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Welcome to EGOV-CeDEM-ePart 2019!

This year's edition of this landmark conference took participants to the picturesque town of San Benedetto Del Tronto, Italy, home to local hosts, the University of Camerino, from 2-4 September 2019. In endeavouring to maintain the established track record of publishing a high standard of emerging and immediately relevant scholarly and experiential research, these proceedings consist of Ongoing Research Papers, Reflections and Viewpoints, Practitioner Research Papers, Workshop Proposals, and Poster Summaries that engage with cutting-edge issues, ideas and innovations across the range of the EGOV-CeDEM-ePart 2019 conference tracks:

- e-Government and Open Government;
- e-Democracy and e-Participation;
- Smart Cities (governments, communities, regions);
- Artificial Intelligence, Data Analytics and Automated Decision Making;
- Social Media; Social Innovation;
- Open Data (social and technical aspects);
- Digital Society; and the
- Practitioner's Track.

Presenting their ongoing research was an excellent way for researchers to explore nascent and emerging research areas together with an expert audience, to highlight topical research problems, and obtain valuable feedback on ideas, innovations, and other work currently in progress.

On top of the list of topics covered by the papers published within these proceedings is the study of data-driven decision-making in the age of smart governance. Gregor Eibl and Bettina Höchtl critically examine how civil servants in the City of Vienna make use of decision support tools to accurately assess the impact of policy. Their research summarizes questionnaire-based results obtained from experts from the City of Vienna in order to provide a deeper insight into how civil servants use decision support tools to take key decisions and to identify how they prioritise the use of these tools in different contexts. The research further investigates the ability of citizens to navigate through the wide range of open government data available, and to take sound decisions important to their day-to-day lives.

Heike Vornhagen, Karen Young, and Manel Zarrouk take a critical look at existing city dashboards and examine how built-in visualisation tools can contribute to a citizen's ability to make sense of provided open data. Their paper uses criteria identified in previous research concerning visualisation tools and applies these to a number of existing city dashboards that are already publicly available and can, hence, be considered as potential communication tools.

A third way of looking at access to information is to consider it through the lens of an information ecology, where information is supplied and can be accessed through the use of advanced information retrieval systems. Shefali Virkar and Anna-Sophie Novak investigate the role of rigorous user-driven, citizen-centric techniques applied to developing an advanced legal information retrieval system that aims to facilitate public access to legal information. Using the example of a targeted user requirements elicitation questionnaire, they argue that requirements elucidation exercises are fundamental to the delineation and understanding of a relevant information environment or ecosystem.

Understanding what makes a city 'smart' and assessing the degree to which smart cities initiatives have succeeded in reaching their proposed goals often relies on the development and application of appropriate frameworks and models. Mauricio Solar, Juan Cockbaine, and Juan Valenzuela take a unique approach to the assessment of a city's degree of 'smartness', developing in their paper a maturity model to guide the progress of cities towards the attainment of this goal. The proposed model consists of three top-level domains – Environment, Mobility, and Government – and their sub-domains, each consisting of fourteen critical variables. Initial validation of the Smart Cities Maturity Model has been carried out by an institution with vast knowledge of and practical experience in the given specialist area.

Similarly, María E. Cortés-Cediel, Iván Cantador, and Manuel Pedro Rodríguez Bolívar critically explore how participation has been conducted and promoted in European smart city initiatives. Through an examination of 108 such projects, spanning 61 cities in 19 countries as reported in the EUROCITIES Network, the authors explore whether those cities that lead urban governance projects actively advocate for increasing and enhancing interactions between citizens and local governments. The success of smart city initiatives can also be ascertained through the use of case studies.

Through a case study centred on the practices undertaken in Chattanooga Public Libraries (USA) Xiaoyi Yerden, J. Ramon Gil-Garcia, Mila Gasco, G. Brian Burke, & Miguel Figueroa critically examine the role of public libraries as anchor institutions facilitating the furtherance of local

government strategies aimed at improving the overall quality of life for citizens and making a city smarter.

Remaining within the domain of data-driven smart governance, other papers within these proceedings examine issues fundamental to open data provision by government. While the idea of open data (OD), and in particular open government data (OGD), has been around for some time, Csaba Csáki argues in his paper that there is a need to revisit the scientific approach surrounding the study of questions pertaining to such data that applies the so-called ecosystem model borrowed from the biological sciences. In particular, he remarks that there is no common notation available to represent entities and relationships in OD ecosystem models visually. To remedy this, the author proposes a set of requirements that could form the scientific basis of an open data ecosystem visual model notation.

Auriane Marmier and Tobias Mettler also tackle newly emerging aspects of OGD provision, describing in their paper a practical approach to the examination of Open Government Data de-identification rules implemented by governments to protect the privacy of individuals. They argue, in particular, that the hackathon is a suitable technique to meet de-identification challenges owing to the emergence of open innovation.

Investigating the impact of digitalisation on, and the use of new digital technologies in, public service provision also remains an important facet of e-government scholarship. In these proceedings, J. Ramon Gil-Garcia and Luz Maria Garcia-Garcia analyse digital government and migration management in Mexico to contribute to a more critical understanding of the use of digital government applications for so-called non-citizens or vulnerable populations, looking particularly at the case of migration services.

What role does technology adoption play in effective disaster management, and what are the potential impacts? Jang Bahadur Singh, Sujeet K. Sharma, and Santosh Misra attempt to answer this question by considering technological framing as a dynamic process, and by taking a critical look at the associated socio-political processes and organisational outcomes. Equally pertinent is the outcome of investments made in digitalisation initiatives by the public sector.

Although it is more or less a given that in today's world an organisation, public or private, will invest in digital technologies, the outcome of these activities is much less certain, and it is difficult to determine when and where digitalisation will create value. Therefore, Pasi Hellsten and Samuli Pekkola argue, it is important to ascertain both the implications of successful digitalisation and its benefits for stakeholders. To achieve this, the authors focus on identifying potential impacts accruing to city employees, decision-makers, citizens, and the public sector in general through a study of such initiatives in a mid-sized city.

Some authors critically appraise the use of new generation disruptive technologies to enhancing public service provision. Yuri Misnikov and Olga Filatova discuss initial experimental results of ongoing research into the use of Artificial Intelligence (AI) for discourse analysis of everyday internet discussions on salient public policy issues. They argue that the approach taken by

researchers conducting these experiments constitutes a unique way to circumvent the barriers associated with the effective application of AI techniques in the field of public communication.

Research conducted by Kerley Pires and Soumaya Ben Dhaou attempts to shed light on the process of Blockchain technology value creation for Government and Public Services (G&PS) by directly addressing research questions that ask what the value created by Blockchain for G&PS is, and what are the required capabilities for reaching this goal. The authors propose to develop a conceptual framework to identify Blockchain capabilities and potential benefits for G&PS.

To facilitate standardisation and interoperability in digital public service provision, the European Commission has recently developed CPSV-AP standard for public service modelling. At the same time, chatbots have become increasingly popular for public service provisioning following their successful adoption in the private sector. Anestis Stamatis, Alexandros Gerontas, and Efthimios Tambouris investigate the technical feasibility of integrating chatbots with CPSV-AP and identify relevant challenges and benefits based on a developed pilot implementation.

Concept-building and theoretical studies surrounding ICT-usage are still highly relevant in the contemporary context. Three different perspectives are showcased as ongoing papers in these proceedings. In the first instance, the study undertaken by Sharad Sharma and Rekha Jain seeks to bridge the gaps in ICT-based innovation literature by attempting to map identified empirical studies to existing theoretical frameworks in order to validate them and to identify existing empirical relations not currently reflected therein.

In a second paper, Toomas Kästik, through the theoretical lens of institutional economics with an emphasis to the theory of transaction costs, investigates the effects of the digital services of the Estonian Tax and Customs Board (ETCB) on enterprises. The study also takes a critical look at developments expected by enterprises in terms of increased efficiency from the reduction of the administrative burden, and the attitude of enterprises towards implementing the instruments of a real-time economy in taxation.

From a critical investigation of core definitions of the concept, Yumei Chen, Ran Wei, Kangchen Li, and Luis F. Luna-Reyes propose, as a third perspective, an assessment framework for community resilience; one that includes economic resilience, institutional resilience, infrastructure resilience, community capital, environmental resilience, and social resilience. The authors then validate the framework through cases studies based on the resilience plans of three cities - New York City, Athens and Toyama.

A final theme running through this year's ongoing papers relates to the evolution and future trajectory of digital government, both as a concept and in practice. J. Ramon Gil-Garcia, Paul Henman, and Martha Alicia Avila Maravilla pose two intriguing questions in this respect: what exactly is meant by the term "government as a platform"? And, could this be considered as the next stage of digital government? Based on an analysis of three of the most advanced national portals – Australia, the United Kingdom, and the United States of America - the authors attempt to answer these questions. Their ongoing research paper explores the extent to which these three digital efforts

are truly representative of platforms, both in terms of conceptual definition and actual usage, as against being merely sophisticated Internet portals.

Reflections & Viewpoints are short critical pieces unique to the EGOV-CeDEM-ePart conference series that focus on, and make the reader consider deeply, issues pertaining to the conference's main themes and issues from the distinct perspective of the author. The three Reflections featured this year promise to engage us into looking differently at e-participation and e-democracy. Uwe Serdült proposes the development of a cryptocurrency based on Blockchain technology as an innovative solution to overcome the problems associated with the regulation of money used for election campaign financing.

Public political discourse in Twitter about the conflict in Donbass framed by institutional actors and political figures of the five countries that constitute permanent members of the UN Security Council is critically examined in our next Reflection piece. The authors, Radomir Bolgov and Vatanyar Yag'ya postulate and then attempt to confirm the hypothesis that there exist two divergent variants of discourse that characterise the participants in the South East Ukrainian conflict. To achieve this, they develop and use a technique that analyses political discourse on two levels: (i) the identification of key conceptual metaphors in both putative discourse options, and (ii) the identification of the semantic opposition "us-them" within metaphors.

The third and final Reflection this year focuses on the identification of causes and outcomes of e-activism spikes within the context of e-participation in six Baltic and Eastern European states. Here, Dmytro Khutkyy explores the similarities and differences in the e-Participation trajectories of Belarus, Moldova, Ukraine, Estonia, Latvia, and Lithuania; based on expert interviews content analysis, and self-reported statistics.

Like in other research areas, high-quality practitioner research is a valuable addition to the domains of e-government, e-participation, and e-democracy; however, it is difficult to come by. This year our sole practitioner paper brings to the fore a wealth of experiential knowledge accumulated by its authors during the course of a large-scale European project. Based on the example of the large-scale pilot TOOP, Thomas J. Lampoltshammer, Klaus John, Philip Helger, and Carl-Markus Piswanger propose Connectathons as a means to facilitate the early detection and resolution of potential barriers to the effective joint development and piloting of technological systems as well as planned demonstrators and prototypes within the context of large-scale European innovation projects.

Workshops are a hands-on way of harnessing the range and depth of extant knowledge and experience present amongst attendees of big conferences. They bend towards either the resolution of a particular problem or the contemplation of a future research trend. From the development of technical compliance standards, to the creation of higher education curriculum, the identification of research and innovation directions for policymakers, or the development of legal information retrieval systems – the workshops organised as part of EGOV-CeDEM-ePart 2019 are set to challenge and engage their participants and push the boundaries of creative thinking in their respective fields. Mathias Van Compernolle and colleagues, for instance, aimed to engage participants in the development of a roadmap and a research agenda on compliance issues of data standards within

the framework of e-government. In particular, the workshop organisers sought to reflect with experts on current existing frameworks for adoption and governance of data standards and intergovernmental interoperability, to build an inventory of tendencies within the field of data standards and their implementations, and identify potential challenges to the conceptualisation of compliance and quality validation in different governance models.

The workshop conducted by Lőrinc Thurnay, Gabriela Viale Pereira, Marjin Janssen, Robert Krimmer, and Edimara M. Luciano aimed at presenting and discussing the current status of the CAP4CITY project, which is to initialize the design of Sustainable Smart City-related, as well as country-specific, educational modules and programs, incorporating Latin American needs that are identified by local stakeholders using the technique of exploratory group work.

The Big Policy Canvas Roadmap aims to put forward the different research and innovation directions that should be followed in order to reach the anticipated vision for making the public sector a key player in tackling societal challenges through new data-driven policy-making approaches. Building on previous projects such as SONNETS, CROSSOVER, CROSSROAD, the road mapping exercise organised by Francesco Mureddu defined five main research clusters related to the use of Big Data in policymaking, for each of which a series of research challenges is identified and applications provided. Organised under the aegis of the ManyLaws Project, the workshop conducted by Shefali Virkar and colleagues sought to enable project researchers and participants alike to understand the ways, in which user-centred design processes contribute to the development of a successful legal information system and better decision making within the broader context of e-government.

Posters provide a great opportunity for researchers and practitioners to showcase their ideas, get valuable feedback on early-stage innovative work, and discuss potential collaborations in an informal setting. This year's conference presented seven posters showing a mix of themes, subject disciplines, and practitioner experiences. Some researchers adopted a unique approach to better our understanding of open government data.

The research showcased in the poster presented by Marcelo Mesquita, Edimara Luciano, Rafael Lübeck, and Guilherme Wiedenhöft aims to discuss the role of government in the open government data (OGD) ecosystem, as either a provider or user, through the lens of a systematic literature review of ninety-four papers and a case study. Interviews, document analysis, and observation techniques are employed to study the case of the Government Agency for Law Enforcement and Prosecution of Crimes in one of the Brazilian states.

Others look at unexplored facets of citizen participation and public engagement. The poster presented by Alexander Kosenkov, Ingrid Pappel, and G. Anthony Giannoumis outlined the results of research on the potential for application of the omnichannel approach in e-governance for public engagement from both a theoretical point of view and within the context of a future research project. A systematic literature review was applied to investigate the omnichannel concept, and highlighted its potential application in public sector.

Natural Language Processing, and the insights obtained through its application, took centre stage for Dian Balta and team – who presented an exemplary text categorization pipeline for online citizen participation and discussed their ongoing research in this context.

Similarly, Dian Balta, Peter Kuhn, Mahdi Sellami, Anastasios Kalogeropoulos, and Helmut Krcmar presented insights from a chatbot prototype for online citizen participation and discussed particular benefits and caveats of artificial intelligence (AI) application in the government domain. They highlighted that AI represented a black box, both in terms the reasoning process itself, and also in terms of applying different building blocks "out-of-the-box"; aiming to show, that the customisation of an AI application involves a barely manageable combination of buildings blocks.

Some posters critically examined public sector innovation, and the potential to incorporate disruptive technologies into the process. Annaflavia Bianchi, Giovanni Marin, and Antonello Zanfei presented the StarPIN project – Statistical Reporting on Public Innovation– carried out for Eurostat by the Università degli Studi di Urbino Carlo Bo, Italy, with the support of Dialogic of the Netherlands. Therein, a theoretical and a methodological framework are proposed for enriching the measurability of public sector innovation and the implications for data collection and analysis in this context were discussed.

In their poster presentation, Dian Balta, Anastasios Kalogeropoulos, Peter Kuhn, and Helmut Krcmar showcased research-in-progress on designing Blockchain/Distributed Ledger Technologies-based IT architectures in government through a three-step approach involving need analysis, a feasibility study, and the design of architecture based on exchangeable building blocks. The role of social media was also considered.

Leah Mwainyekule critically discusses the potential impact of social media on transparency and accountability in African governance. Developing research in underdeveloped aspect of social media research, Mwainyekule's poster explored if and how social media could contribute towards transparency, and also whether there really was any issue with good governance in Africa.

We hope that you found the conference a thought-provoking and enjoyable experience! The editors would like to thank the authors for their contributions; together with the expert peer-reviewers, the programme committee, the track chairs, the proof-readers, and the sponsors for the time and effort expended towards making the EGOV-CeDEM-ePart 2019 conference a grand success.

Enjoy reading!

Ongoing Research

EGOV-CeDEM-ePart

Decision Support in Smart Cities: An Assessment by the City of Vienna

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Abstract: Decision support systems are dependent on various high-value input resources, utilizing external perspectives to assess policy impacts in advance. Data-driven decisions are made possible by integrating experts' and citizens' knowledge, open and closed data sources as well as social media data sources amongst others. This research summarizes questionnaire results with experts of the City of Vienna providing a deeper insight into how civil servants use decision support tools and what they deem essential. This is assessing policy impact in advance, considering local specifics in Smart City Governance, integrating expert knowledge, open and closed data and citizens' opinions. Although respondents would value an inclusion of social media data, most tools in use do not provide this feature.

Keywords: data-driven decision-making, decision support system, participation, smart governance

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1. Introduction

Smart Governance constitutes a component of a Smart City (Albino, Berardi, & Dangelico, 2015) and is an umbrella term for measures to improve the quality of citizens' life. Smart City Governance should be seen in a comprehensive perspective, namely crafting new forms of human collaboration through the use of ICTs to obtain better outcomes and more open governance processes (Rodríguez-Bolívar, & Meijer, 2015). Various requirements were assigned to the idea of a Smart City, including the implementation of a different approach to creating legislation and policies, including "adaptability-oriented policies" (Ruhlandt, 2018; Scholl, & AlAwadhi, 2016). It was found that the Smart City concept has utopian features (Viale Pereira et al. 2017), but there is no predominantly accepted definition of a Smart City (Ruhlandt 2018). The same applies to Smart Governance, but smart decision-making was seen as a part of it (Rodríguez-Bolívar, & Meijer, 2015a). This is why a

Smart Sustainable City, "a city that meets the needs of its present inhabitants without compromising the ability for other people or future generations to meet their needs, and thus, does not exceed local or planetary environmental limitations, and where this is supported by ICT" (Höjer & Wangel, 2015, p.342), may seek to exploit the potential of including the outside perspective in decisions through ICT.

Decision support systems aim at supporting the automation of decision-making processes (Bartolozzi, Bellini, Nesi, Pantaleo, & Santi, 2015). The potential of decision support systems to contribute to increasing effectiveness in organizations was recognized decades ago (Sprague, 1980). More recently, continuous policy evaluation through Big Data Analytics was explored (Höchtl, Parycek, & Schöllhammer, 2016). Including the crowd in the measuring and performance improvement process was recommended (Maheshwari, & Janssen, 2014). Amongst others, social networks can provide decision makers with additional insights in citizens' opinions (Sobkowicz, Kaschesky, & Bouchard, 2012).

This paper focuses the use of decision support systems in the City of Vienna, stressing the combination of sentiments extracted from social media data with simulation tools (i.e. Fuzzy Cognitive Maps, cf. (Pereira, Eibl, & Parycek, 2018)). Ruhlandt emphasized the need for exploring the individual context of Smart City Governance, like local conditions (Ruhlandt 2018). This paper aims at contributing to research on ICT supported decision-making in Smart Cities by providing insights into a discussion and a survey on the use of decision support systems with special emphasis on the local specifics in Vienna. Civil servants provide a threefold insight pointing to the current use, potential application barriers and use cases of decision support systems. The results confirm the importance of considering local particularities and identify some relevant factors like the population size, cultural differences and department's habits to influence Smart City Governance.

2. Contextualization and Related Work

Decision support systems, part of the information systems discipline, focuses on supporting and improving managerial decision-making (Power, 2007). Public administrations increasingly aim at backing their decisions by open and closed data. Ambitions behind that may include the vision to improve decisions (McAfee, & Brynjolfsson, 2012). A variety of resources are included in decision-making (Martensen et al., 2019). The type of decision support system we focused on in the SmartGov project uses Fuzzy Cognitive Maps (FCM). FCMs are fuzzy-graph structures for representing causal reasoning. Their fuzziness allows hazy degrees of causality between hazy causal objects (Kosko, 1986). FCMs are created in a dedicated FCM modeling and simulation software together with domain experts, who develop their knowledge with years of experience in solving problems in a narrow area (Sinha, & Zhao, 2008) and thus are able to point out relevant interrelations. Knowledge acquisition is a crucial stage in the development of an expert system involving eliciting, analyzing, and interpreting the knowledge of experts transformed into a suitable machine representation (Kidd, 2012). Going beyond expert knowledge, public participation is a well-known means to collect an outside perspective. The objectives of using participation in the decision making process range from including the participants' input into decision making to the public influencing the actual decision (Arnstein, 1969; O´Faircheallaigh, 2010). For the purposes of this paper, public participation

is understood broadly as any form of interaction between government and the public that occurs as part of policy decision-making processes (adapted from (O´Faircheallaigh, 2010)). Citizen engagement is a key potential of social media (Picazo-Vela, Fernandez-Haddad, & Luna-Reyes, 2016). Furthermore, social media can contribute to potentially increase transparency and accountability, democratic participation, co-production and evaluation (Tursunbayeva, Franco, & Pagliari 2017) as well as interagency collaboration (Wukich, & Mergel, 2016), searchability and openness (Criado,Sandoval-Almazan, & Gil-Garcia, 2013) and it is seen as a suitable additional channel to interact with citizens (Mergel, 2013).

3. Methodology

With the aim to gain a deeper insight into civil servants' approach to decision-support systems, a survey based on the literature review accompanying the SmartGov project has been conducted among civil servants. To create a common understanding, first the project was presented and initial questions were clarified. Based on that, participants were asked to fill out a questionnaire and following this, they were invited to an experts' discussion with a clear focus on Viennese specifics on 13 December 2018. The main goal was to gain knowledge on how civil servants assess the role of decision support systems and the usefulness of the SmartGov approach in their context. The participants were selected and invited by the department of Vienna's CIO in line with the project pilots' domains garbage and pedestrian mobility.

The interdisciplinary scientific partners of the SmartGov project consortium co-designed the questionnaire with social media, legal, technical and business expertise. The questionnaire encompassed a mix of open and closed questions. In total, 17 questions were asked, resulting in 29 single questions for analysis. The questionnaire was pre-tested by two members of academic staff. With the collected data, we conducted following steps of an explorative quantitative data analysis (cf. Bortz, & Döring, 2007). The written answers were transposed in an electronic CSV file and first analyzed with the summarytools library for the R programming language resulting in a univariate analyses of single variables via histograms. Further, bivariate jitter dot plots combining different variables were produced to identify interesting relations between the variables.

4. Findings

This chapter summarizes both the questionnaire and the discussion. While the future visions and expectations are mostly reflected by the functionalities of the tools in use, a gap between the (high) value participants assign to social media and the (low) support of social media data through the systems in use became apparent.

4.1. Present Situation: Manifold Tools in Use

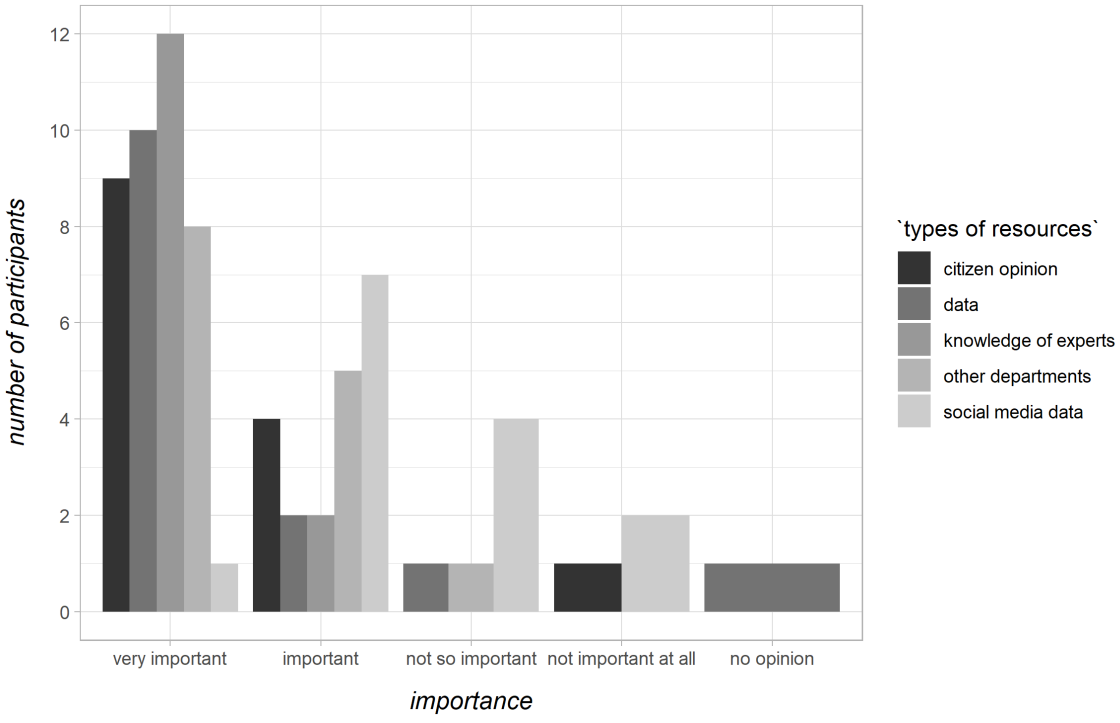
There is a wide range of diverse tools in use which support decision making processes, including self-developed programs (such as building site programs, test center programs, road safety programs) as well as standard programs (like Balanced Score Card programs, BMC Remedy, Arc Map, Excel, Online Surveys, statistic programs, control centers, office suite, SAP, process

management tools, Planview, GeoAnalytics). The majority of the participants has personal experience with the use of an electronic tool for decision support. Asked about the technologies incorporated in the tools being used, according to the majority of those who feel capable of answering this question, the tools use no artificial intelligence technologies. Nevertheless, according to half of the participants, the tools include some modelling and simulation technologies. Apparently, answers are based on a narrow interpretation of the term artificial intelligence. Moving away from the technological focus and turning to the input resources of the tools in use, we differentiated between social media data, citizen participation, expert knowledge input, and open or closed data. Interestingly, only one participant confirms that the tools being used are fed with social media data. The same pattern can be observed when asking about the inclusion of citizen participation, again only one person confirms the inclusion of citizen participation in the tools. However, the opposite, affirming a high use in the tools can be observed for the input resources of expert knowledge and open or closed data.

4.2. Comparing Present Use with Participants' Expectations

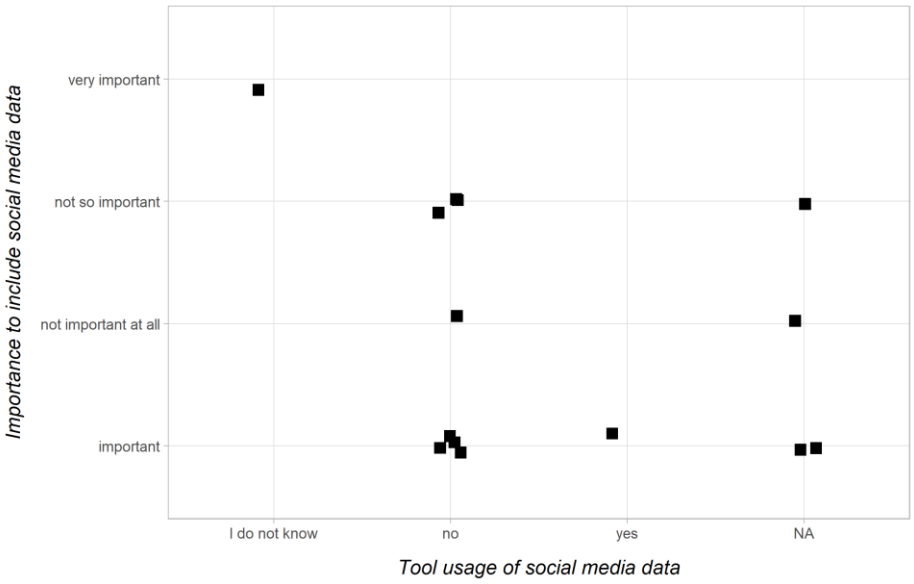
Assessing policy impact in advance is imperative: All civil servants confirm the need to assess the impact of decisions before decision implementation, only one person abstained from answering. The vast majority indicates assessing a decision's impact beforehand as very useful or useful, while only two participants are neutral. Figure 1 shows the rating of importance attached to the inclusion of selected input resources when satisfying the needs in a city.

Figure 1: Importance of Including the Following Resources



The inclusion of social media data is associated with the least importance, while almost all are convinced of the importance to include open or closed data and expert knowledge. A very strong resource is further seen in other departments. Interestingly, despite the fact that five participants would value an inclusion of social media data in the tools, most tools in use do not provide this feature (Cf. Figure 2). In contrast to this mismatch, everyone regards expert knowledge as an important or very important resource for satisfying needs, which requirement is met by all tools in use, presenting a perfect match between the present situation and the participants' expectations.

Figure 2: Tool Usage of Social Media Data versus Importance to Include Social Media Data



4.3. Use Cases and Barriers

Answering the open question "In what domains other than garbage and pedestrian mobility in school areas would the use of SmartGov be of interest for Vienna?", participants provide use cases for tackling needs in their departments. These use cases can be categorized in exploiting the potential of digitalization in public administration, domain specific applications and general organizational support. The category digital public administration includes increasing the acceptance of e-government, improving service development for citizens, uncovering new potential of digitalization and tackling entirely new problems. Domain specific applications point to applications in urban planning and city development, mobility and citizen complaint management. General organizational support summarizes a use for training purposes, a simulation of processes especially in preliminary studies, a use accompanying organizational changes and a use for personnel resource planning. Another question targeted potential barriers with some of the responses confirming some obstacles of e-government implementation (Viale Pereira, 2017) like lack of technology acceptance. Lack of technology acceptance is a category introduced by the authors to summarize participants' answers of lack of acceptance of new tools and questioning the usefulness of new tools. The category of lack of data standards is concretized as bad quality across heterogeneous systems. Lack of resources refers to personnel (knowledge, skills), data and financial resources. The majority is not

sure whether they would apply SmartGov in their everyday work. As part of the open feedback, doubts are expressed with regard to the question if all parameters would be taken into account through SmartGov to reach a "correct" decision. Responding to the question "In comparison to the pilots: Is there something to think of when applying these tools in Vienna? (e.g. amount of Open Data, size of population,...)", the size of the population, cultural and methodological differences, data protection aspects and individual departments' habits were mentioned.

5. Discussion, Limitations and Future Research

It was confirmed that assessing policy impact in advance and including external perspectives in the policy-making process is imperative. Social media data is rarely included in the decision support systems in use. The results suggest, a use of SmartGov - and a decision support tool in general - needs an accompanying framework of consultation and training that can be adapted to the local particularities. Our results clearly confirm that local specifics need to be considered. Some of the barriers may be rooted in institutional structures. To adapt these for innovative approaches is a well-known challenge in e-government research. As Criado (Criado et al., 2013, p.323) puts it "it is now more difficult than ever before to maintain the parallel structure of traditional organizations working with old-fashioned practices and digital structures to deliver public service innovation while protecting organizational inertia." Approaches to automatically enrich the decision-making basis may support public administration and citizens in finding new correlations and depicting a decision's consequences. Limitations of our study include a lack of quantitative statements. We see future research lines amongst others in privacy. Privacy is discussed across several scientific domains. Unsurprisingly, privacy of the users was identified as a main concern in governmental social media adoption (Picazo-Vela et al., 2016). Even though a legal analysis is out of scope of this paper, it should be noted that the design of data supported decision-making processes needs to follow data protection principles, which amongst others require looking closely at the purposes pursued and the intended outcome. Furthermore, a large scale comparison of practitioners' views in the area of Smart City Governance could potentially lead to uncovering additional framework conditions as influential.

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EGOV-CeDEM-ePart

Understanding My City through Dashboards. How Hard Can It Be?

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Abstract: This paper describes research into how current city dashboards support users' sense-making processes. It uses criteria identified in previous research concerning visualisation and applies these to a number of city dashboards that are publicly available and hence considered to be seen as a potential communication tool. The paper briefly describes the context regarding dashboards and gives a broad overview of how visualisation design can affect sense-making processes. Finally it lists the initial results of a 'at a glance'-style review according to a number of sense-making criteria.

Keywords: City dashboards, data visualisation, sense-making

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1. Introduction

City Dashboards are presumed to provide easy and understandable access to data about a city1. However, little research has been carried out into how ordinary citizens (as opposed to city officials) engage with and make sense of city dashboards. Research carried out in relation to visual literacy particularly in the area of visualisations has identified a set of criteria (Kennedy et al., 2016) that could be applied to city dashboards as these are, in essence, an amalgamation of visualisations about different city related topics. We are of the opinion that there is an increasing push to use visualisation and especially dashboards to help people access and make sense of open data about cities. But the problem is that dashboards tend to focus more on how to visualise the data but less on how to support users to make sense of the visualisations presented.

[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.

Hence, we have begun to look at existing publicly available dashboards and assessed these regarding supports offered to help people make sense of their city. This initial assessment will contribute to the overall goal of this research which is to develop a preliminary model that will act as a guideline for future city information visualisations to better take into consideration the sense-making process.

2. Background

2.1. Brief Introduction to Sense-Making

Sense-making developed out of a number of different disciplines such as psychology (understanding as human behaviour), physiology (especially cognitive science, the quantifiable process of seeing, processing and memorising), communication studies (understanding as a method to build knowledge), philosophy and critical theory (both of these concerned with the constraints of traditional science and developing workable alternatives) (Dervin, B., 1997). Klein et al. (2006) further differentiate sense-making from other cognition-related areas. They clearly indicate that while areas such as curiosity or creativity may play a role in sense-making, sense-making itself is a process to develop situational awareness within the context of complex events. (Cohen et al., 2017) distinguish two main capabilities for sense-making - i) effectively structured domain knowledge and ii) critical thinking skills (Glaser, 1941).

Sense-making as a process involves steps that can be broadly summarised into Situations → Gaps →Uses (Dervin, 1997), 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.

2.2. Sense-Making in the Context of Visualization

Pictures are considered to be better in communicating complexities and emotions as it is comparatively easier to digest a large amount of information visually rather than verbally (Dansereau et al., 2009). Some studies have been carried out to see how this applies in the area of visualisation. Lee et al. (2016)'s study of people's sense-making process when encountering unfamiliar visualisations does not explicitly explore the connection between data, its visual representation and users' consequent comprehension. Ziemkiewicz et al. (2010) maintain that visualisation does not automatically transfer information but that the use of design (colour, visual variables, composition etc.) affects users' understanding and consequent reasoning. They state that historically there has been more of a focus on attributes, the parts of a visualisation, but less on understanding the impact, and how design affects this impact, of the whole visualisation.

Apart from design, other factors influence how people make sense of data visualizations: the amount of time people have to engage with the graphic, the interest or prior knowledge they have of the topic (and if the visualization concurs or differs from what they know already), where or by whom the visualization is published, what emotional state people are in and what question initiated their engagement. Added to this are a series of skills that people have to different levels such as graphical literacy, critical thinking, visual literacy, language skills, etc. (Kennedy et al., 2016).

2.3. Dashboards in the Context of Smart Cities

City dashboards are perceived to provide easy and understandable access not only to how a city is performing but also how it may compare to other cities2. This links back to business dashboards in that it focuses on performance management and benchmarking. Added to this is the aim that city dashboard provide insights about the locality and the means for citizens to participate3. For others, city dashboards allow officials to govern a city via their mobile phone4 by providing access to a range of city data through a mobile app. This attitude is captured by Kitchin et al. (2015), who describe dashboards as promoting "a narrowly conceived but powerful realist epistemology" meaning that dashboards are increasingly seen as reflecting and shaping a city in its totality rather than just being a tool to measure and provide information.

Mannaro et al. (2018) define dashboards as "big data platforms" which give access to city datasets as well as supporting user's information acquisition. Apart from a technological know-how, dashboard design depends on public authorities having 'a clear vision of the direction' (Mannaro et. al.): "*City dashboards are defined and shaped in relation to the needs of the urban context and of the local public administrator's goals.*"

3. Methodology

For the purpose of this study, we defined city dashboards as:

- Developed by or commissioned for local authorities such as towns, cities or by third parties for a city without official sanction.
- Combining data from multiple databases and/or sources
- Being publicly available, i.e. freely available online and not requiring login.

We developed a database of city dashboards based on a review of existing publicly accessible dashboards and recent literature in this area. In total we reviewed 39 city dashboards including sites that featured a number of dashboards for different cities (e.g. datausa.io). Dashboards that had essentially the same layout (i.e. citydashboard.org features real-time dashboards for 8 different cities, 7 in the UK and Amsterdam) were counted as one dashboard. Then, based on sense-making criteria as identified by (Kennedy et al., 2016) we classified each dashboard according to the following questions:

1) Subject matter & relevance
   - What is the main feature / topic of the dashboard – general data, single topic, performance (based on key performance indicators - KPI), real-time.

[2] "Dublin Dashboard Launched". 19th September 2014. The Programmable City. Blog entry. http://progcity.maynoothuniversity.ie/2014/09/dublin-dashboard-launched/ accessed May 22nd 2017.

[3] Ibid.

[4] David Cameron: I can manage the country on my BlackBerry, 21st August 2014, https://www.theguardian.com/technology/2014/aug/21/david-cameron-blackberry, accessed May 13th

This question will give an indication of possible intended use and, hence, how relevant the information contained within the dashboard may be.

2) Trust & prejudice
   - Is there a link to and/or from the official city council's main site?
     Issues of ownership and control of data visualizations
   - Is the data downloadable?
     Being able to download the source data and analyzing it can help with trust issues.
3) Confidence and skills
   - What types of graphs are used?
   - What types of interactivity are offered?
     With this question we wanted to see to what extent Interactivity is used as this may help people to better understand the information provided.
   - Are the colors used according to good visualization practice?
4) Textual context (use of jargon, explanatory text, etc.)
   - Jargon here is defined as technical or governance specific language, while explanatory text describes added information which either provides subject related context or information about the data analysis process.

We aimed specifically for 'at a glance' impressions as we wanted to focus on what initial sense people could make of the visualization when visiting the site for the first time. This meant that for this initial research we deliberately did not spend time on examining dashboards in detail but tried to reproduce a more casual approach. We used a check-list based on the questions as defined above and assessed each dashboard without looking for explanations – it is planned that further research will examine a sample of these dashboards in more detail to ascertain if supports for sense-making are included at a deeper level. As an initial step I carried out this experiment myself but it is envisaged to verify and confirm my findings with further work (see section 7) in this area.

4. Results

Subject matter:

- Dashboards focused on a general overview of the city were the most common (14), closely followed by those focusing on performance (13). Real-time dashboards were least common (5) (see Figure 1).

Figure 1: Types of Dashboards - General Data, Performance and Real-time Dashboards

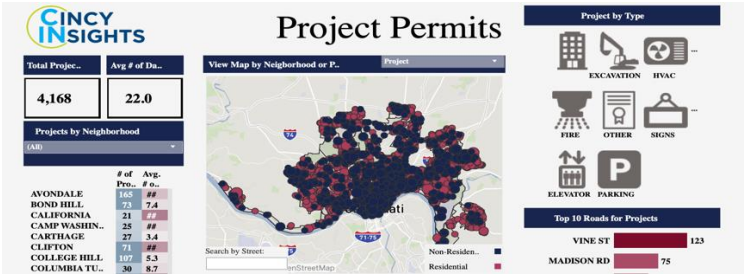
Trust:

- Is there a link to and/or from the official city council's main site?
  Nearly all sites that were developed / authorized by a city council included links from the main site. However, these links were often not easily accessible, some only through search.
- Is the data downloadable?
  More than half of all dashboards included options to download associated data (17).

Confidence & Skills:

- What types of graphs are used?
- Our research found that out of the 39 dashboards assessed, two-thirds (28) featured visualizations using bar charts (including group bar charts and stacked bar charts). The second most common type of visualization involved maps (20) followed by line graphs (17) and pie charts (14). 10 dashboards also featured other graphs such as area graphs, heatmaps or treemaps (see Figure 2).

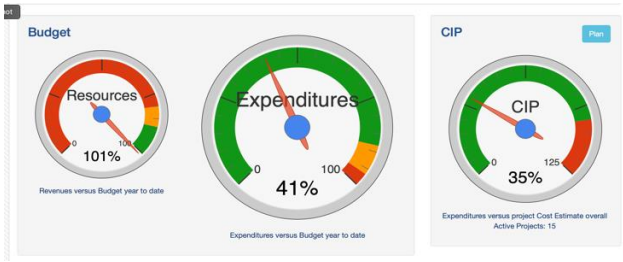
Figure 2: Different Graph Types Featured on Cincinnati Dashboard



- What types of interactivity are offered?
  A number of different types of interactions were observed. These were grouped by their level of difficulty into 'simple, 'medium' and 'advanced'. 'Simple' included basic filters, popups and simple input. Interactivity was gauged at requiring medium skills when it included options to compare datasets or some sort of simple drill down to further data. 'Advanced' included the possibility to include / exclude datasets, or to choose which type of chart to display. Of the 39 dashboards reviewed 15 offered no interactivity options, 16 offered simple levels of interaction, 5 medium and 3 advanced.

- Are the colours used according to good visualization practice?
  Use of colour varied between the dashboards with some using traffic light colour schemes (9) (see Figure 3).

