive research literature and a case study review.

The specific objectives of this proposed dissertation include:

- Evaluate the differences between sustainable and smart cities.
- Research on urban sustainability.
- Research on the smart city concept.
- Study selected smart city assessment frameworks and sustainable city assessment framework.
- Perform a comparison of indicators used in both assessment frameworks.
- Assess the pattern between technology and the environmental sustainability of cities in Europe.
- Propose a framework to measure the ICT development of EU cities.
- Calculate a single measure of ICT development (an ICT development score) based on the framework developed in objective 1.
- Determine an appropriate measure of environmental sustainability in EU cities.
- Establish the relationship between the ICT development and environmental sustainability of EU cities.
- Classify all countries under consideration based on their ICT and environmental sustainability relationship.

- Assess how the use of intelligent technology can decrease Green-House-Gas (GHG) emissions and improve energy efficiency.
- Develop a European smart sustainable city ranking.
- Systematically reduce the number of indicators required to characterize a smart and sustainable city using open data and multivariate statistics.
- Develop a quantitative index to measure and rank European capital cities based on a synthesis of the indicators obtained in objective 1.
- Empirically and visually explore the possible association of the cities rank score with GDP and other variables.
- Contribute to the Geo-C Open City Toolkit (<http://geo-c.uji.es/opencitytoolkit>).
- Develop a geo-visualization tool to share and explore my results as a component of the Open City Toolkit.
- Share guidelines on how to make use of my methods to realize an open city. These guidelines include lessons learned, experiences and insights gained during my research.

2. State of the Art

2.1. Smart Sustainable Cities

The term “Smart Sustainable Cities” only became popular around 2010 as a result of an effort to balance the “smart cities” rave of the moment with long-term sustainability targets (Al-Nasrawi, Adams, & El-Zaart, 2015). Bibri & Krogstie (2017b) appropriately describes this term as “a city that is supported by a pervasive presence and use of advanced ICT, which, in connection with various urban domains and systems and how these intricately interrelate, enables cities to become more sustainable and to provide citizens with a better quality of life”. The concept of smart sustainable cities exists at the intersection of the two broad concepts; smart cities and sustainable cities; and other concepts such as urban analytics, urbanization and urban growth, urban ICT and environmental sustainability (Höjer & Wangel, 2015). It describes the holistic application of ICT and other smart technologies to provide mainstream solutions that provide a conducive environment for the increasing population in urban areas while guaranteeing the sustainability of the various dimensions of the urban domain. An example of when the “smart sustainable cities” concept is at work is when ICT is used to accumulate and investigate data on various urban systems and domains and thereafter used to provide strategic insights for policy-makers to make sustainable decisions to improve livability in cities. From a synthesis of several definitions, the ITU defines a smart sustainable city as one that “uses ICT and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring it meets the needs of present and future generations with respect to economic, social and environmental aspects” (International Telecommunication Union, 2014).

Although the concept of smart sustainable cities is rapidly gaining traction among urban planners and policy-makers, academic literature on this concept is still scanty because the field is still in its infancy stage. However, a number of good articles on this subject have been published in reputable journals (Bibri & Krogstie, 2017a; A Kramers et al., 2016; M Börjesson Rivera, Eriksson,

& Wangel, 2015). In contrast, there are quite a lot of academic articles on related concepts such as smart cities and sustainable cities. The study of smart sustainable cities is a field that has evolved from viewing individual concepts such as smart cities and sustainable cities from a unique perspective and an attempt to fuse and synthesize both concepts together. This has resulted in two major research strands. One research strand attempts to develop a new holistic framework for smart sustainable cities (Bătăgan, 2011). Another research strand is focused on combining already existing individual frameworks on smart cities and sustainable cities to measure and assess smart sustainable cities. Ahvenniemi et al. (2017) have done some work in this area by analysing 16 sets of city assessment framework (eight smart city and eight sustainable city assessment frameworks), breaking each framework down to individual indicators and performing a comparison between the two groups.

Furthermore, some literatures are devoted to exploring the effect of urban ICT and computing on urban sustainability. These interdisciplinary studies attempt to understand the role ICT sensors deployed in urban domains to monitor, probe, assess and plan cities play in fostering sustainable urban development (Bibri & Krogstie, 2017a). Anna Kramers et al. (2014) studied how the deployment of ICT solutions in various aspect of individual household functions can reduce energy use in cities. Although, they were not able to quantify how much energy can be saved, they were able to provide some insights on the relationship between urban ICT and energy usage within the context of a framework. But beyond ICT sensors, there are other dimensions to improve sustainability using ICT one of which is corporate practice-oriented (M B Rivera et al. 2015).

It is also important to state that some smart city concepts incorporate certain aspects of sustainability, leading to the use of the term “smart cities” and “sustainable cities” interchangeably in conversations. In fact, Höjer & Wangel (2015) argued that ‘the smart city is the smart sustainable city and that the word “sustainable” can be left out without further ado’. However, when the term “smart city” is used in this context, sustainability is only assumed to be a by-product and we agree that it holds some potential for sustainability. But as Neirotti, Marco, Cagliano, Mangano, & Scorrano (2014) mentioned, the use of more ICT in various urban domains does not necessarily lead to a more sustainable city because ICT-based solutions are one of the many inputs that drive urban sustainability. There are other inputs listed by Bibri & Krogstie (2017b). Hence, a more comprehensive approach has to be taken to achieve urban sustainability beyond the use of ICT in the urban domain (Dumreicher, Lavine, Yanarella, & Radmard, 2000). ICT (smartness) should not be seen as the goal itself but a means to achieve an end goal of urban sustainability. Bibri & Krogstie (2017b) argue that we can only speak of smart cities efficiently and effectively contributing to the goals of sustainable development when the data sensing and analytics capabilities of these cities start addressing specific sustainability challenges.

There is need to develop indicators and metrics to evaluate cities striving for smart and sustainable urban development (Höjer & Wangel, 2015). This is important because according to Bibri & Krogstie (2017b), “without evaluative approaches and practices, smart sustainable cities risk becoming no more than labels, just like some sustainable urban forms becoming fallacies – without validated urban content or only for urban labelling”. Developing these assessment methods will require a fundamental understanding of the connecting links between ICT, energy

and environmental and social sustainability (Bibri & Krogstie, 2017a). Although the relationship between ICT and the environment is quite complex with both positive and negative impacts, it needs to be thoroughly studied and understood. After understanding these effects decision-makers can commit resources to developing, deploying and implementing smart sustainable cities (Bibri, 2015; Bibri & Krogstie, 2017b).

3. Methodology

The proposed methodology for this dissertation is described below:

- Literature Review: Perform a comprehensive literature review on existing frameworks for smart cities and for sustainable cities.
- Data Sourcing: Source for data from sources such as national, state and local government websites, commercial directories, magazines, and journals
- Sampling: Research on the cities to include in our research. This will be a compromise between the feasible width and depth of our study with the width being the availability of consistent data for a large number of cities and the depth being the appropriate number and types of indicators for our study.
- Data Analysis: We will primarily be carrying out various multivariate data analysis to gain insight from our data. Exploratory analysis will be done to understand the structure of our data. Various summary statistics of all indicators to be used will be calculated and explored to identify and treat outliers. Boxplots and histograms will be plotted for indicators to further understand outliers. Variables identified to be skewed will be transformed using the before further processing. Thereafter, we will normalize our data, scaling down values of the indicators.

Because we will be working with multiple dimensions, we will be using various approaches to statistically reduce the number of dimensions to avoid the curse of dimensionality. We will make sure of several hierarchical clustering algorithms to determine the number of profiles present in our dataset. We will also make use of variance based reduction technique as described by (Kouser, Lavanya, Rangarajan, & Acharya Kshitish, 2016).

Several tests will be carried out to determine the suitability of our data to be transformed from a high-dimensional space to a low-dime

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Digitally Networked Health Advocacy: Towards a Contemporary Framework

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Abstract: This proposal describes a research design for analysing bottom-up health discourses on social media. Based on semantic network analysis, netnography, and semi-structured interviews focusing on issue-based advocacy groups and social support communities for thyroid disease, I propose to analyse the narratives and action frames within this context. Study 1 focuses on illness narratives, framing of identities and personalized action frames. Study 2 focuses on patients' views on social media content, specifically the role of narratives and communities for the negotiation of health paradigms and knowledge building. This will result in a framework for the analysis of social media interactions within contemporary health advocacy. The results contribute to a better understanding of the negotiation of knowledge in a mediated health context.