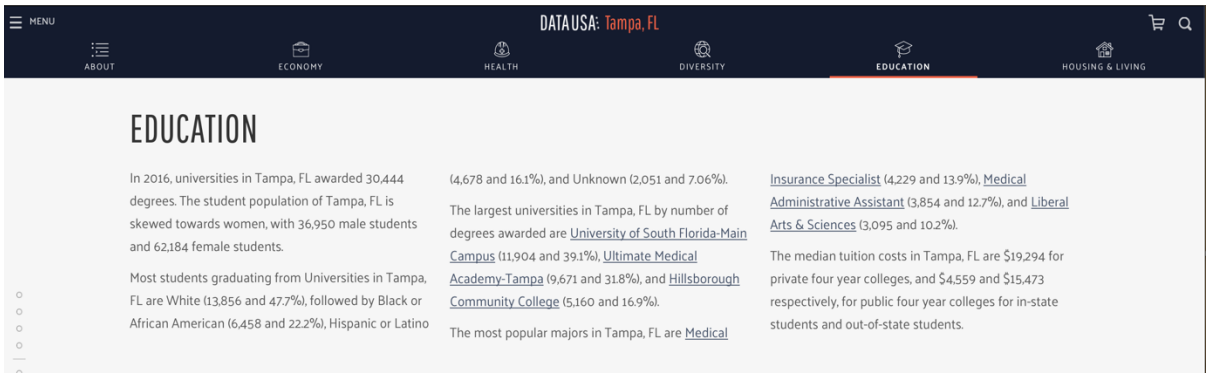
Figure 3: Example of Traffic Lights-style Dashboard



- Other dashboards used same colours to portray different data items and some color schemes were deemed too glaring (e.g. using mainly primary colors). However, it was found that this area needed more research.

- Textual context (use of jargon, explanatory text, etc.)
  The majority of dashboards used specialized language making it harder for citizens to understand. Furthermore, most dashboards do not include textual descriptions to provide context to the data portrayed. Two-thirds of all dashboards (28) were considered to be using jargon while only 13 included explanatory textual descriptions (see Figure 4).

Figure 4: Example of Explanatory Text to Provide Textual Context



5. Discussion

If we consider dashboards under the criteria of sense-making as described above, the following can be observed.

5.1. Subject Matter and Relevance

The information provided by a city dashboard is of relevance to all city inhabitants, however, it is unlikely that people would visit a dashboard unless they had a specific need. This links in to the wider issues of promotion, visibility and accessibility of city dashboards. Those that have been produced by / contracted by a city authority are usually linked to from the main city council website

- though these links are often hidden under 'Open Data' or without any explaining context. For example the main website of Dublin City Council contains at the very bottom a link to the Dublin Dashboard - but unless users already know what a dashboard is this information is meaningless. Stand-alone city dashboards are usually not linked to from the local authority main site.

5.2. Trust and Prejudice

While the data may be coming from different data sources, the dashboard is usually hosted by a local authority / city. Attitudes towards city government will play a role in how people engage and consequently trust the visualisations provided. Distrust / trust may apply to the local authority in its entirety or only be related to a particular policy issue.

Trust can be further undermined if the raw data is not made available. However, even if the raw data is provided it may not result in users' trust as their attitudes may be too strongly negative.

5.3. Confidence and Skills

People have various levels of confidences and skills which affects how they can understand data presented through city dashboards. Therefore, this review looked at methods used by dashboards that might help people with different skills to fully engage with the data.

5.3.1. Graphical Literacy: Reading of Different Charts

Bar charts, line graphs and pie charts are the most common form of charts, hence they are the type of charts that people have been most often presented with. In the context of city visualisations, maps are an obvious choice too though these have their own limitations in regard to sense-making (Idris et al. 2011). Use of simple charts and maps may lead to either an overconfidence in terms of reading these chart types as well as disengagement due to over-saturation. Research has shown that people engage with new chart types through a frame-data-frame sense-making approach (Lee et al, 2016) and it may be the case that conceptual frames that people have vis-a-vis maps, line graphs, bar and pie charts may detrimentally affect their engagement with these types of visualisations.

5.3.2. Visual Literacy: Pattern Matching, Sense-Making

Sarikaya et al. (2018) highlighted the need to support dashboard users' sense-making abilities through automated pattern finding and the usage of stories to successfully present data. They highlighted that rather than focusing on simplification of the dashboard, developers should consider incorporating better end-user flexibility. Furthermore an overreliance on simplistic presentations such as traffic light colour schemes can lead to 'mechanistic, unsophisticated decision-making' (Sarikaya et al., 2018). At present, however, dashboards tend to present data in a pre-defined fashion and rarely within a story context.

5.3.3. Language Skills: Many Works Have Plenty of Text

Most dashboards use relatively little text apart from titles. This in itself is problematic as the data presented does not necessarily speak for itself. While actual 'stories' could be too prescriptive, more

textual information is needed to support users' sense-making. At the same time, if text is used it tends to be upbeat (e.g. references to being 'on target', 'achieved') and jargonistic.

5.3.4. Critical Thinking: To Extract Insight and Meaning

As already highlighted by Sarikaya et al. (2018), dashboards are increasingly being built with little regard to fundamental design principles such as consistency and affordance. This in turn makes it difficult if not impossible for users to fully understand the information presented. Furthermore, dashboards prescribe which data is available for use in a specific section which affects how a problem is framed and what solutions may be applicable (Sarikaya et al., 2018).

6. Conclusion

Public city dashboards currently are presumed to fulfill many functions for many audiences. For city officials they should give an overview of key performance indicators while for businesses they are seen to provide access to public data. For citizens and civil society organisations on the other hand they should provide easy access to information about the city. This myriad of functions and audiences makes the development of a dashboard to cater for all these simultaneously very difficult if not impossible.

Especially for citizens issues arise regarding data literacy and efforts need to be undertaken to ensure those with low computer skills are able to derive meaning from the data presented. Attard et al. (2015) maintain that *"if the projected consumers of the data do not use it, then the objective of open government initiatives is futile*", and if citizens are one cohort of users they must be enabled to use the data.

City Dashboards, while playing an important role regarding access to open data, may not be the best tool to support citizens' understanding of their city.

7. Future Work

This study was based on our own reflections regarding current publicly available city dashboards. Future research needs to be carried out to assess how the different audiences identified above actually engage and make sense of city dashboards. It would also be interesting to carry out in-depth studies of specific dashboards to examine if and how further engagement might impact sense-making. As such we are planning a more detailed study with specific individuals that have an interest in how city information is displayed and ways to make it easier to understand by the general public. At present we envisage this to include diaries, focus group discussions and select interviews. Participation will be invited from different areas of the community including academics, community organisations, community activists, designers, etc. A second part of this research will focus on a more in-depth examination of city dashboards to ascertain how much complexity the dashboards can portray.

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EGOV-CeDEM-ePart

Investigating Patterns of Legal Information Access and Use in Greece and Austria: Towards Defining a Legal Information Environment for eGovernment

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Abstract: Legal information is important to a wide variety of societal actors in professional and personal contexts. The project upon which this research paper is based seeks to develop a legal information retrieval system to acquire, store, integrate, process and make accessible large amounts of European legal information, at an advanced level in various languages, using text mining, information processing, and visual analytics. In stating that the development of a successful legal information retrieval system hinges on the identification of potential users, and is based on an accurate understanding of their preferences and requirements, we critically analyse the results of a user requirements elicitation questionnaire developed to investigate patterns of legal information access and use in Greece and Austria. We argue that user requirements elicitation exercises such as this are fundamental to creating a relevant information environment or ecosystem that would make the various aspects of the law fully accessible, comprehensible, and empowering for different sections of society.

Keywords: Legal Information Retrieval, User Requirements Elicitation, Citizen-centred eGovernment

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1. Introduction

A large amount of information about laws that apply in the European Union (EU) countries, although digitised, currently remains fragmented across multiple national databases and hidden within inaccessible systems, sometimes mainly consisting of documents published in each Member States' language. The centrality of the role played by legal information in decision-making within different political, social, and economic settings cannot be overstated. For the purposes of this research paper, legal information may be broadly considered as comprising of official legal

documents, administration-generated content, scientific and practitioner publications, citizen-generated content, and relevant news/events information. The project under study in this research paper [name withheld to preserve anonymity] seeks to acquire, store, integrate, process and make accessible large amounts of legal information, at an advanced level in various languages, using text mining, information processing, and visual analytics. Initial system pilots are to be held in Austria and Greece.

It is today widely accepted that the development of a responsive e-government information system begins with the identification of potential users, and is based on an accurate understanding of their preferences and requirements. This research paper will critically analyse the results of a user requirements elicitation questionnaire developed to investigate patterns of legal information access and use amongst respondents resident in the two pilot countries. Chapter Two will critically explore the need for user studies within the context of legal information retrieval system design. The research design of the user requirements elicitation exercise will be described in Chapter Three. Chapter Four will explore the results of the user requirements questionnaire. Chapter Five will critically analyse emerging themes and pertinent issues. Finally, Chapter Six discusses the relevance and implications of the study.

2. User Studies and the Design of Legal Information Retrieval (LIR) Systems

Legal information is important to a wide variety of societal actors in professional and personal contexts. It is today widely accepted that the development of successful software systems and products begins with the identification of potential users, and is based on an accurate understanding of their needs and requirements. User studies are may be considered essential to understand information-seeking behaviour and to indicate how a prospective information system may be deployed and used. The Business Dictionary provides a helpful working definition of the term 'user':

"*…[An] Entity that has authority to use an application, equipment, facility, process, or system, or one who consumes or employs a good or service to obtain a benefit or to solve a problem, and who may or may not be the actual purchaser of the item.*" *(2019).*

There are many different types of users who are potentially interested in having improved access to legal information. As a first step to formally investigating user requirements, we opted to construct initial use case scenarios using data collected from semi-structured interviews with 5 archetypal users, and focus group sessions to elicit similar data held in parallel with Greek lawyers (Charalabidis et. al., 2019). Following from the interviews and focus groups, it was recognised that 6 top-level user categories could be derived: Citizens, the Scientific Community, Legal Professionals, Business Persons, Public Servants, and Third Sector Actors.

In developing a specialised large scale information retrieval system it is important to consider the practical problem of aligning the supply of information with user demands, based on data obtained from user studies, so that system design decisions are taken to not only increase levels of supply,

but also to present the information in ways that are relevant and useful to user populations. For scientific information to be considered 'useful' to decision makers within a policy process, McNie (2006) argues that it must satisfy three fundamental value demands of the user population: salience (the relevance of the information to the specific context within which it is used); credibility (the degree to which information is reliable and perceived by users to accurate, valid, and of high quality); and legitimacy (the degree to which producers of information are free from bias, and its transmission in an open and observable manner). It has been argued before that the idea of salience or 'relevance' of information is crucial to legal information retrieval (LIR), and to the design of large-scale legal information retrieval systems (Van Opijnen et. al., 2017), however, given the significant negative impact that decisions taken by artificial intelligence trained on inaccurate or biased data can have on the lives on individuals within society, it is important not to discount the validity of either credibility or legitimacy as fundamental LIR system user demands.

3. Research Design

This chapter presents the methological approach of the study, where the questionnaire as a tool in requirements engineering was applied to elicit information pertaining to a number of different system facets and user requirements. Identified as one of the more traditional techniques used in the elicitation of user requirements of a software system (Nuseibeh & Easterbrook, 2000), questionnaires play a crucial role in requirements engineering, and their application is considered highly appropriate for the task of identifying and describing system functions, features and requirements (Goguen & Linde, 2008). This is because the questionnaire provides a user-based perspective or interpretation of the various requirements in the system model and, therefore, an additional step in the validation of the requirements described thereby[ibid].

An online self-completion questionnaire, consisting of a mixture of closed and open questions, together with a few attitude (or simple Likert) scales, was disseminated via mailing lists, social media, project website and through word-of-mouth between mid-January and early-March 2019. The goal was to reach as many people from the six target groups as possible, and care was taken to ensure that respondents were resident in either Austria or Greece. In order to increase response rates and encourage honest answers, an explicit commitment to preserve anonymity was given to potential respondents. These initial efforts resulted in 67 responses. The following research questions were explored:

RQ.1. In what contexts and for what purpose(s) is legal information in Greece and Austria accessed and used?

RQ.2. What are the current search strategies employed to locate legal information from the different European, Greek and Austrian legal information sources?

RQ.3. What features and services do users (with a clear focus on public servants) look for in a legal information system?

Based on these research questions, the following categories of questions were derived:

Demographic Information: The questions grouped under this category aimed to collect basic demographic data about the respondents to the questionnaire in order to enable project researchers and systems architects to build up a comprehensive picture of the target user population.

Use of Legal information: Data collected from questions grouped within this category focused on respondents' current use of legal information.

Current Legal Information Resources and Tools: Respondents to the questionnaire were then asked more specific questions about their usage of legal information and tools.

Use of European Legal Resources: This category of questions focused on respondents' use of pan-European legal resources. Respondents were asked to specify the EU member states whose legal resources they accessed most often.

Use of Specific Existing Databases/ Services/ Portals: The data collected in this category revolved around specific legal databases such as EUR-Lex, the Greek database NOMOS, the Austrian database RIS and the national parliamentary databases.

Features and Properties of the Proposed Platform: This category of questions centered around the features and properties the users deemed important, not important, useful or crucial.

Other Questions: Finally we asked the users whether they would like to test the services once they are ready and to share their opinions about their usability, functionality and contents.

4. Empirical Data Analysis

4.1. Demographic Characteristics of Respondents

An overwhelming majority of respondents to the questionnaire (71%) self-identified as different types of public servants. Potential target users from the Scientific Community (Non-Legal), Legal Professionals, Business, and the Third Sector were also represented. Nobody reported as pursuing an occupation other than the pre-defined categories.When considered in terms of age, 70% of all respondents reported as being between 25-44 years old. Roughly 65% of all public servant respondents reported as falling into this age bracket. Half of all respondents polled reported themselves as holding a Masters degree. Approximately one-fourth of all respondents reported themselves as being educated to a doctoral level. A significant majority of public servants (81%) reported themselves as being university graduates (in possession of a Bachelor's degree or higher). Indeed, twenty-eight respondents surveyed reported themselves as holding a Master's degree.

4.2. Respondents' Use of Legal Information

Questionnaire respondents were asked to elaborate on the purposes for which they required legal information and to report on their frequency of access. Data reveals that a majority of all respondents (40%) use legal information for professional use only, whereas only 10% require it purely for person purposes. A significant number of respondents (35%) state that they use legal information both for professional and personal purposes. Out of those respondents who use legal information in a purely

professional capacity, only 6% are self-reported producers of legal information. Legislation was by far the most popular searched-for type of information, followed by Explanatory Material, Bills, Minutes, Case Law, and Scholarly writing. Surprisingly, a large percentage of participants (60%) prioritised offline sources of legal information, with only roughly one-third of the sample looking both on- and offline. Most subjects (59%) reported spending an average time of 30 minutes searching for legal information, with only 2% reporting that they spent over 4 hours per day on the same activity.

Respondents were also asked to identify their preferred legal information resources in their home country. For local legal information, parliamentary databases appear to be the most popular go-to resource, closely followed by other national databases and portals. Using a web search engine to quickly locate information, national printing house resources, institutional homepages, and commercial legal were also reported as being favoured (to a lesser extent) by respondents. Books, journals, and specialised magazines were more popular than their online counterparts.

When asked about the resources they used to search for legal information from other EU countries, respondents identified pan-European portals as their most preferred information resource. National parliamentary databases and institutional portals were also identified as being important sources of legal information. Online books and journals were also identified as prominent options, this time more popular than their offline counterparts. Respondents reported using commercial legal databases, specialist magazines (both on- and offline), and national printing house resources to a lesser extent. Using a web search engine was the least popular way of finding legal information from other Member States. Respondents were also asked to describe the frequency with which they used these resources to find legal information from other EU countries. The majority of the respondents (73%) reported that they rarely had use for these resources, while only 6% reported to use them several times a day.

It was considered important to determine whether existing online legal resources adequately met respondents' needs. Approximately one-third of all respondents reported finding pan-European portals useful for their purpose. A large majority (65%) reported to feel the same way about national parliamentary databases. A similar majority felt the same way about national institutional portals. Forty-three percent of the people surveyed reported being satisfied with the content of online books and journals. Roughly a third of the respondents felt this way about online specialised magazines. Commercial legal databases, and national printing house databases, were not considered to be completely satisfactory.

The reasons for not using parliamentary databases were mainly that these resources do not offer enough information and because they are difficult to orientate (twelve answers). A few respondents (four) also stated that the content being in the foreign language only constitutes a hurdle. The reasons why users are not solely relying on National Institutional Portals is, that these portals do not offer enough information (six answers) and that the content is in native language only accessibly. The main reason for not using the Printing House Database is that these platforms offer the content in the native language only (six answers) A majority of the respondents state that they do not use Commercial Legal Databases, because these do not offer enough information. Half of the responses state that Online specialized Magazines do not offer enough information and the other half, that the

platforms are difficult to orientate. The majority of the respondents who do not use Online Legal Journals, state that these platforms do not offer enough information.

To obtain greater context, respondents were asked to indicate the EU countries (other than their own) whose legal information they accessed most often. Data reveals that pan-European portals appear to be used most frequently. Respondents were then asked whether the legal information they looked for in other EU countries was always connected with the application/transposition of EU law/directives. Responses were evenly split, with approximately half of the respondents requiring some sort of connection to EU directives, and the other half not. The EU multilingual legal system was identified as a challenge to the effective use of pan-European information. Most respondents indicated that they would only use legal information in a foreign language (relative to their native tongue) if it was either officially translated or if they were comfortable using the language themselves.

4.3. Respondents' Use of Specific Sources of Legal Information

Roughly two-thirds of all respondents surveyed reported to have used the EUR-Lex Portal to access information. Sixty-eight percent of all respondents reported that they had never used the NOMOS portal to access legal information. With regards to the RIS database, again, sixty-eight percent of all respondents claimed to use it. Eighty-two percent of all respondents claimed to use their national parliamentary databases to access legal information. In all cases, the most common reasons reported for non-use of a particular data source were lack of awareness of its existence, or a lack of need to use it.

4.4. Services and Features of the Proposed Legal Information Retrieval System

Respondents were asked to indicate the importance of the proposed system services based on their needs and personal/professional circumstances:

Legal Information in English and National Languages: The majority of respondents (74%) identified the provision of this service to be either important or crucial. Only 3 respondents did not consider this service to be useful or of any importance.

Assessment of the Degree to Which National Legislation is Compatible with EU Legislation: Over half of the respondents considered this to be a crucial or important service. Almost forty percent of all respondents deemed this proposed service to be useful.

Comparing National Laws that Target the Same Life Events: Roughly 39% of all respondents considered this to be an important service, whilst an equal number of respondents considered its provision to be useful in their everyday contexts.

Parallel Search in National Legal Frameworks: Approximately half of all questionnaire participants see the provision of a parallel search functionality to be either a crucial or important of a proposed LIR system.

Analysis of References to European Legislation in National Laws: Roughly 40% of all respondents consider it important for the proposed solution to provide a means of analysing references to European legislation within national laws.

Comparative Analysis of Related Laws Within the Same Member State: Approximately 42% of all questionnaire respondents considered a comparative analysis of related laws within the same member state to be an important service. Just under one-third reported it to be useful.

Visual Timeline Analysis for All Legal Texts, from Preparatory Acts to Adoption: The provision of visual timeline analysis service for various legal texts was noted to be useful by approximately 41% of all respondents. Another one-third of all respondents considered it to be significantly important or crucial.

Visualizations of Correlations, Dependencies and Conflicts between Different Laws: Visualisations of correlations, dependencies and conflicts between laws were considered to be useful by the large majority (roughly 40%) of all respondents. However, a significant number of respondents (22%) reportedly considered this service unimportant.

Decision Support Service for Legal Procedures: Approximately 77% of all questionnaire respondents surveyed found this projected service to be useful, if not important or crucial. However, this implies that the remaining respondents did not consider its project provision very useful.

Interrelation of Laws and News or Social Media Posts, Including Sentiment Analysis: While roughly 40% of all questionnaire respondents reported that a service feature demonstrating the interrelation of laws with social media posts based on sentiment analysis would be useful, a similar percentage felt that it would not be useful or important to them in their everyday contexts.

4.5. Proposed System Non-Functional or Quality Requirements

Questionnaire respondents were also asked to rank the importance of proposed sys-tem non-functional or quality requirements.

Accuracy: Sixty percent of the respondents surveyed value accuracy of information delivered as a crucial part of the platform.

Availability: While 42 % of the respondents valued availability all the time as im-portant in a platform, a similar percentage found it to be crucial.

Customisation: Roughly half of the respondents (34%) reported that they would find the ability to customise search results useful, while a smaller percentage (26%) considered it to be important.

Internationalization: Forty-six percent of all respondents stated that they would find it useful if the platform would allow them to work in different languages and/or to switch between languages. Only 10% considered this feature to be crucial.

Performance: Forty-three percent of all respondents saw it as important that the platform should to always respond quickly to queries, even during peak traffic times. Only 28% of those surveyed considered it as being crucial.

Reliability: Half of the respondents saw the reliability of the platform as being cru-cial that the platform perform consistently and deliver appropriate results without failure. Slightly less than that number of respondents (41%) considered this feature to be important.

Security: A majority of questionnaire respondents (81%)noted that it was either cru-cial, important or useful that the platform was secure, and was able to resist unau-thorised, accidental or unintended usage and provide access only to legitimate users,

Supportability: A fifth of the respondents found it crucial that the proposed plat-form was to be cost-effective to support and use, while a third found this requirement important and another third, useful.

Usability: Around a third of the respondents found it important, and a third found it crucial, that the platform should be easy to learn, operate, and to use in the prepara-tion of inputs and the interpretation of results.

Verifiability: Approximately half of the respondents considered it important that the platform and supporting infrastructure be validated to the highest reasonable com-mercial reliability standards, while a fifth deemed it useful and another fifth, crucial.

5. Discussion of Findings

As a precursor to the actual design and implementation of an advanced LIR system such as the proposed platform solution, it is important to understand the various considerations involved in everyday legal information search-and-retrieval. In order to achieve this, our research team developed and administered an online questionnaire. An analysis of the data revealed the following overarching key themes and issues:

User Context is Key: Understanding user context is critical to retain information salience in the context of legal information retrieval. It may be inferred from the data that people see themselves as accessing and using legal information in either a purely professional context, or in a mixed context of both the professional and personal. Very few respondents profess to using legal information for purely personal reasons. The reasons for this can be manifold: legal language itself is formal and the legal system highly structured, and so individuals tend to associate encounters with the law as something that happens within a work-related context rather than on a personal level. With their working professionals cap on, individuals may be more open to being self-reliant, and hence would tend to be more independent in seeking and interpreting legal information.

User Perceptions of Authority and Accessibility are Vital: The credibility and availability legal information, embodied in a preference for official or authoritative legal information resources, comes across as being of significant importance during the analysis of questionnaire response data. Respondents reported as accessing regularly portals and databases maintained by European or national legislative agencies as these were identified as being sources of credible and open primary legal data. Commercial databases were not considered as important as initial go-to sources of legal information, and it is conjectured that this because high subscription fees reduce the number of

actors with immediate access to their contents. Multilingualism was highlighted as a particular barrier to the easy access of pan-European legal information, where lack of knowledge of a particular language or the absence of official translations were often stated as reasons why users would abstain from accessing legal resources from other countries.

User-Centred Design is Fundamental: User-centricity, an important goal for good system design, refers to the metric that determines the degree to which a software product or service can be used by a target group of actors as part of their day-to-day routines (Baek et. al., 2008). For a LIR system, the term 'user-centric' is an articulation of the legitimacy of the results produced through the transparent interaction of appropriate users with various system functionalities. To this end, respondents to the questionnaire were asked to describe the nature of their interactions with existing legal resources, pointing out any extant shortcomings. They were also given the opportunity to rank the various services to be offered as part of the proposed solution, and to comment on the system quality requirements.

6. Conclusion

Accurate, user-specific, and current legal information is a strategic input in effective decision-making for a plethora of actors within society. The purpose of developing a large-scale, easy-to-use, agile LIR system would therefore be to not just to bring together scattered sources of legal in one large meta-database, but to create a relevant information environment or ecosystem that would make the various aspects of the law fully accessible, comprehensible, and empowering for different sections of society.

The questionnaire is a useful technique to investigate trends and shifts in user priorities and preferences, to detect nuances in user attitudes and opinions, and to assess levels of user satisfaction with existing and projected products and services. It is limited in the sense that there is no way to ascertain the veracity of answers given, or to follow up on responses that appear interesting or especially relevant. Similarly, it is difficult to ensure that questions are entirely unambiguous, and foreclose misinterpretation. As the questionnaire was administered by an Austrian university, it is likely that that there is a slight skew in the target population responses towards that country, despite all best efforts to obtain an equal number of participants from both Austria and Greece.

Limitations of this study: the project finds itself in the initial system conception phase of the construction of a legal information system for Greece and Austria. The inclusion of further European countries and the possible generalisation of our results to those countries, may be discussed in the future and are not part of this study. We aimed at gathering as many responses from Greek and Austrian public servants as possible. It has to be stated, that having gathered 67 responses, it could be argued that this is not representative enough.

However, it is argued that the results from the questionnaire will be infinitely useful in refinement of the existing conceptual model of the proposed platform, and then in development of the actual system with services tailored to the various categories of users based on their requirement evaluations. Indeed, themes and issues derived, together with the observations gleaned, from the

data are rich and highly relevant, with significant implications both for proposed system design and for further research into the characteristics, habits and perceptions of the various actors that constitute the current European legal information ecosystem.

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EGOV-CeDEM-ePart

Maturity Model to Diagnose "Smart Cities"

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Abstract: This paper describes the design and development of a maturity model to guide the progress of the cities to the "Smart Cities" (SC-MM). The model has a three-domains hierarchy: Environment, Mobility and Government. Their sub-domains have, at the same time, 14 critical variables. This model was implemented through a web tool based on preceding maturity model developments of the Federico Santa María Technical University. The validation was conducted with the involvement of an Institution with vast knowledge in SC and internationally active.

Keywords: maturity model, sustainable cities, smart cities.

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1. Introduction

This world we live in is in constant development and growth. In 2014, the world's population was over 7.000 million inhabitants on the planet; more than half of them live in urban areas, inhabiting cities and towns near to large cities, where migration towards them is constantly increasing (United Nations, 2015). City life creates diverse needs; this is the case of transport, currently one of the most discussed subjects, due to its importance in the urban development and life quality of people. This need increases and becomes more and more complex, as cities and automotive park grows, which also improves CO2 emissions. Therefore, we can identify two transports-associated problems: infrastructure planning and pollution, both currently produced by the energy sources in use.

On the other hand, large cities generate a huge amount of pollution, domestic, industrial and hospital wastes. This is, without doubt, one of the most serious issues of today's society, forcing the planning of collection services, to pick up and store garbage. Currently, cities have created major challenges to governmental entities, encouraging them to implement various sustainable development policies to improve the quality of life now, and reduce the environmental impact generated by life in the urban areas. Various infrastructures were created to implement regulations, researching and investigating new technologies for achieving a fully sustainable and efficient development. From this point stems the need of further diagnosis and assessment of cities, based on

their sustainable development, responsibility with the quality of life of their citizens, and the environment. It is important to identify and assess the current situation, to reveal what are the alternatives that will improve the condition of the cities.

Furthermore, it is necessary to set a comparison concerning to other cities, to generate a feedback validating the different models used. Once the condition of the cities is identified, it can be used the experience to create or improve the current models of infrastructure and development. Nowadays, it is essential to the ICT to integrate global diagnosis systems, providing insight to governments and entities focused on improving the quality of life of citizens and the environmental responsibility. With the aid of a tool that will provide an assessment to the cities, it will be achieved a process of continuous improvement, being this a benefit for the current environment.

The general aim of this work is to develop and validate a maturity model to guide the development of the cities to higher standards of "Smart Cities" (SCs); this is, through a maturity model implemented in an available web tool, which can be used by governments and entities responsible for the planning of the city development. This enables the diagnosis and assessment of the capacity and maturity of the cities, to subsequently guide them in the improvement of those aspects whereby they are deficient. The main objectives are: (1) Develop a maturity model to diagnose and guide the cities to SCs; (2) Implement the model developed through a web platform; and (3) Validate the design of the model and its implementation in the platform.

It is suggested as a solution to develop a maturity model based on the structure of the validated models able to generate a road map, displaying a path to guide the improvement process regarding the variables evaluated in the model. Particular emphasis should be suggested to the areas and improvements to be implemented, to achieve a higher standard. Subsequently to the development of the tool, it will be performed a process of validation of the model; the outcomes obtained will be recorded to carry out an analysis of the diagnosis results of the SMs. Relevant corrections attained to update the web platform will be used by the organizations that will require it. The benefit of this tool is allowing through a free-access web platform, the identification of strengths and weaknesses that cities have in the area of sustainability (SC). It also provides the capacity of a self-assessment, showing a way forward to improve the conditions of the SC. Thus, entities responsible for the planning of the city are able to guide the development of best practices, following the recommendations provided by the roadmap generated by the model.

The current reality of the city and its deficiencies will be understood through a platform focused on a sustainable development of the cities, by leading the financial and planning efforts directly where major gaps exist, optimizing the process of development of the city. Improving and developing the areas that directly affect in the capacity of a city to be a SC, does not completely ensure an optimal result. It is crucial how changes are approached, and these should be appropriate to the realities of each city; this is why they should be interpreted in general terms, and customizable. The application delivers a study of the current situation, and guidance on what is the way forward to improve the status to achieve a higher maturity level. However, the tool does not provide information on how to perform these changes, it only indicates which are the modifications to be conducted; thus, there is no information regarding the financial effort or times of implementation. It should be considered that city planning is not a short-term subject, so orientations and guidelines

to improve the maturity level can be seen in the long-term results. Additionally, it should be also taken into account that in the diverse areas, there are different planning and implementation times. This means it depends on each particular case on where to start building changes, and what will be their direct impact.

This work describes hereunder, the State of the Art of SCs, Maturity Models, and Maturity Models for SCs. Then, Section 3 describes the Design, Implementation and Validation of the Maturity Model proposed to diagnose SCs. The final section contains Conclusions, providing a reflection on the work performed; also, further actions are posed.

2. State of the Art of SCs, and Maturity Model for SCs

The SC concept refers to the sustainable development of the cities, which are able to meet the basic needs of institutions, companies and of their inhabitants. The unbridled population growth directly affects in transport services, safety, water and electricity supplies, provisions, sanitation, natural resources and even in catastrophe management. Therefore, the basic principle of the SC, "Sustainable Development", is a governmental priority worldwide. It is defined as meeting the needs of today without compromising future generations.

SC developments and concepts seen in literature are hereunder described. In Anthopoulos and Tsoukalas (2010) is carried out an architecture based on the analysis of the various initiatives implemented in AOL cities, Amsterdam digital city, Trikala, Kyoto and Copenhague. This highlights the importance of integrating legacy systems, migrate and reuse the existing data, simplify urban processes, optimize resources, interoperability of equipment, and the delivery of tools for the monitoring, management and analysis. Filipponi et al. (2010) develop "Sofia", an architecture composed of sensors, devices and applications in an organized and interoperable manner. The objective is to generate an interactive, self-organized ecosystem, to provide information based on the events of the monitoring of public areas. In Sanchez et al. (2011), we find a description of a laboratory of prototypes and development of technologies, in a real environment. This city has 20.000 experimental sensors that capture data for the different services, providing real-time information.

The start of this project begins with the development of a solution to optimize the fluency of vehicles in parking areas. In Haubensak (2011) is proposed the importance of the sustainability concept, develop self-sufficient processes, with a minimum environmental impact. As an example, it is highlighted Masdar City in United Arab Emirates. This city is built with a 100% of sustainability, without using fossil fuels or CO2 emissions; it is completely supplied by renewable energies, and 80% of the water used is treated. In Nam and Pardo (2011) is introduced the importance of the synergy that should exist between technology, people and institutions, in the design of SCs. It redefines the term "intelligent", for the cities that relate technology with society, and how are they related from day to day, determining the best way to resolve the problems of the city. In Zygiaris (2012), it is suggested a model that can be used in any urban planning, including sustainable concepts, environmental policies in innovation, implementation, integration, synchronization and interconnection. This is a model currently used in Barcelona, Amsterdam and Edinburgh.

The developments presented earlier portray the evolution and importance given to sustainability, a concept that has been associated to the cities and has defined the current SC. In 1987, Brundtland describes this concept as "Meeting the needs of the current generations". However, many decades before, in 1865 William Jevons had already questioned the use of coal as an energetic resource, postulating the possibility of using renewable energies as a solution to the limited coal resource. The improvement of the efficiency in the steam engine of Watt did not imply a reduction in the energy consumption; on the contrary, it increased significantly the amount of demand of coal, which is called the rebound effect: "Increasing the efficiency reduces the immediate consumption, but increases the use of the model, which leads to increase the global consumption".

Currently, after considerable efforts to develop a system of assessment, Boyd Cohen (2014), in collaboration with Buenos Aires, Barcelona and the main cities across the world, develops a set of indicators, which he considers to be essential for the study of SCs; he grouped them in 6 areas of study: (1) Economy; (2) Government; (3) Society; (4) Smart Habitat; (5) Smart mobility; (6) Smart Environment. Thus, it is created the "Wheel of Boyd", which merges the indicators necessary to analyze the level of intelligence of the cities.

3. Design and Validation of the Maturity Model for SCs

Components of the proposed model and hierarchical relations among them are here described: (1) Domains (D), (2) Subdomains (SD), and (3) Critical Variables (CV). Altogether, these elements enable the diagnosis of "Smart Cities". The elements selected for the model are obtained from the study of Dr. Cohen, which develops a methodology, since 2011, to perform a ranking of the SCs. At the beginning he selected 100 indicators in his researches, related to the subject; subsequently, a team of the Ministry of Modernization of Buenos Aires, increased the list to 400 indicators. Later, a team of the city of Barcelona joined the group to work in a process of reduction of the indicators, to obtain a more limited and constrained measuring. Therefore, these will be adapted and validated to the different cities of the world. In Viale Pereira (2017), we can see the importance of having representative indicators in a model of reference. The output of the reduction work decreases to 28 indicators in different areas; these indicators will be used and introduced in the methodology of the capacity and maturity models. However, in the development of this evaluation proposal were removed the domains Economy, Society and Quality of Life, to be focused on the priority concepts for the SCs. In this way, the indicators are used and grouped in 3 axes used as domains, which in turn have different components that were homologated as subdomains, and the indicators, as critical variables used in the structure of the maturity model.

3.1. Domain "Environment"

Sub-domain: Sustainable Urban Planning (Viale Pereira et al., 2017)

Smart Buildings	*Green areas per person*
The urbanization planning of the cities has a key role in the sustainable development; therefore, it is imperative the inclusion of Smart Buildings.	Green areas play an important role in the decontamination of the cities, reducing the pollution in the air. They also provide the community with recreational areas that promote sports and outdoor activities. This variable enables the cities to be assessed according to the World Health Organization (WHO) standards.

Sub-domain: Management of Resources

Electricity consumption:	*Carbon Footprint:*	*Waste generation:*
Energy savings and control of its consumption are key elements to a sustainable development. Hence, this critical variable is part of the assessment in the "Environment" Domain.	In a world where the global warming threatens to continue raising the sea levels, impairing the health of its inhabitants and the Earth's surface temperature, it is essential to become aware of the amount of CO2 per inhabitant, which benefits the authorities' decision making, so it is crucial its assessment.	A SC should intelligently manage the waste it generates. This aims to save resources and be environmentally responsible. It is proven that not recycling the wastes increases the emissions of CO2. Therefore, it is crucial to evaluate the capacity of managing the waste in the city.

3.2. Domain "Mobility"

Sub-domain: Efficient Transport

Clean public transport:
Transport in the cities is directly associated to the energy consumption and CO2 emissions. Therefore, the evaluation of clean transport alternatives is a key element to improve the quality of life and environmental care of the city.

Sub-domain: Multi-Modal Access

Use of public transport	*Bicycle lanes*
Using the public transport implies reducing CO2 emissions and traffic circulation, and a better mobility of citizens. This variable evaluates the use of public transport, given its relevance in a SC; private transport involves more pollution and use of space.	Reducing the use of cars is currently a relevant goal. This fact will make possible the reduction of CO2 emissions, and promotes a sustainable development. It is indispensable to have an infrastructure that provides bicycle lanes to citizens.

Sub-domain: Technology Infrastructure

Real-time information:	*Access to Battery charging:*
Corresponds to the information delivered to the various services of public transport, providing to the users real-time information on travel times and/or waiting times. This improves the quality of the service and the user's experience.	Electric vehicles promote a sustainable development in the city, reducing CO2 emissions, and the dependence on fossil fuels; they also reduce the transport costs. It is, therefore, important to provide the necessary infrastructure to implement this transport alternative.

3.3. Domain "Government"

Sub-domain: Online Services

Online procedures
The ICT can provide online government procedures, reducing costs and time to citizens. This *CV* is essential to assess the e-Gov capacity, which implies an evolution towards the SCs

Sub-domain: Infrastructure

Wifi coverage	*Sensors*
Currently, the population is demanding information, and to accede to it is necessary to provide wireless connectivity, to allow the access to the Internet. This is why the Wifi coverage becomes a fundamental variable to assess the evolution regarding connectivity of the cities.	The monitoring is essential to control and improve the quality of the services provided to the citizens. With accurate information is possible to plan and anticipate various situations that can occur in a city, being an important variable to evaluate in the SC concept.

Sub-domain: Open Government

Datasets	*Open Data*
The critical variable that evaluates the access to open Databases that the government provides to citizens. They represent a step toward an open government model, where a model of conversational democracy is established. The purpose is to listen to what citizens say and request, making decisions based on their needs and considering their preferences.	Additionally to providing infrastructure and Open Data to citizens, it is crucial that citizens use these data; so, they should be aware of the opening of these data.

3.4. Calculation of the Maturity Level

The maturity level is defined by the "Capacity", which is a property of the Subdomains determined with the "Capacity Level" (*CL*) of the critical variables (*CVs*). Each of the *CVs* has a weight, and its sum generates a 100% within each subdomain. This weight fulfills the objective of recognizing the importance among the different *CVs*; hence, they are weighed (arithmetic average), obtaining the CL of a *SD*. By obtaining the different capacity levels that correspond to the *SDs*, these are compared

in a configuration table that reports which is the capacity level that they should have to reach a certain maturity level. Since no in-depth analysis has been performed on the relevance of the *SDs*, a table is configured, so all of them have the same relevance for the calculation of the maturity level.

3.5. Evaluation

To evaluate the different cities, a Web platform is developed where various questionnaires regarding to each domain area should be responded. Through this platform is possible to determine the maturity level that each city has. The maturity levels used in this model are those developed in diverse models, with four (4) maturity levels that improve the evaluation and classification of the element to be evaluated, by having an even number of levels, avoiding the selection of an intermediate level. Therefore, the evaluation will be always lean towards from one end to the other. The *CVs* structure of analysis is adopted from the research used in preceding models, which determines the number of capacity levels necessary to improve the outcomes. This is why all the *CVs* are measured as from 4 capacity levels. The Tables 1 describe the capacity level for 10 critical variables defined in the proposed model.

3.6. Model Validation

To validate the developed model, it was sought the opinion of an organization that was related to the concept of SCs, either by having developed the concept, platforms, studies of research or through the motivation of initiatives in the area. It was crucial to the chosen organization to have a vast knowledge of the concept and be clear on the scope of it. The selected organization was "Fundación País Digital" (FPD), founded by businessmen and university students the year 2001. Their purpose and commitment was to work together with those sectors of the society that would promote the development of technologies in Chile. It is a non-profit organization aimed to investigate, spread, promote and develop the technological sciences.

FPD is part of initiatives as SCs in Chile; it currently has 3 projects and participates in Seminars, Congresses and international Fairs. In addition to its active presence in the area, it has a large experience with the concept, and has recently launched the SCs Ranking in Chile, where it worked together with Boyd Cohen. To validate the model a meeting was held with FPD, where the following steps were implemented:

- *Exposition:* The model, its functionalities and implementation are explained.
- *Round of questions:* Instance whereby the validating institution questions the model, resolving the doubts and questionings generated in the presentation.
- *Counterpart opinion:* The validating institution provides an opinion of the model, based on previously presented and discussed material.

After the presentation and debate, the following points were identified:

- *Domains:* The SC concept is in a constant evolution; there are various definitions, which vary in the domains or "areas" that it should approach. Currently, there is no international formal definition to determine it, which makes difficult the definition of a model. However, FPD validates the developed model, arguing that the selected domains are essential, and are repeated in the different concepts currently developed.

- *Critical variables:* The critical variables are validated, based on their significance in each domain. It is stated the difficulty and importance that the *CV* alternatives have, because they should always seek to be clear, not allowing any doubt on the part of the user.
- *Platform:* The functionality of the platform is validated, emphasizing its easy use. Also, the importance and usefulness of the *roadmap* are recognized, to achieve an evolutionary improvement by the City.