Keywords: Health activism, online activism, support groups, virtual communities, connective action, personalized action frames

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1. Introduction

1.1. Overview

This work offers three major contributions. Firstly, the literature review presents theories comprising the areas (1) health advocacy and health activism and (2) digital narratives and action frames. This shall lead to an analytical framework guiding the investigation of social media interactions in health advocacy. Secondly, the study contributes to research in the thyroid disease domain by creating data for so far under-investigated patient group of increasing global relevance. Thirdly, the results shed light on the significance of online health discourse for a new health paradigm and thus complement studies about the negotiation of truth in a techno-cultural health context (Sobo, 2016), in which different medical paradigms seem to co-exist.

1.2. Significance

Online media and social media have become increasingly relevant for accessing health information, often differing considerably from the dominant medical paradigm (Kata, 2012). While health information created by professionals and experts is a common focus of study, expressions of advocacy or activism which are co-created in a bottom-up manner are less studied. These can be situated against or within a dominant medical paradigm. We are now simultaneously engaged as receivers and transmitters of information (Brown, 2000), often basing our decisions on collectively or connectively (Bennett & Segerberg, 2012) grounded truths (Sobo, 2016), to which digital narratives can contribute. In fact, declaring truth based on autonomous expertise today can even suggest irrelevance and isolation (Singer, 2008), as opposed to collectively formed opinion. Individual, anecdotal narratives might accrete in people's mind to promote suspicion "regarding variables that science has not yet accounted for" (Sobo et al., 2016, p. 540).

The context of thyroid disease is one of a chronic condition of increasing global relevance. However, not many studies in health communication investigated this specific patient group. Furthermore, a lack of research can be identified regarding how networked environments are used by people with thyroid disease. Perumal, Prasad, Surapaneni, & Joshi (2015) claim in their exploratory study in India that thyroid disorders would impact current societal and future health in a manner no other non-communicable disease would. Winterich (2011), who studied the politics of hormonal disease patterns, conducted interviews with women with hypothyroidism, as hypothyroidism disproportionately affects women, typically between the ages of 30 and 50 (Goldman, Troisi, & Rexrode, 2013, 854). She emphasizes a lack of research in the domain despite the strong prevalence. Health communication focuses more on support or self-help groups, or communication of cancer patients, where thyroid cancer cases have been included (Sugawara et al., 2012), but less on elements of connective action. Summarizing, there is comparatively little interdisciplinary work on a topic of increasing global relevance. Possibly, this could be because of the politics adhering to hormonal diseases related to specific illness perceptions that might add to stigmatizing the voices of thyroid patients. Moreover, the analysis of online health discourse can be valuable, not only for this specific disease context, but also for our understanding of the negotiation of truth regarding health in general (Sobo et al., 2016). Research focused on alternative medical paradigms and their anti-scientific nature, for instance within the anti-vaccines movement (even though the focus on alternatives to a consensus is not per se anti-science). Understanding how patients make sense of online content and being aware of different target groups is important to understand the mechanism of health discourse, and the subjectivities of those who seek health information (Sobo et al., 2016). Furthermore, the complexities of the health care system, like the rising costs of health insurance all over the world and the empowerment of patients based on the democratization of information add to the emergence of a new health paradigm. Online discourses in the health domain often differ from the existing medical paradigm but are valued by patients, health advocates, support groups, or communities. Furthermore, content on social media is spread easily online, and information related to distinct narratives can generate echo chambers (Del Vicario et al., 2016). Previous works showed that users tend to aggregate around their preferred information (Colleoni, Rozza, & Arvidsson, 2014) and build their own narratives or rumours in

social echo-chambers (Anagnostopoulos et al., 2014; Bessi et al., 2015). Moreover, false online news seems to spread faster than true online news. (Vosoughi, Roy, & Aral, 2018).

1.3. Research Questions

Study 1 focuses on the activist discourse, specifically digital (illness) narratives (Bury, 2001; Kumagai, 2008) and frames of health advocacy and health activism in social media practice. This is pre-informed by a semantic network analysis (with Node XL programme or equivalent) that seeks to identify and map different discursive themes and opinion clusters.

- What are the prevalent digital narratives? How are identities (and adversaries) framed?
- What do these narratives promote or contest? Are there conflicting narratives or paradigms?
- How are the logic of connective action and personalized action frames reflected in such discourse (Bennett, 2012)?

Study 2 focuses on the activist practices and views of thyroid patients participating in social media. It asks about the role of digital narratives and sense of virtual community for the construction of knowledge.

- How do patients evaluate specific narratives and their impact?
- What is the role of a sense of virtual community for knowledge-creation?

With view to methods, study 1 relates to a netnography (and a semantic network analysis as pre-study); study 2 is covered with semi-structured interviews (and possibly online focus groups).

2. Literature Review and Concepts

2.1. Health Advocacy and Health Activism

Health activism has been defined as alternative discourses that challenge mainstream health care, practices and paradigms (Zoller, 2005). With this conceptualization I am influenced by an article presenting definitions of health activism from Zoller (2005), who argues that this term has been overlooked as a concept, but constitutes a major form of health communication and a useful framework for health-related social action based on issue focus. I argue that these frameworks are particularly applicable to contemporary social media, who foster single issue advocacy via the logic of connective action (Bennett & Segerberg, 2012). "Health activism includes actions related to patient activism, health care reform, disease prevention, illness advocacy, physical disability, environmental justice, public safety, and health disparities in populations such as women, minorities, gays, and lesbians, among others." (Zoller, 2005, 341).

2.2. Telling Stories: Illness Narratives and the Logic of Connective Action Frames

Drawing on research in the medical anthropological field, there is evidence that for some groups, a "collectively grounded 'hive narrative'", which reflects the crowd's wisdom is "better than an expert-generated metanarrative" (Sobo et al., 2016: 531) Narratives have been considered an important part of activism but also within the health domain, particularly when users counter-act an existing narrative or create their own story (Gitlin, 1980; Harlow, 2013). One such narrative

concept is that of the “wounded storyteller” (Frank, 1995), which describes how people can regain agency through storytelling. This concept might be useful to describe acts of resistance within health advocacy. Social movement studies have further utilized the storytelling concept as a useful approach for explaining a sense of shared identity and more attractive activism (Poletta, 2002). Health message framing in health communication research (Gallagher & Updegraff, 2012) investigates how behavior recommendations are framed. Framing is related to the way communities make sense of facts and users, embedded in homogenous clusters, which “trigger collective framing of narratives” (Del Vicario et al., 2016: 554) that are often biased towards self-confirmation. Thus, investigating the collective and connective frames of online discourse is important to understand how communities process information through a shared system of meaning (Del Vicario et al., 2016). Bennett and Segerberg (2012) argue that nowadays, the ideas and mechanism for organizing actions become more personalized than those on the basis of “social group identity, membership, or ideology” (Bennett & Segerberg, 2012, p. 774). Some points of criticism of this theory were that collective identities still play a big role in activism, even though personalized frames might travel easier than collective frames (Postill, 2015). However, it is exactly the possibility to easily merge your own personal struggle in larger frames that enables activist discourse. With view to the classification proposed by Bennett & Segerberg (2012, p. 756), mostly crowd-enabled DNAs (Digital Network Actions) and self-organizing networks are relevant for this study. In health activism, many of the issues seem to be crossing both geographical and issue borders (Bennett, 2003, 2005). Collective action framing (Entman, 1993) can further be seen as part of the storytelling concept, and can aid in the construction of meaning by offering some orientation (Benford & Snow, 2000; Harlow, 2013). Some researchers have argued that social media asks for a new form of storytelling (Harlow, 2013). Finally, when ideas go viral, one often talks of memes (Dawkins, 1976), which refers to ideas, convictions or behavioral patterns. In the context of social media, the spread of memes was turned into a highly visible practice and routine (Shifman, 2013). The project also asks how the meme might be a useful concept for understanding the digital culture in the investigated domain (- what do memes promote or contest?).