Additionally, FPD poses the next reconsideration: "When performing an evaluation at the country level, small cities will always present lower levels, because of the scale of their economies". This opinion creates a future challenge, which consists in generating a methodology of scale assessment of the cities. Thus, it will be achieved a more realistic assessment, according to the access and opportunities that the various cities have for their evolution.

4. Conclusions

This work develops a pilot assessment model to diagnose the level of SC that cities have. After studying and validating the model presented, it is concluded that the stated objectives are complied for this work, in developing a model that enables the diagnosis of the cities, guiding them to better states of maturity. The ICT play a key role in the development and evolution of the cities. In the field of sustainability, they play a leading role, in being an important tool for the management, monitoring and control. Therefore, it is essential that the efforts of the ICT be focused towards the SCs; they are, at the present time, the answer to the problems that are created with the development of the cities worldwide.

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Urban Governance in Action: Citizen Participation in European Smart City Experiences

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Abstract: In this paper we present a descriptive analysis on how participation has been conducted and promoted in European smart city initiatives and whether those cities that lead urban governance projects advocate for increasing and enhancing the interactions between citizens and local governments. For such purpose, we analyze a total of 108 smart city initiatives from 61 cities of 19 countries, reported in the EUROCITIES Network, according to several variables, such as the addressed smart city dimensions and actions, followed participation types and levels, and used participation tools. Among other issues, we identify a number of citizen participaiton patterns that may be attributed to the administrative culture of the countries where the initiatives where implemented.

Keywords: Smart city, citizen participation, urban governance, EUROCITIES Network.

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1. Introduction

In recent years, societies are undergoing a redistribution of power (Meijer, 2016). Specifically, in the smart cities (SC), new forms of collaboration have emerged through ICTs, involving different stakeholders in the decision making arena (Meijer & Rodríguez Bolivar, 2016). This way, ICTs facilitate the transition from traditional forms of government to models of governance with participation dynamics that have changed the relationships between governments and citizens (Brynskov et al., 2014; Willems et al., 2017).

These new models of governance create innovative environments where, through the co-creation of public services, the citizens' quality of life has increased (Rodríguez Bolívar, 2018). Despite of this, there is a lack of understanding of how such models are taking place in the SCs. Although urban

governance can be considered as the core and most important challenge of SC initiatives, the fact is that there is a discrepancy on which governance models work and which do not (Smith, Macintosh, & Millard, 2011), and there is a need for investigating the strategies that governments have followed with respect to citizen participation. In this context, as Rodríguez Bolívar (2018) highlights, the models may differ according to the political and administrative culture where public administrations are embedded. Indeed, although in the European Union all public administrations share the values associated with democracy and the rule of law, the national administrative culture tends to produce important differences in the operationalization of management-oriented principles in public administration (Thijs et al., 2018), in the way that governments are implementing new technologies into their procedures and actions, and in the way that SCs provide information transparency to citizens (Rodríguez Bolívar, 2018).

Hence, in this paper we aim to study how participation initiatives are taking place in the European SCs to achieve a full integration of citizen engagement in public management. For such purpose, we first analyze the empirical experience of citizen participation initiatives in European SCs and obtain **a preliminary view** of how citizen participation and governance models are characterized. Then, we analyze if the SCs that more prone to introduce innovative governance mechanisms on citizen engagement, as well as those located in European countries with different administrative cultures, have different patterns of citizen participation. We thus seek to analyze the dynamics that citizens have in public sector management to know if SCs are oriented towards real smart urban governance (Meijer & Rodríguez Bolívar, 2016).

To achieve these aims, this paper deals with the following three research questions:

- RQ1. How can citizen participation be characterized in European SCs?
- RQ2. How has citizen participation been promoted in European SCs?
- RQ3. To what extent urban governance working groups in European SCs are promoting different patterns in citizen participation?

In order to answer these questions, we have collected participation initiatives from the SCs that are members of the EUROCITIES Network, which is formed by European cities that, among other issues, coordinate working groups aimed to develop cohesion policies in cities. To answer RQ3, we have focused our analysis in distinguishing SCs members of the EUROCITIES Network that are working in the "urban governance" group.

2. Data Collection and Empirical Methodology

2.1. Data Collection

We consider a large number of European SC initiatives entailing some kind of citizen participation through case studies reported by the EUROCITIES Network. As far of March 2019, the network is formed by local governments of over 140 major European cities, and is aimed to offer a platform for sharing knowledge and exchanging ideas. Through 8 thematic forums – cooperation, culture, economy, environment, knowledge society, mobility, social affairs, and urban governance –, the network website provides information about working groups, projects, activities and events.

More specifically, to capture the data about the reported case studies of participation initiatives in SCs member of the EUROCITIES Network, we implemented and executed a computer program to automatically download and process all the web pages in the EUROCITIES Network platform, publicly available at the end of December 2018. Each case study was identified by the following data: title, description, publication date, forums, and related issues. After that, by means of another computer program, we identified the case studies whose titles or descriptions contained certain keywords that correspond to participative initiatives. In particular, we defined two sets of keywords, and required that, at least, one keyword of each group had to appear in the titles/descriptions of the case studies selected for analysis. The first set contained keywords related to citizen participation, such as citizen* participation , citizen* collaboration, citizen* engagement, electronic participation, e-participation, co-participation, co-production, co-creation and co-decision. The second set, much simpler, just contained the keyword smart cit*.

As a result of this retrieval process, we finally built a dataset with information provided by the EUROCITIES Network about 108 smart city initiatives in 61 cities from 19 countries. Next, we list the considered SCs (and their numbers of initiatives), grouped by administrative cultures or traditions of the countries on which the SCs are located.

- **Scandinavian countries and SCs**. Denmark: Copenhagen (2); Finland: *Tampere* (4), Oulu (3), *Helsinki* (1); Sweden: *Gothenburg* (6), Malmo (1), *Stockholm* (1).
- **Anglo-Saxon countries and SCs**. UK: Birmingham (2), *Glasgow* (2), *Leeds* (2), Belfast (1), Brighton (1), Edinburgh (1), Liverpool (1), Newcastle (1).
- **Germanic countries and SCs**. Austria: Vienna (5); Germany: *Munich* (3), *Dortmund* (2), Leipzig (2), *Berlin* (1), Cologne (1), Dusseldorf (1), Hamburg (1); The Netherlands: *Amsterdam* (2), Rotterdam (2), Almere (1), Eindhoven (1), *The Hague* (1).
- **Central-Eastern countries and SCs**: Bulgaria: Sofia (1); Croatia: Solin (1), *Zagreb* (1); Moldova: Chisinau (1); Poland: Gdansk (2), *Warsaw* (2), Bydgoszcz (1), Krakow (1); Slovenia: Ljubljana (3), Maribor (1).
- **Southern countries and SCs**: Belgium: Ghent (4), Ostend (3), *Antwerp* (2), *Brussels* (1); Cyprus: Nicosia (1); France: *Nantes* (4), Rennes (3), Lille (1), Lyon (1), Nancy (1); Greece: *Athens* (2); Italy: Bologna (2), Milan (2), Genova (1), *Rome* (1); Portugal: Braga (1), Funchal (1); Spain: Barcelona (3), Gijón (3), Málaga (2), *Madrid* (1), Valladolid (1), Zaragoza (1).

2.2. Empirical Methodology

Three types of variables have been categorized to capture data for each of the selected initiatives. These variables, named "contextual", "smart city-related" and "participation-related" variables, allowed us to operationalize the data, enabling the analyses of the research questions of this paper. The **contextual variables** aim to contextualize the analysis according to the locations (cities and countries) and implementation time (year) of the initiatives. Based on prior research (Ongaro et al., 2018; Rodríguez Bolívar, 2018), **we consider the administrative culture types of European countries to classify the analyzed SCs, namely Scandinavian, Anglo-Saxon, Germanic, Central-Eastern and Southern countires**. The implementation years of the selected initiatives ranges from 1992 to 2018, and showed a greater, constant increment since 2015.

The **smart city-related variables** allow describing the issues addressed by the SC initiatives. In this case, we consider the dimensions proposed by Giffinger et al. (2007): Smart economy (ECO), Smart environment (ENV), Smart mobility (MOB), Smart governance (GOV), Smart living (LIV), and Smart people (PEO). For each dimension, we also considered the "actions" (i.e., problems, challenges) addressed by the initiatives.

Finally, **participation-related variables** characterize the citizen participation conducted in the initiatives. The first variable refers to the level of participation achieved in the initiatives, which distinguish different degrees of interaction between stakeholders. In our study, we have taken three levels of participation into account, namely petition level –which occurs when the target stakeholders show their interests in specific city issues–, discussion level –in which the stakeholders are consulted about their opinions–, and collaboration level –which corresponds to a more intense degree of participation where stakeholders are part of the decision making. The second variable included in our study is about the type of participation. Specifically, the participation can be "open" or "selected", depending on the open or restricted access in which stakeholders can participate. Finally, as the third variable, we have considered the participation tools, i.e., the instruments and channels used by the stakeholders in the initiatives. Within the variety of identified tools, we find both human-driven (e.g., meetings, working groups, and social events), and electronic (e.g., e-participation platforms, social media, and Open Data) tools.

3. Analysis of Results

3.1. Scope of Citizen Participation in Smart City Experiences

RQ1 analyzes where and how participation initiatives have been implemented. SCs in German countries do have the highest rate of participative initiatives reported in the EUROCITIES Network –23 initiatives from 13 cities–, followed by SCs in Southern countries, with 42 initiatives from 23 cities. The countries with more initiatives are Germany in the Germanic administrative culture, and Spain, Belgium and France in the Southern region. At city level, we observe a high interest in implementing participation initiatives for improving citizen participation by Southern cities as Barcelona, Ghent and Nantes, and Germanic cities as Vienna and Munich. Within the Scandinavian countries, Finland –leaded by Tampere– and Sweden –leaded by Gothenburg– also show a relatively high number (8) of participative experiences. As Spain and Germany, UK –which is the only Anglo-Saxon country appearing in our evaluation sample– presents 11 initiatives, showing the strong emphasis of its smart cities on making government open and close to citizenry needs. Birmingham, Glasgow and Leeds are examples of such cities. Finally, Central-Eastern countries are the least represented in the EUROCITIES Network in terms of participative initiatives. Nonetheless, they have several SCs that show relatively high interest in citizen participation such as Ljubljana in Slovenia, and Gdansk and Warsaw in Poland.

With respect to the SC dimensions of the participation initiatives, Smart People (PEO), Smart Governance (GOV) and Smart Living (LIV) are the most frequent dimensions in the initiatives. This was expected for GOV since, as explained in Section 2.1, the surveyed initiatives were obtained from the EUROCITIES Network website by means of a keyword-based query related to citizen

participation, considered as one of the main goals of smart governance projects. In fact, the top 3 GOV actions identified in the analyzed initiatives were bottom-up processes coordinated by municipality (e.g., *Can Local Aspirations Change the World?* initiative in Antwerp), participation in decision making (e.g., *OpenBorough* project in Amsterdam), and complaints and suggestions (e.g., *Youth Election Project* in Berlin). Southern countries –mainly Spain, France and Italy– are those that put the strongest emphasis on GOV. Regarding PEO, Southern countries, followed by Germanic countries, are those that implement more participation processes, mainly oriented to social inclusion policies and actions, such as cultural pluralism (e.g., *A City for All* project in Barcelona), gender equality (e.g., *Shared productions* initiative in Nancy), and pro-poor growth (e.g., *Ghent: Bridges to, on and from The Site* in Ghent). Apart from these countries, Scandinavian and Anglo-Saxon countries show the highest relative percentage of participative initiatives for the LIV dimension. Local cultural programs (e.g., *Brighton & Hove Shapes Future through Creativity* project in Brighton & Hove), family and children aid (e.g., *Project Filur* in Stockholm), long term unemployment (e.g., *Tackling Unemployment at Local Level* in Newcastle), and immigrant services (e.g., *Leeds boosts migrant support* project in Leeds) are among the most popular actions in this case.

Smart Environment (ENV), Smart Economy (ECO), and Smart Mobility (MOB) are the dimensions that show less participative initiatives. For ENV, France (as Southern representative), and The Netherlands and Germany (as Germanic representatives), followed by Finland and Sweden (as Scandinavian representatives) are the countries with the highest number of initiatives. In this case, the most popular actions are the involvement in sustainable activities (e.g., *Lyon develops flagship smart city district* initiative in Lyon), tools for behavioral change (e.g., *Sustainability street by street* in The Hague), and policies and systems to involve people in energy consumption and sustainability of buildings (e.g., *Lille Promotes Circular Economy Construction* project in Lille). With respect to ECO, there are no significant differences between the regions, but Southern countries do have the lowest percentage of initiatives in comparison to the other dimensions. The main goals in this dimension are the creation of entrepreneurial environments and infrastructures (e.g., *Munich Develops Flagship Smart City District* in Munich), actions to foster cooperation between administration, businesses and education (e.g., *Brainport Eindhoven* in Eindhoven), and policies, plans and infrastructures for enhancing innovation (e.g., *Reuse System for Furniture and Equipment* in Brighton & Hove). Finally, in MOB, our research sample presents the lowest number of initiatives. Scandinavian countries, leaded by Denmark, are those that put more emphasis on citizen participation in mobility actions. Clean energy in traffic and parking (e.g., *European Platform on Sustainable Urban Mobility Plan* in Copenhagen) and cycling options (e.g. *Cycle Superhighways* in Copenhagen) are the most popular actions in this dimension.

Regarding the participation levels achieved by the initiatives, we identify 3 main groups of SCs. The first group is composed by SCs located in the Germanic countries, which present the relatively highest percentage of initiatives at petition level. The second group would be composed of SCs located in countries where the number of initiatives at collaboration level is higher than at the other levels. In this regard, SCs located in Scandinavian countries, such as Sweden and Finland, and SCs in the Anglo-Saxon tradition, UK, are included into this second group. Finally, the third group would be formed by SCs located in countries in which the discussion level takes a relatively higher

interest. Poland in the Central-Eastern region, and Belgium, France and Italy in the Southern region, are representatives of such group.

3.2. Promotion of Citizen Participation in Smart City Experiences

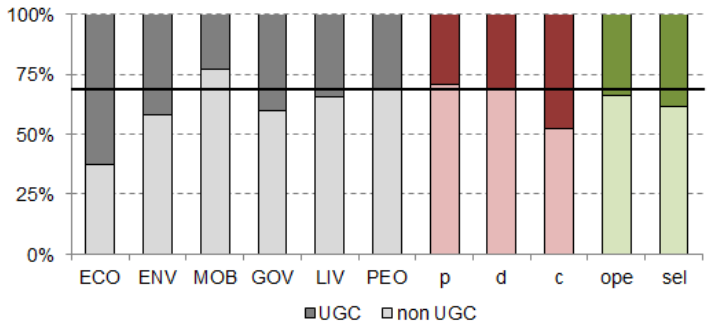
Addressing RQ2, we collected information about the participation types (open/selected) in the sample selection case studies. In this regard, we observed a superiority of open participation over selected participation (the former is followed by 65.7% of the analyzed initiatives). SCs in Scandinavian, Anglo-Saxon and Central-Eastern countries show similar preferences for open and selected participation processes, whereas SCs in Southern and Germanic countries promote (much) more open participation initiatives than selected participation initiatives. More specifically, SCs in Belgium, France and Spain, followed by SCs in Italy and The Netherlands, are the sample cities with the highest number of open participation processes.

Regarding participation tools, ad hoc e-platforms and social media as electronic tools, and meetings, talks/seminars, workshops, social activities and working/discussion groups, as human-driven tools, represent the top participation instruments in all SCs. There is not a clear preference for any of such types of tools. As more fine-grained aspects, we notice that digital devices/displays/maps only appear in initiatives of SCs in Scandinavian countries, meetings and social activities are of special interest for SCs in Anglo-Saxon and German countries, and workshops have significant importance in SCs in Central-Eastern and Southern countries.

3.3. Urban Governance through Citizen Participation in Smart City Experiences

To address RQ3, we conduct an analysis comparing the SCs of our sample that are involved in the Urban Governance forum of the EUROCITIES Network (UGCs) (these cities are in italics in Section 2.1) against the rest of the sample SCs. UGCs represent 31.1% of all sample cities and implement 35.2% of all participation initiatives. On average, UGCs undertake 2.0 initiatives per city, whereas non UGCs present 1.7 participative initiatives per city. SCs in Scandinavian and Germanic coun-tries are the ones that relatively have more UGC: 57.1% and 38.4% respectively. They are followed by SCs located in Southern (26.1%), Anglo-Saxon (25%) and Central-Eastern (20%) countries. Fig. 1 shows the percentages of UGCs and non UGCs initiatives that address each smart dimension, participation level, and participation type used in RQ1 and RQ2. The horizontal line indicates the percentage of UGCs (31.1%) with respect to the total number of cities.

Figure 2: Percentages of Initiatives Implemented by UGC and Non-UGC, Addressing Each Smart City Dimension (i.e., ECO, ENV, MOB, GOV, LIV and PEO), Participation Level (i.e., petition, discussion and collaboration), and Participation Type (i.e., open and selected).



Regarding smart city dimensions, we first observe that UGCs implement 62.5%, 42.1%, 40.0% and 34% of the total ECO, ENV, GOV and LIV initiatives. These results reveal that SCs located in those European cities are considered to promote urban governance in a higher degree and implement a significant number of innovation initiatives entailing participation. In particular, core actions of these cities are the creation of entrepreneurial and innovation environments, infrastructures, policies and plans, as well as business and commerce networks at the ECO dimension (e.g., *Grondstoffen Collectief Almere* project in Almere), policies and systems that involve people in energy consumption and sustainability at the ENV dimension (e.g., *Sustainability Street by Street* in The Hague), and bottom-up processes coordinated by municipalities, participation in decision making, and collaborative production of services at the GOV dimension (e.g., Decide *Madrid* in Madrid). At the LIV dimension, we also find initiatives aimed to enhance the interconnection between government and other stakeholders, such as citizens, ONGs and universities (e.g., *Investing in Children and their Families* in Nantes).

As for the participation levels, Figure 1 shows that UGCs implement a high percentage (47.6%) of the initiatives at collaboration level, which reinforces the idea that UGCs put citizen participation into practice. Regarding the participation types, there are no significant differences in the number of open and selected participation initiatives. The slightly greater percentage of selected participation initiatives is due to the fact that 47.3% of the UGCs belong to the Scandinavian and Germanic administrative cultures, which, as discussed in Section 3.2, have leaded the use of such type of participation.

Finally, as an additional indicator of the high citizen participation in UGCs, we also consider the percentage of initiatives involving government with other stakeholders. For non UGCs, we identified that 58.8% and 54.4% of the initiatives considered government interactions with citizens and business actors, respectively. For UGCs, on the other hand, such percentages were higher: 70.3% and 56.8% for citizens and business actors, respectively.

4. Conclusions

Analyzing 109 case studies from 61 cities of 19 countries reported by the EUROCITIES Network, we have shown that specific national administrative cultures, traditions and management trends have

implications for participation initiatives. In this regard, SCs in Southern countries, followed by SCs in Germanic countries, represent the European SCs where open participation has been most promoted; predominantly at the petition and discussion levels, and mainly focusing on Smart People and Smart Governance actions, such as social inclusion policies, and bottom-up processes coordinated by municipality, participation in decision making, complaints and suggestions.

We have also found that, in contrast, SCs in Scandinavian and in Anglo-Saxon countries more advocate for selected participation processes, and achieve the collaboration level in a higher degree. The former are the countries that put more emphasis on Smart Environment and Smart Mobility actions, whereas the latter focus on Smart Living actions, like local cultural programs, family and children aid, long term unemployment, and immigrant services. Finally, our analysis has revealed that SCs in Central-Eastern countries, with a relatively low number of participative initiatives for all smart city dimensions, tend to conduct open and selected participation at petition and discussion levels. With regards the SCs that are leading urban governance in the EUROCITIES Network, our findings show that such cities put in practice a relatively high number of participation initiatives where citizens play a key role of the initiatives, mainly for the Smart Economy, Smart Environment and Smart Governance dimensions.

Future research should develop our study in depth considering additional factors that may promote and engage citizens to be active participants in SC projects and policies. In particular, we propose to analyze the stakeholders involved in the initiatives, as well as the relationships between them. We plan to characterize (if any) the feedback given by government and citizens during and after the participation processes. Moreover, we would like to go further in our analysis, and investigate the effects and impact that citizen participation has on the urban governance of SCs. For this purpose, the citizens' opinions in social networks and the news published in the media may be valuable sources of information. Measuring user engagement metrics and the analysis of the participation tools are more effective for the interactions could help on that purpose (Cortés-Cediel et al., 2018).

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EGOV-CeDEM-ePart

A Quadruple-Helix Model of Smart City Development? Understanding the Role of Public Libraries

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Abstract: Local governments are exploring different strategies to build smart, inclusive and connected communities, from public-private partnership to the engagement of civil society. Some of them have recognized that government agencies need to collaborate with other local entities, including private companies, universities, and civil society. However, in many instances, some community actors are left out of the model for building smart cities. For instance, with strong legitimacy from the perspective of citizens and multiple innovations in services and programs for the community, public libraries currently play a very important role in building smart communities. However, this role has not always been identified and integrated into smart city initiatives. This paper analyzes innovative practices in Chattanooga Public Libraries (CPL) and its role as an anchor institution in making Chattanooga smarter. We argue that together, these innovations represent a human-centric and quadruple-helix collaboration and these are important strategies for smart city development.

Keywords: smart city, quadruple-helix, public library, anchor institution, smart community

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1. Introduction

With increasing urbanization, cities are faced with challenges of governance, emerging social problems, and concerns about sustainable development. Technological innovation enables local government strategies to improve government services, overall quality of life for citizens and make the city smarter. Most of these strategies focus on implementing advanced technology to help

government with decision making and provide better public services (Mora et al., 2018a). In the United States, increasing federal funding has been given to encourage public-private partnerships and engagement of various stakeholders, including data scientists, technologists, together with civic leaders to improve data driven decision making and to come up with new solutions to societal issues.

While recognizing the benefit of technology and collaborative efforts of stakeholders within the city, these initiatives often less focus on identifying citizens' demands that are the fundamental issues needed to be addressed during the development of smart cities (Calzada, 2017; Anttiroiko, 2016; Almirall et al., 2014). Moreover, besides governments, technology experts, civil society, it is unclear which other specific stakeholders are playing or can play a role in building smart cities. For example, public libraries as community institutions, have been largely left out of the discussions on building smart cities (Burke et al., 2014).

Public libraries have been viewed as necessary partners in community development by urban planning research for decades (Goodman, 2013; Jerkov et al., 2015; Maurrasse & Bliss, 2006). In the United States, public libraries have been viewed as anchor institutions and information technology hubs that help improve connectivity, engage communities, and address their needs through various free physical and online resources. Transformation and innovation are needed for public libraries to better act as community anchors in building smart cities. However, very few studies have illustrated what strategies public libraries have adopted to engage citizens in smart cities? What programs and services are they providing to contribute to the development of smart and innovative cities and communities? What are the benefits to the community, and what challenges are they facing when involved in smart city initiatives?

This ongoing research paper aims to address these questions above through a case study of Chattanooga Public Library (CPL). We explore the innovative practices of CPL to understand what strategies, programs, services, and tools it has used to contribute to the development of a smart city in Chattanooga. The paper is organized into five sections, including the foregoing introduction. In section two, we present some background on smart cities and explain the concept of quadruple-helix model for building smart cities. Section three describes the research design and methods used in this study. Section four presents some preliminary results from the case study and section five provides some final comments and next steps for this research.

2. Literature Review

Over the past 20 years, research from different disciplines have been conducted with a focus on smart cities. Some ranked and bench marked the status of the cities' smartness (Giffinger et al., 2007; Giffinger and Gudrun, 2010; Hall, 2000). Some proposed comprehensive frameworks and pointed out the key components of the smart city ecosystem and influential factors in building smart cities (Chourabi et al., 2012; Gil-Garcia et al., 2015, 2016; Kuk & Janssen, 2011; Meijer & Bolívar, 2016; Meijer, 2017; Nam & Pardo, 2011). Although there is no consensus on the definition of smart city, a common theme has emerged: smart city initiatives are designed with an integral view of the city and

aim to facilitate sustainable urbanization, promote economic development and improve quality of life (Gascó, 2016).

Previous research also mentioned different strategies to develop a smart city. One of them is a collaborative model and emphasizes how cities need partners to become smarter (Mora et al., 2018a). In this case, the collaboration could include one or more entities that work with the city government. Within this strategy, the double helix model was first proposed, in which IT providers persuaded government to adopt smart technologies for urban innovation. Later on, some researchers who believed it was not sufficient to use this double helix model for smart city development formed a vision of a more open and collaborative smart city ecosystem. A triple-helix model (governments, academia and industry) and quadruple-helix model (also including civil society) were proposed as collaboration strategies to build a smart city (Mora et al., 2018b).

The triple-helix model was first raised to represent the interplay among government, academia and industry in creating a knowledge-based economy (Etzkowitz & Leydesdorff, 1995). Each actor contributes to different aspects of the city development based on their traditional roles and functions within society: government as regulators making rules and monitoring all the activities, academia as knowledge generators bring in intellectual inspiration, and industry work as creators of wealth. Interplay among them forms a collective mechanism that affects the innovation in public management and smart city development (Leydesdorff & Deakin, 2011). Lombardi et al. (2012) adopted this triple-helix model to assess the collaboration among these three actors in building a smart city. Dameri et al. (2016) summarized the similarities and differences among these three actors and emphasized the importance of reaching the common good during the collaboration in order to successfully achieve the ultimate goal: improve the quality of life for citizens.

In recent studies, the concepts of knowledge society (Carayannis & Campbell, 2006) and participatory governance (Foray et al., 2012) have been recognized as important components for smart city development. Therefore, a fourth helix: civil society, has been added to the model and forms the quadruple-helix collaborative model. Different from the technology driven and government led approach in the previous models, the quadruple-helix model emphasizes user-centric innovation (Deakin et al., 2018) and advocate the combination of top-down and bottom-up approaches to build smart cities by (1) recognizing citizens as active users, (2) supporting citizen engagement and participation in decision-making, and (3) aiming to benefit the community as a whole (Borkowska & Osborne, 2018). However, from existing research, it is not clear how citizens participate in implementing smart city initiatives: directly or through nonprofit organizations and other entities. Besides citizens, there are other involved community actors have been left out in the discussion; for example, public libraries. As the information and technology hub for many cities, they are providing various resources helping citizens to be involved in building smart cities and communities. Thus, we argue that it is important to understand the more specific role that public libraries play within the civic society component of the quadruple helix model.

3. Research Design and Methods

In order to have a better understanding of what strategies, programs and services that public libraries have adopted to facilitate the development of smart cities and smart communities, we first conducted an online environment scan of public libraries in the United States and identified which ones have been involved in building smart cities and communities. Secondly, taking a case analysis approach, we chose the Chattanooga Public Library (CPL) as a representative library and discussed in detail how it has acted as an anchor institution and enabled the development of a smart city in Chattanooga, Tennessee. We first reviewed the library's official website and searched for related news articles to get a preliminary understanding of the CPL. In early November 2018, we visited the CPL and conducted 12 semi-structured interviews with libraries staff, government officials and external stakeholders using pre-designed interview protocols. All interviews were recorded using a digital recorder with the permission of the interviewees and then were transcribed manually for further analysis.

4. Preliminary Findings

As an information hub that is free and open to everyone, public libraries provide a public and safe space for people to access technology and information, and various programs and services that can potentially help them to participate in smart community initiatives. They also take advantage of the collaboration with local governments and external partners to better adapt and improve their capabilities to serve the community as a whole. Located in the heart of the downtown area, the Chattanooga Public Library (CPL) was constructed in 1976 and includes 108,500 square feet of conditioned space. Its facilities and equipment position the library to be a catalyst for the participation of citizens in smart community initiatives. Following, we present some preliminary findings about how the CPL is contributing in the development of a smart city in Chattanooga by providing citizens with the necessary skills, technologies, and opportunities for engagement.

4.1. Access to Technology and Necessary IT Skills

With the mission of being the catalyst for community lifelong learning, the CPL has been dedicated to serve community. Like other libraries, the CPL provides basic resources and equipment like books and references (hard copy and digital version), public computers, printers, scanners, fax machines, etc. It is simple and satisfies patrons' basic needs; for example, access to a computer and the Internet, fill in online tax form, apply for a job online, and so on. The library also provides guidance like computer classes at different levels and 45-minute one on one training session with a librarian. It helps patrons better interact with the technology and solve their practical issues, such as setting up smart devices and resume design, among others.

Beyond traditional library services, the CPL also designed some user-centric innovative programs to better serve the community. Taking advantage of the high-speed Internet: the "Gig", the library turned its storage space into a public laboratory and educational makerspace called: The 4th Floor. Over 12,000 sq. feet of space hosts state of the industry technologies such as a 3D printer, laser cutter, vinyl plotter, virtual reality machine, etc., as well as traditional tools like sewing machines, a floor

loom, hand tools etc. Patrons are able to experience traditional and advanced technology and tools based on their interests and needs.

As another example, the Tech Goes Home Chattanooga (TGH CHA) program at the CPL offers patrons with 15 hours professional training that helps Chattanooga citizens improve their technological skills. At the end of the training, participants are also able to purchase a new computer and have access to Internet service at a very low cost. With better engagement with technology, patrons are better informed and motivated to participate in community events.

4.2. Support Citizen Engagement and Participation

Beyond access to technology and information, the CPL also creates a welcome environment that supports production, connection and knowledge sharing among patrons and librarians. It also provides resources for the development of entrepreneurship. Especially in the makerspace on the 4th floor. People come in to prototype their ideas using tools at the library and later produce them at a larger scale. A Small Business Saturday Program is also offered by the CPL to provide guidance for people who want to start a small business. More than consumers only, citizens now become creators and innovators that contribute to the development of their city and community.

The CPL also provides various events to facilitate citizens' engagement with useful information. For example, the mobile kitchen provides cooking training and nutrition information for underserved community members to improve their awareness of healthy eating. Reading programs for different age groups help create shared topics and facilitate communication and connectivity within the community. Distributing flyers and postings on social media are other ways in which the CPL helps city government agencies to engage with citizens and encourage them to participate in voting and political discussion.

Finally, the CPL has been very proactive to participate in different kinds of government meetings and look for opportunities to collaborate with the mayor's office and other government agencies. The CPL provides spaces for government staff to have office hours at the library, which makes it convenient for citizens to convey their issues to the government. With its expertise in storing and managing information, the CPL partners with the City of Chattanooga to host and manage the city's open data portal. Citizens are able to access community data for informing, problem solving and better engaging in community events and discussions. Last year, the CPL also took over the project of the city's Maker Faire. It included over 50 makers from different fields. The makers' products were presented around the library building, and over 2000 people participated and experienced all kinds of innovative products and services within the community that helps improve their quality of life.

5. Final Comments and Next Steps

The preliminary results show that through active collaboration with local government and external partners, CPL has been designing user-centric programs and services to help improve patrons' digital literacy, bridge the digital divide, improve citizen engagement, and foster innovation and entrepreneurship. All these are contributing to the development of a smart city and community as suggested in the quadruple-helix model. Our next step is to continue analyzing the data from our

interviews and discuss in more detail how other public libraries can learn from CPL's experience and become an important component in the quadruple-helix collaborative model in building smartness and improve the quality of life in their communities. We are also including other cases with different characteristics in diverse local government settings.

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EGOV-CeDEM-ePart

Collecting Requirements for Designing an Open Data Ecosystem Visual Model Notation

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Abstract: The practice of open (public) data (OD) has been around for some time. One specific scientific approach to investigate the questions surrounding OD applies the so-called ecosystem model borrowed from biology and rooted in ecology. While many OD papers utilize ecosystem as a model, there is no common notation how to represent entities and relationships in OD ecosystem models visually. This paper reviews publications that include some form of a visual representation of an open data ecosystem (depending on the specific interpretation of the authors) and offers a set of requirements that leads the design of an open data ecosystem visual model notation.

Keywords: open data, open data ecosystem, ecosystem model, visual modelling notation.

1. Introduction

While the idea of open government data (OGD) has been around for some time, every few years there is a rejuvenated scientific interest in the topic. Earlier motivation had focused on transparency and accountability, while the late '90s saw some heightened interests in the commercial reuse of public sector information (PSI - Janssen, 2012). With the rise of the open government idea (typically dated around 2009 or so) the picture has become even more complex as transparency goals have become mixed with free availability of government data to be used in innovative services (Zuiderwijk et al, 2014). Earlier models attempting to explain the open government data phenomenon did focus on OGD as a data supply chain or data value chain, but these models could not cope with the large number of actors, the complexity of the data flow, and the various relationship of participants in the data chain. In addition, it was realized that the 'chain' needs to be more like a loop, offering feedback for end users of OD. Furthermore, the final goal was not simply the ability to reuse OD in services, but raised questions about the benefits of publishing and reusing public data (especially when data from different government sources are integrated or even combined with private data). Such benefits were investigated at individual, local or even at societal level. To understand the resulting complex picture of the practice of open government data more and more scholars have started to apply a metaphor rooted in biology and treat participants and their actions and relationships as part of an ecosystem (ES). With a growing interest in the ecosystem approach several authors presented visual representation of their interpretation of the open data

ecosystem (ODE). However, this resulted in a proliferation of various visual models, each using their own notation and focusing on different aspects of the ecosystem or using a unique lens.

To establish an acceptable common notation for open data ecosystems this paper investigates relevant literature and collects requirements that would enable the design of a baseline for required visual model elements. Theoretical contributions include a means of presenting ODE concepts and elements, analyzing actors along with their roles, relationships and actions; while for practice it would offer the ability to augment case studies and to compare country specific ecosystems in a standard way. The paper first reviews definitions of open data and ecosystems to show the need for a common notation of ODE visual models. After the methodology section, the paper reviews fifteen publications that include some visual representation of ODE, then these models are analyzed in order to extract requirements towards a common notation. Finally, the paper presents further steps required to design a usable, standardized notation.

2. Open (Government) Data Ecosystems

The term *open data* as a popular concept was first used in 2006 by the Open Knowledge Foundation, but the term has a special meaning in public sector contexts. The idea of open government data (OGD or OD for short) is rooted in the public sphere principle of 'freedom of information' (FoI - Janssen, 2012). In addition, 'public sector information' (PSI) is defined as "*information, including information products and services, generated, created, collected, processed, pre-served, maintained, disseminated, or funded by or for a government or public institution*" (OECD, 2008). Making (certain) government data openly available to the public has also become a key element of e-Government and such projects are often termed Open Government Initiatives. Open data thus implies the results of various programs that make both public data and information in the public sphere available over the Internet (and such data is often made available in bulk). It is made public – as a secondary goal over the primary use by government or public entities themselves – mainly to allow for transparency and through that accountability, which in turn requires political will and legal control. An additional purpose behind opening up public sector data that has emerged gradually is to make datasets accessible for others to use and repurpose: requesting access to even more public sector information is motivated by commercial interest, namely the trend to apply open government data in innovative value added services (Zuiderwijk et al, 2014). In the context of open data Parsons et al (2011) defined an 'information ecosystem' as "*the people and technologies collecting, handling, and using the data and the interactions between them*" (p. 557). The option to reuse open data adds a few new actors to the 'consumer' side in order to generate higher added value. There are also special channels required to close the feedback loop. Realizing expected benefits of open data requires so called infomediaries, whose role is to clean, sort, interpret, reformat, link, and improve the data (i.e. prepare the data for reuse on the one hand and provide better – easier, more organized – access to open data through services and apps on the other). Trying to understand these more complex roles lead researchers to the systematic application of the 'ecosystem' approach to open data, and this model has become a dominant stream in OD research (Styrin et al., 2017). The key is to create a linked OD ecosystem "*where stakeholders of different sizes and roles find, manage, archive, publish, reuse, integrate, mashup, and consume open government data in connection with online tools, services and societies*" (Ding et al., p. 326).

Authors have offered and characterized an array of various (partly over-lapping) roles and functions. This can be explained by the observation that open data ecosystems are dynamic and open systems. Indeed, stakeholders who participate in the system change over time, so do relationships among them (Styrin et al., 2017). Typical participants include various government actors, private organizations (who use data to create applications or offer technical solutions), individuals (e.g. citizens who benefit from both data and applications) (Dawes et al., 2011). Such stakeholders may collaborate, but their activities should also be enabled and controlled by policies, management practices and technical elements of the ecosystem and may shape their own personal and organizational routines. To stimulate the open data ecosystem, governments may develop (or buy) and manage an actual service platform. Indeed, it is well debated in the literature, whether the OD ecosystem is better left self-organizing (self-facilitated) or a strategist is required (who oversees the system and able to organize participants) – with the latter role likely be taken by some government entity (Martin et al., 2017; Turki and Foulonneau, 2015). Zuiderwijk et al. (2014) provide a comprehensive review of elements in ODE covering roles (data suppliers, customers, users, complementors, developers, infomediaries, and facilitators); actual participants (agencies, departments, civil servants, internal elements, partners, communities, individual stakeholders, citizens); as well as tools and functions (platform and resources that release, publish, format. patch. link, package and archive data, send notification, automate integration, address licensing, create usage statistics, provide architecture, provision metadata, allocate resources, enable e-participation).

Since there is no accepted notation how to (visually) model open data ecosystems, the following research objective had been formulated: Collect requirements for a visual notation that is capable of representing elements of concepts commonly used in Open Data Ecosystem visual models appearing in relevant literature.

3. Methodology: Systematic Review of ODE Model Literature

Under the above objective, the following research questions were proposed: 1) What are the existing ODE visual models in related literature?, and 2) What requirements may be collected for an ODE visual model based on their commonalities? To answer these questions a systematic literature review based on the PRISMA approach (Liberati et al., 2009) was selected as research method. The conceptualization of topic (aimed at selecting and defining key terms) considered a selection of a short list of broad terms to ensure a wide coverage of potential literature to be fed into PRISMA: Open Data Ecosystem, Open Data Ecosystem Model, Open Government Ecosystem, Open Government Data Ecosystem. The search strategy included two rounds conducted in February of 2018 and considered all types of English language publications (i.e. not only papers from selected journals, but allowed for white papers, blogs, research reports, and thesis/dissertations – to be consistent with the principle of wide coverage). The above terms have been searched in both the Scopus database and in Google Scholar and resulted in an integrated set of 583 documents as the input to the Screening phase.

Then 103 duplicates as well as 65 non-English items, citations and non-scientific reports have been removed leading to 415 identified starting records. In the second round of Screening, articles were assessed by their title and abstract and as a result 3 were eliminated because the paper could

not be identified and an additional 67 was also excluded as the items turned out to be from other scientific areas. The remaining 345 had a third round of Screening and 96 had been eliminated due to the fact that they had nothing to do with ecosystem (3 were full proceedings, not one paper; 2 considered legal aspects of OD or OG; 9 looked at organizational issues only; 7 dealt with policy; while 74 with other, general areas of OG, and 3 with various other issues). The Eligibility step thus started with 249 items and the full-text of the articles were assessed in two rounds. First studies were paged through to see their relevance regarding ecosystems and those that focused exclusively either on open data or on ecosystem separately were excluded: 124 items were left out. In addition, 24 could not be reviewed as the full paper was not available, and there were 2 additional duplicates found. Then 99 papers were read even deeper for a second eligibility round leading to the exclusion of 58 items as they did not actually have any usable model of ODE: thus 41 papers were left to be used in collecting ODE model examples. The Inclusion step of PRISMA now focused on collecting visual models from the remaining documents. During this process 7 items turned out to have no usable model, 8 had not an original model, but they had referenced models from other 6 new papers. 4 items had two different visual ODE representations, leading to a total number of 32 visual ODE models from 28 pieces. Due to the length of this publication white papers, graduate theses, and articles dealing with ecosystem and OD but not ODE were left out leaving 15 articles to be discussed in the next section (for a more detailed discussion of the original 32 models, *see* Csáki, 2019).

4. Visual Representations of Open Data EcoSystems

The 15 articles (and their 19 models) are presented in the chronological order of their publication:

- Davies (2011) may be the first ODE visual model (p. 3): an infrastructure is defined through a list of technical components and processes, while the ecosystem (emerging over the infrastructure) is made up of a series of interrelated tools and services and their relationships.
- Gama and Lóscio (2014) present two distinct ideas how ODE may be visualized (p. 662, 663): the first concentrates on relationships of actor-groups (over an OD service platform), while the other focuses on the technological architecture needed for ODE. The claim is that key participants are Civil Society, Government, Developers, Universities and Funding agencies – and the roles they may assume are data provider, aggregator, sponsor, and consumer.
- Immonen et al. (2014) also present two models: one discussing actor-roles and relationships (p. 91) while the other considers conceptual elements within an ODE as business (p. 92). The first one focuses on types of roles (and subtypes) while the latter defines mixed things (including activities, actor types, and abstract concepts) without an apparent structure.
- McLeod and McNaughton (2015) present several instances of visually analysing one specific case of an ODE (p. 8, 10, etc.) and identify common features displayed by various elements. Entities cover various (concrete) actors, country, data sources and data types - all categorized over specific attributes using a generic notation (of colored dots and lines between them).
- Ponte's (2015) ODE diagram (p. 3) lists four role types with Enablers connecting Suppliers to Consumers and they also mitigate Intermediaries (aggregators, developers and enrichers).
- Turki and Foulonneau (2015) discuss value exchanges in ODE and show participants (such as Citizens, Public or Private Providers or Developers as well as Aggregator, Enricher or Enabler)

and their relationships (including providing data, platform, or service) as well as the flow of data and benefits. There is no legend provided and the notation applied does not differentiate actor types from the various roles, and the flow of (value) exchanges mixes things at different levels (e.g. data with services or with abstract concepts such as reputation or benefits).

- Dawes et al. (2016) explain how to design OGD initiatives. Their ODE model (p. 19 and 25) differentiates three main role groups (Providers, Users and Beneficiaries) with actor types in each group (e.g. political leaders, civic community) and connects them through activities (such as data use or feedback) and other abstract concepts (i.e. motivation, benefits, characteristics, or data products). The model is similar to value chains but the connections are not clean data or value flows as they also represent influences and conceptual relationships.
- Dickinson (2016) composed two circular diagrams of how ODE may grow: the view is centered around OD and circles out towards citizens with intermediaries (providing services) working with various end users in different order. The four layers contain entities at different abstraction level, such as data, services, actor types, roles and groups.
- Van Schalkwyk et al. (2016) investigate the roles of intermediaries. They present a model of an application area and country specific ODE (p. 73) along with its context (of regulations, standards, and agreements). The goal is to depict specific entities (e.g. institutions) who have control over different types of data sources. It shows some data flow and feedback as well.
- Zubcoff et al. (2016) investigate a specific case of a university ODE (p. 251): it looks at actor types or categories (such as university, citizens or entrepreneurs) and a few relationships revolving around OD (including some actions as well as value exchange/generation).
- Kitsios et al. (2017) provide a generic representation of four roles that are key to an ODE forming a simple circle (p. 401): Data providers, Service providers, Application developers and Application users. The authors call these 'actors' – but in other models they are rather roles.
- Martin et al. (2017) propose a new role for ODE, called the 'stimulator' (function) and present this new role (p. 61) with its relationships to other roles (including the Citizen/Consumer, Public and Private Providers, and Infomediary roles). In the model relationships may be actions, events, services, data and capabilities, influences or value/benefits.
- Najafabadi and Luna-Reyes (2017) call their model the 'abstract layers' of an ODE: it presents a data-flow-like connection among different types of concepts related to open data ecosystem complete with feedbacks (p. 2713). The elements included are Data, Applications, Use and Benefits (i.e. artefacts, activities, and abstract concepts). They have a second type of model summarizing their view of the main sectors and feedback processes present in OGD ecosystems (p. 2716). They use a dedicated notation but there is no legend provided.
- Styrin et al. (2017) have a conceptual model with three elements determining an ODE (p. 134): (governmental) policy provides the environment in which ecosystem development occurs; society (in general) represents the users of OD; while (organizational) management focuses on processes related to data (see Zuiderwijk et al. 2014). Interactions within an ODE then happen at the interceptions of these dimensions and the ODE shaping up is specific to a given country.
- Van Schalkwyk et al. (2017) present a diagram of the Nigerian ODE (p. 97) where open data in the center is surrounded by four activities – two on the Government's side (as one actor): Disclosure and Accountability, and two on the Citizens' side (as the other actor): Engagement and Reaction. A fifth activity is associated with the data itself: platform development by

various civil society organizations (the third actor type) – and this platform connects the three actors through allowing online access to open data.

5. Discussion: Key Requirements for a Notation

Apart from the divergent approaches and individually developed notations of how to represent an ODE, what is apparent from these models is the wide range of entities and concepts considered to be part of an ecosystem around open data. At a high level, models may be categorized to be either conceptual (focusing on context, value, benefits, influence, etc.) or oriented towards one or more specific component (such as actors, roles, relationships, data-flow, resources, activities, services, tools, attributes, or process). From a different point of view models may be static or dynamic (with this latter covering data flow, steps of communication or exchange in time, or the evolution of a given ODE over time). Furthermore, some models were at a generic level while others described one specific ecosystem (of a country, domain, or application). Consequently, it is very likely that one single model will not be able to cover all the information that is required for a model to properly convey certain messages when describing an ODE – and a set of model types will be required. In detail, the concepts and entities an ODE model notation should be able to handle are as follows.

Need to allow for the rich description of the Context of ODE both at a general and at a case level – with policy, regulations, standards, rules, practices, agreements, all influencing elements and connections and determining operational aspects of an ecosystem. One important distinction to be made based on the literature is the separation of Actors from (their) Roles. Actors are participants (also called stakeholders) in the ODE while a role describes what function participants may take to serve the goal(s) of the ecosystem – they require dedicated notation. Actors in the models identified at two levels: actor types (government, agencies, departments, civil servants, businesses, software companies, NGOs, communities, citizens – individuals and groups) and actual actors, that may be considered the "instantiations" of those actor types (e.g. Belgian government, Ministry of Health, a given company, community, or person). These levels need to be differentiated in the notation. Roles should also be shown at two levels but differently: groups (data providers, intermediaries, end users) and specific roles within the groups (data producer, data guard, data cleanser, service developer, application developer, aggregator, enricher, facilitator, stimulator, data consumers, and service users).

The model should be able to connect actors to roles (indicate the roles actors play). Actors also have Relationships to be indicated (may be interdependencies, inter-actions, influences) and Capabilities (they define purpose, abilities to perform actions, or rules of operation but may also be features, such as interests, goals and methods of using data). Relationships may exist between roles as well that also need to be represented. The notation should also be able to denote grouped parts of ODE. Beyond denoting actors with roles, the notation should show distinctively other components, such as Resources and Artefacts – the former covering datasets and services, the latter including hardware and software components and other tools (it is less important from the point of view of the notation but some authors group data under artefacts). Similarly to the actor-role pair, artefacts may provide resources (such as Software offering services). The artefacts and resources make up the Infrastructure (often implemented as a technical platform) which is defined through

not only the list of technical components but also related Functions. Each of the infrastructure elements need to have their different properties and abilities shown. One important dynamic aspect of an ODE to be modelled is the Activities that are typically associated with certain roles and in a concrete instance are executed by various actors. For example, data producers register, define, update and refine datasets. The ODE model (or a type of ODE model) should be able to denote not only who may execute certain activities but also how activities may be organized into Processes, where selected actors in certain roles execute some activities utilizing various resources – all to be displayed in a dynamic model. Obviously, one key process to indicate is the flow of data through the ecosystem from owners of the original data set through some treatment by intermediaries until it gets utilized by some end users and, ultimately, delivers some value and benefits; while another process concerns service development.

6. Conclusions and Next Steps: A Call for Standardization

This research paper has shown that there is a wide range of divergent views in the current literature about how to represent an open data ecosystem visually – let it be generic, conceptual or a specific case. The review demonstrated that there is not only a definite need to find a common notation, but existing models also offer a good starting point to collect requirements for a standardized notation. It did collect and present the first baseline for such a proposal. The next steps recommended are as follows: 1) Validate and expand on the requirements using discussions within the ODE research community; 2) Look at notations from other fields (such as the UML used in Software Engineering) and design the first version of the notation; 3) Validate the notation by a) checking it against the models listed in this paper and by b) using existing case studies of (country or domain) specific ODE and verifying if they can be represented in the proposed notation; 4) Improve and finalize the notation through discussions.

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Challenging the Robustness of OGD De-identification Rules through a Hackathon

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Abstract: With the emergence of the notion of "open innovation", public organisations are currently undergoing a transformation process. Particularly driven by the idea of open government, the release of data that has been produced and financed by public funds has increased and with it, the risk associated to the publication of sensitive or personal information about citizens. Although the diffusion of open government data (OGD) might be beneficial for the private sector, the disclosure of such data might engender several risks, which could affect an individual's privacy. In order to avoid this issue, governments worldwide have started to protect the privacy of individuals by applying de-identification rules. However, de-identification is not risk-free. If the de-identified data does not provide sufficient robustness, re-identification (or re-construction) of personal information is possible. In this paper, we describe a practical approach to examine OGD de-identification rules.

Keywords: De-identification, Open Government Data, Action Design Research, Hackathon

1. Introduction

Public organisations have released a large amount of open government data (OGD) in the past years. With the emergence of open innovation, the interest for such data have grown steadily and require public organisations to rethink their mode of governance. With the progressing digitalization of the public administration, it has become easier to exploit ever-larger amounts of public data that is published on open government platforms or government websites. This data may reveal important information about diseases, financial situation, or consumption habits of an individual. The disclosure of such data may engender several risks, which may lead to extremely negative consequences (e.g. identity theft, fraud, job or reputation loss of an individual) (Erdem and Prada 2011) (Benitez and Malin 2010) and consequently may affect individuals' privacy (Paspatis, Tsohou et al. 2017). In order to avoid this issue, governments worldwide have started to care more about de-identification by implementing specific techniques to ensure that sensitive information is not disclosed to third parties. However, de-identified data has a significant risk of re-identification if these techniques are not sufficiently robust.

In this paper, we therefore describe an approach related to the following research question: How to evaluate the robustness of OGD de-identification rules? For that matter, we propose to follow Action Design Research (ADR) (Sein, Henfridsson et al. 2011), a pragmatic research method that links practitioners and researchers to build a concrete solution (i.e. in our case de-identification rules for OGD) and evaluate the robustness of these rules during a hackathon. By applying ADR to build and evaluate our artefact, we consider the specific needs of public organisations, create a practical solution as well as simultaneously test it in a safe place, under real conditions (i.e. a hackathon). In view of challenges that appear when we contrast data privacy theories to a real-world problem (i.e. re-identification of personal information) (Sein, Henfridsson et al. 2011) hackathons provide to public organisations a sort of think tank to observe and evaluate the suitability of developed techniques.

This paper is organised as follows. First, we explore the current state of discussion concerning de-identify technics and re-identify risks in the literature. Then, we explain the process of the ADR method, followed by a complete description of the design proposed to public organisations to build and test de-identification rules (see Fig. 1). We finally discuss the reasons that a hackathon seems to be an appropriate solution for assessing the robustness of de-identification.

2. Background

2.1. Data Protection and De-identification

In the perspective of ensuring private life, limiting risks but still providing analytical utility for researchers, Erdem and Prada (2011) note that authorities must be responsible to assure data confidentiality. According to El Emam (2016), open data initiatives should not release personal information. Joo, Yoon et al. (2018) argue that for this reason, OGD programs need robust strategies to manage the publication of personal and sensitive information. Many public organisations have adopted diverse technics to mitigate risks of data privacy. Although in the literature the technics used for de-identified varies (Benitez and Malin 2010, El Emam, Arbuckle et al. 2012, Scaiano, Middleton et al. 2016) researchers agreed that de-identification tends to reduce the risk associated to the publication of sensitive and personal information (Benitez and Malin 2010, U.S. Department of Health & Human Service 2010, Scaiano, Middleton et al. 2016). These are appropriate technics to secure citizen data (Iverson and Davis 2007). Joo, Yoon et al. (2018) note that after being de-identified, such type of data can be freely used as any other OGD.

Among the various de-identification techniques (Finkle and El Emam 2016, Office for Government Policy Coordination 2016, Simson G 2016), the utilisation of de-identification rules on public data sets is one of the most used alternatives (Joo, Yoon et al. 2018). That technique consists of transforming sensitive data elements by applying dedicated rules (El Emam and Arbuckle 2013). Experts recognize two types of sensitive data elements: direct identifiers and quasi-identifiers (or an indirect identifier) (Willenborg and De Waal 1996, Duncan, Elliot et al. 2011, El Emam and Arbuckle 2013, Scaiano, Middleton et al. 2016). In the literature, variables that can be used alone to uniquely identify individuals are defined as a direct identifier of a data set (e.g. social security number, telephone number, voter identification number, etc.) (Benitez and Malin 2010, El Emam and

Arbuckle 2013, Czajka, Schneider et al. 2014). Guidelines also treat name or email as direct identifiers because on a given data set there is generally only one individual that has this name or email address (El Emam and Arbuckle 2013). On the other hand, quasi-identifiers are variables that represent the contextual information about individuals that can be used to indirectly identify them (e.g. gender, date of birth, age, geographical information, zip codes, spoken language, ethnic origin etc.) (Benitez and Malin 2010, El Emam, Arbuckle et al. 2012, El Emam and Arbuckle 2013, Scaiano, Middleton et. al. 2016). They are often used in combination (e.g. ethnicity, birthdate, and geographical location) (El Emam and Arbuckle 2013).

2.2. Re-identification Risks

While there are many ways to de-identify data sets, various scholars have demonstrated that transformed data can be easily re-identified (Porter and Tech. 2008, De Montjoye, Radaelli et al. 2015, Financial Times 2016, Paspatis, Tsohou et al. 2017). The combination of a voter list (providing information such as birthdate, gender and residential ZIP code) with hospital discharge records have been led to the re-identification of the medical record of the Massachusetts governor (Sweeney 2000). Culnane, Rubinstein et al. (2017) demonstrate that limited information is sufficient in the process of an individual's re-identification. Similarly, Paspatis, Tsohou et al. (2017) show that sensitive and personal information is present everywhere on the web and the sharing of only three of them is sufficient to re-identify an individual.

We note that de-identification guidelines only recommend risk assessments of re-identification but not to test in real condition if these de-identification rules can be breached having a certain background, situational information. In the context of de-identification, researchers note that often risk evaluation approaches are limited (Meystre, Friedlin et al. 2010). Benitez and Malin (2010) developed two risk estimation metrics that allow them to evaluate the probability of re-identification for each record in a published data set. The study conducted by Scaiano, Middleton et al. (2016) shows that the metrics used for the evaluation do not consider the risks associated with the release of data (i.e. they only include data that needs to be treated, without taking into account its environment). In other words, practitioners traditionally de-identify data as if they were independent, excluding the impact of the real world. In general, governmental guidelines (Finkle , Canadian Institute for Health Information 2010, National Institute of Standards and Technology 2012, Office for Government Policy Coordination 2016) recommend conducting risk assessment procedures before the publication of data. They usually propose qualitative or quantitative approaches. Qualitative approaches base the risk assessment from a set of questions such as the number of data, the level of security control, the type of data etc. while quantitative approaches measure the risk of re-ID as the probability that someone will find the correct identity of a single individual. Simson G (2016) recommends evaluating rules through a software and Finkle () advices the utilisation of a motivated intruder test (i.e. data experts try to re-identify data sets). We note that the rules are rarely subject to the conditions they will meet once published (e.g. hacker, media, researchers etc.). Through this study, we would like to see if by placing the de-identified test data in a real and controlled environment (hackathon) would allow us to better understand the risks associated with re-identification.

3. Methodology

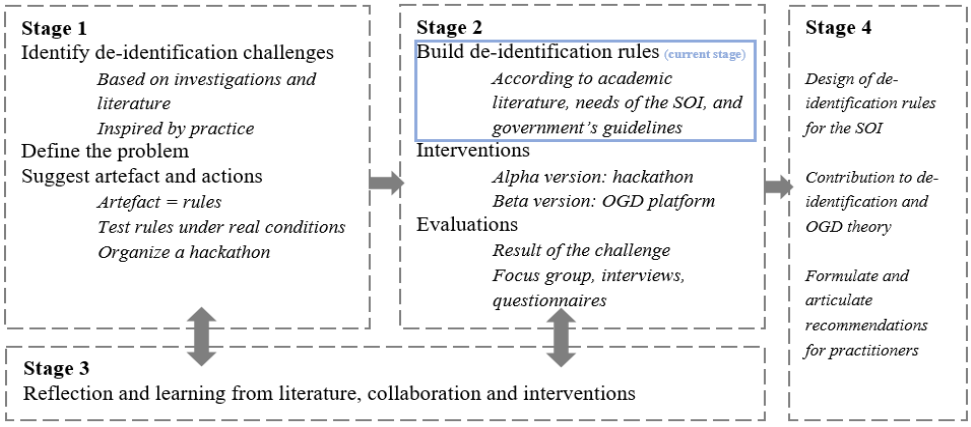
According to Petersson and Lundberg (2016), the Action Design Research (ADR), introduced by Sein, Henfridsson et al. (2011), can be used to foster new ideas for the creation of new technical solutions as well as organizational learning. ADR is composed of four stages: 1-Problem formulation (i.e. specify a concrete problem), 2-Building, Intervention and Evaluation (i.e. finding and evaluating solutions in an iterative process between practitioners and researchers), 3-Reflecting and Learning (i.e. after each iteration add recommendations for an artefact) and 4-Formalisation of Learning (i.e. give final recommendation) (Sein, Henfridsson et al. 2011), ADR provides researchers and practitioners with a systematic approach for planning a participative intervention, as we plan to do with our hackathon for testing de-identification rules (Sein, Henfridsson et al. 2011). The use of ADR allows researchers to learn from the intervention, optimise the artefact, find applicable recommendations for organisations or resolve problematic situations (Baskerville and Wood-Harper 1998, Von Alan, March et al. 2004, Sein, Henfridsson et al. 2011, Crow and Shangraw 2016). An artefact often emerges from the intervention of researchers to solve organisational challenges (Sein, Henfridsson et al. 2011). This artefact typically represents material and organisational features emerging from design, use, and ongoing refinement in a project (Sein, Henfridsson et al. 2011). In our case, the artefact is the de-identification rule set which we develop in collaboration with academic researchers and the Organisational and Informatics Service (SOI) of a major city in Switzerland.

4. Application of ADR

In the problem formulation stage, we examined the challenges posed by the de-identification process. We have discovered that several actors appear in that process: the researchers, the SOI, (i.e. IT department in municipal level), the housing department (i.e. the owners of OGD), citizens (i.e. they are directly affected by data disclosure risks) and OGD end-users. One of the goals of the SOI is to « facilitate » the publication of the city-owned data. It is its responsibility to ensure that the legal base about anonymization is respected when data is being published in open access. We apply the de-identification process on the housing department data mostly because the two services (i.e. SOI and housing department) maintain a good working relationship but also because the city for this study is actually engaged in sustainable development policy. Data such as energy consumption of an urban building or water consumption of citizen appears to be the most attractive option in terms of data valorisation and therefore potentially the most used for re-identification. Together with the SOI and the housing department, we form the ADR team. Based on the literature, practice guidelines, as well as personal meetings and participant observation of the SOI and the housing department, the ADR team has shaped the concrete problem: the individual disclosure risk assessments is weak and misunderstood. We concluded from our examination of the literature that there is a lack of practical approaches for re-identification risk assessment. Consequently, we formulated our research question: How to evaluate the robustness of OGD de-identification rules? In order to answer this question, the ADR team recommended organising a hackathon, to test the rules under a real and controlled situation.

We are (i.e. the researchers) currently in the initial phase of stage two (see Fig. 1). Based on the needs of the SOI and the housing department, the gaps described in the academic literature as well as other government recommendations we built the de-identification rules (Finkle). As recommended in existing guidelines (U.S. Department of Health & Human Service 2010, Office for Government Policy Coordination 2016, Simson G 2016), we first sort out and selected the most relevant data to be used in such a process (e.g. application to control its energy consumption or to reduce water use). In accordance with the SOI, we identified the data used for potential individual disclosure, sensitive data and data considered to be risk-free. The latter was excluded from any de-identification. We also decided to exclude sensitive data (define by the European General Data Protection Regulation (GDPR) list), in order to limit ethical risks (Regulation 2016). As the characteristic of data defines the type of de-identification, we then together determined among the data remaining direct identifiers and quasi-identifiers (El Emam 2016). Then, for each group, we determined the characteristics of the data (e.g. numerical or geographical data, date and times, unstructured text etc.) and finally chose the most suitable rule.

Figure 3: Action Design Research Applied to De-identification Rules Process



The hackathon, the intervention that will serve to test the alpha version of our artefact, has not yet taken place. We will challenge the de-identified data during the hackathon as well as continue our observations, interviews and survey in order to still reflect and learn about de-identification challenges and artefacts. End users of OGD will be invited to explore the de-identified data and imagine re-identification attacks. Insights from this step will help us to develop a robust rule set for a specific domain that will then be published on an OGD platform.

Finally, the formalisation of learning stage will take the form of final de-identification rules and recommendations addressed to the SOI about requirements and needs in publishing OGD safely.

5. Discussion

Heeney, Hawkins et al. (2011) argue that privacy risk assessments need to consider the whole data environment and not only a single data set. According to El Emam and Arbuckle (2013), the techniques used to achieve de-identification should not be separated from their context and should be evaluated on a larger scale, including the environment of the data as well as be implemented

across varied sources (Meystre, Friedlin et al. 2010). In the context of de-identification, we note that privacy risk assessments often ignore these recommendations. Public organisations rarely test de-identification rules in a final data environment (i.e. OGD platforms) and consequently, few are confronted with real-world challenges. In the literature, scholars have started to explore innovative contests as appropriate for proposing practical solutions in de-identification challenges (Möslein and Bansemir 2011, Hjalmarsson, Johannesson et al. 2014, Juell-Skielse, Hjalmarsson et al. 2014, Juell-Skielse, Hjalmarsson et al. 2014), but there are a limited number of solutions proposed to integrate environment impact on de-identification rules (Dinter and Kollwitz 2016). By linking the actors in a situational environment with the de-identification techniques and de-identified data sets, we believe to perform a participative intervention such as those presented by Hjalmarsson, Johannesson et al. (2014) (e.g. collaboration, innovative workshops (Möslein and Bansemir 2011), online setting (Möslein and Bansemir 2011) or hackathons), in order to challenge the robustness of de-identification, which to our view is one of the most important steps in the OGD publication process. For Dinter and Kollwitz (2016), participative innovations constitute a suitable method for innovating with OGD.

Owing to the emergence of open innovation, we are convinced that the hackathon is suitable to meet de-identification challenges. Often rewarded with a price, hackathons usually regroup participants as teams, over a short period (e.g. 24 to 48 hours) with the aim to resolve dedicated issues. Teams may be composed of highly qualified individuals as well as people curious and interested in innovations. In general, teams work on diverse challenges such as data processing or any other computing problem (Briscoe and Mulligan 2014). Such events make it possible to estimate locally, from a different point of view, the risks of re-identification prior to sharing data on open platforms (Benitez and Malin 2010). We see the hackathon as a sort of laboratory to test the robustness of the rules. It represents a safe place for authorities because they released data in a restricted area to controlled groups of people, surrounded by experts of the domain and citizen representatives. It allows the ADR team to gather activities such as operate in the organisation, improve de-identified rules and evaluate them concurrently. By putting our de-identification rules in real-life conditions while remaining in a protected environment, we are then able to observe them and understand their weakness. Furthermore, the hackathons give the opportunities to the SOI to have an overview of the housing department data that interests the most participants, better targeting their needs and therefore adapting to the de-identification levels required. It is not only a question of testing an artefact but also for understanding, the issues related to the data that will soon be published.

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Digital Government for Non-Citizens? Preliminary Findings from Migration Services in Mexico

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Abstract: Digital government could be understood as the use of information technologies to support government operations, provide public services, engage with citizens, and promote an information society. Currently, most scholars and practitioners would not question the need to develop better understanding about citizens' needs and expectations and citizen-centric digital government has become an imperative. However, countries around the world are increasingly facing situations in which they need to develop and deliver information and services for non-citizens (including permanent residents, immigrants, visitors, etc.). This reality changes the relationship between government agencies and their main clients or target audiences, since frequently non-citizens are highly heterogeneous and difficult to reach social groups. In some cases, they have also limited language skills, no Internet access, and low formal education, among other challenging conditions. Based on the analysis of digital government and migration management in the case of Mexico, this ongoing research paper provides preliminary evidence to better understand the similarities and differences when designing, implementing and using digital government applications for non-citizens, particularly in the case of migration services.

Keywords: Digital government, Online services, Non-citizens, Migration services, Success factors

1. Introduction

Countries around the world are increasingly including electronic government as a strategic component of their administrative reform efforts. Digital government could be conceived as the use of information technology to support government operations, engage citizens, and provide government services (Dawes, 2002). Most digital government engagement and service provision is directed at native language-speaking citizens who have spent their entire lives in the country in question and have the rights and skills to obtain value form their interactions with government agencies. In fact, many of these services, explicitly or implicitly, require users to have certain political and civil rights as well as certain technical and educational skills.

However, governments are increasingly using information technologies to engage immigrants, temporary migrants and visitors from abroad and provide services to them via websites, mobile

apps, and other electronic media. Primary examples of such digital government are the "back office" administrative systems that process applications for immigration services or benefits, such as immigrant and non-immigrant visas, adjustment of status to permanent residence and naturalization as well as by the "front end" websites and web portals that enable immigrants and their lawyers (as well as citizen and employer sponsors of immigrants), to apply for such services without filing paper applications.

Such digital government for non-citizens differs from most digital government applications and services because many immigration service applicants and recipients may have limited host country language abilities (making reading the websites and filing electronic applications more difficult) and/or may live on the socio-economic margins with less than optimal internet access. Given that many applicants may rely on third parties (e.g. immigration lawyers, clergy, community groups, state and local government social service agencies) the ultimate users of electronic application processes may have a wide range of capabilities and differing needs for outreach and training. Based on cases of digital government and immigration services from Mexico, this paper identifies key variables to understand this phenomenon and suggests digital government strategies to better serve immigrants and other hard-to-reach communities.

The paper is organized in four sections, including the foregoing introduction. Section two presents a review of current literature on digital government and the role of citizens. We argue that these concepts and their relationships can help to better understand the design, implementation and use of information technologies for immigration policies and programs. Section three briefly describes the research design and methods used for this study. The study is based on a systematic review of government documents the official website where services for non-citizens are offered. Section four presents some preliminary results.

2. Digital Government for Non-Citizens

Governments are attempting to use information technologies in order to reduce costs and provide better public services to their constituencies. Most government services are designed for citizens and according to their needs and capabilities. However, some target populations have limited political and civic rights, because they are not citizens, but permanent residents, visitors, or immigrants. Based on current academic literature, this section discusses some concepts and analytical frameworks that could help to understand digital government when the main clients are not citizens.

2.1. Digital Government Success Factors

Digital government does not refer only to information technologies, but also to organizational, institutional, and contextual aspects that affect the characteristics and potential results from the use of information technologies in government settings. Recent literature has identified different types of factors that are related to the success of digital government initiatives (Gil-Garcia, Pardo & Baker, 2007).

To ensure the quality of the information, it must comply with the following characteristics: 1) accuracy, 2) objectivity or comprehensiveness, currency, cognitive, assurance, relevance, timeless,

perceived value (Klischewski & Scholl, 2008). Contrary to the fact that the information has inconsistencies or is incomplete which hinders the performance of the information systems (Gil-Garcia and Pardo, 2005). It is required that the data entering into the system be accurate (Burbridge, 2002).

Regarding technical factors, Ziemba et al. (2013) points out that the adoption of digital government is strongly influenced by the maturity of electronic services. It is also necessary to build an adequate IT infrastructure (Hwang, Li, Shen and Chu, 2004). Problems in relation to infrastructure, data, compatibility, and information management, are considered technical problems (Anthopoulos et al, 2016), as well as factors such as hardware and software availability and compatibility (Elkadi, 2013). According to Gil-García and Pardo (2005), the system usability and the ease of use are important factors to consider, while the complexity and newness of technology are aspects that potentially affect the outcome of IT projects.

For some authors, organizational factors are the most important for digital government success (Ziemba et al., 2013). These factors are related to resources, including the required money, people, and time to successfully complete the project (Elkadi, 2013). Organizational factors, such as the number of IT employees, have an effect on the functionality of systems. Additionally, specialized training for employees designing and developing the systems also influences, and marketing can help identify information and services that users want (Gil-Garcia, 2006).

The adoption of digital government is affected by the current laws (Ziemba et al., 2013). Government organizations are created and operate under specific laws or a group of laws and the development of digital government relies on appropriate legislation and regulations (Gil Garcia and Pardo, 2005). Moreover, institutional factors also refer to norms, actions, and behaviors that people accept as good or take for granted (Gil-Garcia and Pardo, 2005). These institutions can constrain or guide the actions of the participants in the process of building digital government. Therefore, institutions influence the results of digital government (Eom, 2010).

Environmental factors could include cultural, political, economic, demographic, social and ecological factors (Gil-Garcia, 2012; Hatsu and Ketcha, 2015). These contextual factors play an important role in the way technology is designed and used in government (Gil-García and Pardo, 2005). Digital government projects require a substantial amount of financial resources to purchase the necessary equipment (Ifinedo, 2011). The political variable is considered a determining factor in the information systems success (Jansen, 2011). Bolgherini (2006) considers that the political and administrative tradition plays an important role in the digital government, stating that only if a digital government policy is based on a firm political position will it have a good chance of being successful.

2.2. Digital Government, Citizens, and Non-Citizens

Scholars and practitioners argue that citizens must be at the center of digital government efforts; that is to say, government use of technology should enhance information and service delivery and satisfy their needs (Islam, 2007). Having a citizen-centric approach allows not only improving digital government; it also increases efficiency and reduces bureaucracy in public offices. If governments

develop a digital government strategy based on a citizen-centric approach, they may have important benefits such as: improving the quality of public services, generating a most effective Public Policy, stimulating citizenship participation, transforming traditional and bureaucratic government structures, increasing transparency and accountability, improving public offices efficiency, and develop a modern legal framework to support digital government actions (Janssen, Chun and Gil-Garcia, 2009). A citizen-centric approach implies creating services from the citizens' point of view rather than following the government bureaucratic structures and processes. In a citizen-centric approach, the citizens are frequently seen as customers of government, similar to the case of private companies (Chakravarti and Venugopal, 2008).

Previous literature concentrates on the importance of having a citizen-centric approach, what we seem to be lacking is a focus on the noncitizens that access, or need to access, government information and services. As an operational definition and a first approach, we propose a continuum based on the political and civil rights of individuals with the following categories: 1) citizen, full in rights and obligations; 2) resident, full in rights except for some electoral rights, 3) non-permanent legal visitors, such as students, working and tourist visas; and 4) unauthorized immigrants. Most government programs in general and digital government projects in particular focus and are limited to citizens. However, there are some services that are specifically targeted to non-citizens and there are also government services that are general and not intended to citizens only. In addition, noncitizens have other limitations to access government programs, which are related to the lack of political and civic rights, being part of a "hard-to-reach" community, low levels of formal education, income, and lack of access to computers, Internet, and other technologies.

This work attempts to understand how electronic administration of migration and other government services needs to shift from the citizen-centered approach to the context of noncitizens. There is additional complexity in migration services, because when we talk about the "user" as a non-citizen, the possibilities for the potential user's profile are broad and the challenges for personalized attention are major, since the aims of migration can be very diverse: work, tourism, or business. Furthermore, migrants may come from different nations with different languages and social conditions. For governments, the precision of data and the clear identification of the individual becomes even more important when dealing with noncitizens. This could be related to national security and may require the use of additional measures or technologies, including biometric data from users. In addition, in some countries there are external funds coming from international agreements signed with the purpose of increasing border security or communicating and exchanging information with international security agencies (Garcia-Garcia and Gil-Garcia, 2018). Finally, there are laws and norms established for each type of process depending on the specific profile of the migrants and their country of origin.

3. Research Design and Methods

This section briefly explains the research methods used in this study and provides a brief description of the case. This paper includes the review of current academic literature and official documents from Mexico regarding immigration policy and programs, focusing particularly on the use of information and communication technologies. The official sources consulted this research are the

National Migration Institute (www.inm.gob.mx), the Ministry of Finance (www.shcp.gob.mx), the Accountability Report of the Federal Public Administration 2006-2012 (Informe de Rendición de Cuentas de la Administración Pública Federal 2006-2012), and the Proposal of Comprehensive Immigration Policy in the Southern Border of Mexico (Propuesta de política migratoria integral en la Frontera sur de México). Based on re view of all these documents and the official website, we present the case of Mexico main characteristics, goals, challenges, and results.

3.1. Brief Description of the Case

This section briefly describes the current digital government capabilities for immigration services in Mexico. It includes information about some administrative systems that are mainly related to the back office and internal processes, as well as information about websites and other alternatives to interact with their users. The Mexican migration system has been modified to adapt to new realities. The main purpose is to update, simplify, eliminate or fuse the requisites of the migration procedures, in order to incorporate the use and advantages of Information technologies and reform the legal framework in order to achieve agility, certainty, trust and reduce bureaucratic discretion. These information systems are the new internal network, the Comprehensive Management Immigration System (SIOM) and the Immigration Procedures Electronic System (SETRAM).

3.2. Implementation, Challenges, and Benefits of the INM Technological Modernization Program

SETRAM was implemented in May 2010. At that time, the main goal was to replace most of the INM's hard-copy administrative processes with online modules to accept applications, provide notifications, and make printable migration forms available. Most of SETRAM's benefits were related with improvements to back office procedures. Much of the work done in Stage 2 was focused on the establishment of office to start processes and the definition of new mechanisms to automatically process applications. The improvements from Stage 1 to Stage 2 of SETRAM went into adapting the system to new migration regulations and creating an office to review and correct some of the data entry. As of 2015, SETRAM is available in all INM offices and Mexican consulates, as well as online via the National Communications Network intranet, and it transmits data from all those agencies to SIOM. While there are reductions in back office work, the applicant is still required to personally go to an INM office in order to start and finish any process.

4. Preliminary Results

As mentioned before, when dealing with non-citizens data accuracy is very important in any information system. An error in the data can be the difference between allowing the entry to someone who meets the requirements or not. In the case of Mexico, the SIOM system, captures all the information of those who enter the country. Unlike other countries, Mexico does requires a visa for most countries, so it will not have the information of those who are entering in advance, therefore the rapid verification of the data of people wishing to be admitted to Mexico is very timely through the information systems. The use of biometric data collected from the applicants that are used to share them with other agencies in charge of security like CISEN to verify applicants' data. This is a

feature of information systems designed for migratory services, it is considered essential to have a verification of data for security purposes and it is very different from systems dealing with citizens.

Information systems implementation was carried out in stages. In these stages, systems were created or adapted to migration laws. In the first stage the objective was only to leave paper applications behind, while in the second stage the goal was to interconnect the national module with the consulate modules on the online platform and adapt the system to the requirements of the programs for temporary workers in the southern border. In the second stage SETRAM system does include spaces for attention to users, for example, in filling out the forms to request a procedure, also it allows users to follow up on the application process they perform with the INM, because through the data provided by the system and their password, they can review online what happens with their request. The design of the systems needs to consider multiple users, their needs and skills. This is not always easy, since the users of migration services are very diverse in many respects and they do not have the same civil rights and requirements.

To implement the systems, it was necessary to make adjustments in the back office too. These had to do with adapting specific tasks, investing resources such as time and energy, as well as training employees in the use of the new systems. Financial resources are different from systems designed for citizens, since many times the money comes from international agreements, in which multiple countries collaborate and there are national security concerns. It is common to share information with security agencies inside the country and with international organizations.

Migration policies have determined the course of the implementation of the technologies. In this case the integration of technology came with the updating of migration policy in particular to improve security and migration management. An important difference when dealing with noncitizens is that, most of the time, migration services cannot be completed totally online. This is because in many instances dealing with noncitizens requires data to be verified by security agencies. In addition, unlike most services for citizens, noncitizens may not obtain the service even when they meet the requirements and make the corresponding payments. Migration services can take much longer than expected and the result could be more uncertain, since could be related to specific legislation, the profile of the applicant, as well as a series of external conditions that affect some individual countries or type of migrant. This affects the potential of technology in these cases, since it is not always clear the role that it can play in the overall process.

Overall, it seems clear that digital government services for non-citizens present some additional challenges that could lead to rethink some of the aspects related to citizen-centric digital government. This is the case because noncitizens are a very heterogeneous population, but they all receive the same or very similar services. Language, IT skills, and formal education are just a few examples of characteristics that impact the diversity of users in migration services. Since governments cannot easily get feedback from such a diverse audience, public managers in charge of migration agencies need to make decisions about potential demand and acceptance of digital government services with little or no information about and feedback from users. Another important aspect is that information must be shared with different domestics and international organizations for security purposes. It is also common the use of biometric information from the users of the services. Financial resources are impacted by international agreements and the characteristics of the

systems are affected by domestic laws, but also by requirements from other countries involved in the collaboration.

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EGOV-CeDEM-ePart

"Invented-on-the Fly" Mobile Application for Disaster Response: Construction of Technological Frames and Impact

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Abstract: Natural disasters such as cyclones, earthquakes, floods among others can occur any time in any part of the globe. The natural disasters cause damages to community, society, and economy. We present the process view of improvised technology adoption and its impact in disaster management. Our preliminary findings suggest of technological framing as a dynamic process. Results show that changes from the initial frames are triggered by abstract feature of the technology along with the social and political processes. Our study contributes to a general process theory of technological framing by describing the triggers of frame changes and associated organizational outcome.

Keywords: Technological framing, disaster management, GIS.

1. Introduction

Natural disasters create sudden and profound changes in human systems and built infrastructures which require immediate response by utilizing all possible resources available with State agencies (Mendonca and Wallace, 2007). The unplanned contingencies created by natural disasters render the usual management procedures, techniques, and tools unsuitable. The improvisation and other emergent phenomena such as adhocracy are critical in disaster management (Mendonca et al., 2007). In disasters typically one of the State agencies take the leading role in response activities. However, the very nature of the disaster necessitates coordination and collaboration with several departments having very different organizational culture and organizational structure. To meet the response goal, State agencies create ad-hoc organization with personnel drawn from different departments, who take new or extended roles, develop new processes and adopt novel technologies to handle the disaster (Kreps and Bosworth, 1993).

The role of information and communications technologies (ICTs) is paramount in supporting the ad-hoc response organization where multiple decision makers from different organizations communicate and collaborate to manage a complex situation with a diverse network of personnel

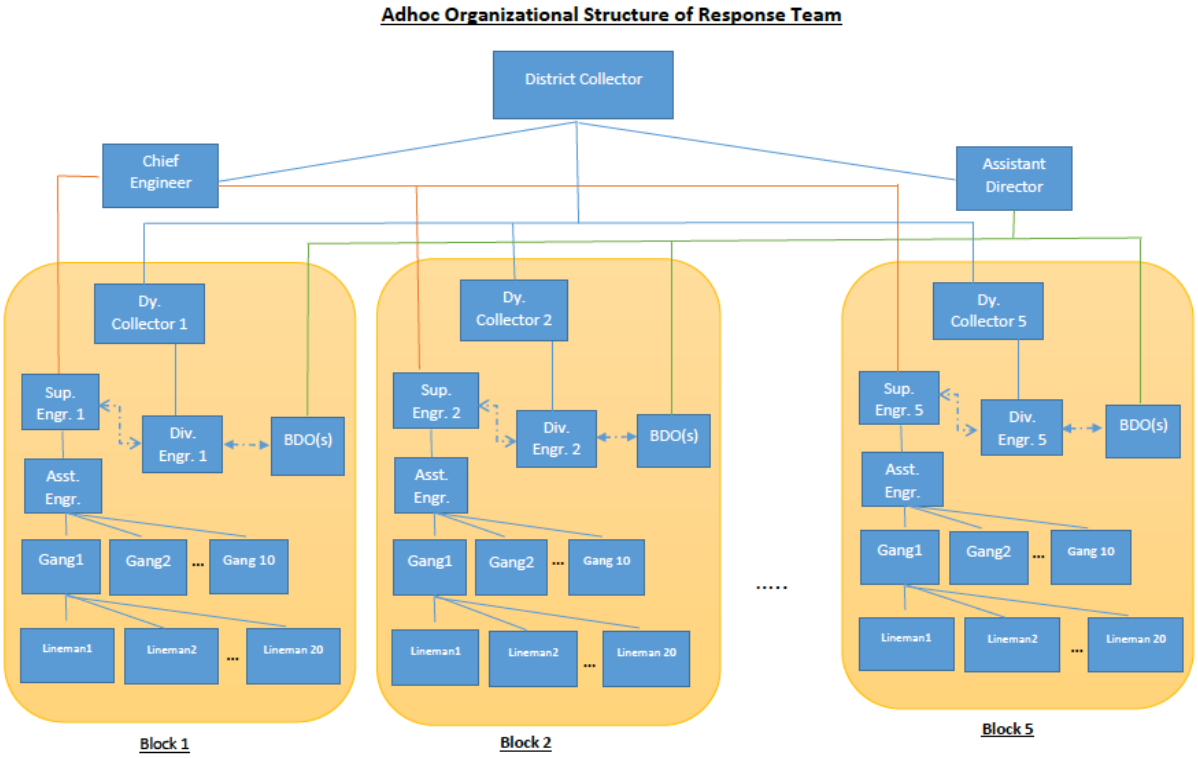
and material resources (Mendonca et al., 2007). Recent research shows that planned disaster response supporting technologies rarely works due to the breakdown in complementary infrastructures (Tim et al., 2017). Disaster situations are characterized by time urgency, uncertainty and emergent interoperability with diverse stakeholders (Mendonca, 2007). The disaster response systems, designed for information sharing and collaboration among internal or pre-designated teams, are often found ineffective (Janssen et al., 2010). The reason for ineffectiveness of such systems is unanticipated need of collaboration with heterogeneous personnel from various organizations in highly complex disaster environment (Crowe, 2012). To manage such events effectively, highly flexible technologies are required to support the emergent ad-hoc organization structure by facilitating effective coordination and collaboration (Tim et al., 2017). In recent years, social media has emerged as an example of flexible technology to support diverse stakeholders for information sharing. Social media technologies have been helpful in coordinating the rescue and relief works and in engaging with the affected communities in real time (Crowe, 2012). However, response teams may need unique applications to support their emergent processes to manage human and material resources. Such technological needs are likely due to the unique nature of the complex task which may be standalone or workflow based. In such situation, response agencies may be required to improvise applications with mix-and-match technologies to fit the task at hand (Mendonca et al., 2007).