3. Methods

3.1. Motivation and Philosophy

Regarding the studied case, my personal history of thyroid disease (a thyroidectomy due to cancer suspicion in 2014) should be an advantage, as it can help me with understanding the background as well as access to the target group. I follow a qualitative research design that is appropriate for analyzing online discourse due to the novelty of the investigated cases and the aim of extracting so far unknown narratives. Netnography transitions traditional techniques of cultural anthropology to an online setting (Jong, 2016). The same accounts for the interview part, where I seek to utilize a traditional method in an online setting. Wallendorf & Russel (1989) note that ethnographic research integrity can be facilitated by well-developed field research techniques such as prolonged engagement. My longer engagement in some of the investigated groups and pages due to my own disease history can facilitate this, as I will have gathered some pre-information through persistent observation. For the interviews, I will apply an inductive content analysis approach.

3.2. Research Design: Netnography and Semi-Structured Interviews

Hine (2015) covers cross-platform approaches (Hine, 2015, p. 65) and encourages an open approach to the identification of field sites (Hine, 2015, p. 157). boyd (2008) has argued for an ethnographic approach to understanding the use of social media (boyd, 2008). This means that even though I focus on social media, I will stay open to content outside of this platform. The researcher will aim to join the conversations of groups and pages and observe their online discourse. I intend to aim for an overt observation. One problem with this approach might be that social media sites, due to their chronological nature, might not offer the best opportunity to continuously lay the identity of the researcher open. However, the methodology is asking for full disclosure of intentions and identity of the researcher during the research interactions (Kozinets, 2015). One solution would be to make the fact that the researcher is conducting research prominently visible in a personal profile, in status updates (Kozinets, 2015) and a website. Inspired by the results of (Silver, 2015) the aim of the semi-structured interview part is to examine patients' view on social media narratives. Interviews will be done mostly by Voice over Internet Protocol (VoIP) messengers. Although VoIP mediated interviews cannot completely replace face to face interaction and interviewing, they work well as a "viable alternative or complimentary data collection tool for qualitative researchers" (Iacono, Symonds, & Brown, 2016). Because of the need to reach an international and varied sample, VoIP seems justified. In selected cases, VoIP interviews can also be exchanged via online chat protocols or face-to-face protocols. For analysis, I will combine a thematic content analysis and discourse analytical approach based on hermeneutic interpretation.

3.3. Data Collection

In a first step, different social media were searched for relevant online communities related to the topic of thyroid disease. As it became apparent that most crowd activities are present on Facebook, I will focus on this social network. When collecting data for the netnography, I will try to stratify the results and include both smaller and bigger groups as well as different regions, as well as closed and open communication. The investigated pages and groups display characteristics of dense communication and as such make interesting crowds for issue-framing. As for the semi-structured interviews, I will try to recruit potential interviewees by cooperating with health advocates and group moderators. If this approach is not successful, I will try to recruit patients by snowball sampling out of different groups on social media. On the basis of this data, I seek to develop a framework for the analysis of digitally networked action in health advocacy.

4. Preliminary Dimensions of the Framework and Expected Findings

The following preliminary dimensions of the framework emerged:

4.1. Framing Dimension

- Digital Storytelling and Illness Narratives
- Connective Framing: Memes and Personalized Action Frames
- Collective Framing: Diagnostic, prognostic, motivational (Goh & Pang, 2016)

4.2. Advocacy Dimension

- Conventional and unconventional action (activist sphere)
- Sense of virtual community vs. issue formation
- Locality of discourse: open/public vs. closed/private

4.3. Goal Dimension

- Empowerment of patients
- Illness perception (Zoller, 2005)
- Social relations

Based on the first results of the netnography some gender-specific narratives that are counter-acting the stigma of the disease or dominant illness narratives emerged. Social media acts as a site to create alternatives: either via contesting or appropriation of negative disease context. The promotion of treatment choices and alternatives is often related to an activist persona or sometimes to a celebrity narrative. Health activist practices utilize non-factual messages next to factual messages, either for the creation of attention or for support. The activist discourse displays different narratives and aims, reflected in different groups of thyroid disease. These socialities could be situated along two axes: activist sphere (activism versus social bonding) and locality sphere (open versus closed media structure). Activist refers to the type of advocacy (for instance radical activist or social bonding), locality to the online spaces of the discourse (open or closed localities). The result that most activist discourse is found in open spaces would be in line with research pointing towards awareness creation as the main function of open Facebook groups (59.9%, Al Mamun, Ibrahim, & Turin, 2015). Furthermore, regarding the narratives for the expression of connective identities, a re-appropriation of disease characteristics can be observed, sometimes in a gendered version by expressing aspects of the female. Example of such identity narratives or memes, which are often found in pictures, are the sleeping beauty or tiredness theme, the not lazy theme, the not crazy theme (denial of socially constructed identities and change of illness perception). Other measures of creating identities via digital narratives are of a visual kind (for instance, the sharing of tattoo or surgery pictures). Identities are furthermore expressed via the distancing to adversaries, for instance to uninformed doctors, or to ones not open to alternative approaches, often gendered as male and of adult age (negative framing of established medical paradigms). Personalized action frames can be seen in the posting of personalized pictures of bodies, for instance before and after a specific alternative treatment as well as other visual narratives and memes.

5. Impact of the Results on Research and Practice

The analysis will contribute to our understanding of the creation of knowledge and truth in health-related choices, as well as to theories of connection action in social media practice. As for the broader theoretical contribution, as Zoller (2005) argues, the work of cultural theorists and the theoretical base worked out in social movement studies are not yet integrated fully into health communication research. Hence applying an interdisciplinary focus could contribute to filling this research gap and contextualize contemporary media theories within the health advocacy field.

Eventually, insights about the target group can form a basis for health communication actors. This can prove valuable to developers of practical applications, for instance for health communication actors or people who are interested in designing e-health-portals or mobile solutions for this audience.

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Decision Support for Weighing the Potential Risks and Merits of Opening Data

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Abstract: The trend of open data has spread widely in government nowadays. The motivation to create transparency and accountability, to stimulate citizen engagement and business innovation are the main drivers to open data. Nevertheless, governments are too often reluctant to open their datasets, as there might be risks like privacy violating, the opening of inaccurate data and the wrong interpretation of data. The purpose of this research is to develop a Decision Support System (DSS) to evaluate the potential risks and merits of opening data. This study uses a Design Science Research approach to develop a DSS, which will include a DSS prototype as a design artefact. Algorithms such as Bayesian-belief Networks, Decision Tree, and Clustering will be reviewed for their suitability in predicting the risks and benefits of opening a dataset. The main reason to use the Bayesian-belief Networks in this study is due to its ability of making various uncertainty predictions and computing the probability of an event occurrence.

Keywords: decision support system, open data, risks, benefits, Bayesian-belief networks

1. Introduction

The trend to open data by governments has increased extensively over the last few years. The motivation to create transparency and accountability, to create citizen engagement, and to enable business innovation are the main drivers to open more data (Ali-Eldin, Zuiderwijk, & Janssen, 2017). Moreover, the disclosure of the data is ultimately expected to improve decision-making by both the government and society (Ubaldi, 2013). Society expects governments to open their data for all kinds of purposes. Opening data by organizations can improve their reputations by showing that they are an open organization (Janssen, Charalabidis, & Zuiderwijk, 2012).

Despite the potential the risks often dominating the decision to open data. There is no decision support to evaluate the risks of opening a dataset or to weigh the benefits and risks with each other. If data are not opened, then the benefits cannot be gained. Furthermore, it is possible to reduce the risks by taking measures like reducing sensitive data elements or introducing noise. Policy-makers and decision-makers have no means to weigh the potential benefits and risks in their decision-making process. The objective of this research is to develop a decision support

system to evaluate the potential risks and merits of opening data. In general, there are two main steps to weigh the potential risks and benefits of opening data, namely the evaluation and assessment phase. The evaluation stage is aimed at identifying the possibility of risks and benefits by quantifying variables using Intelligent System algorithms such as Bayesian-belief Networks, Decision tree, and Clustering. The expected result of this stage is that the DSS can define the classification of the single risks and benefits status. An example of a classification of a variable is very high, high, moderate, low, or very low.