Scholars have been discussing that modified-on-the-spot, improvised or "invented on the fly" IT applications are possible due to proliferation of reconfigurable, user-programmable and platform based technologies (Orlikowski, 2000, p.406). As disaster response structures are shaped by both planned and unplanned contingencies that necessitate emergent workflow based collaborations, predefining IT applications for every possible use leads to a theoretical and practical cul-de-sac (Mendonca et al., 2007, p.47). Such a context not only requires but also presents an opportunity for improvising IT applications on the spot by integrating reconfigurable and modular technologies. Uncovering the process of adoption and its impact is essential to enrich disaster management understanding. However, improvised applications-based disaster response is still an under-researched phenomenon. This study is aimed at filling this knowledge gap and seeking response to the research question: How do 'invented on the fly' IT applications get adopted and how do they facilitate disaster response? Thus, the context of disaster management presents a unique opportunity for the enquiry of the process view of development, implementation, and exploitation of IT applications. Developing a theoretical and empirical basis of such understanding will contribute to the broader question of how the process of novel IT implementation and change may be undertaken to accomplish emergent interoperability during disaster response.

We examined our research question in the context of recent natural disaster of cyclone "Gaja" in one of the southern state of Tamil Nadu in India. Gaja had caused an unprecedented damage to the electrical infrastructures of the state. It created complete black-out in the affected areas (an estimated 5 million populations were affected). To restore power supply, an ad-hoc response team consisting of members from several government departments was formed (Figure 1). To gather real-time information on restoration, a mobile application was developed by integrating databases of electrical assets and habitation-wise details of consumers. This application was improvised as existing response managements systems had proved ineffective to provide real-time accurate data of the

electricity restoration. In this GPS enabled application, field engineers responsible for restoration of electrical assets entered data, based on which a GIS map showing real time update was made available to the team. Response teams were not only involved in restoration of electrical supply but they also adopted mobile application in their work.

Figure 1: Ad-Hoc Organizational Structure of Response Team



Job Descriptions:

- **District Collector**: Overall monitoring of electric restoration in Pudukotai district
- **Chief Engineer**: Monitoring of superintendent engineers to restore electricity from technical view point
- **Assistant Director – Panchayat:** Collecting water and electricity restoration related data from BDOs and reporting to District Collector
- **Dy. Collector (1 to 5)** – *Deputy Collectors*: Monitoring overall working of electric restoration in each block.
- **Sup. Engr. (1 to 5)** - *Superintendent Engineer:* Monitoring electric restoration in each block from technical view point
- **Div. Engr. (1 to 5)** – *Divisional Engineer:* Providing and coordinating the logistict supports such as workforce, food, payments and paperwork
- **BDO** – *Block Development Officer:* Block level senior officer monitoring developmental programs
- **Asst. Engr.** – *Assistant Engineer (Section Engineer):* Performing technical work in feeder restoration and feeding data in mobile application.
- **Gang (1 to 10)** – Group of supervisory staff, overseeing the working of lineman
- **Lineman (1 to 20)** – Field workers restoring the electricity

We draw on the theoretical perspective of technological framing (Orlikowski and Gash, 1994) for this research enquiry to present a process understanding of the IT adoption and its subsequent impact in the disaster management. The technological frames perspective is used to make sense of the improvised technology application as it provides a framework to delineate both contextual and

technological factors in shaping the adoption, use and its impact. Technological frames analysis is interpretative process theory that demonstrates that IT adoption and subsequent change is a social and political process in which various user groups frame and reframe their understating of IT application (Davidson, 2006). Technological frames are defined as the various user group's knowledge, assumptions and expectations about the technology (Orlikowski and Gash, 1994). It is argued that these frames change through social, political and technological sense making process (Lin and Silva, 2005; Young et al., 2016). Such framing and reframing are observed in longitudinal studies however dynamic context of disaster response also provides the sites to observe change in technological frames. Disaster situations create a unique time-space edge where transformations and changes happen on compressed time and space dimensions (Harrison et al., 2007).

2. Theoretical Foundations: Technological Frames

Orlikowski and Gash (1994) presented concept of technological frames of reference to study interpretative process related to implementation and use of IT in organization. Their central theme was to understand how organizational members make sense of IT and how their understanding of the IT influences their interaction with the IT and its consequences. Orlikowski and Gash define the technological frames as following:

"We use the term technological frame to identify that subset of members' organizational frames that concern the assumptions, expectations, and knowledge they use to understand technology in organizations. This includes not only the nature and role of the technology itself, but the specific conditions, applications, and consequences of that technology in particular contexts". (p. 178)

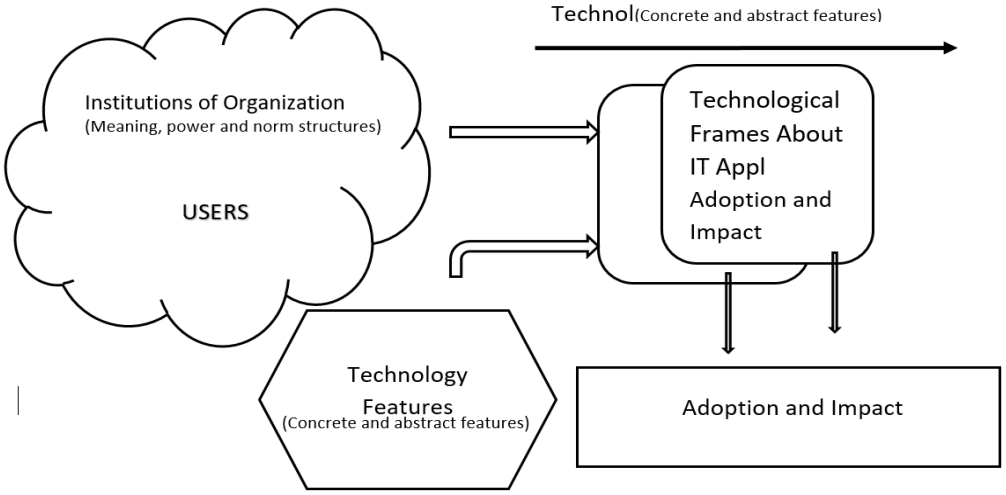
It is argued that the member of social groups shares the core assumptions, knowledge, nature and expectation about technology, however shared technological frames of one group may not necessarily be accepted by the other group. Such difference of frames (if any) in various organization communities is knowns as 'incongruence of technological frames'. In the same vein, 'congruence of technological frames' appears when various groups share similar expectations and assumptions about the nature of technology and its use. The extent of congruence or incongruence in frames of social groups shapes IT appropriation and its outcome.

In technological frames of reference (TFR) studies, there has been significant research and development in the frames analysis. One of the focus has been that technological frames needed to be embedded in the structural context of organization, such as meaning structure, power structures and norm structures (Barrett, 1999). Thus, framing might be based on the cultural assumptions of the institutionalized setting where social groups are located. Another significant development has been to demonstrate that the initial framing is also trigged by features and capability of the technology (Griffith, 1999). Researchers have called for greater attention to study framing as a dynamic process (Davidson 2006). Initial framing and reframing is triggered by many circumstances such as changes in the environment (Davidson 2006) or through social or political processes (Lin and Silva, 2004) or in technology features (Griffith, 1999). Technology features, relevant to this study, can be further classified as concrete and abstract (Griffith, 1999). Concrete features are those which

are directly observable while abstract features are observed through special knowledge or experience (ibid.).

We used technological frames analysis to illustrate the interpretive process of IT adoption and impact. Research framework based on technological frames of reference and framing (Figure 2) was used to understand meanings and interpretations of technology by various social groups. The framework was also applied to trace the triggers and subsequent changes in their frames and finally its influence on outcome.

Figure 2: Construction Process of Technological Frames and Impact



3. Research Methodology

We adopted interpretative case research methodology as it emphasizes importance of subjective meanings of the actions in the process through which individuals construct or reconstruct their social reality (Orlikowski and Baroudi, 1991). This approach allowed us rich understanding of the process of novel technology implementation and its consequence during disaster response.

The Gaja cyclone disaster was used as a case study to investigate our research question. The disaster created need for unprecedented collaboration amongst various government departments responsible for disaster management. In Tamil Nadu, the Electricity department is responsible for managing the electrical infrastructure and providing the electric supply. In response to the cyclone disaster the State Government of Tamil Nadu formed an ad-hoc organization (Figure 1) with members drawn from electricity department, rural development department and revenue and disaster management department, to restore the electricity. Our research focus was concerned with the use of improvised IT application in the restoration effort of power supply. This research setting presented a unique site to understand the dynamic process of IT adoption and change.

4. Data Collection and Analysis

Data were collected from various sources: news, media coverage of the cyclone, semi-structured and open interviews, and participant observation of meetings of response teams. Two authors visited control room of the response team multiple times and also visited work sites of field engineers. Field visits started soon after the access to the sites was available, which was four days after the implementation of the mobile application. Authors continued engagement with the field work till the restoration work of all domestic connections were over, which took about 35 days after the landing of cyclone.

Table 1: Summary of Group Composition and Interview Details

Group	**Composition**	**No. of Interviews in the group**	**Responsibility**
Monitors	Senior administrative officers	4(R), 1(NR)	Monitoring the overall electricity restoration work.
Managers	Senior and mid-level engineers of electricity department, officers of rural development and revenue department.	10(R)	Human and material resource planning and gathering information to report the status of work to the monitors
Field Engineers	Field level engineers	12(R), 4(NR)	Undertaking all technical works required in electrical assets for restoration of electricity supply.
Total No. of Interviews = 31 (**(R-recorded, NR-not recorded)**			

A total of 31 interviews were conducted with members from three different group members who were directly responsible for the restoration works (Table 1), out of which, 26 interviews were semi-structured and were recorded. Out of 26 semi-structured interviews, eight of them were conducted on telephone and face-to-face interviews were also followed-up whenever required over telephone. Five face-to-face interviews, open ended in nature, were not recorded, however authors made detailed notes of these. All interview recordings and observation notes are being transcribed. The authors spent over 20 man-hours in interpretive dialogue for data analysis and derived the preliminary findings. In our interim analysis, we have adopted three technological frames domains suggested by Orlikowski and Gash (1994, p.202) as starting point. These three domains are: nature of technology (what is it?-general understating of technology), technology strategy (Why is it there?-motivation for use, criteria for success) and technology-in-use (How it will be used?-general assumption how it will be used in day to day basis).

5. Case Description

Six coastal districts located in the southern part of Tamil Nadu in India witnessed a severe cyclone 'Gaja' in the early morning on 16 November 2018. More than 2.3 million households in Nagapattinam, Tiruvarur, Thanjavur, Pudukottai, Dindigul and Trichy districts had a shortage of power supply due to snapped electricity wires. About 150,000 electric poles were uprooted and destroyed. Alone in Pudukottai district (a research site of this study) over 47,000 power supply poles were uprooted and nearly 8,300 distribution transformers were affected and required re-installation, thereby approximately 4,062 houses in Pudukottai were left without a power supply. In order to restore the power supply in the affected regions of Pudukottai district, the Tamil Nadu Electricity department deployed about 5,400 state officials and nearly 1,500 workers from neighbouring states. Senior civil services officers (IAS officers) with a specific brief were deputed to administer the restoration operation with an ad-hoc organization (Figure 1).

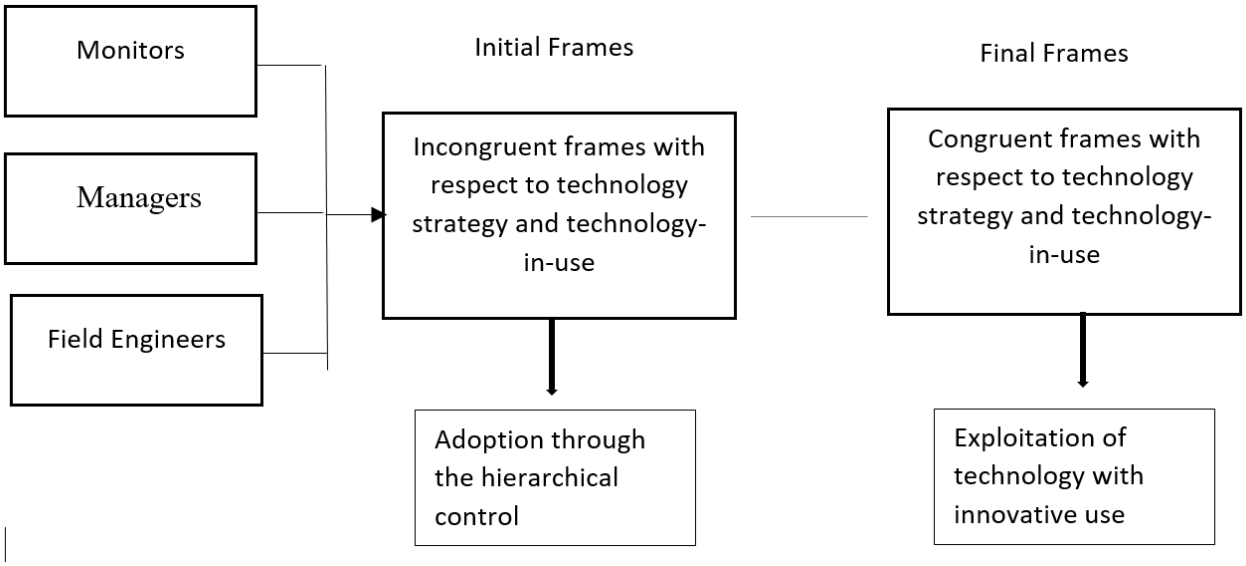
The complex nature of the restoration task required smart management of available resources: workforce and material. For instance, about sixty-four different types of components were needed for restoring the power supply in the Pudukottai district. About 2010 km transmission line conductor that covered the district was snapped and needed repair. The situation needed for a quick and reliable information flow mechanism between field officers and district level decision makers-Chief Engineer, District Collector and the monitoring officers, to monitor the mobilization of material as well as the management of the deployed workforce (see Figure 1 for organization chart). Since the density of electrical connection in urban areas is different from that of rural areas, the telephonic communication between officials to gather important information (e.g. the total number of poles erected, the total number of transformers charged and the total number of electrical connections restored) was ineffective to provide sufficient granularity to monitor the restoration task.

To deal with a problem, the help of information technology (IT) was sought to design a mobile application that allowed the officials to store and retrieve data with habitation and distribution transformer level granularity from the operational fields. The mobile app was designed with an intent to provide uninterrupted information flow even in the absence of a phone network. In regard to mobile app functioning, field engineers were required to enter the data that was stored in their phone memory and automatically transmitted the data as soon as their mobile phones received network connectivity. To ease the information store, site engineers were supposed to select from the pre-installed data related to the power supply sub-stations, district feeders, and the habitations in village clusters in the mobile app. In addition, the engineers used the GIS map of a Pudukottai district on a mobile app to allow them storing household wise electrification information. The feature augmented the visual progress of the restoration process. Consequently, visual information improved task periodization and the planning for the following days of the operation. Visual data enabled engineers and administrative officers to quickly identify the possibilities of connection re-routing as well as the shorter route to reach to the houses without power supply.

6. Preliminary Findings

Our preliminary findings based on the qualitative analysis, points towards the dynamic process of technological framing of novel applications introduced during disaster response. As mentioned earlier, our analysis included three TFR domains identified by Orlikowski and Gash (1994). Initial frames of social groups are largely shaped by the cultural assumptions of the institutionalized settings and context where they had been working. Technology triggers to these frames were the concrete or visible features technology. For example, field engineers only acknowledged structured data collection form of the application as feature that they used. Managers and monitors realized GIS map a great feature of the application in planning and control of response actions. These initial frames of user groups had incongruence of frames of reference. Field engineers interpreted it only as a data collection and monitoring tool; mangers and monitors saw it only as an efficient field reporting tool replacing their tedious phone calls with hundreds of field teams every day.

Figure 3: Construction and Reconstruction of Technological Frames and Impact



Despite of the incongruence of the frames, institutionalized setting of hierarchical control made sure that the application was used by various stakeholders which led to a significant positive impact on planning of material and human resources. However, we observed a change in the initial frame of reference of field engineers triggered by abstract features of the application. As mentioned earlier, ad-hoc response team members were working in unfamiliar locality. Due to unprecedented scale of damage in the infrastructure, there was huge pressure from consumer and other stakeholders to prioritize the supply of electricity for drinking water-supply restoration. In the field, consumers would provide the location of water-supply stations to the engineers and since the application was developed on integrated database of electrical assets and consumer connections, engineers could search correct feeders and identify connections they needed to restore to get the drinking water-supply started for the affected villages. This change in frames of field engineers led towards greater congruence and encouraged on the spot innovations like “back-feeding” and “switching conductor voltage” wherever suitable. This aided engineers to recognise the likelihoods of switching over to

the nearest alternate feeder to provide electricity without waiting for the original feeder being restored. A summary of the preliminary findings are presented in Figure 3.

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EGOV-CeDEM-ePart

The Impact Levels of Digitalization Initiatives

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Abstract: Contemporary organizations invest in digitalization initiatives in order to boost their productivity, improve processes, or simply to cut costs. However, quite little is actually known about the outcomes and impacts on how, where and when digitalization initiatives create value. We aim to identify what kind of impacts digitalization initiatives in a mid-size city create. In particular, we focus on identifying potential impacts for city employees, decision-makers, citizens, organizational activities, and public sector in general. Our findings show that potential impacts are multifaceted and numerous. This has further implications to the assessment of success and benefits of the digitalization initiatives; they vary according to the stakeholders and their expectations.

Keywords: Digitalization, Public sector, Impacts, Value, Smart program.

1. Introduction

The public sector is largely about service provision (De Vries et al., 2016; Higgins, 2017). Reducing resources, citizens' expectations, and public pressure resulted in the development of operations being a constant concern. The organizations have thus launched various digitalization and smart city initiatives (Bakıcı et al., 2013; Denhardt and Denhardt, 2015; Taylor Buck and While, 2017). Those are often small-scale experiments, not radically new ways of delivering services. The experiments serve organizational learning, emphasizing the assessment of their desired impacts.

Public sector organizations are not always prepared for ubiquitous technologies, such as info-searching, banking, social networks, and communicating in their services and service provision (Lindgren and Janssen, 2013). Often the services are 'siloed', targeted only to a single purpose rather than being broad, linking several sections or crossing organizational boundaries. This disintegration results in a number of individual and isolated services, each requiring licenses, maintenance, and user training. Their impacts on the organizational processes, costs savings, or productivity increase becomes minimal. This may result in the whole digitalization phenomena being judged unsuccessful.

Identifying and assessing the impacts and success of information systems (IS) and digitalization initiatives is not straightforward (Ylinen and Pekkola, 2018). Different stakeholders

have different expectations and objectives, and they assess the benefits from their own points of view. Time is also significant since an initially unsuccessful appearing initiative may turn out to be successful when the environment changes. The time has also other implications since dissecting the impact of an individual digitalization initiative from the broader development, e.g. the changes in the political climate, citizens' expectations, or the process improvements due to employees' better system usage, becomes very difficult. In summary, impacts and value of digitalization initiatives remain hidden.

This motivates our paper. We answer the research question: "What effects the digitalization experiments present?" by studying a mid-size city in Finland. The city has set up a digitalization program where different experiments all around the city departments and processes take place. The aim is to learn from the experiments so that their latter expansion is financially feasible and sensible. The city thus wants the impacts of their experiments analyzed. We consequently interviewed 20 key stakeholders for their perceptions about the impacts. The results of a qualitative study show a multifaceted nature of impacts, making it very difficult to assess them without explicitly articulated goals. Section 2 presents our theoretical background. Sections 3 and 4 present the research setting and methods, and our findings. Section 5 discusses the results, and places them in a broader context.

2. Theoretical Background

A city is a complex entity with a large number of tasks. City administration needs to consider the development schemes stemming from different departments with different aspirations, maybe with political agendas (Aichholzer and Schmutzer, 2000). The city has to manage and provide services to a number of areas, such as community and environment, economical, education and culture, social and healthcare (Finnish association for municipalities ("Kuntaliitto.fi" 2018)). Each area has its own practices, process, and personnel. This presents varying requirements for information technology support and solutions. Finding unified rules and solutions becomes challenging.

Digital transformation refers to renewing the business models. This includes different ways of executing daily practices, processes, routines, and tasks. Digital transformation affects resource allocation and operational execution (Agutter et al., 2017). Altering the business logic influences not only business-related activities and functions but also the processes behind those actions. The influence escalates to organizational culture (Wirtz, 2016). Digitalization may result benefits also in non-strategic areas, such as sales and marketing (Agutter et al. 2017), being related also to the public sector whose operations converge to the privately owned format (Van der Wal et al., 2008). The extent of digitalization depends for instance on Chief Information Officers (CIO) attitude and the organization's readiness to promote and participate in experimenting, and an overall positive attitude towards renewals (Ding et al., 2014). Organizations with this kind of capabilities gain advantages in trailblazing and gathering experiences.

Already maintaining the current level of services is difficult when the resources are constantly scrutinized (Arnaboldi et al., 2015). Different departments require intensive attention and development, while the resources are decreasing. At the same time, the services should be improved, redesigned and (re-)invented (ibid.). Yet it is difficult to define and measure the success and the

implications of a digitalization initiative (Bourne et al., 2002; Heberle et al., 2017). Moe et al. (2006) focuses on the personnel and their readiness to acquire and use new services. Fox (2002) argues for the better allocation of resources in providing public service. Both perspectives are about increasing productivity and impact in the public sector. Impact, however, is asks for a closer inspection.

Experimenting organizations want their employees to continue being active and productive in their mundane routines. This emphasizes management skills, an understanding of the workplace dynamics, and ability to efficiently run the experiments (Beck and Cowan, 2014; Hekkert and Negro, 2009). Planning the digitalization initiatives and introducing them into the organization requires that the employees' commitment and willingness is assured to lower potential resistance (Fernandez and Rainey, 2006). Ideally, this results in positive outcomes (Huitt, 2003) and significant benefits (Zack, 1999; Zhou and George, 2001). Digital solutions aim at improving the services, making the organizational processes more innovative and fluent, reduce costs, or making new openings (Bongiorno et al., 2018). However, the organization may not always be capable enough. People, technologies, or processes may need to be developed before the digitalization initiative. (Hagen et al., 2004).

As the public sector organizations becoming more service-oriented, their IT units are going through similar transformation. In ICT service provision, the convergence of supplier-side and user-side underlines intensive user involvement (Ahlemann, 2016) and a need for new IT governance models (Magnusson et al., 2019; Ylinen and Pekkola, 2019). Improved user involvement consists of technical usability, access, accessibility, information ergonomics, and user experience (Barki & Hartwick 1989). It also emphasizes organizational culture; how and where from new ideas are received and accepted, and possibly experimented (Verbeeten and Speklé, 2015). Organizational culture dictates the reactions when something fails. Potential reaction, ranging from rewards to punishments affects to the willingness to future experiments. The CIO plays a major role in creating and promoting a positive organizational culture towards novel ideas (De Tuya et al., 2017).

Managing digitalization initiatives is challenging. Different organizational silos and branches necessitate different management approach (Goldfinch, 2007). For example, in our case the focus was on the employment services, land-use, and customer service. The initiative was supported, not dictated, by the CIO's office. Consequently establishing, organizing, and facilitating the community for digitalization initiatives was done in collaboration between the CIO and each department. Related literature depicts numerous points where digitalization initiatives are influenced. This makes it difficult to develop measures and metrics for assessing the impacts, effectivity, and effectiveness, and comparing the results (Baily et al., 2005). Differences in perspectives, operations, actions, and cultures make this challenging, requesting qualitative, often subjective measures.

3. Research Setting

This paper describes a case study (Yin, 2008) in a city of 230 000 inhabitants and 15000 employees in more than 2000 sites. The CIO's office provides IT services for all departments, ranging from the top management to the city tourist bureau. The stakeholders have varying needs and capabilities in using the technologies. Existing systems and services needed an update. The city thus launched a

Smart city program to modernize their operations. The digitalization initiative was introduced and localized in different departments. There project managers were supported by development managers and a steering group in both subject matters and technical issues. The program aims at developing digital services to ease the future everyday life for the inhabitants, increase wellbeing and security, promote smoother moving in and within the city, and create new business by enabling cooperation between various stakeholders.

To understand potential impacts of the Smart city program and its digitalization component, we conducted a set of semi-structured interviews to collect qualitative data from different parts of the city. The interview themes were decided with the CIO. After these talks, more concrete topics and questions based on literature were drawn. The interviews focused on the initiation and rationale of the digitalization program, its resources and stakeholders, and its effectiveness and impacts.

The CIO suggested the key interviewees. Also snowball sampling (Morgan, 2008) was used. Twenty interviews were conducted, including the CIO, program manager, three development managers, ten project managers, IT manager, service designer, productivity controller, enterprise architect, and a digimarketing manager. All interviews, lasting 60 minutes in average, were recorded and transcribed. Three different cases were chosen: the city land-use office, customer service, and employment services. Land-use office wanted to renew their processes. They took on a demanding, but rewarding and promising experiment of 3D-modelling their construction sites as an example. The requirements were novel in terms of technologies and users' mindsets. Customer services focused on the customer scheduling. They felt the experiment being relative easy as the work practices did not differ much. Employment services experimented with robotic process automation to be used for fetching their customers' background information. This created significant time-savings.

The data analysis followed interpretive research approach (Walsham, 2006). The first researcher went through the material several times to gain an overview of the topic. He labeled the issues related to potential impacts. Process diagrams and stakeholder maps were drawn and iterated with the city representatives and the second author. Finally the findings were collectively discussed.

4. Findings

Successful implementation of an experimenting culture and gaining benefits from various innovations required close co-operation between all parties. The experiments comprised both functional and technological innovations. This means the idea of the 'digitalization' concept varied significantly between the departments. In some, the use of Skype was seen as 'digitalization' while in others the process itself was considered. The benefits of Smart city program were mostly the experiences from the experiments: how these issues should be addressed in the city operations and on what organizational level.

The goal of digitalization is to provide better services for the citizens and the city employees (Flak and Solli-Saether, 2013; Paivarinta et al., 2007). In our case, the experiments merely touched this. In

the words of a senior employee at the ICT unit: *"There are very few direct impacts on the citizens. Perhaps there will be later [..] Currently everyday life will not get any better as the scalability is still lacking."*

We identified five targets for the impacts: citizens and their everyday life, individual city employees and their routines, departments where the employees are working, city processes and operations, and regional or even nation-wide angle.

Some interviewees acknowledged that the citizens might experience direct benefits from the Smart city initiative. For example, when contacting the customer service with reduced waiting time. However, also opposite opinions were articulated. It was said that these benefits will be realized only after the service is scaled up and being standardized into regular service offering.

Digitalization enforces city officials to unlearn their old ways of working as all innovations are not technical. The processes need to be rethought and renewed, requiring changes in the attitudes and mental models. The understanding about the tasks need to become clearer and broadened with digitalization: *"The way of conducting business is changing [..] It is clearer what needs to be done, besides those single points."* [Project Manager]

This was seen as an instant benefit. Individual tasks were reflected through the understanding of the operations and the city strategy. The departments rethought their processes. Broader understanding from different perspectives supports this. Development of the thinking patterns includes the managerial function and the subordinate issues: *"In general, better working, on and for all sides [..] new culture of doing things"* [Project Manager]

The bigger picture becomes clearer. This, in turn, helped to comprehend the role of each department among others. Communication within the city improved as there were more resources for the initiative. This in turn increased the need for communicating the progress, increasing the awareness of the results from the experiments. The city officials felt that the initiative took the city into the 21st century. Also the image of public sector and civil servants improved: "*The operation [of the city] is simply more up-to-date, forward-looking and more risk-taking."[Project Manager]*

Some experiments were also reflected to even broader scale. For example, the employment services renewed their operations so that their time-savings gained attention from the ministry. Similar actions were then planned to be implemented to other cities.

It is also necessary to considered whether the service quality, the employees' and citizens' experiences, or the departments' performances improved since there may be innovative ways to execute the tasks, which however, may result 'side effects' on different organizational levels. This may even be scaled up on the citywide level to see whether the actions correspond to the city's strategic objectives. The national level was mentioned in only a few of cases. All cases emphasized that immediate benefits may not necessarily be gained.

All project managers supported the initiative by stating that it was for a worthy cause. The digitalization, in whatever form it may be applicable for their own department, was welcomed development. The interviewees were one-minded that the transparency of the city administration in general, and in the program in particular, was much improved.

5. Discussion and Conclusion

The largest impact of digitalization was that the city benefited from learning a new culture. The progress and the attitude towards the innovations at large were perceived positive. The city operation are now more transparent for internal parties, and the city's culture has taken a step towards a more innovation friendly atmosphere.

The experiments require knowledge and technical skills, and a vision and understanding of an overall situation. The organizational culture and the processes facilitating the actions are essential. Thus a need to replace old ways of working emerges. Still, before this can happen, old practices need to be unlearned and new ways of working need to be learned. This chain of learning was seen as a significant impact by the project managers. All impact levels are summarized in Table 1.

Table 1: The Impacts of Digitalization on Various Levels

	Service experience	**Novel attitude**	**Work input**	**Manage the task**	**Relation to strategy**
Citizen	x	x	x	x	
City employee	x	x	x	x	x
City dept.		x	x	x	x
City		x		x	x
Nation			x		x

The service experiences may become quicker, better, and more concentrated on the important issues. This applies to both the citizens and the employees. The actions and their fit with the city strategy were also seen important. Through the experiments, the employees felt that the transparency improved and understanding about the city operations was clearer.

Some issues need to be further developed. These include measuring uncertainties in individual tasks and their connections. Expectations and objectives were not clear for all project managers. Even if the improvement actions were commonly agreed, concrete steps were not always clear. For example, what digitalization means varied; is it about the processes or the tools? It was also not always clear when something is 'good enough' and 'what is enough'. Smart city initiative was thus a combination of technological innovations with a change to prevailing attitudes. The resistance for change can be relieved by actively involving the personnel into the initiative.

The experiments aimed to communicate and implement the city's strategy, and further to formulate a mission for individual departments. The mission is then refined to an action plan where

the objectives are set. The action plan entails an answer to what are the employment services after all; are they about finding jobs for unemployed, or to improve the self-seeking processes. Therefore the setting of goals for the digitalization experiments becomes crucial. This need to be done concurrently with planning and assigning decision-making power. The objectives need to be defined individually for various parts of the initiative. However, there the experiments may not be comparable as the same metrics cannon be used. The operations are simply too different. This, again, makes it difficult to assess the impacts.

We thus provide two-fold contributions. We first illustrate possible dimensions of impacts of Smart City initiatives. They are summarized in Table 1. Second, we argue that planning and executing the initiatives is difficult since they all require different goals, actions, and measures. This makes the learning of experiments very difficult.

There are several limitations. This is just one case. However, we argue that it is plausible to assume that similar settings would provide comparable results. Further research is although needed. Second, we derived the impact levels and dimensions from the data. This needs more validation. Third, measuring the impact itself was left out. This need to be considered as our impacts might be marginal or significant.

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Testing the Applicability of Training Recurrent Neural Networks for Analyzing Online Policy Discourses in Russia

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Abstract: The paper presents initial experimental results of ongoing research into the use of Artificial Intelligence (AI) for discourse analysis of everyday internet discussions on salient public policy issues. The ultimate goal of the research is to develop approaches and AI instruments helping discussants reduce the excessively polarized opinions in a deliberative and dialogic manner. This first experiment involves training of the Recurrent Neural Network (RNN) to assess its potential to predict attitudes of discourse participants towards the Russian government's policy to increase the retirement age, as a case study. It was done by conceptualizing a dedicated discourse model adapted to the machine learning needs which defined the scope of a training data set and its annotation scheme. The trained RNN demonstrated the prediction accuracy of nearly 90% with the training dataset of some 7,000 posts. The accuracy visibly drops as the dataset size gets smaller.

Keywords: Machine learning, Discourse analysis, Recurrent Neural Networks, Sentiment, Corpus annotation

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1. Introduction

Machine learning is seen as a 'new frontier' in the field of Artificial Intelligence (AI) in general and Artificial Neural Networks (ANNs) specifically (Arel et al 2010). Mehdi, Lazreg, Goodwin and Granmo conclude that deep machine learning 'techniques with back propagation and deep convolutional nets have brought breakthroughs in image processing while recurrent nets have

brought amazing advancements in sequential data analysis such as text and speech recognition' (Mehdi et al, p.3). Social media content has quickly become a subject of such analysis by applying disparate machine learning techniques (Aggarwal & Wang 2011). The aims vary from, for example, detecting the areas of public concern in the field of health safety (Lazard at al 2015) and crisis situations (Mehdi et al 2016) to studying the competitiveness of pizza industry (He et al 2013) and to assessing the satisfaction with casino services (Yanlong at al 2015) and to demonstrating changes in sentiment about financial risks in stock market research (Li 2006). Sentiment analysis or opinion mining realized with the help of machine learning techniques has become especially popular in such research (Hájek & Boháčová 2016, Agarwal et al. 2011, Liu 2015, Pang, B., & Lee, L. 2008, Devika et al 2016). Its goal is to identify and classify positive, negative and neutral (ambivalent) sentiment.

In very general terms, the sentiment analysis can be divided into two parts (Desai & Mehta 2016). The first one is the creation of the comprehensive data corpus from which the neural network could learn from about the phenomenon in question. The second part is about sentiment classification and ensuring the accuracy of the chosen machine learning algorithms to meet a planned outcome. The first phase is critically important as it involves pre-processing of the training data on which the accuracy of machine learning depends (Haddi et al. 2013, Kotsiantis et al. 2006, Angiani et al. 2016). Data annotation can be done at the level of full documents, sentences and individual aspects (Wiebe at al. 2005, Deng Wiebe 2015, Cossu et al 2017). Our research focuses on the document level, when the messages posted on discussion threads were annotated as documents. Special tools were developed to automate the process of annotation for subsequent manual use by trained coders. The novelty of our research is in the search for new ways of defining the scope of training data and their further annotation within the framework of Jurgen Habermas' discourse ethics theory. That means that only those posts are included in the training data corpus that meet specific deliberation criteria, such as the inclusion of claims to validity to capture the discourse interactivity and reciprocity supported by respective argumentation, as explained in section 3.1 below.

The main aim of this experiment was using such data for training the Recurrent Neural Network (RNN) and test its prediction potential to reveal negative, positive and ambivalent attitudes of discourse participants towards the policy of raising retirement age in Russia that took effect in 2018 (was not consulted publicly). The ultimate aim of this research is to apply such prediction capabilities for developing a dedicated policy consultation e-tool that would help gauge the polarity of opinion and guide discourse participants in structured, rule-based public consultations to reduce their differences in a argumentative, dialogic and deliberative manner, in line with the Amy Gutmann and Denis Thompson's principle of the economy of moral disagreement (Gutmann & Thompson 2004).

The paper starts by describing the problem of researching internet discussions at the crossroads of computer science, linguistics and deliberation. Then we contemplate how online deliberation is conceptualized to generate training data set based on a dedicated discourse model that defined a respective data annotation scheme. After that we describe how the RNN was trained and present first results. At the end of the paper we outline the next steps of this research.

2. Problem Statement and Research Assumptions

2.1. Research Problem

The main problem of applying AI in the field of public communication, including internet debates on salient policy issues among ordinary citizens, is the lack of the adequate conceptualization of such research. It is typically technically driven, with the priority given to justifying the use of particular mathematical models rather than to conceptualizing first the social phenomenon that is studied and only after that choosing suitable analytical instruments. There are virtually no studies that examine which neural networks, which machine learning algorithms, which training data sets and which annotation schemes work better for specific forms of online policy discourses. Usually, technical instruments are chosen without grounding their conceptual use from the social perspective. Another problem is the lack of clarity about the propose of such research, apart from the trivial social media and public mood monitoring, especially in non-democracies. Policy-related agenda is rarely articulated as the goal of using AI in social media research. Consequently, the online discourse content chosen for building the training corpora is often a collection of unrelated texts which complicates the interpretation of machine learning results.

2.2. Research Assumptions

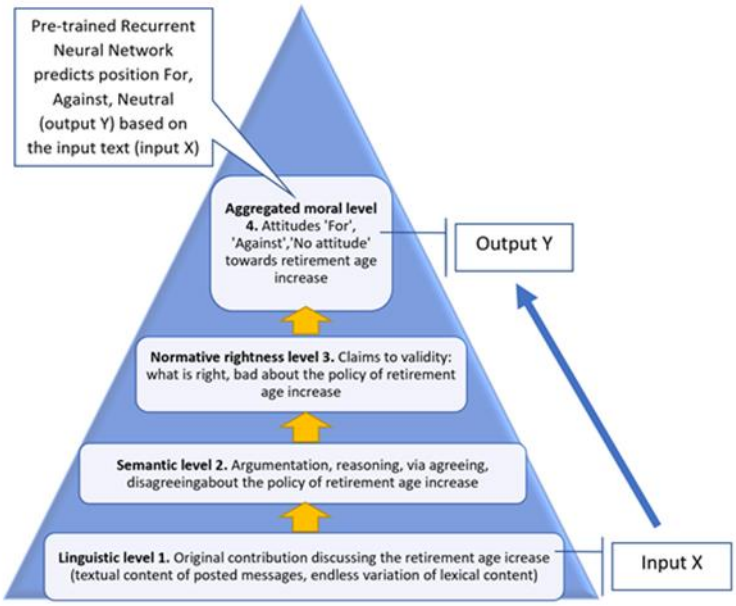
The main assumption of the research stems from the understanding of AI per se and why they could be beneficial for analyzing discourses as social and political phenomena. Such benefits are usually seen in their prediction capabilities, i.e., in the capability to predict an outcome of a system that is socially so complex in its functioning that it cannot be meaningfully or accurately described with the help of a fixed set of programmable parameters. In other words, it might not be impossible to build a mathematically formalized model that reliably describes the system's workings and relationships. The use of artificial neural networks helps solving this problem by learning about such relationships through an iterative process of repeated approximation until the outcome looks reasonably accurate from the human point of view. Our second assumption was that studying public discourses – whether with or without AI tools – means studying complex social and politically-informed practices based on text analysis. It is done by applying a well-tested array of the Natural Language Processing (NLP) and computational linguistics tool-boxes that to distill meaningful information from documents, sentences and words. The key to the linguistic approach is text-mining that allows for applying a vast arsenal of machine learning methods including sentiment analysis. We trained the RNN to learn how the text of posted message relates to three categories of sentiment (attitude in our case): (a) positive expressing support to the policy of retirement age increase, (b) negative - rejection of such policy, and (c) neutral sentiment (lack of an articulated attitude). Each post included in the training set was annotated according to these three categories.

3. Research Design and Results

3.1. Discourse Conceptualization from a Machine Learning Perspective

The common feature of many machine learning models used to analyze textual content is to classify it by choosing relevant data annotation techniques (Wiebe at al. 2005, Deng Wiebe 2015, Cossu et al 2017, Boros & Dumitrescu 2017, Johnson Zhang 2014, Zhang et al 2015, Kim 2014). Annotation was performed at the level of messages considered as documents (even they could contain just one word or a sentence). We conceptualized such a model distinguishing between four different discourse levels resembling a pyramid-shaped discursive formation. The role of discourse levels 2 to 4 is to aggregate the intended meaning (opinion) of the post and eventually tie it to one of the three categories of attitudes, namely: 'For' (positive - support), 'Against' (negative - rejection) and 'No opinion' (neutral - ambivalence), as depicted in Figure 1.