The artifacts resulting from this research are both a DSS and a prototype. The DSS will include elements such as how the prototype should be used (e.g., principles) and the process of the decision-support system. The prototype, on the other hand, serves to provide specifications for an actual working system of decision support using case study datasets. The functionality of the prototype will be tested to define whether it passes the requirements and to evaluate where improvements are necessary. To accomplish the objective of this research, a design science approach will be followed (Hevner, March, Park, & Ram, 2004) and the formulation of five research questions, as follows:

Table 1: Research Questions of this Study

RQ#1	RQ#2	RQ#3	RQ#4	RQ#5
Which factors influence the risks and benefits of open data?	What are elements of decision support systems for weighing the potential risks and benefits of opening data?	Which decision-making techniques can be used to evaluate the risk and benefits of opening data?	What are the functionalities of a prototype to weigh the potential risks and benefits of opening data?	What are the effects of the developed decision-making support system to open more data?

The first research question (RQ#1) seeks an answer to which factors influence the risks and benefits of opening data. Factors influencing the opening of data will be studied by carrying out a literature review to provide an overview of the current issues. This should result in a taxonomy of risks and benefits. The results of the investigation of the first question will contribute to the step to identify what elements can be used to weigh the potential risks and benefits of opening data (RQ#2). The elements of the DSS will be identified by using literature and by performing case studies to understand the barriers to open data. This will result in a list of requirements and detailed steps that need to be taken to decide to open data.

After the elements of the decision-making support of opening data have been established (RQ#2), the next step is to select appropriate mechanisms for evaluating the benefits and risks of opening datasets including Bayesian-belief networks, Decision tree, and Clustering (RQ#3). These kinds of algorithms will quantify and classify the possibility of the risks to generate the level status of the risks of dataset until the benefits are maximized. The prototype of the actual decision-making support model developed in the fourth research question (RQ#4). The taxonomy of risks and benefits of RQ#1, the elements of RQ2, and suitable mechanism of RQ#3 will be used to define

the functionality. Based on the functionality the prototype will be developed, although it might not be feasible to include all mechanisms.

RQ#5 will be answered by evaluation of the prototype, which will be done by employing them in case studies. In these case study possible missing elements, benefits, and risks might be revealed, and it will be evaluated whether the decision-making support plan successfully covers all the needs of stakeholders. The DSS should help decision-makers to decide whether the data may be opened, limited access will be granted, additional screening is necessary, or the dataset should remain closed.

2. Related Work

In order to present the current model of decision-making support and related work in the domain of opening data, we have reviewed some previous references as the general summary and it is shown in Table 2.

Table 2: The Previous Models of Decision Support for Opening Data

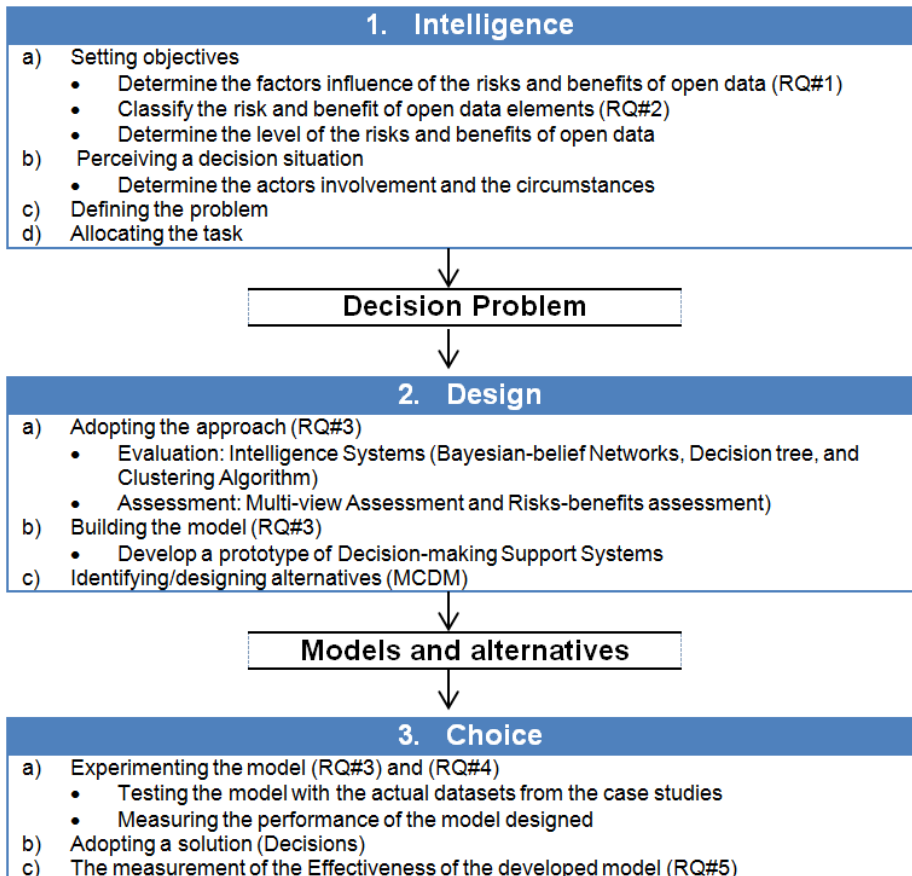
	Name of the Model or Method	Paper/ Authors	Research Overview	Limitation
1	Trade-offs for opening data	Paper title: Towards decision support for disclosing data: Closed or open data? (Zuiderwijk & Janssen, 2015)	The objective of this study is to provide a decision-making model that contributes to trade-offs between the pros and cons of opening data.	Unavailability of specific evaluation and assessment method or algorithm to weigh the potential values and risks of open data.
2	Decision Support Framework	Paper title: Decision support framework for opening business data (Buda et al., 2015)	The model performed an in-depth analysis of seven empirical case studies. A developed prototype of the decision support framework.	Proposed model is specifically for business and private organizations. There was no evaluation and assessment model available.

3. Theoretical Framework

DSS emerged as a new domain for the first time in the era of 70's and brought together with the systems terminology for supporting managerial decisions (Filip, Zamfirescu, & Ciurea, 2017). For one reason, the DSS concept was prevented by the idealized vision of over the precognitive man-

computer systems, which is enabling man and computers to gain cooperation on making decisions and manage various of complex situations (Licklider, 1960). Decision-making support, on the other hand, is a specific form on information processing which presents an action plan under particular circumstances (Simon, 1979).

Figure 1: Decision-Making Support Process in this Study (Adapted from: Simon's Process Model of Decision making (Simon, 1979))



At the same time, Herbert Simon notices that there are three steps to create the process of decision-making support as follows (Simon, 1979): (1) Intelligence. There are three activities involved in these steps such as (a) setting the goals, (b) data elicitation and analysis on the purpose of recognizing a decision problem, and (c) problem statement. (2) Design. There are three activities that will be carried out such as (a) identification of the alternative actions, (b) type of the design, and (c) evaluation of a variety of possible solutions of the problem statements. (3) Choice. This final step is called decision, which presents the way to release it for implementation.