Figure 1: Discourse Model of Opinion Aggregation Viewed from Machine Learning Perspective



This is consistent with Jurgen Habermas' argumentation-informed discourse ethics theory when 'Every agreement, whether produced for the first time or reaffirmed, is based on ... grounds of reason. Grounds have a special property: they force us into yes or no positions' [Habermas 1984, p.19). The process of aggregation includes only those posts that contain Habermasian basic validity claims to intersubjective (i.e., relational) normative rightness to convey an intended meaning of the claim regarding something that prompts other discourse participants to agree, disagree or ignore the message (Habermas 1987, p.313-314, Habermas 1984, p.52, Misnikov et al 2017). Such posts were annotated to assign them to one of the above-mentioned three categories of attitudes towards the retirement policy agenda. In doing so, the main research question we asked was whether it would be possible to build a (deep) machine learning model that is capable of (a) learning how to classify the posted messages containing argumentative claims to agree or disagree with retirement policy and (b) of predicting such attitudes based on the textual content.

Modeling discourse as a level-based aggregation pyramid helps determine which level serves as input for RNN and which as its output. That provides additional opportunities for annotation experimentation. For this experiment we directly connect level 1 as input X (training dataset) with level 4 representing output Y (resulting attitude) to test a principal possibility of the network's prediction potential. Ideally, the coding and prediction should gradually move from lower to higher levels. We would assume that the prediction accuracy would be substantially increased in this case.

3.2. Training Dataset

The first step in implementing the deep machine learning algorithm was to prepare a training set that would be used by artificial neural networks to learn – and further predict – whether certain textual comments posted by discourse participants can be associated with their support, rejection or ambivalence towards the pension reform. The training data set included 10,592 comments posted by 998 participants on 16 internet-discussions that took place in 12 cities of different size and in different regions and also on Russia's three national discussion forums. The first step was to extract all the posted comments from their respective media, upload them into Excel spreadsheets and convert into a .csv format for further processing. Sixteen trained coders annotated each comment using the following three attitude categories: 'Against the Reform' was marked as '0', 'For the Reform' was marked '1', and Neutral attitude received code '2'. The coders were trained to identify and code the Habermasian validity claims to normative rightness via agreement or disagreement with previous messages under condition that such claims display certain arguments to explain the attitude. Afterwards, conclusion was made whether participant's attitude was positive, negative or neutral. Table 1 presents the distribution of comments by attitude.

Table 1: Distribution of the Attitude Categories

Attitude category	Comments	Percentage
Against the Pension Reform	2,510	24%
For the Pension Reform	304	3%
Neutral towards the Pension Reform	7,778	73%

3.3. Building a Machine Learning Model

The Python (version 3.6) software was used to programme and implement the machine learning algorithms. Data in .csv format were inputted into the machine learning programme with the help of the pandas library. Two columns of the data were used: (a) one contained the original texts posted on discussion threads, i.e. input data X to be used for training, and the other (b) was Y output data with attitude For = '1', attitude Against ='0', and Neutral attitude = '2' categories. The open neural network library Keras was used to implement the machine learning algorithms. Keras applications are deep learning models that can be used for prediction are compatible with TensorFlow, Theano, Deeplearning4j, CNTK. Keras architectures enable building RNNs and short-term memory (LSTM) networks, performing word embedding for attitude prediction. In this research, Keras was implemented alongside Tensor-Flow. Prior to feeding the training data into a machine learning model, the original text was 'cleaned' by using the built-in Tokenizer (part of Keras library)

removing punctuation marks, numbers, hyphenation signs, the most frequently and rarely used words and leaving 3,000 the most relevant words.

After that the data were split into training and validation groups in proportion 80/20, i.e. 20% of all data set were used for testing of the trained neural networks. The validation data set was not included in the training sat, which means that the model will 'see' them for the first time only at the final testing phase. The input text was converted into vector sequences not exceeding 200 characters (longer texts included more than one vector sequence). Two approaches have been used for building the output layer Y: (1) Use of two classifications to determine 'For' and 'Against' categories, without accounting for the third 'Neutral' category (2,814 comments were processed) and (2) Use of all three classifications (all 10,592 comments were processed). The number of learning iterations was ten epochs. More cycles of iteration led to the network's over-learning. The trained model with two output layers was saved in two files, which can be further used for an automatic prediction of the attitude category of any new comment.

3.4. Validation of the Machine Learning Model and Results

The validation test was performed on the model by feeding into it the comments that did not participate in the model training (20%). With the use of a two-category classifier ('For' and 'Against' categories), the prediction accuracy reached 89%. In the case of a three-category classification ('For', 'Against', 'Neutral'), the level of accuracy dropped to 78%. These accuracy levels seem to be sufficiently good for such a small size data sample. In addition, an open validation test was performed by feeding the randomly selected data from the produced output data into the trained model to generate the positions they contained (if any). The resulting output was comparable with the 'true' results generated earlier, namely: that the neutral messages are predicted with higher accuracy (probability is higher) than those that contain either 'For' or 'Against' attitudes. The reason for such discrepancy is a disproportionately small presence of 'For' and 'Against' categories in comparison with the dominant presence of neutral positions in the training dataset.

4. Conclusion

The first results of this ongoing research show that the overall prediction accuracy of the built RNN model is relatively high for the rather small dataset used. This is a doo result given the fact that that the training set was disproportionately biased towards the 'Neutral' attitude category, which dominated the discourse (74%), whereas category 2 'For' was very small, with just 3% of all the comments - that was not enough for a proper training of the network model. The open validation tests prove that when the RNN encounters the message with the attitude 'For', it fails to categorize it as 'For' preferring instead 'Neutral' or 'Against' categories due to the very small sample of 'For' messages. When it 'sees' the message containing a 'Neutral' attitude, there is a high likelihood that it will assign it to the same category 'Neutral'. When the network 'sees' the message with the attitude 'Against', it might hesitate between 'Against' and 'Neutral' categories. Whilst these discrepancies were the main limitation of the first phase of the research, they also indicative of the importance of the training data corpus. Another finding is that, when the sample is large enough and properly balanced, RNNs alongside the LSTM cell blocks demonstrate good prediction capability to build

more complex discourse models. The next phase of the research will focus on assembling training sets at each discourse levels.

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EGOV-CeDEM-ePart

Blockchain Technology and Value Creation for Government and Public Services

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Abstract: A growing interest around Blockchain is noticeable, and the technology is fast developing and changing (Lundbaek and Huth, 2017). The interest is not exclusive to the private sector, but also Governments worldwide consider more and more the adoption of Blockchain to improve the efficiency and the security of their services (Chen et al., 2018). However, Blockchain technology is not mature enough (Janton-Drozdowska and Mikolajewicz-Wozniak, 2017). The prospective benefits for Government and Public Services (G&PS) are not readily observable (Olnes et al., 2017). Studies highlight a gap regarding how and where blockchain could be effectively deployed and its practical effect and value (Risius and Spohrer, 2017; Yli-Huumo et al., 2016).

The aim of this research is to shed light on the Blockchain value creation for G&PS by addressing the following research questions: "What is the value created by Blockchain for G&PS?" and "What are the required capabilities for reaching this value?". The paper proposes to develop a conceptual framework to identify Blockchain capabilities and potential benefits for G&PS.

To achieve the objective and answer to the research questions, the study adopts the resource-based view, and the dynamic capabilities approach as a theoretical framework, as well as a qualitative methodology based on secondary data analysis of use cases. Data were collected from journal papers, reports, newspapers, and funded research projects related to the use of Blockchain for G&PS. A preliminary database of 36 finalized and ongoing use cases is developed. The data analysis involved content analysis, open coding, creation of categories, and abstractions (Elo and Kyngas, 2007). From the data analysis, 37 capabilities of Blockchain for G&PS were found. These capabilities were grouped into 6 main categories: Organizational and Institutional, Governance, Business and Project Management, Technological, Data Management, and Innovation. The value created by Blockchain for G&PS was derived from the benefits of the technology, and a total of 21 benefits (or potential benefits) were identified. These benefits were organized in 5 categories defined based on Gilbert et al. (2004) classification.

From a theoretical perspective, the main contribution of this study is to build a conceptual framework based on theoretical considerations and empirical data from use-cases. The purpose of the framework is to identify the capabilities and benefits of Blockchain for G&PS. This study emphasizes that the definition of the real value of the technology requires a critical assessment

(Olnes et al., 2017) to avoid the waste of public resources, to minimize the risks of the solutions implemented, to prevent the spread of misleading information, and to provide evidence-based support to the prospective benefits. This study contributes as well to an advanced knowledge of information technology value creation, one that has paid little attention to the Public Sector (Pang et al., 2014).). From a managerial perspective and given that the justification of IT investment remains a problematic issue for IT managers (Polykarpou et al., 2018), the identification of the capabilities and the benefits are relevant to guide managers with the required competencies, knowledge and resources to be developed to promote transformation in G&PS.

This study is an ongoing research that requires further development and to increase the number of cases analysed. However, the availability of information constitutes a challenge. In the next steps, the identification and analysis of the use-cases of Blockchain use for G&PS will be enlarged, as well as the collection of primary data to complete the research, increase the validity of findings and improve the outcomes of this research.

Keywords: Blockchain, value-creation, government, public services, capabilities, use-cases

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EGOV-CeDEM-ePart

On Using Chatbots and CPSV-AP for Public Service Provision

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Abstract: Public service (PS) provision is at the heart of electronic government (eGov). To facilitate standardisation and interoperability, the European Commission has recently developed CPSV-AP for PS modelling. CPSV-AP is a promising standard without however wide adoption, which can be attributed, amongst other factors, to the complex underlying technologies. At the same time, chatbots are increasingly adopted for public service provisioning following relevant success in the private sector. However, the implementation of chatbot applications is based on ad-hoc PS models. The aim of this paper is to investigate the technical feasibility of integrating chatbots with CPSV-AP and identify relevant challenges and benefits. Based on a developed pilot implementation, we suggest that the integration of chatbots and CPSV-AP can provide citizens with an intuitive graphical user interface for acquiring personalised public sector information, transforming the way that citizens interact with public authorities, and at the same time facilitate interoperability and standardisation across the public sector.

Keywords: Public services, Chatbots, CPSV-AP, eGovernment.

1. Introduction

Public service (PS) provision is at the heart of electronic government (eGov) (Tambouris, 2018). Public authorities often develop portals, namely PS catalogues, to provide information about public services, or eGovernment information systems, to provide online public services. Usually, both implementations are based on ad-hoc PS models or national standards. On this article we focus on information provision about PSs. Currently, the most popular technique for providing information about PSs is the presentation of a set of PS descriptions in web pages, constituting a PS catalogue. Additionally, some PS catalogues employ a set of predefined questions, embedded in a web form,

to refine the set of PS services that a citizen might be interested for, see for example the Belgium "Guide for Doing Business"1.

In these implementations, citizens should navigate the PS catalogues in order to find the PS and the information that are seeking for. Additionally, the concepts consisting a PS description (for example the title, the description, the legal framework, the cost, etc) are different at each PS catalogue, resulting in familiarization burden with the structure of every PS catalogue.

The European Commission has recently developed the Core Public Service Vocabulary (CPSV), as the proposed European standard for PS modelling, and subsequently the CPSV-AP, which is a relevant application profile. CPSV-AP is an open PS model, employing linked data as underpinning technology. However, operational implementations of CPSV-AP are still missing.

Following the private sector, recently the use of chatbots has been adopted for public service provisioning (Mehr, 2017). Chatbots are considered user-friendly applications, providing as easy-to-use graphical user interface. Research on exploiting chatbots for Public Sector Information (PSI) provisioning has been published recently (Androutsopoulou et. al., 2019). However, currently chatbots are based on ad-hoc approaches and underlying data models (Mehr, 2017). To the best of our knowledge, the integration of a chatbot with CPSV-AP compliant linked data has not been demonstrated so far in any published article.

The aim of this paper is to investigate the technical feasibility of integrating chatbots with CPSV-AP to facilitate provision of information about PS and identify relevant challenges and benefits. Toward this objective we demonstrate, as a "proof of concept", a pilot implementation integrating chatbots technology and CPSV-AP for providing information about a PS, such as the cost for the citizen. We acknowledge that in a real-life full-scale deployment technical, organizational, legal or other challenges will be encountered. However, in this article we focus only on technical issues.

The rest of this paper is organized as follows. In Section 2, related work is summarized. In Section 3, the pilot implementation and a usage scenario are presented, while in Section 4 the conclusions and directions for future work are provided.

2. Related Work

Public Services Information (PSI) is currently provided using a variety of approaches. Some common examples are web pages, call centers or human agents (public servants). A major drawback of these approaches is that they do not combine user-friendliness, personalised PSI provision, and constant availability. Furthermore, PS catalogues are usually based on ad-hoc PS models, preventing semantic interoperability. However, two recent technological advances could be used to overcome these obstacles for user-friendly, personalised PSI provision and improved semantic interoperability. Chatbots could offer a user-friendly graphical user interface for acquiring

[1] https://business.belgium.be/en/setting_up_your_business

personalised PSI. Additionally, CPSV-AP could be used as standard PS model facilitating semantic interoperability.

In the framework of ISA and ISA2 programs, the European Commission (EC) has identified the need for a standard model to unify PS modelling, facilitating semantic interoperability across European Union (EU) Member States or even beyond the EU. For this purpose, CPSV has been released in 2013. Subsequently, by the end of 2016, EC released CPSV-AP 2.0, which is an application profile of CPSV (European Commission, 2016). The use of CPSV-AP is two-fold: new PS models can be based on CPSV-AP and existing PS models can be mapped to CPSV-AP. Thus, CPSV-AP can be used as a gateway for bridging and federating systems, for example PS catalogues or eGovernment information systems, based on different PS models and thus facilitating semantic interoperability. Additionally, CPSV-AP incorporates linked data as an underpinning technology. Thus, PS descriptions can be published as linked data and becoming part of linked data cloud. Many researchers suggest that linked data paradigm is ideal for Public Sector Information (PSI) publishing, enabling the potentiality of breaking the bureaucratic silos. Additionally, new web applications can be built exploiting PSI linked repositories in combination with other linked data repositories, hosting general-purpose information, such as DBpedia. However, CPSV-AP has not been widely adopted yet. Previous research indicated that a major reason is that linked data technology, apart from its benefits, puts some significant obstacles (Gerontas et. al., 2018). For example, the management of a linked data repository (e.g. data update), is a cumbersome process.

Recently, chatbot applications have been also employed in the public sector (Mehr, 2017). Chatbots are mainly intended to function as digital representatives. For example, North Carolina government office implemented a chatbot application for serving citizens' requests. Nearly 90% of calls are just about basic password support. Additionally, Microsoft created chatbots for citizen services in Singapore. Moreover, New York City is planning to exploit IBM's Watson for building a customer management system to speed up the time of process for answering questions about city problems. IBM's Watson has also been exploited by "MySurrey" application at British Columbia, which is an application for quickly answering citizens' questions. Chatbots offer a user-friendly graphical user interface for acquiring information or getting assistance. Users can interact with a chatbot simply by texting rather than using complex user interfaces. Additionally, a chatbot could provide users with more personalized information and answers.

3. Pilot Implementation and Usage Scenario

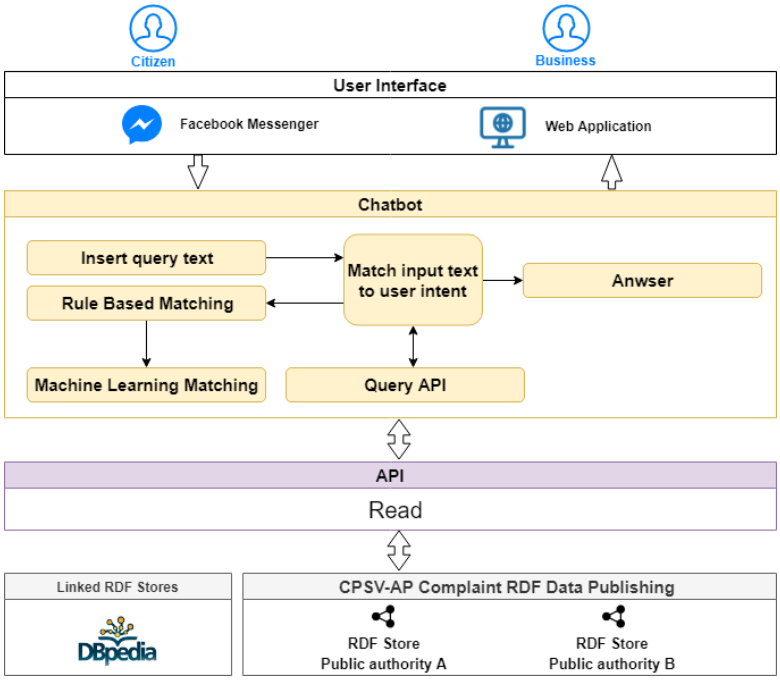
In this section a pilot implementation of a chatbot over CPSV-AP compliant data and a usage scenario are presented. The testbed of our pilot implementation is the Citizen's Guide of the Region of Epirus, which is an award-winning PS catalogue. In previous research work we have modeled a number of PS descriptions included in this catalogue, exploiting CPSV-AP (Gerontas et. al., 2018). As the PS model of this catalogue was not compatible with CPSV-AP, we had to map it to CPSV-AP. Subsequently, we transformed them to linked data and published them in an RDF store.

The architecture of the proposed pilot implementation is structured in three layers. Conceptually, it is based on previous relevant work (Tambouris, 2018). The lower layer includes the semantic data

repositories, which include CPSV-AP compliant RDF stores. In the next level, an application programming interface (API) intermediates between the data repositories and the chatbot. In the level above the API, there is the description of the chatbot mechanism and in the upper level there is the graphical user interface, which varies depending on where the chatbot is integrated, for example a web-site or social media platform, such as Facebook messenger.

The API has been implemented in PHP as RESTful based on HTTP protocol. It includes multiple programming methods to manage the data repositories. Each method executes a different SPARQL query to the SPARQL endpoint. The selection of the right method to perform, which is a not a straightforward task, is carried out by a main method having as input the chatbot's output towards the API. Apart from the main method, we have developed two more methods for "reading" RDF data from SPARQL endpoint.

Figure 1: The Architecture of Pilot Implementation

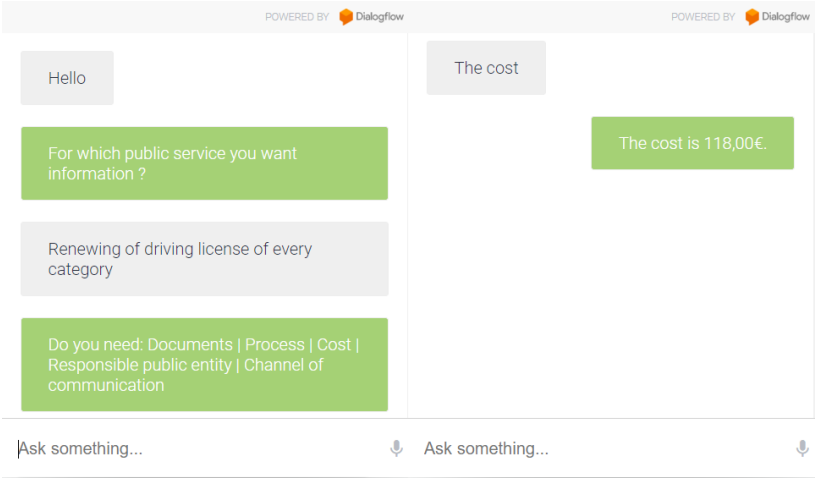


For chatbot implementation we used Google's Natural Language Platform Dialogflow. We created tree structures with "intents" as nodes. Intents are collections of input texts that a user may enter as an input to a chatbot. It is a good practice to create sequences of intents in a tree-like structure in order to build a structured dialogue. An intent is consisted of a set of words or phrases because users can ask the same thing in many different ways. To create the intents, we set input texts and corresponding responses. We can set the production of a response in an intent in two different ways. One way is to get the acquired information from the API. In this case, we intervene a webhook after input and before output of an intent. The webhook calls the API and retrieves the data from the API. In the second way, a response is selected randomly from a pre-configured list of responses. We set multiple answers to each intent to emulate a more human reaction, by answering the same question with similar sentences.

Along with the above described chatbot functionality, which is rule-based, a machine learning method is also employed. Whenever a user makes a question that fails to match an intent, the system saves that question. Afterwards, the administrator can match these questions to relevant intents. Thus, the system becomes more mature and "clever". Such a chatbot that works in conjunction with these two available methods (i.e. rule-based and machine learning) can be categorized as a hybrid chatbot. On the top layer, a chatbot can be integrated with a variety of channels. We have configured the integration of our chatbot with a web application and Facebook messenger.

In our usage scenario the user wants to know the cost of the public service "Renewing of driving license of every category". The dialog between a citizen and the chatbot is depicted in Figure 2.

Figure 2: The Dialog Between a Citizen (in grey color) and the Chatbot (in green color). On the left side we see the beginning of the dialog while on the right side the end of the dialog.



4. Conclusions and Future Work

In this paper we present an application that exploits chatbot and CPSV-AP, to provide PSI via an intuitive and user-friendly interface. Most chatbot applications are not modular. Data and argument logic are embedded into the same system component. Thus, these approaches produce static and inextensible implementations. The proposed chatbot application is based on a layered, modular, architecture. In this way, the chatbot is decoupled from data repositories. In addition, the underlying data model is CPSV-AP, which is the proposed European standard for PS modeling for facilitating semantic interoperability. We demonstrate, as a proof of concept, a pilot implementation integrating chatbot technology with CPSV-AP, including a simple usage scenario for acquiring information about a PS using natural language, in English, through the graphical user interface of the chatbot.

This pilot implementation indicates that the integration of chatbots with CPSV-AP is technically feasible. However, there are still some challenges to be overcome for real-life implementations. For example, our API is still incomplete. In addition, it includes multiple programming methods to manage the semantic data repository. Each method executes a different SPARQL query to the

SPARQL endpoint. The selection of the right method to perform is a not a straightforward task. Thus, we suggest that an indexing matrix for matching intents with methods should be created.

Based on the pilot implementation, we suggest that applications that are based on the integration of chatbots, as the front-end, and CPSV-AP, as the base data model for the implementation of the back-end, could potentially provide citizens with benefits and facilitate the adoption of CPSV-AP harnessing the potential benefits of its exploitation. For example, they could provide them with an intuitive graphical user interface for acquiring more easily personalised PSI, which is a main priority of the new European Interoperability Framework (EIF), namely transforming the way that citizens interact with the public sector. We acknowledge however that more work is needed before accomplishing this goal.

Future work includes the development of a complete rule-based dialog for acquiring information related to more public services. It also includes the development of all appropriate programming methods for our API to exploit all CPSV-AP classes. We further plan to use historical data from the dialog with users to return more personalized information. Furthermore, we plan to collect data to train our chatbot and make the machine learning functionality more efficient.

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EGOV-CeDEM-ePart

A Framework for ICT-based Innovations in the Public Sector

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Abstract: Innovation through Information and Communication Technologies is one of the key aspects of public sector reforms process to bring in productivity enhancement, efficient service delivery, and improved quality of public services. Innovation literature has focussed largely on the private sector. It does not take into account the role of institutional factors like legal environment, socio-political, and cultural aspects that play a more significant role in the conceptualization and delivery of ICT based innovations in the public sector. There are several theoretical papers having a limited empirical basis. On the other hand, there are several empirical studies that have not taken adequate cognizance of the relevant theoretical frameworks specific to the public sector. Our study fills this gap by attempting to map the empirical studies within the existing theoretical frameworks in order to validate the existing framework. We identify existing empirical relations that are not reflected in the theoretical framework.

Keywords: ICT innovation, Public Sector, Technology Enactment, Institutional Framework.

1. Introduction

To remain relevant under a rapidly changing environment of enhanced private services and new technologies, the public sector characterized by traditional top-down bureaucratic approach must reform itself to operate like private businesses with higher productivity, customer orientation, and be ready to fulfill greater expectations (Osborne, 1993; Peters, Pierre, 1998; Wallin Andreassen, 1994).

Innovation through Information and Communication Technologies (ICTs) is one of the key aspects of this reforms process to bring in productivity enhancement, efficient service delivery and improved quality of public services (De Vries, Bekkers, Tummers, 2016; Heeks, 1998; Osborne, Brown, 2013; Silcock, 2001).

Innovation literature has focussed largely on the private sector. It does not adequately cover the role of institutional factors such as the legal, cultural, and socio-political aspects. However, these are important elements that influence the conceptualization and delivery of ICT based innovations in the public sector. Further, studies based in the private sector do not take into account the

transformations brought about by ICT in the external institutional environment. A comprehensive literature survey revealed that there are two types of studies:

- Theoretical studies that develop frameworks for analyzing the relationships between the identified constructs/dimensions. Most of these frameworks have been developed based on limited case studies which are specific to the selected socio-cultural and political context and attempt to recognize the dynamic and complex nature of ICT innovations in the public sector; and,
- Largely empirical studies focusing on specific aspects of ICT implementation, such as the role of top management, vendors, facilitating factors/barriers for ICT adoption, and impact of ICT implementation on the organization's performance. These studies are based on theories or models that may not be specific to or have not been validated adequately in the public sector. Such theories and models include the Theory of Reasoned Action, Theory of Planned Behaviour, the Technology Acceptance Model, Diffusion of Innovation, Unified Theory of Acceptance and Use of Technology, and Information System Success Model, While such studies contribute to a better understanding of the specific relationships among the various factors identified above, they lack the theoretical underpinnings of a public sector context.

However, these empirical studies could provide a very rich context to not only validate but also possibly extend the existing theoretical frameworks. Despite this, there has been little work in this area. Such work could help validate, extend, and strengthen the existing framework and provide guidance to practitioners based on sound theory.

2. Objective

Our study fills this gap by attempting to map the empirical studies within the existing theory in order to validate the established framework. It would help to identify the gaps, if any, and thus strengthen the theoretical work. By linking the empirical studies to the prevailing frameworks, this study provides directions to policymakers/practitioners regarding the nature and type of relationships between different constructs in a comprehensive manner.

3. Research Methodology and Data Sources

We identified 7 Public Administration and 20 IS Journals in the top (according to the Master Journal List of Australian Business Deans Council (ABDC)) ranking. We searched for "ICT Innovation in Public Sector" in the research articles published in those 27 journals during the last six years. We also included the Government Information Quarterly, which though does not figure in the Master Journal List of ABDC but is an international leading, peer-reviewed journal that examines the intersection of public policy, IT, and government. This search generated a pool of 245 research articles. Among those research articles, we went through the keywords and abstract and selected 59 articles which have examined the phenomenon of ICT Innovations in the Public Sector.

4. ICT-based Innovation in the Public Sector and Frameworks

We have considered an ICT based innovation as the one in which either new services and new means of service delivery/production or significant changes in the service delivery/production mechanism are built around the use of ICTs (Baregheh, Rowley, Sambrook, 2009; Djellal, Gallouj, 2000; Gault, Pattinson, 1995; Rogers, 1998).

We have studied five frameworks that try to explain the process of ICT Innovations in the Public Sector.

(1) Framework for Fostering Innovation (Mulgan, Albury, 2003);

(2) The Simplified Model of Innovation Process (Koch, Hauknes, 2005);

(3) Technology Enactment Framework (TEF) (Fountain, 2001);

(4) Extended TEF (ETEF) (Fountain, 2004); and

(5) Hybrid TEF (HTEF) (Schellong, 2007).

(1) Mulgan and Albury's (2003) framework for fostering innovation is inward focused and organization-centric. This has been developed through the analysis of research literature and examples taken from the case studies on public sector innovations in the UK in the area of education, healthcare, and construction projects. This early framework focussed on the importance of developing innovation and design capabilities within the organization. However, innovation in the public sector is greatly influenced by the surrounding environment and the actors outside the organization. This particular aspect is not taken care of in the framework (Bailey, 2012; Matthews, 2009).

(2) The Simplified Model of Innovation (Koch, Hauknes, 2005) moves one step forward by taking into consideration the influence of the environment in the form of political objectives, public opinions, and social needs but does not focus on outcomes. Similar to Mulgan and Albury's framework, this model is also based on a systemic approach to innovation. We find two major shortcomings in this model. Similar to the Mulgan and Albury's framework there is no mention of the outcomes which is the key focus of NPM as well as the main concern of the public sector innovation because of huge expectations (Gascó, 2017). Secondly, there is no mention of the socio-cultural aspects, which greatly influence the innovative capabilities and eventually, innovation itself, especially in the public sector.

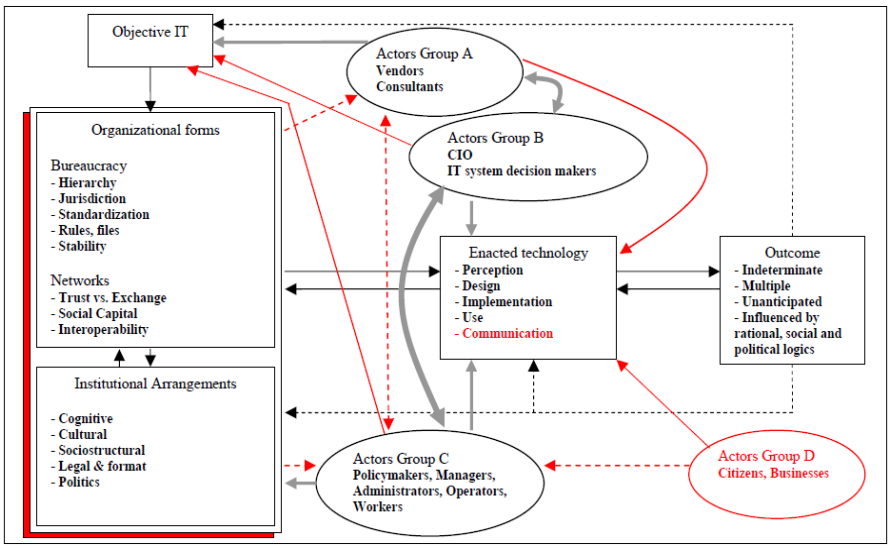
(3) TEF recognizes the significance of bureaucratic politics, network formation, and organizational structure in the innovation process in the public sector setup. It is an important contribution to gain a well-structured understanding of ICT projects in public administration and is used to analyze the implementation and impacts of ICTs in public organizations (Cordella, Iannacci, 2010; Luna-Reyes, Gil-García, 2011). It overcomes the limitations of the earlier two frameworks and duly recognizes the significance of institutional arrangements. In this framework, the focus is on the importance and capabilities of software and hardware as perceived by actors. Contrary to the earlier frameworks, this framework views ICT innovation as a dynamic process.

We focus on TEF because it highlights the role of interdependencies between organizations and technological systems in ICT based innovations (Baregheh, Rowley, Sambrook, 2009; Goswami, Mathew, 2005; Xiao, Califf, Sarker, Sarker, 2013) in the public sector. TEF provides a comprehensive basis for analyzing the causal relations amongst the variously identified constructs. It identifies Organizational Forms (OF) as consisting of Bureaucracy and Networks and their associated elements. OFs are related to the different aspects of the Institutional Arrangement (IA) that include the cognitive, cultural, socio-structural, and legal and formal elements. The relationship between OF and IA is specific to the organization. Another construct, Objective IT (OIT) refers to the actual hardware and software. Its implementation/adaptation in a particular context of users and processes is captured through the construct of Technology Enactment. The interaction between these constructs leads to the Outcomes. Thus, TEF is an institutionally oriented framework. TEF has been modified as ETEF (Fountain, 2004) by incorporating the influence of different actors as follows:

- Group A: External to the organizations (Vendors and Consultants),
- Group B: CIO, decision makers of IT systems, and
- Group C: Policymakers, Managers, Administrators, and Workers.

ETEF was further modified (Schellong, 2007) by incorporating the additional actor perspective of citizens and businesses as Actors group D. Thus, leading to a hybrid of institution oriented TEF and actor-oriented ETEF and was, therefore, called the HTEF. As can be seen, the direction of arrows represents a causal relationship between various constructs, reflecting the underlying dynamic processes (Fountain, 2001; Fountain, 2004; Schellong, 2007). Since communication (how, who, time, framing/unique selling point) could influence ET, this aspect was incorporated as well (Schellong, 2007). For example, in e-Government services, it is not only the ET as seen by group D actors, that influences its success, but also who is involved, what the unique selling point is and how the framing of benefits is communicated, contribute to the same. Given the comprehensive nature of HTEF, we adopt it for our subsequent analysis.

Figure 4: HTEF



5. Mapping Empirical and Theoretical Studies

Out of the 59 research articles that we studied, 56 studies have focussed on at least one or more relationships between the constructs of the HTEF (without explicitly taking any cognizance of it). We have mapped these relationships in the HTEF. Each cell represents the relationship between the HTEF constructs corresponding to the intersecting row and column. The entry in the cell (say, a) is the serial number of that paper, which finds evidence in support of the corresponding relationship. For example, (7, 53) in a13 indicates that paper no. 7 and 53, (Bernardi, Constantinides, and Nandhakumar, 2017) and (Tõnurist, Kattel, and Lember, 2017) have found evidence in support of the causal relationship between OIT (row 1) and OFs (column 3). Cell a52, depicts evidences we have found in support of IAs influencing ET, but this relationship has not been identified in HTEF. An entry of "--" in a cell represents that there exists a relationship in the HTEF, but we did not find evidence of it in the reviewed literature.

Table 1. Mapping of the Reviewed Literature against HTEF

	OIT	**ET**	**OFs**	**Outcome**	**IAs**	**Actor Groups**			
						A	B	C	D
OIT			7, 53						
ET			5, 10, 30	2, 4, 5, 9, 15, 16, 18, 26, 33, 35, 39, 41, 45, 49, 54, 58					
OFs		7, 8, 14, 20, 22, 24, 25, 37, 48, 49			--	29		--	
Outcome		--	--		--				
IAs		1, 9, 13, 16, 36, 46, 47,	53					19	

			48, 52, 55							
Actors Groups	**A**	--	23, 33, 40					--	--	
	B	--	11, 12, 33, 50				--		11, 12	
	C	--	3, 7, 8, 16, 21, 23, 24, 26, 33, 41, 44, 50			--	--	--		
	D		17, 26, 27, 28, 31, 33, 34, 42, 43, 51, 56						42	

6. Findings

We have the following findings:

(1) Ten studies have indicated that IAs influence ET directly. Whereas, in the HTEF, IAs are shown to influence ET only through the mediating variable OFs. This suggests a revision in HTEF. We represent it as a direct arrow from IAs to ET, indicating a causal relationship. Our finding substantiates the public value paradigm (Cordella, Bonina, 2012) that emphasizes the role of institutional arrangements in influencing outcomes of such reforms. This, however, has not received adequate focus in prior studies.

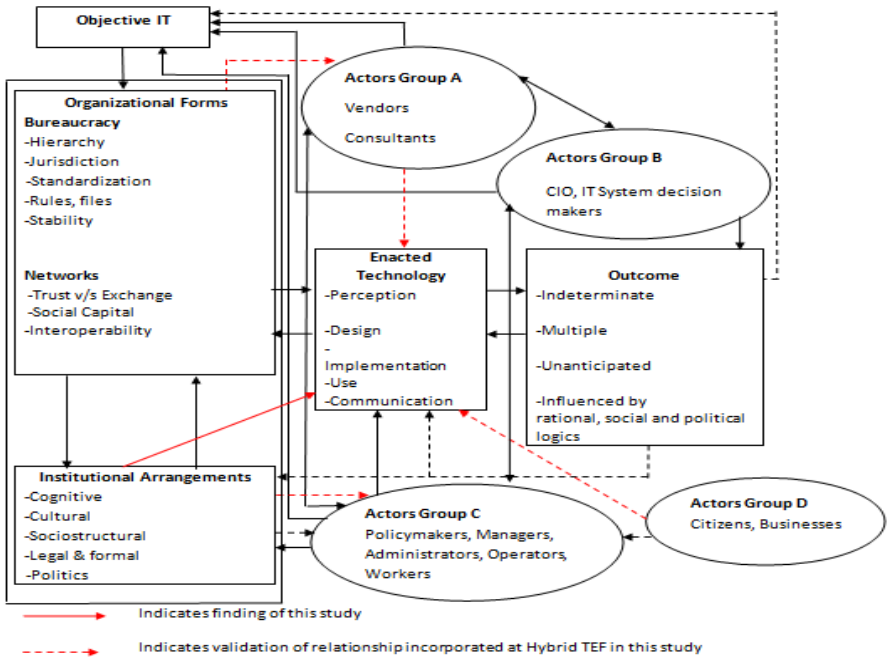
(2) Our mapping validates the following: OFs influence Actors Group A (Vendors and Consultants), IAs influence Actors Group C (Policymakers, Managers, Administrators, Operators, Workers), Actors Group A (Vendors and Consultants) influence ET and Actors Group D (Citizens, Businesses) influence ET. These relationships were not there at the earlier stages of TEF and were incorporated at the HTEF stage only.

These findings are shown in Figure-2. A red arrow from IAs to ET indicates that IAs influence ET. This is the revision suggested in the HTEF through this study. Red striped arrows are the validation of the relationships incorporated at the HTEF stage, which is carried out in this study through the literature review.

(3) There are a total of 39 studies examining the influence on ET. It shows recognition of the influence of OFs, IA, and actors leading to the contextualization of OIT outcomes. Within this perspective, twelve studies examined the influence of Actors Group C (Policymakers, Managers, Administrators, Operators, Workers), eleven studies examined the influence of Actors Group D (Citizens,

Businesses) and ten studies each examined the influence of OFs and IAs. The role of Actors Group A (Vendors and Consultants) and Group B (CIO and IT System Decision-makers), has not received as much focus. In the private sector, this area has received attention.

Figure 5: Findings of the Study



7. Future Research

Future researchers may explore the relative roles of different elements of IAs such as cognitive, cultural, socio-structural and legal and formal structural institutions and under what circumstances, these influences are manifest.

The examination of the influence of OFs on IAs and Actors Group C (Policymakers, Managers, Administrators, Operators, Workers), Outcome on OFs and IAs, and the interaction among various actors may be more relevant and constitute an area of interest for the organizational and public policy scholars. The influence of Actors Group A (Vendors and Consultants) and Group B (CIO and IT System Decision-makers) in the public sector may need to be reviewed more thoroughly.

We do not find empirical studies establishing the influence of Outcomes on ET and OIT, although prior literature and HTEF recognize these linkages. Future researchers may like to explore this and further the reasons, why certain relationships are more frequently examined in relation to others.

8. Contribution

To our knowledge, ours is the only study that examines the recent scholarship on ICT based innovations in the public sector comprehensively and ties together the existing theoretical and empirical work. We also contribute to strengthening the existing theory by extending HTEF.

Although various relationships between the constructs of the HTEF had been examined by prior empirical studies, they had done so with limited cognizance to frameworks relevant to the public sector. Our study fills this gap.

Through our analysis, we have identified that there is a direct relationship between IAs and ET, thus strengthening the existing theoretical model of HTEF. This also has implications for policymakers/practitioners as they could facilitate ICT based innovation by strengthening IAs. This is a shift from the earlier prevalent notion of the mediating relationship between IAs and ET through the OFs.

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Digital Transformation Lessens Administrative Burden for Enterprises: the Case Study of Estonian Tax and Customs Board

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Abstract: This research explores the effects of the digital services of Estonian Tax and Customs Board (hereinafter ETCB) on enterprises. The study also investigated developments expected by the enterprises in order to increase efficiency by reducing the administrative burden. Furthermore, the study surveyed the attitude of enterprises towards implementing the instruments of Real-Time Economy in taxation. The theoretical framework of the paper based on the institutional economics with the main emphasis to the theory of transaction costs. The empirical part of the study uses the mixed method approach, the combination of surveys and interviews throughout all the stages of the research. The results of analysis indicate that usage of digital governance has a remarkable effect on raising the efficiency of enterprises by lessening the administrative burdens. The implementation of Real-Time Economy in taxation has great potential to deliver positive outcomes.

Keywords: Digital Governance, e-Government, Public Digital Service Design, Institutional Economics, Transaction Costs Theory.

1. Introduction

Industrial digitalization and automation have changed the current logic of input priorities, manufacturing transmutes into being much more technologically intense compared to what it used to be. Expanding industrial automation will lessen the payroll costs share in the cost of sold goods compared to the traditional manufacturing practice we have had in the industry. In several sectors, for instance aircraft or automotive industries the companies give preference to components that are not made by human manpower, but instead produced by totally automated manufacturing, using only automated equipment systems and industrial robots. There is no need to allocate the manufacturing plants into the countries with low labour costs in this type of paradigm shift. High level technology costs are similar everywhere regardless of where the equipment is accommodated, in urbanized or rural areas, in districts with high or low labour costs. Determined by optimal supply chain, it will be possible to relocate production close to the client and market.

Digital transformation and automation in industry as well as logistics allow to optimize manufacturing input and supply chain. Small batch supply within a short time span at competitive prices will be a norm and it will make the component of flexible supply more important as a competitive advantage.

Value chain will be more focused on regional rather than global dimension. New opportunities in organizing the production and supply chain will bring a shift in global value chain and facilitate an evolvement of national as well as regional protectionism. National states and groups of countries will be able to restrict the access of competitor countries and regions to the market significantly more than is common or possible today.