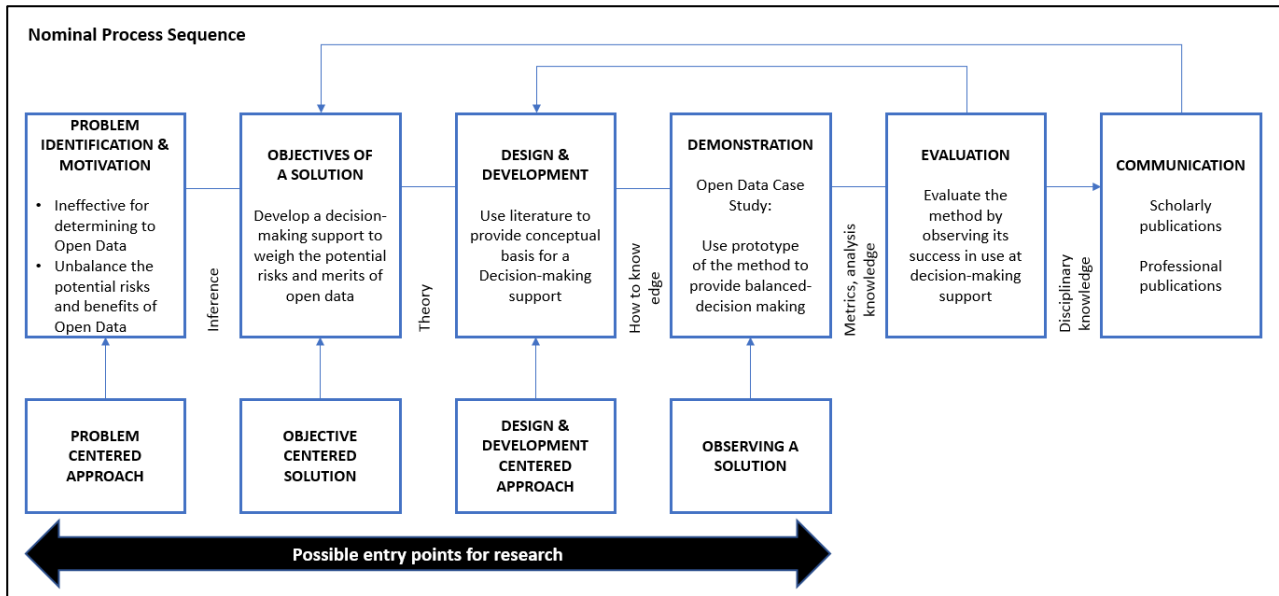
4. Methodological Approach

Design Science Research Methodology (DSRM) is a methodology for conducting Design Science in information systems. The main aim of the DSRM is to develop knowledge that researchers as well as professionals of their discipline in question can use to determine solutions for their field

problems (David, Tranfield, & Aken, 2008). Design Science Research (DSR) should address important and relevant problems as presented in Figure 2 (Hevner et al., 2004; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007). The degree of thoroughness in each of these analyses in this stage greatly influences formally the solutions taken against the various domains of the problem. The process elements are explained as follows:

- 1) Problem Identification and motivation. At this first stage, the problems are identified and defined. In this situation, there are two main problems: (1) no support for determining whether to open data, and (2) an imbalance in the potential risks and benefits of opening data.
- 2) Objective of the solution. After successfully identifying and defining the problem, then at this stage purpose of his research to develop a decision-making support to weigh the potential risks and merits of open data is derived. This objective at the same time serves as a solution offered to solve some of the problems that arise in this research.
- 3) Design and development. Literature will be reviewed to provide the theoretical and fundamental relating to the scope of decision-making support and to derive the functionalities of the DSS. Furthermore, case studies will be investigated to gain a deep understanding of the problem at hand in practice. Case studies might provide more detail than literature and might reveal other problems and give a deep understanding. The results of this literature study and case studies will conceptualize the DSS, and then develop a prototype for supporting the weighing of benefits and risks of opening data.
- 4) Demonstration. After designing and developing the DSS and prototype (as artifacts), its use will be demonstrated in case studies. The prototype itself also serves as an assessment tool for training data on a government dataset. Suppose, in case of misuse of data on the medical record datasets. Thus, the prototype will do the test with several times iteration so that if the risk is higher, then it will be lowered before the datasets are published to the public.
- 5) Evaluation. The main purpose of this stage is to compare the objectives of the predetermined solution to the actual observations of the use of artifacts in the demonstration phase. The evaluation includes observation of the use of the DSS and prototype, determining performance measures, providing surveys about the usability and insight gained, and providing feedback to the users. At the end, decision-makers can decide whether it is necessary to reiterate in order to try to increase the value or decrease the risks of a dataset.
- 6) Communication. The final stage of this process is how researchers can communicate issues and interests including ensuring artifacts that have been constructed are useful, effective, and relevant to the objectives of the study.

Figure 2: Design Science Research Process in this Study (Adapted from: (Peffers et al., 2007))



The evaluation will partly be done in parallel with the stages of Design and Development. The rationale is that evaluation can provide insight to further improve the DSS and the accompanying prototype.

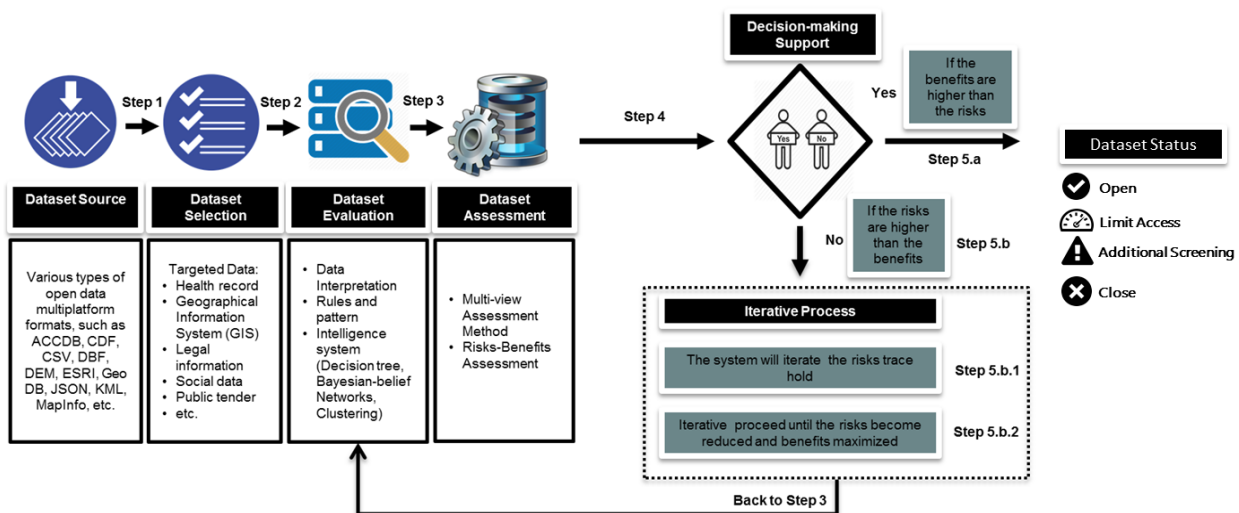
5. Preliminary Results

There is a procedure that will be processed by decision-making support namely “One-Off”. Decision-making is a condition the datasets are evaluated and assessed with a one-time process with several times the possibility of iteration (see Figure 3). The assessment results will refer to four possible decisions that are open, limit access, additional screening, or close. There are five main steps to judge whether to open data. The steps used in this model present in Figure 3 as follows:

- Step 1. Retrieve and decompose datasets format. The system will carefully sort the tables in the datasets, including ensuring that all fields are intact and maintained in relation to each table. A variety of datasets structure formats can be read by the system both based on proprietary database or open platform such as ACCDB (Microsoft), CDF (XML standard), and others.
- Step 2. Evaluation. This stage is a very important stage where the datasets that have been selected in the previous step will go through the evaluation process. The system will perform interpretation of data that translates each data value from a table to be included in two broad categories of risks and benefits. Datasets are evaluated using the Intelligence System Algorithms such as Decision Tree, Bayesian-belief networks, or clustering. In the case of using Bayesian-belief Networks, for instances, there are seven stages to run the evaluation process. The output of this step is to provide a classification practical performance measures of the risks and benefits of dataset selected.

- Step 3. Assessment. The results of the evaluation in the previous stages are classification and level references to the risks and benefits of datasets. The advantage of this system is to provide iterative process conditions when conducting an assessment to ensure that the benefits level is higher than the risk at hand. Technically, during the assessment process, the system will combine the overall scores from the benefit and risk analyses to determine the appropriate solution for how to treat the dataset.
- Step 4. Decision-making support system. There are four possibility decisions to release the datasets. Open: Publishing the dataset presents a low risk to individual or organizational identification, or the potential benefits of the dataset substantially outweigh the potential risks. Limit Access: Publishing the dataset will create a moderate risk, or potential benefits of the dataset do not outweigh the potential privacy risks. Additional Screening: By publishing the dataset, it tends to create significant risks and the potential benefits do not outweigh the potential risks. Close: Releasing the dataset generates a high or very high risk to individual or organizational and significantly outweigh the potential benefits.
- Step 5.a. Open Decision. In this step, when the datasets test results show that the datasets have a greater benefit condition than the risk, the system will provide a reference to open the data to the public.
- Step 5.b. Non-open Decisions. If the risk attribute of the datasets is still higher than the benefit (5.b.1), then the system performs the iteration of the trace hold risk and returns to the evaluation in step 3 (5.b.2) until the risk is reduced and the benefit becomes increased. The possibility of the non-open decisions is Limit Access, Additional Screening, or Close.