All of the above will advance the transformation of the business models. The level of digital transformation and automation will increase and cost of high technology is similar regardless of where in the world, in what location the equipment will be installed and operated. In planning the location of the production site, the access and propinquity to the client will become increasingly important, as it will increase the flexibility of supply and competiveness. Therefore in industrial location planning, the business environment, its smoothness and how hassle free it is, will play a more decisive role in the future.

National states compete with other countries for capital e.g. direct investments, therefore a business environment with low transaction costs will be a crucial competitive advantage.

A government designs the institutional environment, where enterprises are enacting, with its politics and decisions both explicitly and implicitly (Kästik, 2018). This way it is possible to use the synergy created from skilful implementation of Information and Communications Technology (hereinafter ICT) at maximum scope (Kästik, 2018). In developed economies the share of service sector may constitute up to 80% of the Gross Domestic Product (hereinafter GDP). The bigger the service sector, the lager the share of transaction costs. For instance in the 1970s the transaction costs complied up to 55% of the GDP in the United States (Kästik, 2018). The skilful implementation of ICT, especially digital platforms, creates a huge technological advantage for minimizing the transaction costs for several actors (Kästik, 2018).

The transaction costs can be minimized by effective case management and digital governance services, which is the research aim of this paper. The precondition for large-scale implementation of digital governance is the existence of respective institutional infrastructure, in other words, a working system of digital governance, which has three main components - technological, legislative and organizational framework. The implementation of ICT makes it possible to raise the effectiveness of single operations, however when combined with political and administrative capability, the effect is multiplied (Kästik, 2018). In the context of state, flexible and dynamic legislation and organizational capability are huge empowerments for ICT. In conjunction with above-mentioned fields, the digital governance will create the potential to raise the wellbeing of society.

The lager usage of technological innovations is described by functional, both horizontal and vertical integration in various fields of society. It is also described by irreversibleness, in most cases

reverting back to the time of pre-innovation is neither realistic nor doable. For instance in earlies times the data systems were mostly supporting the processes of finance accounting. The skilful usage of data systems help the flourishing of the contemporary world economy by improving everyday lives of people (Kästik, 2018). New technologies make the processes in contemporary society a lot smoother, simultaneously making all of us more dependent on various technologies and applications also.

Under the condition of limited resources, priority should be given to developing those digital governance services that improve the business environment most and therefore act as empowerments in improving the competitiveness of the country. Depending on the type of administration model of particular country, the level of empowerment of digital governance can be different. ICT is an empowerment in the limits and framework of particular existing social and political structure (Kästik, 2018).

Research Questions:

- To what extent does the digital services of the ETCB spare transactions costs for enterprises?
- Which digital services of the ETCB should be developed further and how in order to improve the entrepreneurship environment?

The next part of the paper will offer overview of research methods by discussing sampling for surveys, semi-structured interviews and process of analysis. This is followed by a discussion of the main findings and an analysis of the implications.

2. Research Methods

The current paper originates on the main concepts of Institutional Economics, the emphasis laying on Transaction Costs approach having major effect in service and knowledge economy. The paper researches the impact of digital governance instruments on the entrepreneurship environment rely on the ETCB case study. Institutional Economics is a study about the economic role of institutions in society and what impact they have on the behavior of the actors. One of the areas regulated by government, which has a significant impact on the daily life of economic actors, is taxation.

Society is a sophisticated and complex mechanism and in order to minimize the risk related to the division of labour and organization of cooperation, institutions as forms for managing societies have emerged and developed over the evolution of mankind. Appropriate institutions help to overcome the decisions, which derive from opportunistic behaviour in the conditions of imperfect information and by doing that those create higher level of wellbeing for whole society.

According to Institutional Economics, the transactions in different stadiums – preparation, execution and control, are all related to direct or indirect costs, which have significant effects on the enterprises. Ronald H. Coase (2003) said that the alter-native instruments of coordination used in order to minimize transaction costs, which themselves also have costs and are quite far from perfection however tend to be more efficient compared to market coordination price mechanism in many cases (Kästik, 2018). Oliver E. Williamson focused on the question, how to find the most

efficient institutional solution for minimizing the transaction costs in an environment of limited rationality and opportunistic actors. Transaction Costs Approach researches the market and enterprises in combination, based on the opportunity costs, it is reasonable to execute some operations in-house, because using the market may be more expensive in certain cases (Kästik, 2018).

According to the transaction costs, the role of institutions is important (Kästik, 2018), as it helps to guarantee the contractual relations, which differ in essence and term, in order to make the cooperation possible between various counterparts. Institutions help to ensure the exchange on the market and help to manage the in-house operations (Kästik, 2018). The transaction costs reflect the complex unity of institutions, which compiles economy as well as society on a larger scale (Kästik, 2018). ICT helps to reduce transaction costs significantly (Kästik, 2018), simultaneously these technologies raise the efficiency of processes mostly thanks to the institutional environment, where actors operate.

By compliance cost in taxation, the author means the costs for one, which derive from following and fulfilling the legal tax regulations, such as obtaining the necessary skills as well as hard- and software for tax accounting, declaration and filing of taxes, counselling service, also the transport costs of people and data carriers used in the process (Kästik, 2018), but not the actual tax amount itself (Kästik, 2018).

Significant share of compliance costs are caused by obligations related to management and processing of data. For instance purchasing software, which is necessary for tax accounting and declaration. Also the expenses connected to compile, systemizing and representing information, which derive from the obligations of legal regulations. The latter may be interpreted as encumbrance for tax administration. Compliance costs are in correlation with the actions of taxable person, the lower compliance costs derived from simple tax system bring along the higher level of voluntary tax compliance (Kästik, 2018). Most of the national tax boards, which measure the tax compliance costs, use the Standard Costs Model (Kästik, 2018). Standard Costs Model (hereinafter SCM) researches the administrative burden on an enterprise, which derives from legal acts and regulations and it is focused on the aspects include information (Kästik, 2018). The fact that makes SCM methodology universal to use, is that it can be implemented on all business forms regardless of their size and activity, as well as on different taxes and legal regulations (Kästik, 2018). Time spent on tax accounting, declaration and paying the taxes is one of the most easily measured compliance costs (Kästik, 2018). SCM also measures labour costs, both internal (part of general expenses) or externally bought labour hours. The other big group of costs measured by SCM are the expenses caused by necessary and appropriate data management and processing (Kästik, 2018).

In this particular paper the author conducts a case study which is analysed by mixed method. Combining quantitative and qualitative method in this case guaranteed the result, where frequency and conformation are balanced by infrequent, yet important processes. Both, quantitative and qualitative data were gathered during the research and both were used in data-analysis, in order to integrate the results (Kästik, 2018). Quantitative method gave the case study its reach and background, while qualitative method brought in the necessary depth and granularity.

In the first phase of the research, the author hypothesised questions, and conducted data gathering by survey and semi-structured expert interviews, after which the complex analysis was done (Kästik, 2018). The usage of qualitative method in the current paper helps to explain and enrich the quantitative results (Kästik, 2018), which made it possible to get thorough and balanced knowledge about the general conglomeration, the target group. When explaining the relations to the automatic data collection environment concept (hereinafter Reporting 3.0), the author uses qualitative and quantitative methods equally and in parallel (Kästik, 2018), as the researched solution is entirely new, therefore it does not have an analogue as a descriptive comparison base.

2.1. Sampling

The research population is compiled of an important segment of Estonian enterprises, Growth Clients, who make up the efficiency centre of Estonian economy and who impone most to the accomplishments of strategic goals (Kästik, 2018). According to the Digital Business Register, the number of enterprises in 2015 was 6152 (data drawn in 2017).

The author used self-constituted probability, random sampling for the survey. The questionnaire of the survey was sent to all 6152 enterprises in the research population. The person, who this questionnaire was addressed to in each enterprise, was the Chief or Senior Accountant, who is responsible for the communication and relationship with ETCB and foremost the filing tax, submitting of reports and tax declarations. Author implemented the method of questioning online, meaning that each recipient received a hyperlink, which directed them to a survey. The questionnaire was completed by 1.82% of the research population, which is 112 enterprises in total.

2.2. Process of Analysis

The author measured respondents attitude towards using the four most used digital services provided by ETCB and also to the developing Real-Time Economy services - Reporting 3.0 (decreases the bureaucratic hassle for companies during the data collection process) and Data Reflection (enterprises see their tax compliance rating and the tax risk rating which shows the probability of being audited).

Likert-scale with verbal scale of five levels was used in designing the questions. The selection for the qualitative data collecting method's semi-structured expert-interview was composed by purposive sampling principle. The author chose twenty enterprises mostly from the service sector, out of which twelve agreed to participate in an expert-interview. The representatives of these enterprises are all experts in financial accounting, with long-term experience in filing tax declarations to ETCB.

In regards to the calculation of alternative costs of the services provided by ETCB the author relied on the SCM (Kästik, 2018), which is calculated by formula "cost x quantity". The hourly labour cost of respective accountant needs to be multiplied by working time opportunity cost, which means the time difference between traditional, analogue service and digital service provided by ETCB.

In order to process the research data the author used the statistical data processing functions in Excel-program. Correlation analysis was conducted in regards to the result of the survey, frequency tables, mood as well as mean were compiled and analysed.

Semi-structured individual expert interviews facilitated the explanation of improving proposals for the digital services as well as matters connected to Reporting 3.0 to be more thorough, as these were the explanations done by experts. Interviews were analysed in three different stages, first one of them being multiple re-listening and transcribing of the interviews. After that, the author coded and categorized the transcribed interview-protocols. In the last stage, the author conducted a toted qualitative content analysis, during which the word-cloud instrument was used. The latter was generated using a qualitative analysis program, NVivo.

3. Findings and Analysis

The target group attitude to the four most frequently used digital services provided by ETCB as well as on the concept of implementation of the Real-Time Economy in taxation were examined by significant parameters and categories.

3.1. Satisfaction

The general satisfaction of the respondents with the four most used digital services provided by ETCB is high, in 5-level scale mode "completely satisfied". Forty-three percent of all the recipients were completely satisfied with the four most used digital services and forty percent of the recipients replied that they are "mostly satisfied" with these services. The respondents valued higher the satisfaction with the Income and Social Tax Unemployment Insurance Premiums and Contributions to Mandatory Funded Pension (hereinafter ISTUIMP) digital service. The higher the automation level of a particular service, and the less working time it takes, the higher is satisfaction. The assessments of ISTUIMP and Value Added Tax (hereinafter VAT) digital declaration are quite similar, while digital Correction of the Report on Intra-Community Supply (hereinafter CRICS) is extra time-consuming and less convenient digital service. So-called manual-work proportion in the satisfaction assessments is quite obvious, in Report on Intra-Community Supply (hereinafter RICS) as well as CRICS the percentage satisfied with the service is 79% of all the recipients, which is more than 10% less as compared to ISTUIMP digital declaration. The percentage of unsatisfied recipients was 10%, which is five times more compared to VAT digital declaration.

Tax reporting for enterprise finance accounting is an aggregate service, beginning with inserting the data up to applying the declaration. The satisfactory assessment reflects not only the application of the declaration, but indirectly all of the aspects of this process. The preparation of data is very important and the effectiveness of this depends on the respective accountant's ability to use the program. Therefor it is reasonable to ponder the service development of finance and economic activities' re-porting so that the taxonomy and interface developments would preferably take place as onetime for companies. Preferably, the amount and parameters of metadata should stay constant at least in midterm perspective. The dynamic development burden should be carried out by the government sector, so that when the reports of a respective agency change, then the relevant

government agency could manage by itself and there would be no need to burden the enterprises with it.

3.2. User-friendliness

The austerity of usage of digital services is one of the most crucial criteria in the design of digital services, which is also the guarantee for the usage success as well as the sustainability for its lifecycle. Digital service accelerates and simplifies the actions of users, at the same time it has to be simple and understandable to handle. It has to be usable, believable, approachable and useful. User-friendliness has to remain the core when planning and building up the service, also keeping in mind the abilities of the target group, their web-usage habits, and hard- and software standards.

The development of digital services provided by ETCB has had a positive effect on the in-house division of labour of enterprises by lessening the internal transaction costs. Before the ETCB digital services were implemented, there used to be a dedicated specific person in each enterprise, whose responsibility was to communicate with the ETCB. Now it is made possible that the person responsible for a particular function communicates directly to the ETCB, for instance regarding VAT and RICS/CRICS digital declarations would be the Finance and regarding ISTUIMP it would be the HR department. The respondents assessed the simplicity of the digital services provided by ETCB on a scale of five levels to be very high, mood value being "rather simple". Seventy-seven percent of the respondents thought the services to be "simple" and only six percent considered them to be difficult.

The user-friendliness for respondents is based on both the ability to use the finance accounting program as well as its smooth incompatibility with the systems of ETCB. Only 2% of the respondents thought the digital services to be difficult and about 4% considered them "rather difficult". The level of Estonian accounting and tax filing digital services is so high that the workload of process itself, the preparation of data, carries on to the assessments about submitting the declarations. It is very understandable from the point of view of finance accounting, because the tax reporting starts with reporting of the data and ends with the submitting of the declaration. The results of the survey show that the extra time consumption of CRICS (compared to the improvements of VAT) digital declaration raised the assessment proportions in "difficult" and "neutral". The non-automated processes associate as difficult and complicated to the respondents.

The respondents value the automated communication between databases very highly. The need for this is very objective, because the renewal of co-partners database in real-time is not really common and diffused by the enterprises. The feedback about VAT digital declaration form, where inserting the taxable person registration number automatically brings up the name of the enterprise, was truly positive. The similar service is also expected by the recipients in regards of the RICS digital declaration. This is motivated by comfort, saving time and desire to minimize mistakes. Taking into account the level of European integration, it would be useful to consider the Pan-European tax report design, which includes for instance a drop-down menu in a way that the numeral data and/or text will be inserted and re-inserted via existing choice which would help surmount language difficulties in communication between taxable person and tax authority.

In case the reporting system is changed, this usually brings along an overload in development, but at the same time the change can bring a direct profit to enterprises. For example, when the new demand to declare all the invoices over 1000 euros was stipulated, the overload of the development part was significant, but nowadays the ETCB accomplishes 98% of the VAT-returns within two working days (ETCB 2018). When developing a service, it is crucial that the actions, processes and means are all in compliance among each other, at the same time keeping the user-friendliness of the service as the final and ultimate goal in mind.

3.3. Main Problems

As the result of the survey and the analysis of the expert interviews, the author concludes that the representatives of enterprises who participated in the research relate to the tax declaration as an aggregate service, where the submitting of declaration is very important, but still just one stage in a long process. Majority of resources go to building up the form, which one then later submit. In case the enterprise uses finance accounting software to this, the respondents consider the development encumbrance as an opportunity cost, they value the money as well as the time spent on development and support critically. The same understanding reflects questionnaire results, where 23% of all respondents considered the development encumbrance as a problem.

3.4. Spared Labour Costs

The respondents assessed the length of the usage of one digital service provided by ETCB to be 13.5 minutes, while the length of the same service being accomplished by traditional service, in analog to be 82.2 minutes, the saved time is 6.1 times or 83.5%.

When the activities related to customs declaration and clearance are usually out-sourced, then according to the common practice most of enterprises execute ISTUIMP, VAT, RICS/CRICS declaration to in-house. The RICS is presented according to necessity, occasionally when there is intracommunity revenue. Presenting ISTUIMP and VAT declarations are monthly actions in a case of business operations and performing enterprise. The average length of applying ISTUIMP and VAT digitally is 28.3 minutes while doing the same in the, traditional manner would take 164.4 minutes, as assessed by the respondents (2 x 82.2 min). When we do the subtraction, we see that the time saved is 164.4-28.3=136.1 minutes or 2.27 working hours per month per enterprise, when summarized.

The population of the research is 6152 enterprises. When we take into account that 99% of them apply the ISTUIMP and VAT declaration via digital services, we get 6091 enterprises that save 13828 working hours monthly and 165919 working hours annually by doing this. When taking into consideration the fact that in 2017 the average median gross wage per year for senior accountant was 37200 euros in the capital area of Estonia and 35005 euros in other parts of Estonia (Kästik, 2018) and when we add employment taxes to this amount, the numbers will raise to 49773.60 euros and 46836.69 euros respectively. There were 2026 working hours in 2017, which makes the cost of working hour 24.57 euros in the capital of Estonia and 23.12 euros in the rest of the country.

According to Statistics Estonia 64% of GDP of Estonia in 2016 was produced in the greater capital area in Estonia and 36% in other regions of Estonia. The same ratio is considered by the author when

calculating the regional wages in the current paper. According to this the growth clients saved 2609008 euros in greater capital area and 1380973 euros other regions respectively or 3989981 euros altogether annually by applying the ISTUIMP and VAT declarations digitally.

Digitalization process in taxation has brought along the growth in quality in both collecting and paying taxes. The increase of efficiency of the ETCB operations by implementing digital services is outstanding.

3.5. Reporting 3.0

Real-Time Economy is a process for executing digital processes from the beginning to the end. Within ETCB Real-Time Economy concept, Reporting 3.0 the machine-to-machine data transfer takes place automatically in real-time, what would make the process of various tax accounting reporting separately dispensable. Almost two thirds of the enterprises who participated in the survey, 63% expressed that they not agree to implementation of ETCB's Real-Time Economy digital services solution, Reporting 3.0, the mode of answers on five-level stage was "rather to not agree". Very same standpoint dominated also in the interviews. This is a position toward conceptual solution, which is currently not existing and it raised questions among the respondents about the concrete technical matters and their actions.

Accountants are very reluctant to use new digital solutions that make the workload easier, but at the same time there is a strong wish to minimize the possible mistakes. Even the respondents, who were very excited about the Data reflection project and Reporting 3.0 concept, were sceptical about implementing the latter in real-time solution. Negative attitude may by connected also to the wish to retain the ultimate control over the data exchange, which is probably amplified by the negative attitude towards giving total control to government institutions. The author concludes from the answers to questionnaire and results of the interviews that the manual actuation associates with having control and privacy, while the real-time solution opens a cognitive access to third counterparts outside of the enterprise and creates possible conditions for the government to have total control.

The respondents did not see direct and noticeable gain for the enterprise from real-time solution interface, then the attitude towards generating metadata gathering re-ports was clearly positive. It was stated that in case the workload lessens and the user-friendliness grows, then the attitude towards the new implementations will be positive. A strong expectation was expressed towards solutions of digital governance, which would eliminate or at least minimize the need to report to different government agencies with the same data. Most questions arose from technical matters, like corrections of line items deriving from accrual recording and the on-time recording of invoices.

In case the Real-Time Economy digital solution would be implemented, it would give a considerable effect towards minimizing the transaction costs, but also in the ongoing battle with shadow economy. It is also important to receive information instantly and analyse of decisions about entrepreneurship and economy. The author thinks that ETCB has an opportunity to turn more attention to informing target groups and involve different segments of stakeholders into working out and inducing new principles.

3.6. Data Reflection

The ETCB possesses information for generating an analysis about finance indicators, which are based on certain enterprise and which relates to respective industry, region or country average ratios. This kind of analytical data helps the owner and management of the enterprises to plan the development actions more thoroughly and therefor raise the competiveness of the enterprise. Analytical information based on particular enterprise would help to lessen the transaction costs, which have an effect to valuing the credibility of the cooperation partner. Fifty-one percent of respondents valued the Data Reflection service provided by ETCB positively, but quite large share, forty-two percent remained at a more neutral position. The mood of respondents' assessment on a five-level scale regarding the Data Reflection effect to cooperation-relations was "has rather a positive impact on cooperation". The demand for Data Reflection service is noticeable among these enterprises, where there is higher risk arising from having a bigger number of cooperation partners, the same in enterprises with dynamic client base.

The respondents valued the enhancement of information and the possibility to have larger transparency level for enterprises and business environment as a whole to be very useful. Simultaneously they pointed out that the enterprise itself should have the possibility to share the Data Reflection with the public as well as to decide to what extent it should be done.

On a condition that the bureaucratic burden does not get bigger, which means that the analytical and qualitative information by government institutions will be produced based on the data that are already gathered, there is a real possibility to create a distinctive public service that offers a lot of practical added value for the enterprises and community. The introduction of Data Reflection would create a precondition for an institution that would enact on self-regulation and where the transparency of an enterprise's economic activities are considered a common practice.

4. Summary

The results of the analysis show that the implementation and usage of digital governance have a remarkable effect on raising the efficiency of actions of enterprises via lessening the administrative burden. The length of the usage of one digital service provided by ETCB is 13.5 minutes, while the length of the same service being used in traditional, analog manner is 82.2 minutes, meaning that the difference is 6.1 times or 1.15 working hours in favor of the digital service. Satisfaction with the digital service is in strong correlation with its usage simplicity, which is the key criteria for developing digital services.

More than one-third, or 37%, of the recipients found that it is complicated to make corrections and amendments to the report on intra-community supply. Also that there could be created a possibility for inter-database information control, while put-ting data into the report on intra-community supply.

While developing the digital services for ETCB, one has to take into consideration what kind of financial burden it may bring along to the taxable person in regards to achieving the technological abilities to use these services (Kästik, 2018).

As the result of the questionnaire, and from the analysis of the expert interviews, the author concludes that the representatives of enterprises who participated in the survey relate to the tax declaration as an aggregate service, which also includes an input from the entrepreneur's side - either prior preparation of data or using the relevant software. A large part of the respondents, 29% and 25% respectively, assessed the burden of development to be the biggest problem in regards to ISTUIMP and VAT digital declarations.

Only 24% of the respondents agreed to the concept of Real-Time Economy, Report 3.0, the enterprise finance accounting system machine-to-machine real-time data transmission to be interfaced to the systems of ETCB in order to guarantee automatic and hassle free filing taxes. Almost two thirds, 63% of respondents did not agree to this solution. The negative attitude in this matter is more of a cognitive nature and one of the solutions could be that the automatic machine-to-machine relation would be implemented on a voluntary basis and principle of top-down in public sector in the beginning of its introduction.

There was a clear positive attitude in the responses of the interviews towards implementation of taxonomy in regards to reported data and overall understanding that this would save significant amount of time and also lessen the development burden.

The solution of Data Reflection has a positive effect on creating a credible business environment, which brings along the lessening of risks for cooperation partners as well as lessening of transaction costs. The respondents gave more positive assessments to Data Reflection compared to Real-Time interfacing solution. At the same time, the interviewees expressed their high expectations toward the content quality.

Implementation of Real-Time Economy has a definite positive effect and when introducing it, one has to draw attention to informing and bringing in all the relevant stakeholders.

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Community Resilience Assessment and Improvement Strategies Study

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Abstract: Communities are the basic units and key subject of disaster prevention and reduction, and community resilience plays very important role. International organizations have paid great attention to the resilience of communities. This paper studies community resilience and proposes an assessment framework for community resilience which includes economic resilience, institutional resilience, infrastructure resilience, community capital, environmental resilience, and social resilience. Finally the assessment framework is optimized through cases studies mainly based on the resilient plans of three cities New York City, Athens and Toyama, which makes the framework to better measure the community level of resilience.

Keywords: Community Resilience, Resilience Assessment, Improvement Strategy, Disaster Prevention and Reduction

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1. Introduction

In recent years, the community system has been frequently impacted by emergencies and natural disasters. For example, heavy rain in Beijing on July 21, 2012 caused 79 deaths and a direct economic loss of 11.64 billion RMB. In December 2015, a landslide hit Guangming district of Shenzhen city in south-China, burying people and damaging the industrial park. And the Tianjin port explosion in China, etc., all these emergency events reflect the vulnerability of the community system in the face of disasters. As the basic unit of a city, the community is the direct recipient of emergencies and the direct participant of post-disaster recovery. To improve the resilience of the community is to enhance the ability of the community to bear disasters and recover from disasters. It is also an important way to improve the resilience of the city and reduce its vulnerability.

Community Resilience focuses on how to improve the community's "mitigation & preparedness capability" and "self-recovery ability". From the linguistic point of view, resilience comes from the

Latin word “resilio”, which means a return to the original state. The term resilience emerged with the ecological sciences. It was first proposed by the Canadian ecologist Holling (1973). In this paper, we will explore the dimensions of reliance, comparing common dimensions that we found in the literature with the community resilience planning practices in New York, Athens, and Toyama in the “100 Resilient Cities” project initiated by the Rockefeller Foundation. Our work will contribute to the development of a framework to understand community resilience. Dimensions from the literature include social, economic, institutional, infrastructure, community capital and environmental resilience.

2. Literature Review

Similar to the city resilience, how to measure the community's resilience has always been the focus of academic research. This paper aims to develop a framework to assess the resilience of some areas towards natural disasters.

This paper searched out forty five papers which focused on the dimensions of community resilience. The number is much higher than the number of resilient city literature. Resilient community and community resilience are two different concepts, resilient community assessment is an assessment of the community, and community resilience assessment is an assessment of the resilience of the community. Cutter et al. (2014) points out that looking at the dimensions of disaster resilience indicators follows two perspectives: a perspective that focus on attributes(Social, Economic, Environmental) and a perspective that focus on capacities(social capital, community functions) .

Cutter et al. (2008) first proposed the five dimensions, including physical, social, institutional, economic, and ecological dimensions. In 2010, Cutter et al. (2010) goes on to discuss the disaster resilience indicators, that is social, economic, institutional, infrastructure and community capital, the difference with the former is the latter excluded the environmental resilience. In addition to, Ostadtaghizadeh's (2016) standpoint is a little bit different in terms of expression with the other papers . Actually, the meaning is identical. For these authors the important attributes are social resilience, economic resilience, institutional resilience, infrastructure resilience and community capital, environmental resilience. From the perspective of adaptive capacities, Sheerieb et al. (2010) pointed out two dimensions of resilience: economic development and social capital. Similar to Sheerieb, Parsons et al. (2016) also focused on capacities, from the two aspects: coping capacity and adaptive capacity and proposed the seven common properties of resilience assessment.

In terms of community and resource capabilities, The community resilience index of FEMA divides the community resilience into three parts: the basic ability of the community, the ability of risk management and mitigation action, and the ability of post-recovery and re-development, which are based on various community resources with dynamic properties (Federal Emergency Management Agency, 2016). Joerin et al. (2016) constructed a comprehensive analysis framework of community resilience from the aspects of economy, society, physics, system and natural environment. Such tools tend to focus on quantitative data and decompose the community into

different subsystems for separate evaluation, easily ignoring the complexity of the interaction between subsystems. In terms of systematic classification, Bruneau et al. (2003) used engineering of robustness, rapidity, redundancy, resourcefulness, four indexes to measure the toughness of the community system. Xiaodong Guo et al. (2016) believes that community resilience is equal to the ratio of community resilience to community vulnerability to disasters.

Cutter et al. (2015) pointed that it was possible to reconcile both perspectives into an integrative framework that involves attributes and capacities. Although in his integrative framework he includes 10 dimensions, we only use 6 of them because some dimensions overlapped in other frameworks. For example, the information/communication attribute from Cutter is commonly included into the community capital (Kusumastuti et al. 2014). Similarly, the social capital capacity is included by many authors into the Community capital (Burton, 2015). The Emergency management dimension is about shelters and evacuation routes and included in infrastructure resilience (Frazier et al. 2013). The connectivity is a part of community capital according to Frazier et al. (2013).

3. An Assessment Conceptual Model on Community Resilience

Based on the analysis of the literatures, almost all of the papers have mentioned Social, Economic, Institutional, Infrastructure. Some papers referred to community capital/competence, Environmental resilience just mentioned by several papers. Community is a major governance unit, played an essential role in reduce the effect after adverse events in a state. The following is about each dimension's introduction:

3.1. Economic Resilience

Economic resilience is related to the economic vitality of the communities and the diversity of the local economic environment. Cutter et al. (2010) defined economic resilience as housing capital, employment, income and equality, single sector employment dependence, business size and health access. Kusumastuti et al. (2014) pointed out that economic is composed of wealth generation, economic recovery, asset and business contribution. Ostadtaghizadeh et al. (2016) thinks the sub-dimensions of economic resilience include income, employment and economic relations. In spite of different with others, Burton's (2015) view can be also integrated into asset, employment, economic diversity and resource level. Parsons et al. (2016) also think economic capital means home and car ownership, income, employment and economy diversity. It can be seen from this, asset, employment, economy diversity and income is imperative to economic resilience. In the end, the paper concluded five sub-dimensions for economic resilience: economic diversity, employment, asset, income and equality and economic recovery.

3.2. Institutional Resilience

Institutional resilience is related to the prior disaster experience, mitigation and planning and resources, including the efforts of local government to raise the awareness and preparedness of the

residents toward disaster. Noticeably, Parson's (2015) coping capacity mentioned infrastructure and planning, among its ingredients, the local government planning is close to management, leadership and policy, and in adaptive capacity, there are institutional character, policy and legislation and research and development. Based on these views, the hazard mitigation and plans, preparedness and managerial resources and institutional character are ingredients of institutional. Beyond that, mitigation spending is also imperative, it can be classified to management, leadership and policy. In a word, institutional resilience encompassed hazard mitigation and plans, preparedness, management, leadership and policy, institutional characters and managerial resources.

3.3. Infrastructure Resilience

Infrastructure resilience is related to the capacity for a community to respond and recover from disasters and physical aspects of the area, such as electricity, water supply, sanitation, and transportation network. It contains five sub-dimensions. Kusumastuti et al. (2014) made three sub-dimensions: critical infrastructure, building/housing stock and transportation network. Burton (2015) divided infrastructure resilience into housing type, response and recovery, access and evacuation and infrastructure exposure. Ostadtaghizadeh et al. (2016) adopted qualitative method to explain infrastructure resilience, namely location, structure and space. Though Singh-Peterson thought that infrastructure resilience not only include the elements mentioned above, but also contain care for housing/infrastructure.

3.4. Community Capital

Community Capital is the relationships between individuals, and their larger neighborhoods and communities. Cutter et al. (2010) pointed that community capital includes three themes, sense of community, place attachment and citizen participation. Kusumastuti et al. (2014) pointed out two aspects, namely community competence and understanding of disaster risk and mitigation. Community competence is about the local wisdom and the level of participation of the community in developing their competence (Kusumastuti et al. 2014). In other hand, community capital also contains cultural which mentioned by Ostadtaghizadeh et al. (2016). Burton's (2014) claim is most comprehensive, there are social capital, creative class, cultural resources and sense of place. We can conclude the main aspects to social capital, community bonds, innovation/creative class and community competence from these views. Sherrieb et al.(2010) proposed a comprehensive view about community competence, such as has effective leaders help each other and so on.

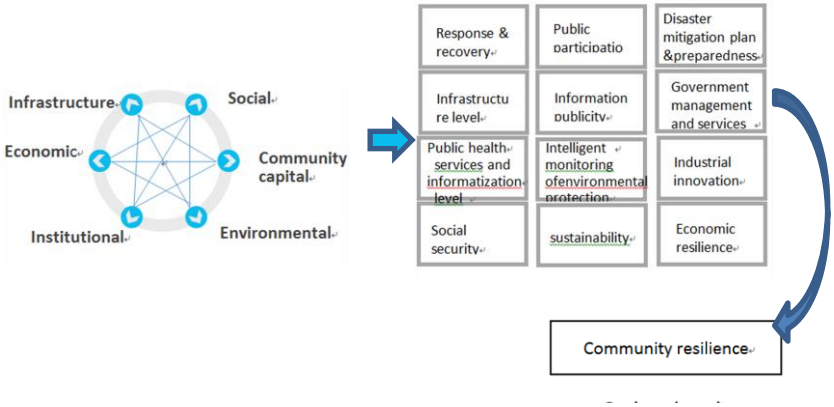
3.5. Environmental Resilience

Environmental resilience is related to hazard frequency and intensity, ecosystem, sustainability and protective resources. Ecosystem, Hazard intensity, Hazard severity, Risk and exposure, Sustainability, Protective resources are the elements of environmental resilience. Among all of these papers, there are only eight discussed environmental dimension and Burton given out the most rounded analysis about environment resilience, are respectively risk and exposure, sustainability, protective resources and hazard event frequency. Hazard frequency is similar with hazard intensity and hazard severity mentioned by Ostadtaghizadeh et al. (2016). Therefore, these five dimensions are used as the primary indicators of environmental resilience.

3.6. Social Resilience

Social resilience is a function of demographic characteristics of the population and their access to resources, including health, education, well-being and social stability. This dimension includes five sub-dimensions, namely Education and education equity, Demography characteristics, Public health services, Social services and well-being, Social security. Among the seventeen literatures, there are thirteen which mentioned social dimension. As for sub-dimensions, Cutter et al. (2010) introduced educational equity, age, transportation access, communication capacity, language competency, special needs and health coverage. Singh-peterson et al. (2014) made some modification on the basis of Cutter's viewpoint, added preparedness into social resilience. However, Cutter et al. (2014) further improved the social resilience in 2014, put the physician access into this dimension.

Figure 6: Conceptual Model of Community Resilience Assessment



4. Methodology

We will use the multiple cases study method (Robert, 2015). We are choosing three cases which are classified under similar disaster hazards and are also similar in terms of geographical conditions, New York, Athens and Toyama from the project 100resiliencecities.org (100 resilient cities, 2014). We will use qualitative research to identify main about community resilience topics in the plans of these three cities, comparing them to the main domain categories identified in the community resilience literature.

4.1. New York City

New York City is located at the Hudson River estuary, with an overall area of about 468.9 square miles (1,214 square kilometers). It has more than 520 miles of coastline and 8.4 million residents (in 2015), nearly 400,000 of whom live in buildings vulnerable to coastal flooding and rising sea levels. It is also threatened by a variety of natural disasters, including blizzards, hurricanes, floods and earthquakes.

In 2015, NYC implemented a resilience plan, which mainly contains four visions of building a dynamic New York City. They are Prosperous Cities, Fair and Just Cities, Sustainable Cities, and Resilient Cities. The four visions of the new New York Resilience Program include 24 goals, including seven target distribution in social toughness dimension, two construction targets distribution in economic resilience, distribution toughness of three in the system, and distribution in infrastructure toughness of latitude that most reached ten. Community capital and environmental resilience have 5 and 4 goals respectively. Obviously, in order of importance in New York's resilience plan are infrastructure resilience, social resilience, community capital, environmental resilience, institutional resilience and economic resilience.

4.2. Athens

Athens is the capital of Greece with a history of more than 3,000 years. As of 2013, Athens had a population of 5 million and a total urban area of 412km2. In recent years, Greece has faced severe economic challenges and continued environmental pressures. The main challenges fall into eight categories: earthquakes, climate change, civil strife, cybercrime, a depressed economy, aging infrastructure, migration, and mistrust. Athens' resilience plan has four components: 1. Effective and efficient governance, and better communication and collaboration with residents by promoting data-driven policy development and accountability. 2. Meet the human need to be close to nature and be able to resist climate change and environmental challenges. 3. Improve best "survival" skills and create a reliable and safe environment for people. 4.Nurture and develop their assets to promote happiness, creativity, and entrepreneurship.

Under the four directions of the Athens resilience plan, there are a total of 13 measures. Institutional resilience is one of the dimensions that has received the most attention in the Athens resilience strategic plan. The second focus is on social resilience, with eight targets distributed, infrastructure resilience and community capital supported by seven specific measures. And finally environmental resilience and economic resilience. In terms of quantity, economic resilience receives far less attention than other dimensions, but in terms of content, it receives more attention.

4.3. Toyama

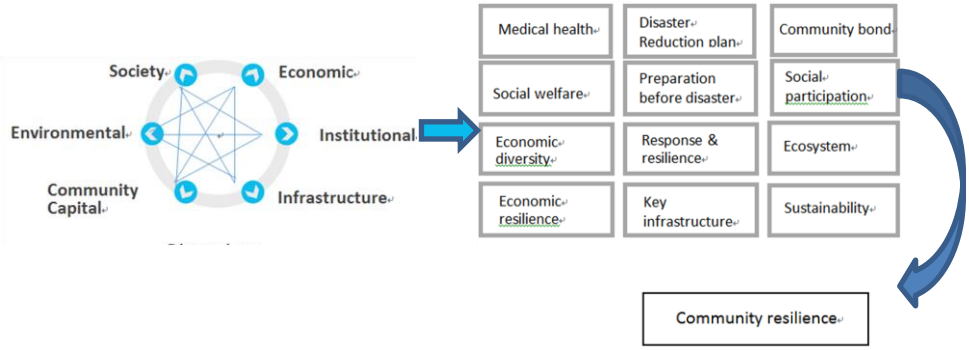
Toyama belongs to Japan, with an area of 1,242 square kilometres and a large amount of agricultural land. Its total population is about 420,000 (in 2010). The challenges facing Toyama can be summed up in two categories: acute shock and chronic stress. Acute shock has four main types of acute shocks: floods, landslides, earthquakes and potential infrastructure failures. There are five main types of chronic stress: ageing and declining populations, ageing infrastructure, a lack of economic resilience, environmental degradation and inadequate opportunities for residents to achieve self-actualisation goals. Toyama, Japan, developed and released its resilience planning strategy on July 12, 2017, which sets building targets that will last until 2050. The idea of fushan resilience planning strategy is based on four aspects: Resilient People, Resilient Prosperity, Resilient Infrastructure and Resilient Environment. A total of 10 goals in the four aspects. According to the six dimensions of the urban resilience framework, infrastructure resilience and economic resilience are given enough attention in the Toyama resilience plan, nine of the ten targets are related to them. Then there is

social resilience and environmental resilience, which have six goals, community capital, institutional resilience are last.

5. Discussion and Conclusions

Comparing the theory modeling to the three cities' resiliency plans, we suggest that the community resilience measurement can be revised to more detailed dimensions as described in Figure 2.

Figure 2: A Revised Conceptual Model of Community Resilience Assessment



The three cities are similar in geographical environment and natural disasters encountered. From the perspective of the communities in the cities involved in the comparison, infrastructure and institutional resilience are key pillars to community Resilience. Athens and Toyama both emphasized institutional resilience in its resilience plan. New York and Athens include social resilience as an important component of their plan, second only to infrastructure and institutional resilience. On the other hand, New York and Athens paid less attention to economic resilience; and Toyama paid more attention to economic and infrastructure resilience and less attention to institution resilience and community capital.

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EGOV-CeDEM-ePart

Towards "Government as a Platform"? Preliminary Lessons from Australia, the United Kingdom and the United States

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Abstract: In the last two decades, Internet portals have been used by governments around the world as part of very diverse strategies from service provision to citizen engagement. Several authors propose that there is an evolution of digital government reflected in the functionality and sophistication of these portals and other technologies. More recently, scholars and practitioners are proposing different conceptualizations of "government as a platform" and, for some, this could be the next stage of digital government. However, it is not clear what are the main differences between a sophisticated Internet portal and a platform. Therefore, based on an analysis of three of the most advanced national portals, this ongoing research paper explores to what extent these digital efforts clearly represent the basic characteristics of platforms. So, this paper explores questions such as: (1) to what extent current national portals reflect the characteristics of what has been called "government as a platform?; and (2) Are current national portals evolving towards "government as a platform"?

Keywords: Web portals, Government platforms, digital government evolution

1. Introduction

Governments have used Internet websites as part of their digital government strategies for several decades. These government websites have significantly altered the everyday presence of government, with major implications for the way in which citizen-consumers interact with government. Governments worldwide spend sizeable sums on building government web portals as their formal public online face. One way to define a web portal is as a website designed as an entranceway onto, or guide into, the web (Tatnall, 2005). In that way, government web portals help users navigate within a government's web presence. Henman and Graham (2019) have identified two distinct portal designs. An information referral portal design is designed to refer users beyond

the portal to other government websites, whereas a repository portal is designed to collate and curate vast amounts of government information and services within the one portal.

The concept 'platform' arises out of the development of Web 2.0 and is related to successful networked business models from the private sector (Brown, Fishenden, & Thompson, 2014; Helmond, 2015). No matter how successful the model is in the private sector, it is critical to understand the relevance of these models to the public sector (Brown et al, 2017) and to which degree those models could be adopted and adapted into the public sphere (Janssen & Estevez, 2013). Some could claim that platforms are the next stage of digital government but the cost and benefits of transitioning into a new model have to be clearly understood. In fact, it is also not clear which characteristic governments need to consider when envisioning a platform.

The research strategy in this paper is to define the main characteristics of "government as a platform" presented in key pieces of literature. Afterwards, using qualitative research methods, we identify if there is evidence of those characteristics in the national web portals that were used as case studies. We expect that the insights provided by interviews with government CIOs and other top managers of some of the most advanced countries in digital government will enlighten our understanding of the concept "government as a platform" and whether government Internet portals are transitioning to this new paradigm.

2. Theoretical Framework

The first part of this section briefly describes the stages of web presence in the evolutionary approach to digital government The second part identifies the main characteristics of "government as a platform" from key pieces of literature.