Figure 3: Proposed Decision-Making Support System



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Effective Visualisation to Enable Sensemaking of Complex Systems. The Case of Governance Dashboard

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Abstract: One of the main challenges regarding data is the need to be able to view, understand, and analyse it quickly, and data visualisation is seen as the primary effective means to help achieve this goal. Data visualisation is particularly useful in communicating data to a wider (and often lay-) audience and can support increased engagement with the underlying data. This is of particular importance in the area of governance and increased engagement by civil society in public policy. However, data visualisations in the context of governance can sometimes mislead by omitting information and relationships thereby becoming liable to present a skewed picture to end-users. This research will focus on what sense different audiences make of current governance dashboards and how complex systems such as a city can be represented visually.

Keywords: human-centered computing, visualization theory, concepts and paradigms; applied computing, e-government; applied computing, multi-criterion optimization, decision-making

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1. Introduction

Complex systems are extremely hard to comprehend and making decisions on the limited understanding we gain is fraught with detrimental impacts as time progresses due to internal dynamics and hidden relationships (Sterman, 2002). Humans have the tendency to oversimplify complexity and to expect quick-fix solutions to problems that may have many causes and been developing over many years (Norman & Stappers, 2015). This research aims to develop a visualisation model that captures this complexity and allows users to focus on details without losing the impact on the whole system. It is proposed to use governance dashboards as a use case domain for two main reasons.

- 1) Cities are a microcosm of the global system and contain all the different elements that make up the global system: diverse cultures, economic disparities, environmental challenges, and political agendas to name a few, albeit on a smaller scale (Hepp, 2015).
- 2) With the advent of open government data and the Internet of Things (IoT), there is at least some interest and willingness to look at ways how data can be used to improve a city. Dashboards are just one manifestation with their focus on measurable data, open access and diversity of structures (Ubaldi, 2013).

We consider this research important as current governance dashboards have a tendency to further compartmentalise our understanding of cities, thereby exacerbating problems arising out of disjointed decision-making.

2. Research Questions

Research Question 1: How do different audiences make sense of governance dashboards? Focusing more on what sense different audiences make of current governance dashboards than on how people process the information. It is envisaged to answer this question through an exploratory qualitative survey of different user groups.

Research Question 2: To what extent do visualisations depict internal / hidden dynamics? This will involve a review of existing city visualisations and visualisations of complexity to ascertain to what extent and how these visualisations depict complexity. Further work with a cohort of people from the survey in RQ1 will be carried out to look at what would be needed to effectively capture the complexity of a city. From the results of RQ2, a prototype will be developed, which will again be tested for sensemaking.

Research Question 3: Complexity versus detail - seeing the parts while making sense of the whole. It is envisaged to create a test visualisation based on the results to RQ1 and RQ2 that will be trialled and refined. A final model will be developed.

3. Related Work

3.1. Governance Dashboards

Most city visualisations focus on a specific area only. Governance dashboards, however, tend to amalgamate data from many different departments and different sources and are lauded as providing a “One-Stop Digital Shop for Digestible Data on Your City”¹ by giving people access to information about a locality, thereby increasing their understanding of it. However, governance dashboards are problematic on three distinct levels.

¹ “The One-Stop Digital Shop for Digestible Data on Your City”. 4th April 2016. CityLab, The Atlantic. <https://www.citylab.com/life/2016/04/this-new-data-tool-brings-city-data-to-the-surface/476661/> accessed May 22nd 2017.

- Governance agendas define which data is worth gathering, what cleaning and filtering should be undertaken to transform it into usable data fit for its stated purpose. Data in this context is never neutral but informed by the political framework (Kitchen, 2014).
- The heterogeneous nature of the data sources themselves bring challenges as they may be sourced from different city departments or external entities (such as social media, semi-state bodies).
- Lastly, the audience of governance dashboards is extremely varied. Not only do dashboard users have different capabilities in relation to the technology employed, they also pursue different agendas and their sensemaking will be as much informed by their individual background as it is by the type of visualisation employed.

Furthermore, Kitchin (2014) argues that there is a broader concern regarding the use of city data. The author argues not every aspect of a city can be measured (and maybe should not be measured) and an over-reliance on data could lead to serious problems if the data infrastructure breaks down or is hacked. Many of these initiatives “are contingent, relational and contextual” and their output creates an ‘image’ of a city that is not based on reality but instead asserts “a particular expression of power/knowledge” (Kitchen et. al., 2015). There is also a concern that city dashboards facilitate an inward-looking culture driven by control, ignoring the connections a city has to its surroundings and the wider world (Mattern, 2015).

3.2. User Experience Design and Visualisation

User Experience Design combines a number of related design methods such as interface design and user design. It aims to produce a product that fulfills the users’ needs while also serving the objectives of the producer. User needs in this instance include the effective results of human-computer interaction rather than just practical usability, connecting it with emotions, behaviour, and attitudes. DesignX - coined by a number of designers in response to defining design dealing with, as of yet, unknown approaches - develops this further by focusing on the broader contextual complexities of sociotechnical systems. According to Norman & Stappers (2015), DesignX encompasses dealing with three challenges that could be described as human-centred (psychology of human behaviours and cognition), society (social, political and economic framework of complex sociotechnical systems), and engineering (technical issues that contribute to the complexity of DesignX problems). Norman & Stappers (2015) maintain that each of these areas poses considerable challenges, but that these challenges need to be tackled in order for people to understand complex systems. Data visualisation, in a nutshell, is the representation and presentation of data to facilitate understanding (Kirk, 2016). It involves careful consideration of the target audience (who are they and what are their needs?), gathering appropriate data, and defining a message and ways to best communicate it with visual properties (such as colour, annotations, visual variables).

3.3. Sensemaking in the Context of Data Visualisation

According to Klein and Moon (2006) sensemaking is a process to develop situational awareness within the context of complex events. Freemann et al (1996) distinguish two main capabilities for sensemaking - effectively structured domain knowledge and critical thinking skills. Sensemaking

as a process involves steps that can be broadly summarised into Situations -> Gaps -> Uses (Dervin, 1983), where each step requires an initial framing (based on pattern-recognition or prior experience) which influences the data collection & transformation and a consequent critique of the initial frame. This is referenced by a number of sensemaking models. It is also reflected by Lee et al (2016) who defined five specific stages that people go through when encountering unfamiliar visualisations. Called NOVIS, this includes peoples' initial encountering of a visualisation, followed by the construction of a framework ('this visualisation is about ... '), before exploring the visualisation in more depth. An often less explored effect of sensemaking vis a vis visualisations centres on the implied reduction caused by graphically displaying data. According to Rieder und Roehle (2012), less research has been carried out into the underlying epistemology of creating data visualisations, i.e., what are the reference points for the data analysis, the algorithms, and the visualisations itself? They stress that visual literacy will be an essential skill and that the provision of source code and specifications need to be included but also expanded to allow users to fully understand visual representations of data. Echoing Kitchin et. al.(2015), they are concerned that visualisation as a tool carries its own reductive meaning (Rieder & Roehle, 2012). In a paper by Rensink (2002), this is again referred to in that they describe visualisations as having a defining impact, not only on how we see things but also how we make sense of the things we see. They identify three forms of data transfer within visualisation, each with their own reference points. The first transfer from world to data looks at what sources are used for data generation (or 'ecological fallacies' as Kitchin et. al. (2015) calls it). The second point focuses on the transfer from the data to the image and the associated selective strategies used in the visualisation process. Lastly, the transfer from the image to the eye, the actual sensemaking process, which is dependent on each individual viewer's background and circumstances. Lastly, the way we see things is a learned skill and is influenced by the context more so than the actual visual display. Studies by Healy and Enns (2012) have shown that change blindness (inability to see change in a visual display) and virtual representation (an image consists of prior knowledge and information received visually) play a big part in our ability to see things. Moon et al (2006) argue that our emotions also influence what we see and, more crucially, what we expect to see next.

4. Theoretical Frameworks

This research is informed by three broad areas:

- a broader systems thinking approach to look at and make sense of a city in its entirety. This will involve careful consideration of all actors as well as their relationships with each other and the 'wider world'.
- a communication approach and a visual exploration model to capture the sensemaking processes of dashboard users. Particularly the data/frame theory (Moon et. al., 2006) above will be utilised in order to understand how people make sense of governance dashboards.
- a visual science approach which will consist of both a visual analytics framework (i.e., shape of the visuals used) and a review of current city space visualisations.

5. Methodology

5.1. Motivation

This research is inspired by key works within the Systems Thinking sphere but also by personal experience and reflection on the interconnectedness of this world. I am of the opinion that we learn nothing from history because all we ever try to change are the symptoms of widespread system failure that has its origins in when humans started to see themselves apart from the wider world and accelerated when specialised expertise became the norm. Within cities, this is reflected by separate departments which may help to focus on details but often lead to a loss of connectedness especially if this connected-ness is not easily understood and/or subjected to different time frames.

5.2. Perspective

I am focusing specifically on cities as they are composed of interconnected systems such as society, technology, the wider environment etc. Basically, a city allows me to focus on complexity within a definable framework without missing out on an essential component. I hope to utilise Systemic Design approaches (Ryan, 2014) in that I want to focus on the following areas to inform my research:

- Appreciation of multiple scales and perspectives
- Working with users
- Any plans have to allow for unpredictable emergence
- The city as a complex system is a construct which can be reconstructed

5.3. Research Design

The research design can be divided into three stages, which are reflected by the research questions. The first stage focuses on establishing a baseline regarding existing visualisations of city space and how these reflect complexity. This stage includes an examination of people's sensemaking in relation to cities and visualisations. The second stage aims to map the city within a system thinking framework with a particular focus on feedbacks (including time-delayed feedback), nonlinear relationships and stocks & flows. The third stage attempts to collate the results from the other two stages to develop a visualisation model that captures complexity in an easy to understand manner.

5.4. Data Collection Techniques

Data will be collected by the following means:

- qualitative surveys to establish people's sensemaking in relation to existing governance dashboards,
- focus groups to mindmap requirements,
- dialogue games to examine people's engagement with and understanding of new city visualisation models,
- further research.

6. Results

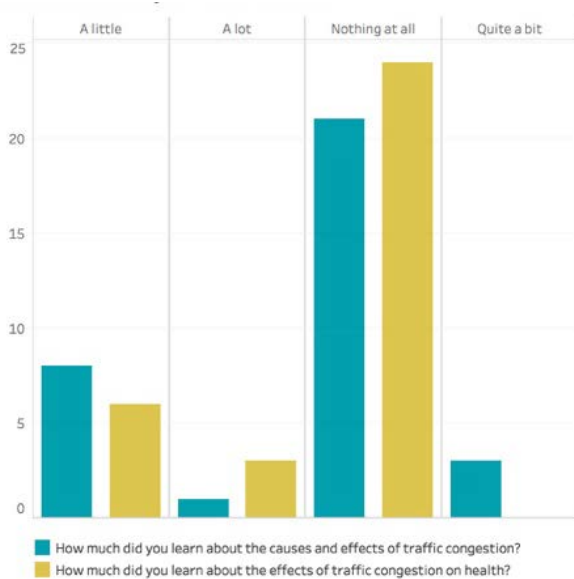
6.1. Preliminary Results

At this stage, an exploratory survey to examine people's sensemaking process in relation to governance dashboards as well as a review of some city visualisations in the European context has taken place.

6.2. Survey

A total of 38 responses were received. Participants ages ranged from 20 to over 70, and two-thirds identified as male (63%). 17 people (47%) said that they were not familiar with dashboards at all, another 17 identified themselves as casual users / somewhat familiar, while 2 (6%) said they used a dashboard regularly / were expert users. Initial findings indicate that the current version of the Dublin dashboard does not allow users to query and/or understand complexity (see Figure 1).

Figure 1: How Much People Learned from the Dashboard about Specific Topics



Furthermore, people expressed difficulty to find answers to the question itself.

Table 1: How Complete was the Answer?

	No answer found	Answer not detailed enough	Answer somewhat detailed	Answer sufficiently detailed	Answer too detailed
Number of respondents	11	2	6	5	1
Percentage	44%	8%	24%	20%	4%

6.3. Review of Current Visualisations Concerning Cities in Europe

In order to establish an overview of current visualisations concerning cities, I have begun to gather and evaluate visualisations of cities within Europe. So far approx 40 visualisations have been assessed.

Criteria included the type of visualisation (map, infographic, art, film, dashboard), if it offered interaction (i.e., is exploratory), if it offered further information (i.e. is explanatory), if the data was made available and what topic(s) it covered. Visualisations were gathered through a simple search focusing on terms such as visualising cities, city visualisations, city infographics.

Most visualisations were classified as a form of a map (22) or infographic (10), with various levels of explanatory / exploratory attributes (see Figure 3).

Figure 3: Type of Visualisations

Explinator..	Exploratory	3D	Art	dashboard	Film	Infographic	Map
no	no		3		1		3
	yes		1	1			6
somewhat	somewhat	1					1
Yes	no		1		1	4	3
	yes	1				6	9

Of the visualisations depicting single topics, transport is the most common. However, most visualisations assessed so far depict more than one topic, e.g., transport & sentiment.

6.4. Discussion

The results from the survey, while not providing definite evidence, indicate that the current version of the Dublin Dashboard does not allow people to query and / or understand complexity. While some of the problems encountered by respondents may be due to design issues (e.g., lack of a search function was mentioned repeatedly), there seems to be an underlying difficulty in connecting complex topics meaningfully. Other visualisations about cities - while often combining (at first glance) unrelated topics - rarely go beyond a handful of topics. Dashboards, while collating data about a myriad of city-related areas, also rarely allow users to query unrelated topics easily. From these two surveys, it seems that there is a need for an interface that facilitates users to explore and understand cities as complex systems.

7. Possible Future Impact

Current debates around smart cities and open data tend to focus on the challenges involved in making data available and accessible. This includes issues such as interoperability, privacy and data protection, trust, and data validity to name but a few. In our opinion, defining a visualisation model that captures a city as a complex system will help to frame developments to overcome these challenges. Furthermore, if the final model succeeds in enabling users to make sense of their city as

a complex system, this research will support better engagement with and understanding of controversial policy decisions that need to be taken to ensure the sustainability of the city.

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Workshops

Workshop: Roadmapping Government 3.0

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Abstract: Considering the novelty of the Government 3.0 concept and the lack of a consensual definition, there is a need for framing the term based on potential tangential concepts. The main objective of this workshop is to use scenario techniques to roadmap the emerging Government 3.0 research field: its gaps, main challenges, and research directions.

Keywords: Government 3.0, digital governance, Gov3.0 keyword, roadmap

Acknowledgement: This workshop is developed in the context of the Gov 3.0 Project. It has received funding from the Erasmus+ Knowledge Alliance, Project Reference No. 588306-EPP-1-2017-1-EL-EPPKA2-KA.

1. General Description

Since nearly two decades, Electronic Government has been researched and implemented with differing foci, such as public service provision, automation in the public sector, interoperability and common standards, modernisation and innovation through organisational change and collaborative governance, privacy, security and legal issues. Along with the continuing evolution of ICT, government services improve and adapt, incorporating the latest available technologies. While Government 1.0 was more focused on the efficiency part, Government 2.0 concentrated on the collaboration and citizens' engagement following the web 2.0 paradigm and the emergence of social media. Recent technology advances such as artificial intelligence, machine learning, big, open and linked data, data mining and sentiment analysis, blockchain, augmented and virtual reality are only a few examples of the new topics of research in e-government. The ongoing ERASMUS+ research project "Scientific Foundations Training and Entrepreneurship Activities in the Domain of ICT-enabled Governance" (Gov 3.0) goes beyond the existing state-of-the-art in analysing developments from the public and private sector towards establishing the next evolution called Government 3.0.

Based on initial research, the Gov 3.0 project consortium has developed the following definition of Government 3.0: *Government 3.0 refers to the use of disruptive ICTs (e.g., blockchain, big data and artificial intelligence technologies) in combination with established ICTs (distributed technologies for data storage and service delivery) and the wisdom of crowd (crowd-sourcing and co-creation) towards data-driven and evidence-based decision and policy-making.*

2. Aim of the Workshop and Organization

In the workshop, an overview of the current research of Government 3.0 will be presented, followed by participatory techniques to develop a roadmap of emerging Government 3.0 research needs. In the group discussions, scenario technique and technology road mapping will be used to develop a vision, current gaps and needs for research, and future research directions. The scenario-building approach will be adopted from previous successful road mapping projects of the workshop organisers like eGovRTD2020 and Crossroad. The workshop will be based on the data collected during the first phase of the Gov 3.0 project on current research trends and training needs on government 3.0. The participants of the workshop will first be asked to construct scenarios of possible future developments in Government 3.0 using disruptive technologies such as AI, machine learning, blockchain technology, big data analytics. In a second step, the scenarios will be analysed against current research and roadmap suggestions will be derived. Researchers and practitioners in electronic government are the intended audience of the workshop. The workshop will be organised in two sessions. The first session will start with short presentations by the ERASMUS+ Gov 3.0 project members and presentations by invited speakers. The first session concludes with group discussions on future scenarios. During the second session, participants will work on the roadmap suggestions and subsequently present the results in the plenum. The workshop will conclude with a plenary discussion of the scenarios and roadmap.

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Transforming Decision and Policy-Making through Big Data

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Abstract: For the workshop to achieve its purpose, representatives of public authorities, civil society organisations, ICT research organisations, big data providers and companies are expected to participate and contribute. The workshop will be highly-interactive and will use engaging activities, including game-storming session to motivate the participants. By using visual metaphors and games, creative thought will be encouraged. Towards this direction, indicative resources to be utilized in the context of the workshop include beamer, flipchart, post-it notes, coffee, and water.

Keywords: workshop, big data, decision-making, policy-making

1. Rationale

It can be taken for granted that technological advancements, especially of the last decade, have revolutionised the way in which both daily and complex activities are conducted. It is indicative that practically all expectations of innovation towards covering domain specific needs, regardless of the domain of application, are most of the time directly linked with the exploitation of emerging technologies, as well as with the constantly increasing volume of available data. It is, thus, expected that synergy among all important actors, such as the public and private sectors, should lead the way towards a successful disruption paradigm through the adoption of novel approaches and state-of-the-art ICTs. New concepts, especially those that consider the available (big) data as a way of ensuring accurate and meaningful input to all stakeholders' groups that can help establish new types of evidence-informed policies and decision making in general, are of the utmost importance. However, despite the investments continuously performed and initiatives implemented during the last years in the corresponding research and application fields, it is hard

to allege that “we are already there” when it comes to full exploitation of ICT innovations and data towards meeting the societal and financial needs that are emerging.

In this context, four EU funded projects would like to offer their perspective on how needs decision and policy-making in different sectors can be overcome. Big Policy Canvas project aims at renovating the public sector on a cross-border level by mapping the needs of public administrations with methods, technologies, tools and applications from both the public & the private sector, stepping upon the power of open innovation and the rich opportunities for analysis and informed policy making generated by big data. As a result, the project will deliver a live roadmap that will propose short and midterm milestones and relevant actions needed towards achieving the expected impacts for the public sector and the society at large. The aim of the PoliVisu project is to enhance public involvement in and support for urban policy-making by equipping decision-makers with the skills and tools to use big data for collaborative policy experimentation, from open (geo) data processing to advanced visualisations. Working with three cities in the areas of smart mobility and urban planning, PoliVisu will enable public administrations to effectively respond to complex, systemic policy problems with innovative thinking and transformative solutions. BigDataOcean aims to enable maritime big data scenarios for EU-based companies, organisations and scientists, through a multi-segment platform that will combine data of different velocity, variety and volume under an inter linked, trusted, multilingual engine to produce a big-data repository of value and veracity back to the participants and local communities. AEGIS aims at driving data-driven innovation that expands over multiple business sectors (e.g., public, environment, health, automotive, insurance) and taps structured, unstructured and multilingual data sets to create a novel data value chain around Public Safety and Personal Security (PSPS).

2. Objectives and Expected Outcomes

To produce the desirable results, it is imperative to engage representatives of all possible stakeholders' groups (public sector, business, research, and the society itself), fostering a new culture of collaboration, multi-disciplinary, and mutual benefits. And so, the purpose of this workshop is then to present and discuss existing needs and trends originating from the four projects and investigate commonplaces and/ or further synergy opportunities; promote active dialogue among the participants and use the resulting feedback to refine the solutions and any of the underlying methods as Big Policy Canvas, PoliVisu, BigDataOcean and AEGIS prepare to move forward to the next stage.

3. Approach

For the workshop to achieve its purpose, representatives of public authorities, civil society organisations, ICT research organisations, big data providers and companies are expected to participate and contribute. The workshop will be highly-interactive and will use engaging activities, including game-storming session to motivate the participants. By using visual metaphors and games creative thought will be encouraged

Towards this direction, indicative resources to be utilized in the context of the workshop include beamer, flipchart, post-it notes, coffee, and water unless this will be available as part of the main conference. The workshop structure, aiming for a duration of three hours, is as follows:

(a) Introduction (5'); (b) Presentation of the projects' results and feedback session (30' - 5' project presentation, 10' initial Q&A session); (c) Short break (10'); (d) Game-storming and Co-creation session with the workshop participants and presentation of results (90'); (e) Panel with experts and overall Q&A session (30'); (f) Wrap up and further steps (15')

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Dr. Panagiotis Kokkinakos holds a MSc. in Electrical and Computer Engineering from the National Technical University of Athens, an MBA in Techno-Economic Systems and a PhD in social web exploitation for the policy cycle. He has more than 7 years of experience in the areas of Future Internet and Enterprise Systems, eGovernment, eParticipation, Data Management, Management and Monitoring of Projects.

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Using Social Media in Public Administrations

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Abstract: With the use of Web 2.0 applications, organisations and companies can reach both a mass audience and a niche audience at the same time. They can act creatively and flexibly, and they can be close to their users. There are questions an organisation must ask itself when using social media, but are these questions suitable for public administrations too? This workshop aims to explore the questions a public administration needs to ask when using social media, whether a social media strategy and guideline can be made to be suitable for several different stakeholders and what the role of social media is in the digital transformation of public administration.

Keywords: social media, public administrations, digital transformation

1. Questions for Using Social Media in Public Administrations

Social media play an important role in the information society: They support and enable phenomena such as user participation, sharing content online, pushing network effects, but also achieving collaborative and efficient action with a large number of participants (Chadwick, 2009). The use of such applications can help increase the number of services offered and improve the quality of services, the customer base expanded, and interaction and cooperation with customers in product development can be facilitated and supported (Bughin, Manyika, & Miller, 2008; Serrat, 2017). The public sector has begun to use the (far-reaching) knowledge of citizens for the optimisation, development and innovation of administrative processes and services with the help of methods from open innovation (Loukis, Charalabidis, & Androutsopoulou, 2017). The European Commission praises in particular the digital services provided to the public.¹ However, public

¹ Digital Economy and Society Index (DESI) <https://ec.europa.eu/digital-single-market/en/desi>

authorities and organisations must continue to refine their methods for the appropriate use of social media and networks to carry out their tasks.

2. Issues to be Raised during the Workshop

The questions an organisation must ask itself when using social media are (Serrat, 2017, p. 931): How can Web 2.0 tools and social media be used to increase an organization's success? How can they be used to collect knowledge, skills, resources from customers, partners and audiences? How do they change processes? How do they support the development and protection of reputation and trademarks? How can they be used to identify, recruit, develop, deploy and retain talent? What information must not be made public? But are these questions also suitable for considering the use of social media in public administrations? Both Mickoleit (2014, pp. 65–66) and Mergel et al (2013) propose that a series of questions for public sector institutions that are developing strategies for the use of social media. In this workshop we would like to consider the different users and stakeholders who are affected by the use of social media in public administrations. Following a brief presentation of the relevant research on social media in public administrations and the guidelines by Mickoleit and by Mergel et al, we would like to discuss with the workshop participants:

- Drivers and barriers of social media in public administration;
- Good and bad practice of social media in public administrations;
- The different stakeholders' expectations regarding the use of social media in public administrations;
- How a social media strategy and guideline can be suitable for several different user groups;
- The role of social media in the digital transformation of public administration.

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