2.1. The Evolution of Government Web Presence

Under the optic of the evolutionary approach, government use of the web has evolved along two different, and no-overlapping, trajectories over the last two decades, where web presence develops through 'stages of e-government'. In the first trajectory, each stage is defined by greater functionality of websites. From an initial informational web presence, web stages progress to interaction, transaction, transformation and e-democracy (Gil-Garcia, 2012, Lyne & Lee, 2001, Siau & Long, 2005). This model is widely used and underpins international rankings of countries' use of the internet (Luna et al. 2007, Gil-Garcia, 2012; Tatnall, 2005). The stages of government model and associated rankings are not without criticism (Bannister, 2007; Gokdkuhl & Persson, 2006).

In the second trajectory, the integration among government websites has evolved. Initially, government agencies each had their own website, then agencies created multiple websites for various thematic purposes. Single websites were also created by several government agencies to provide a more 'joined-up' web presence for a theme or service delivery purpose. Whole-of-government portals emerged to provide a 'one-stop-shop' to government (Henman & Graham, 2019). Today, governments typically have a single whole-of-government portal, but also maintain other portals for various purposes (i. e. business focus, open data, tourism). Web portals have advanced long-standing aspirations for 'joined-up', 'holistic' government and one-stop shops

(Christensen & Laegreid, 2007, Kubicek & Hagen, 2000; Leat & Setzler, 2002). Even the transitions to unified web portals inside the same public administration are difficult and controversial (Chadwick, 2011).

2.2. Government as a Platform? Some Important Characteristics

The term 'platform' is vague enough to be used by multiple actors in very different ways depending on the field of study (Gillespie, 2010; Helmond, 2015). Gillespie (2010) sees four broad categories for the discussion of the term 'platform': computational, architectural, figurative, and political. We recognize that there is prolific and rich literature on platforms, but this paper uses mainly two sources for defining their main characteristics. The first one is the influential book chapter of Tim O'Reilly (2010) who coined the term Government as a Platform (GaaP) and presented a radical view of the capabilities of platforms in government. The other source is Brown, Fishenden, Thompson, and Venters (2017) "Appraising the impact and role of platform models and Government as a Platform (GaaP) in UK government public service reform: Towards a platform assessment framework". One of the several merits of this article is the exhaustive literature review used to draw three different dimensions of platforms centered on the organizational form, the market dynamic and the architectural structure. The authors also have identified the constitutive concepts and features within each dimension.

O'Reilly's GaaP is a mandatory referent to identify the main characteristics of government platforms. It focuses on the creation of a new paradigm of government participation and co-creation supported by the material-technical capabilities of the Web 2.0 and other technologies. The author presents several lessons learned from the success of computer platforms in private sector that can drive "…a radical departure from the existing model of government" (O'Reilly, 2010, p. 15) under the assumption that government is itself a platform. A clarification is needed about the differences between the specific concept coined by Tim O'Reilly's GaaP and other conceptualizations of government platforms. Brown et al. (2017) have pointed out some of the distinctions.

As part of the analysis strategy of this paper, we have identified in the literature some of the most relevant characteristics of a platform as a potential digital government tool and they are: cross-government architecture, modularity, citizen-centered design, open participation, network of collaboration, flexible collaboration model, programmability, open standards, and promotion to experimentation. Given the limitations of an ongoing research paper, here we focus on three of these characteristics: (1) Cross-government architecture, (2) Modularity, and (3) Citizen-centered design. Following, they are briefly described.

Cross-Government Architecture

From the lessons learned from the private sector, O'Reilly suggests embracing the philosophy of simplicity and platform thinking (O'Reilly, 2010). A challenge for government in creating simple architecture comes from the legacy systems and proprietary software already in place. Digitally enabled open architectures allow reducing the complexity into smaller building blocks. Brown et al refer to how architectural models can insulate service delivery channels from the complexity of the government back-office (Brown et al., 2017). If many public agencies implement their own platforms,

the fragmentation will have difficulty attracting the needed critical mass of participation into each platform (Janssen & Estevez, 2013). Cross-government architectures allow government to improve services across the organization, using common infrastructure, instead of developing small local infrastructures (Brown et al., 2017). Shared resources like databases, standard processes, and applications would facilitate integration. Citizens are not necessarily aware of the intricate logic of the government structure and policy design, distribution of legal competencies, or the logic used in the web portal scheme, but they demand easy-to-use, seamless digital transactions with the assurance they are trustworthy. In this sense, integrated and cross-government services could be seen as adding public value, which could be done through the use of platform models. Cross-government architectures align to concepts of "the Whole of Government", 'joined-up' web presence by cross-cutting institutional boundaries, and 'One-stop shop'.

Modularity

O'Reilly (2010) affirms that government assumes that their ideation of systems specifications are correct, which can be tested in reality only when the system is put in place. Modularization is the creation of modular components called widgets that enable the integration of content and functionalities in a different website with just a few added lines of code (Helmond, 2015). It is a strategy to deal with complexity because it breaks it down into different components and it is also a strategy to decentralize platforms because those components, the widgets, could be reused by other actors in the platform (Helmond, 2015). Organizations envision the possibility of building modules, design guidelines, and standards that allow the network to create their own content and assemble the specific functions that satisfy their requirements (Brown et al., 2017). Modularization provides flexibility and places a bigger emphasis on end-user needs. If a module is not working as desired, it is easier to replace it without making major changes in the system.

Citizen-Centered Design

Government needs to be aware of what the 'market' needs. The adoption and adaptation of models used in electronic commerce is a constant strategy to innovate in the public sector (Luna-Reyes, Picazo-Vela, Luna, & Gil-Garcia, 2016). The private sector has a constant motivation to create ever more sophisticated methods to gain market and bring visibility to their products and services (Dunleavy, Margetts, Tinkler, & Bastow, 2006). One key objective is to create a satisfactory customer experience that guarantees loyalty to the company. Even when public administration does not have these motivations, the satisfaction of the citizen's needs is persistent. Platforms in the public sector may make sense in the right context, but it is necessary to understand the process of public value creation in the delivery of public services (Luna-Reyes et al., 2016). O'Reilly's (2010) fifth lesson to learn from the private sector is about how data mining allows the utilization of implicit participation. Data analytics to understand the user needs throughout the traces left by the user during the digital interaction with government. Government can also learn from citizens monitoring and understanding their user behavior (Janssen & Estevez, 2013; O'Reilly, 2010). Producing citizen-centered public value is the anchor of public services delivery and one of the main objectives of digital government (Cordella & Bonina, 2012).

3. Research Design and Methods

For the inquiry informed in this ongoing paper, we are drawing on early findings examining the national or federal websites from Australia, the United Kingdom, and the United States of America. For this study, we are considering the ranking informed by the United Nations e-Government Survey 2018 (Online Service Index) from which we have selected the USA, the UK and Australia as case studies (UN E-Goverment, 2018). We expect that countries in higher positions in the rankings of digital government would be the first to try the transition into a platform model, if platforms are the next stage of the evolution of digital government.

The participants are government CIOs or other executives involved in web portal design, strategy and oversight, in central government agencies (e. g. Office of the President or Prime Minister), and in major service delivery agencies. We expect to interview about seven participants for each country. While several interviews have been conducted, this phase of data collection is ongoing. The interviews have an average length of sixty minutes and were audio-recorded with the consent of the participants. The semi-structured interviews were conducted using a questionnaire of between 10 and 15 questions. The interviews seek to identify: the rationale and purpose of the web portal; the overarching web architecture, design, functionality and strategic direction; organizational boundary keeping and conflict arising from the portal. They are complemented with an analysis of policy documents and other information provided in the web portal.

4. Preliminary Results

This section presents some preliminary results in terms of governments' thinking about platforms and platform-like functionalities of their portals. Firstly, understanding the rationale for the design of a portal provides insights into the possibilities of platforms. In relation to portal webpage size, one USA CIO stated "big is not always better", suggesting strong advantages in a distributed model. In contrast, the UK approached the portal in a very centralized way (within the Cabinet Office). Australia initially considered adopting the UK model, but with agency push back, remained with an information referral approach. Secondly, there is very little talk about "platforms" in relation to the portal. The latter is associated primarily with citizen-user facing informational services, rather than transactional services. There is a strong stream of interest in progressing in parallel (and often within different agencies), joined up transactional services for citizen-users that have no direct connection to the information-focused portal. Platform terminology is most evident in the UK, with some use in Australia. In these cases, 'government as a platform' is used to mean that central government builds and offers digital tools and APIs that other government agencies (and potentially non-government organizations) can use to host or build their public citizen services. In this way the platform is not for external, but for internal, users to build a kit for citizen-users. For example, the Australian Department of Finance offers GovCMS, a "content management and website hosting" service for government. Thus, in contrast to the dominant discourse of business platforms as international meeting spaces populated with people, these government discourses envisage platforms as functionalities for non-interaction, but transactional government. As mentioned before, following, we present preliminary results from our cases in terms of three characteristics of "Government as a Platform."

4.1. Cross-Government Architecture

About cross-government architecture, one interviewee from the USA stated that the decision in the US of keeping disaggregated websites has been taken. The interviewee presents different reasons for doing so. One of them is related to the tradition and culture of the country as being decentralized. Another reason is the diversity of the programs supported by the systems. Distributed systems also protect from having large outages. Australia's approach demonstrates that the distributed model can coexist with sharing of digital tools and resources. By sharing such tools and approaches, rather than having largely independent digital activities and approaches in multiple agencies, governments can gain cost benefits without having a large centralized digital platform, as in the case of the UK's portal. Indeed, the USA interviewee noted that "[u]nderlying architectures become less important than the citizen interaction." Government's web presence can look like it's one government and one portal access to all government service but do so virtually. A key element in this strategy, shared by all governments, is a move to manage electronic authentication. The UK has sought to establish Gov.UK Verify for this process, with considerable challenges and overruns. Australia has long had a My.Gov.au sign on that enables linking through many services, with USA's login.gov service in operation since April 2017. In synthesis, it is clear that for all three countries is very important for citizens to have a single place for digital services, but the actual architecture is less important from their point of view.

4.2. Modularity

In regard to the modularity, an interviewee from the US mentioned that the USA is embracing more flexible delivery methodologies like agile instead of more traditional waterfall-type delivery where government needs to make big investments, wait some years, and hopes that the results will be the expected ones. The interviewee underlined that like any government, they have faced failed system deliveries. They have learned from the private sector how to deal with IT, "… which is small, manageable investments over an extended period of time, delivered in a continuous improvement model". Another advantage is the exponential reduction of risk in the project because it is possible to identify bad ideas in an early stage and just to eliminate them. Identifying in ate an early stage represents also less lost money and the possibility to redirect the efforts to the desired results. In contrast, the UK typically adopts a large-scale centralized approach driven by a large centralized unit, the Digital Government Service (DGS).

4.3. Citizen-Centered Design

Finally, Citizen-centered design has long been a hallmark aspiration for digital government. The US digital agenda requires putting "the citizen to the very front of everything that we do". They mentioned that it is difficult to keep the pace to the change of technology, but it is even more difficult 'to keep up with is people's expectations. And when you can anticipate their expectations, then you're better able to serve them". To be sure, however, such rhetoric positions citizens as passive consumers of pre-existing services through digital means, and is a call to build systems from the perspective of citizen-consumers, rather than around agencies or legacy systems. The UK makes emphasis on the citizen-centered design which underpins the rationale for their enormous www.gov.uk portal, with a focus on placing everything in one searchable website. Citizen-centered

design is now emerging in the digital governance units operating like startups (Clarke 2017), such as the USA's USDS and 18F and (to some extent) Australia's Digital Transformation Agency. There is a continued thinking inside these startup organization on how to enhance the citizen interaction with government. For learning about the user behavior the USA uses the traditional IT metrics and for capturing the successful use and visits they are using unstructured data. Somewhat unusually for national governments, Australia's tax office is experimenting with an interactive platform as a discussion forum to enable tax agents, lawyers, government officers, and taxpayers to develop an interactive space to ask technical tax questions and co-contribute to answers.

5. Final Comments and Next Steps

Technologies, as government web portals, and now platforms, have become new government actors (Gil-Garcia, 2012). Traditionally, a country's constitution and legislation, and the material buildings government agencies occupy defined the shape and presence of government. However, in the last few decades, governments' websites have become an actor representing the state, performing different roles from being the 'digital face' of government to acting as the intermediary of transactions with the citizens. Online presence, accessibility of information and information flows are becoming a key driver of organizational visibility and effectiveness, public value, and the achievement of social and economic benefits. It is not clear, however, whether or not platforms can truly substitute current portals or if they will coexist and become part of them. As next steps, this ongoing research will attempt to understand what leads CIOs to look at the platform as a goal? What do they find interesting? Which other variables are important in the degree to which Internet portals are transitioning towards a platform model?

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Reflections & Viewpoints

EGOV-CeDEM-ePart

Reconnecting Citizens to Politics via Blockchain - Starting the Debate

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Abstract: Elections are not the only but arguably one of the most important pillars for the proper functioning of liberal democracies. Recent evidence across the globe shows that it is not straightforward to conduct them in a free and fair manner. One constant concern is the role of money in politics, more specifically, election campaign financing. Frequent scandals are proof of the difficulties encountered with current approaches to tackle the issue. Suggestions on how to overcome the problem exist but seem difficult to implement. With the help of blockchain technology we might be able to make a step forward. A separate crypto currency specifically designed to pay for costs of political campaigning and advertising could be introduced. Admittedly, at this stage, there are many open questions. However, under the assumption that blockchain technology is here to stay, it is an idea that deserves further exploration.

Keywords: blockchain technology, elections, democratic innovation, e-government, democracy

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1. Democratic Malaise

At the current state of affairs in the history of democracies across the globe, we are facing a paradoxical situation. On one hand we were able to observe the emergence and growth of the number of formal democracies over the last couple of decades, mainly in Latin America and Europe. On the other hand there seems to be a certain and deeply rooted dissatisfaction with politics in general, even in well-established polities of the so-called Western world. The disillusionment about politics can partly be related to a lack of performance legitimacy in the aftermaths of the most recent financial and economic crises but not exclusively. According to Crouch (2004), the deeper reason for this conundrum is the fact that many democracies have entered a post democratic phase. In post democracies formal requirements of a democratic polity as we define them – including basic political freedoms and rights, the rule of law and the separation of powers just to mention a few – are fully met. Elections take place in an orderly fashion and governmental forces do alter. However, politics

has moved beyond so called first moments of democracy characterized by genuine mass participation, deliberation and a broad engagement of civil society. Even though elections are obviously being held, citizens now know they do not really matter much anymore. In post democracies boredom, frustration and disillusionment about politics are kicking in. With the knowledge of public relations experts as well as scientists, professionalized political forces such as politicians and lobbying groups have learned how to manipulate public opinion thus turning elections campaigns into a theatre orchestrated for the mass media. In order to find out what people want politicians started imitating show business and marketing techniques to increase their chances of getting elected or re-elected. Party platforms have become more superficial and less discriminatory, leaving the voters clueless about content and vulnerable to the personalization of politics. Important policies are being negotiated behind closed doors once elections are over, mainly between governments and big business. Corruption is not only a problem of the global South but represents a deeply entrenched phenomenon in politics in general. Citizens take part in decision-making only very unfrequently or not at all. Democracies thus tend to turn into empty procedural shells which can formally not be called undemocratic but leave many citizens – better educated than ever in human history – frustrated with politics, low respect for politicians and ultimately erode the legitimacy of democracies. Even if we were not fully convinced by that grim characterization and the statement that many countries entered a post-democratic stage (Merkel, 2014) we must concede that a couple of the described symptoms are difficult to reason away. Additionally, in most established democracies we observe a decline in electoral turnout accompanied by the rather bizarre situation that state authorities frequently have to admonish citizens to turn out and run actual campaigns for that.

Digital democracy, at least in the early stages, has been seen as a beacon of hope. However, the hope that the less powerful or financially less potent actors can have a say in politics with as little as an internet connection did not come true. It might have led to a further disillusionment instead: using the communication tools of the internet seems to require professional solutions, time and money, thus again favoring the larger, well established and well financed organizations. This is not to say that there is not the occasional exception which did not exist before such as a blog entry or a tweet causing a turn of developments or mobilizing the masses for a while. But this is clearly the exception. Also, the more radical approach of trying to circumvent dirty politics with the help of the internet all together, leading to a more direct and at the same time liquid democracy, does currently not seem to be a valuable alternative. Day-to-day politics caught up with such approaches quickly and we cannot see them taking root yet. Granted, more time might be needed but even then the looming question is whether liquid democracy would be capable of producing coherent policy output in the long run. A third option which is currently representing the most common and accepted track, is a digital democracy interpreted in the sense of bringing the citizens closer to the state and public administrations so that more efficient problem solutions can be found. This digital democracy approach currently seems to have the highest potential but also comes with some dangers. The closer citizens interact with the state the higher the danger for data misuse (for example in case of a change of government to one of a different color). In general, elements of digital democracy did not yet seem able to unleash its full constructive power, on the contrary, with micro-targeting of potential electors and increasing tendencies to influence voters on social media, also from abroad, we currently are faced with fighting the unwanted effects of the digital in politics.

2. Current Election Campaign Financing Rules and Suggested Reforms

Elections and election campaigns play a crucial role in democracies. They represent the high service transferring the powers from citizens to representatives and rulers for yet another term. It is also a time when through acts, procedures and symbolism democracies become visible and even tangible for the largest part of the electorate. Arguably, elections are not the only but certainly one of the most fundamental pillars for the proper functioning of liberal democracies. Unfortunately, evidence across the globe demonstrates how difficult it is to conduct them in a free and fair manner, even in more advanced liberal democracies. In particular, a constant concern is the role of money in politics, more specifically, money used for election campaign financing. Frequent scandals are proof of the difficulties encountered with current approaches to tackle the issue. As reported in a comprehensive, systematic and up to date analysis of political finance in comparative perspective (Norris et al., 2015) by the Electoral Integrity project and partners (Global Integrity, 2015) we are forced to conclude that the de facto situation often does not match with what regulation would prescribe. While a few countries score high on electoral integrity without detailed legal frameworks on how money can be used during election campaigns the opposite is also possible. In the majority of the covered countries the regulation in place does not affect third party actors such as political action committees, unions and certain not for profit organizations. The monitoring for direct and indirect financing of election campaigns furthermore shows that rules are often not very specific, that documentation is incomplete, incomprehensible and delivered late. Furthermore, in most countries public resources are being used for campaigns which makes it more difficult to quantify real costs and to track their use. The report comes to the quite devastating conclusion that the violation of rules is rather the norm. Only in four out of the 54 monitored countries did the authors not find any violations during the most recent elections.

Literature shows that there is a long political struggle to regulate election campaign donations. Typically, legislation would require campaigners, mostly political parties and candidates, to register and disclose donations they receive (Gilland Lutz & Hug, 2010). However, experience shows the futility of this approach. Having personally being able to check what kind of documentation is routinely handed in under the regime of some of the Swiss cantons with a disclosure rule for political donations (Serdült, 2010; Braun Binder 2015) it is not surprising to comprehend the conclusions of the upper mentioned international reports. Several contributions for a political party taken down in the name of the treasurer of the respective political party are not conducive to increasing trust in the system. Reporting duties for donations in the official gazette simply being ignored for years demonstrate that controls seem to be lax and the consequences eventually not severe in the case of infringements. The maximum fine could be well beyond the amounts received. The rules are sometimes also relatively easy to circumvent. Larger amounts of money can be split up to go beyond the allowed amount and thus stay under the radar screen. Contributions can be made to organizations not falling under the legislation. They can also originate from or be channeled to accounts abroad. In case campaign ad space is voluntarily given away for free because of ideological proximity between media owners and political party there is even no money trail at all. Occasionally, campaign financing scandals pop up, but they probably only represent the tip of the iceberg. In sum, current regulation approaches seem to lead to bureaucratic and largely ineffective solutions. However, if current campaign regulations have no positive effect on the fairness of elections better

solutions should be sought. A first cursory review of potential remedies found in the literature reveals the following:

- Ayres and Bulow (1996) suggested a fund controlling for the identity of donors but then to relay the money to the receiver anonymously,
- a Council of Europe (2004) report put forward the idea to use vouchers instead of the national currency,
- Lessig (2011) proposed a reform of campaign financing allowing citizens to donate vouchers.

Whereas governance of any campaign financing regulation is going to stay key despite of the technology applied, a distributed approach involving not only public administrations or electoral management boards created to supervise all matters elections but the public in general might help to achieve a paradigm shift in the not so distant future.

3. A Blockchain Technology-based Approach

Thanks to distributed leadger technology - colloquially referred to as blockchains (Wattenhofer, 2019) - new options are now available, helping to combine and implement ideas such as the introduction of vouchers and partly anonymous donations in a more persistent way. Lessig's notion of paper vouchers can directly be reformulated in blockchain terminology terms as tokens. The logic behind the introduction of vouchers is that donations and campaign financing increase the risk of corruption and that one should try to extract those money flows from a market in which transactions are difficult to trace. With blockchain technology political campaigns can be tracked and financed by a crypto token owned by the people. Such crypto vouchers can have a duration and nominal value. They can be issued and distributed for every election or even for a complete legislature. In case there is a need, additional vouchers could be released. Each country or constituency could therefore create its own vouchers within a couple of hours. The suggested blockchain system would allow tracing all flows of the campaign crypto currency and to keep the total amount spent under control. However, the arguably more important innovation of the suggested approach is not only the technical aspect per se but the direct involvement of citizens. Every registered voter would henceforth have a small but direct stake in the electoral race. As a much welcomed side effect, interest in politics and therefore turnout might increase as well.

As a starting point for further reflection, token owners would, in the first place, have the following three options: they can pass tokens on to any other citizen, candidate or political group (donate), sell them in a market (trade) or even decide not to use them at all (abstain). For contested electoral races the price of a token could go up. National banks would be potential organizations capable to issue campaign tokens. They can hold them in their books just like any other currency. Last but not least, the most important point, all citizens are directly reconnected to politics by receiving tokens which define the total amount for campaign spending.

Interdisciplinary research to study technical, regulatory, economic as well as behavioral dynamics of such a blockchain-based campaign financing solution is of course much needed. The following research questions can serve as a preliminary guide for the development of future feasibility studies. The by no means exhaustive list of questions can be grouped into four domains:

1) Governance and legal: Which legal requirements apply to a cryptocurrency for political campaigns? In particular, which constraints are imposed by the principle of economic freedom and what requirements must be met with regard to ensuring electoral freedom? Which monetary law provisions would be necessary for the introduction for a separate cryptocurrency for political campaigns?
2) Technological: How should the tokens be designed? How can token donations stay anonymous but become public when reaching a certain threshold? Can secure and easy to use applications for individual use be envisaged?
3) Economic: How much would the introduction and administration of campaign tokens cost regarding administration as well as energy consumption? How can those costs be financed?
4) Behavioural: How do citizens react to the idea of creating tokens to finance political campaigns? Would they be willing to use them? Which patterns of token use can we observe?

4. Discussion

The suggested additional use case of blockchain technology in the public domain (Rizal Batubara et al., 2018) for a core aspect of any democracy worthy of its name has the potential to shed new light on one of its long looming conundrums. It provides for a prospective and optimistic way on how technology can be helpful for the design of a future (if not completely but increasingly) digital democracy. Through a transdisciplinary approach comprising legal, economic, technical and experimental elements, the proposal to create a decentral election token provides public authorities, politicians and society at large with an innovative template on how campaign financing could look like in the not so distant future. Furthermore, the prospective aspect of the proposal allows lawmakers to update themselves on the future challenges regarding the application of blockchain technology in democratic political systems.

Feasibility studies could help to cast light on opportunities and risks for the use of blockchain technology in the public domain. In that regard, Switzerland with its frequent referendum votes and elections on three state levels is a particularly well-suited field of experimentation. Referendum topics at stake do not necessarily and always follow the party lines. They can be cross-cutting. We can therefore expect campaign financing donations to reveal non-partisan patterns as well. However, whether citizens and other stakeholders would mainly donate along partisan lines, diverge from the expected pattern or in an act of self-interest prefer to cash in their allocated amount by selling the vouchers in a market (Fehr & Fischbacher, 2003) is an empirical question which should be addressed in studies. Regulation will most probably need to be local and study results will therefore not travel very well to other polities. However, all research along those lines will certainly have an international appeal and novelty. Feasibility studies need not be restricted to referendum votes such as in the Swiss case. On the contrary, the fact that Seattle in 2015 started an experiment making use of publicly funded 100 USD paper vouchers during an electoral race hints at the fact that the proposed, digitally enhanced campaign financing solution is not of a purely speculative nature and deserves the attention of researchers, politicians and civil society organizations alike.

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EGOV-CeDEM-ePart

Public Diplomatic Discourse in Twitter Involving Conflict in Donbass

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Abstract: The paper deals with the results of the study of public political discourse in Twitter about the conflict in Donbass formed by institutional actors (permanent missions to the UN) and political figures (representatives, their deputies etc.) of five countries - permanent members of the UN Security Council (China, France, Russia, the USA and the UK). The authors prove the hypothesis about the existence of two divergent variants of discourse which in different ways characterize the participants in the conflict in the South East of Ukraine. To confirm the hypothesis, we develop and use a technique for analyzing political discourse which includes two levels of analysis: identification of key conceptual metaphors in both putative discourse options (positively or negatively characterizing the parties to the conflict) and identification of the semantic opposition "us-them" within metaphors.

Keywords: Political Discourse, Discourse Analysis, Political Metaphors, Twitter, Social Media, United Nations, Conflict in Donbass.

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1. Introduction

Large-scale political events on international arena cause a wide response at all the levels of society, becoming the main topic of public discourse. At the same time, traditional media gradually give a way to the Internet in general and social media in particular. Social media are becoming a leading platform for the discursive discussion of social problems that blurs the traditional boundaries of the public space and deprives traditional media of their monopoly of public opinion formation. Diplomats as part of society are becoming online as well. They use different platforms for discussions, including the United Nations (UN) as most influential international organization.

We analyze public political discourse in Twitter about conflict in Donbass within the framework of the UN. Initially we hypothesize two forms of discourse generated by social media on topics related to the armed conflict in Donbass – discourse which positively or negatively characterizes the

insurgents. Then we present the results of the research, focusing on the method developed by us (Bolgov, Filatova et al., 2016), as we believe that it can be used in similar studies in the future.

2. Political Discourse Analysis and Twitter

We base this study on Van Dijk's model of discourse, which means social interaction based on linguistic communication. The key aspect of the discourse is not the fact of "live" communication and not the specific linguistic parameters of the produced text. The most important component of texts construction and perception is the judgments of social situations behind them and their cognitive representation(van Dijk, 1985).

The notion of the final understanding of discourse as verbally mediated social interaction was developed by Habermas, who proposed considering communication and discourse not just as the interaction of at least two subjects (able to speak and act) entering (through verbal and non-verbal means) in interpersonal relationships (Habermas, 2008) but the interaction that takes place on important public and political issues.

Discourse in social media is a collection of open (accessible for change and expansion), verbally mediated discussions on certain topics, and conducted by peer-to-peer actors. However, a full part of the public discourse is only those discussions devoted to problems that matter to the whole of society that have already fallen into the public sphere. Discourse in social media is a part of the general public discourse, with the difference that any subject can become its actor in social media (Bolgov, Filatova et al., 2016).

Pamment (2014), Sethi (2018) and Duncombe (2017) focus on the use of Internet in diplomacy. Strauß and colleagues investigate the use of Twitter by the embassies of Western countries as a part of digital diplomacy (Strauß, 2015). Dodd and Collins compare the Western European countries experience with Eastern European countries by the embassies' use of Twitter (Dodd& Collins, 2017). They investigate Twitter discourse of 41 embassies using content analysis. Kampf and colleagues explore the use of Facebook and Twitter by eleven ministries of foreign affairs (Kampf et al., 2015) which also held comparison of experience of these ministries. Moreover, the researchers focus on studying the national experience (Dolinskiy, 2011; Zhang, 2013) and assessment of efficiency (Bolgov, Bogdanovich et al., 2016) of Twitter diplomacy.

3. Methods and Research Material

The paper analyzes the corpus of tweets created by institutional actors (permanent missions to the UN) and political persons (representatives, their deputies, etc.) of the states - permanent members of the UN Security Council. Only text messages belonging to participants have been investigated. Only officially confirmed accounts were included into the sample. The selection criterion was the presence of a direct link on the official site of the actor or the presence of a mark on the authenticity of the account on the page on the social network. Redirections from the pages of other participants were not included in the corpus.

The choice of Twitter as a platform of discourse is adequate due to its openness to all participants, concise messages, as well as the ease of sharing and tagging information. In addition, participants often repeat information in all social media to increase the reach of the audience. Therefore, the analysis of this platform alone is sufficient for the analysis of social media discourse.

In total, the corpus is consisted of 165 texts formed by 13 actors (see Table 1).

Table 1: Sample of research

Institutional Subjects		
United Nations Office	**Twitter Accounts**	**Number of Publications**
Russia, since August 2011	@russiaun	18
United States, since February 2011	@usun	5
UK, since May 2010	@ukun_newyork	23
France, since January 2010	@franceonu	10
China, since April 2015	@chinamission2un	0
Persons		
Person, position	**Twitter Accounts**	**Number of Publications**
Nikki Haley, Permanent Representative of the US to the UN, 2017-2018	@nikkihaley	20
Samantha Power, Permanent Representative of the US to the UN, 2013-2017	@AmbPower44	39
Karen Pierce, Permanent Representative of the UK to the UN, since 2018	@karenpierceun	1
Jonathan Allen, deputy. Permanent Representative of the UK to the UN	@ambassadorallen	0
Matthew Rycroft, Permanent Representative of the UK to the UN, 2015-2018	@matthewrycroft1	12
Mark Layal Grant, Permanent Representative of the UK to the UN, 2009-2015	@lyallgrant	2
Anne Gaugen, deputy. Permanent Representative of France to the UN, since 2016	@annguegueguen	1
Dmitry Polyansky, first deputy. Permanent Representative of Russia to the UN, since 2017	@Dpol_un	34

As for method of analysis, so we limited the research to two levels of discourse analysis: identifying key conceptual metaphors of both alleged discourses (positively and negatively characterizing the participants of the conflict), and the identification of semantic oppositions "us-

them" implemented within the framework of metaphors. Thus, we had formed a technique which, in our opinion, is most appropriate for discourse analysis in political studies that was not directly related to linguistics.

The first component of our discourse analysis is an identification of key conceptual metaphors generated in both discourses. The use of conceptual metaphors in discourse allows to transfer onto an object negative or positive qualities that the subject of naming has, even without naming them (and in some cases avoiding direct naming). All this makes the metaphor a tool of making of recipient' desired attitude to problems, events, personalities.

The second stage of our discourse analysis was to identify the semantic opposition of "us-them", which was embedded in the framework of the identified metaphors. The concept of semantic opposition in discourse study was used by van Dijk (van Dijk, 1985). His work was devoted to the study of images of the immigrants that are emerging in the discourse of the native Dutch. A specific feature of such discourse is a special structural parameter - the opposition of "us-them"("friend or foe"). This opposition reflects the conflict between the ethnic groups, majority and minority, and simultaneously defines different assessments of the situation ("view"). The style of the stories, the presence of specific pronouns, various rhetorical techniques and structure of stories, and other linguistic means express the opposition and their corresponding points of view.

The presence of opposition in which we, or "friends", are always right and "good", and they, or "enemies", are a priori wrong and "bad", is a mandatory component of any discourse. This opposition is implemented on different levels: not only at the structural level of discourse (i.e. macro level) (which is more typical for the more or less big connected texts) but also at its micro level by using different speech means. The specific feature of this opposition is the rising of "friends" and the humiliation of "enemies" at all textual levels. This analysis of oppositions is concentrated on detecting speech features (lexical, stylistic etc.) because of the empirical basis of our research, which is a set of more or less short texts in Twitter written by different actors.

4. Results of Research

(1) Initially presumed hypothesis of the existence of two divergent discourses which are differently characterizing the armed conflict in Donbass in Twitter was fully confirmed. There are two clearly identified images of conflict in general and its parties in particular. The first discourse can be euphemistically described as "Good insurgents against bad Ukrainians", the second - "Bad conflict initiated by Russia".

(2)In the conceptual metaphors of the first discourse, all of the positive concepts belong to the metaphors, signifying the insurgents, and all the negative concepts belong to the metaphors signifying Ukrainian party of the conflict that depicts the insurgents and their struggles (i.e. the conflict per se), generates a positive overtone.

Conceptual metaphors of the second discourse are solely based on the negative concepts that signify the conflict per se and the insurgents who are identified in this case with the Russian authorities in general and personally with Russian President.

(3) In semantic oppositions of the first discourse, insurgents (people and Donetsk / Lugansk People Republics, DPR/LPR, per se) and the Russian party (including Russia and the nation per se) are nominated as “friends”. The Ukrainian party (government, military, the nation, and Ukraine per se) and the West are depicted as "enemies".

In three out of ten semantic oppositions there is no clear articulation of "friends". In four semantic oppositions "friends" are insurgents per se; in one opposition "friends" are "Russians" per se (and the insurgents among them), in two oppositions "friends" are Russia per se and Russia+Europe. Thus, only self-proclaimed republics DPR/LPR and Russia are "friends". The number of "enemies" includes: "Ukrainian military" and “Ukrainian authorities” (two oppositions each), "Ukrainian authorities" (in three oppositions), "Ukraine,” “Ukrainians” the “West,” and “United States”(in one opposition each. Thus, only opponents of the insurgents (Ukrainian party and Western countries) are “enemies”.

The final conclusion is that the discourse which describes insurgents in a positive way is present in the general discourse of social media on the conflict in Donbass.

The semantic oppositions of the second discourse "friends" are not nominated (only one of the oppositions has extremely wide name "the nation"). The insurgents and the Russian party (including Putin, the Russian authorities and the Russian combatants) are nominated as "enemies". The Ukrainian party is not mentioned in the second discourse. The discourse has eight semantic oppositions. “Enemy” and “Putin” (two oppositions each), "Russian authorities", “insurgents”, “Russian media”, “Russian combatants” and “Putin and insurgents”.

(4)In both discourses most texts appeal to the audience’s emotions. The specific features include exaggeration, and the widespread use of expressive words.

5. Conclusion

The main conclusion is that diplomats, using Twitter for communication, need to use the metaphors, which cannot be neutral by nature. Consequently, we can see the paradox: traditionally, the mission of diplomats was to smooth sensitive issues in conflict situations. But on Twitter, diplomats play the role of propagandists. This means, on the contrary, they fuel conflicts, aggravate controversy, and destroy communication.

Our work is an example of interdisciplinary research, which couples the linguistic aspects of words with the study of public political discourse in social media. Many discourse studies in political science deal often, in our opinion, with very specific linguistic parameters. Those limits primarily consist of counting the quantitative indicators, transforming discourse analysis into content analysis. The study does not claim to be comprehensive and is intended in some way to fill these gaps.

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EGOV-CeDEM-ePart

E-Participation Waves: A Reflection on the Baltic and the Eastern European Cases

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Abstract: E-participation often experiences rise and decline, thereby the study aims to identify causes and outcomes of e-activism upturns. The research is based on expert interviews, content analysis, and self-reported statistics. It became evident that the studied European countries – Belarus, Moldova, Ukraine, Estonia, Latvia, and Lithuania – follow different trajectories, but still reveal common patterns. In particular, election campaigns, political and economic crises, and new policies can facilitate e-participation, which can institutionalize, frame an agenda, draft a policy proposal, and lead to a policy change or a government change.

Keywords: digital democracy, electronic democracy, participatory democracy, e-participation

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1. Introduction

Political participation rates in European countries are generally low. This is especially pronounced if we consider that modern engagement options are easily and instantly available via online platforms. Nevertheless, sometimes e-participation rises and declines in a cyclic pattern. Therefore, this paper aims to explore such pattern in selected countries. The two research questions are: what conditions lead to a rise of online participation? what are policy outcomes of such e-participation?

To seek answers to these questions, it is useful to conduct an international comparative study. For this aim, six European republics – Belarus, Moldova, Ukraine, Estonia, Latvia, Lithuania – are a suitable choice. In 1990s, they started from similar politico-economic conditions, but followed different paths, generating a diversity of political situations with observed ascension in electronic participation. So, the paper will analyze the cases of enhanced e-participation in these countries.

For this aim this exploratory qualitative study employs an inductive approach, using empirical data to draw conceptual conclusions. It is primarily based on a series of semi-structured expert interviews with civic activists, scholars, IT specialists, think-tank analysts, politicians, officials, and

other experts. The fieldwork lasted from March 6, 2017 till June 6, 2017 resulting in 70 interviews. The distribution of interviews among countries is the following: Belarus – 10, Moldova – 12, Ukraine – 14, Estonia – 10, Latvia – 14, Lithuania – 10. Also, a content analysis of e-platforms was conducted and their self-reported statistics was considered. The findings are presented below.

2. E-Participation Cases in the Baltic and the Eastern European States

In Belarus, people turn to online platforms and to social media (Facebook and Twitter, VKontakte, and Odnoklassniki) to deliberate and mobilize for offline protests. In March 2006, following the presidential campaign with disputed election results, the public went out into streets to demand re-elections in the so called "Jeans Revolution," but the protesters were arrested. The Belarussian public discussed the situation in the safe online space of Live Journal (Interview with Dzmitry Karenka, 21 March 2017). During June-August 2011, people protested against government's policies linked to financial crisis, but were arrested not reaching any policy results. This "Social Network Revolution" relied on social media for civic mobilization for street protests, informing on results, discussion, and internal communication (Interview with Andrei Kazakevich, 10 April 2017). In 2015, the president issued a decree on preventing social dependency, which demanded unemployed to pay fines to the state, affecting hundreds of thousands of people, who received notices to pay fines. Information from official mass media was widely disseminated and discussed in social media (Interview with Dzmitry Karenka, 21 March 2017). As the deadline for paying fines was approaching, people self-organized in social media and started a series of protests lasting for four months (February-May 2017). Due to these protests, the decree, despite being legally enacted, was in fact stopped (Interview with Andrei Kazakevich, 10 April 2017). Besides, after the protests activists launched a crowdfunding campaign in Facebook to support those who were fined, demonstrating moral and material solidarity (Interview with Julia Mitskevich, 12 April 2017).

In Belarus, the government avoids public discussion, so people migrate to social media for a genuine deliberation, thereby becoming cyber-guerillas (Interview with Dmitry Boichenko, 1 April 2017). Authorities often ignore people's e-appeals on official online portals (Interview with Uladzislau Ivanou, 1 April 2017). Even the most optimistic estimations demonstrate that not more than every second petitions are reacted upon (Interview with Uladzimir Kavalkin, 14 April 2017). Consequently, digital activism intensifies around election cycles. It might be magnified by some pre-election liberalization (Interview with Tatsiana Chulitskaya, 14 April 2017) conducted to legitimize elections for international community (Interview with Vasily Naumov, 27 April 2017). Also, social activism arises in times of crisis (Interview with Mikhail Doroshevich, 16 April 2017).

In Moldova, e-participation is reportedly low. However, there are some spikes around elections. Numerous diasporas employed digital tools to discuss political developments in social media and to push for elections (Interview with Stela Cudalb, 9 May 2017). Observers who witnessed violations submitted real-time online reports via Internet-equipped tablet PCs (Interview with Ion Manole, 31 May 2017). Also people used Facebook to unite for an offline protest against the change of the proportional voting system towards uninominal voting system (Interview with Maria Stratan, 18 May 2017). Besides, the project Promis registers and analyzes electoral promises and check them for implementation. It experienced its highest activity in 2010 and 2014, precisely around parliamentary

elections. Yet, the 2019 parliamentary elections are not reflected there. Reportedly, this initiative has not had much impact (Interview with Marian Cepoi, 13 May 2017). Besides, people mobilize online reacting to a corruption scandal, yet such activism soon declines. For example, the e-appeals project Alerte.md was launched in February 2011, reached its peak of e-appeals in May-December 2014, and faced a decline in usage since then (Alerte.md 2019).

The political context for online activism in Moldova is unfavorable. There is a low level of trust of citizens towards authorities (Interview with Ion Manole, 31 May 2017) and a low awareness about online platforms, leading to a low participation (Interview with Cornelia Amihalachioae, 21 March 2017). Allegedly, the government is not willing to introduce fundamental institutional changes (Interview with Elena Prohnitchi, 6 June 2017). Authorities are not very open, few officials respond to e-appeals (Interview with Olesea Stamate, 19 May 2017). In most cases even journalist investigations do not impact policies (Interview with Petru Macovei, 2 June 2017). Not all identified corruption cases are transferred to court and even fewer are prosecuted (Interview with Cornelia Cozonac, 31 May 2017). Therefore, civic activists in Moldova do not rely on participation institutions, but launch an hoc campaigns (Interview with Marian Cepoi, 13 May 2017).

Ukraine's most notorious e-mobilization case occurred in November 2013, when a journalist made a Facebook post calling people to join him at Maidan Square in Kyiv to demand Association Agreement with EU. This post went viral and attracted protesters for what then became Euromaidan. The clashes between the protesters and the police went violent. As a result, the Revolution of Dignity, which ended in February 2014, turned geopolitical attitudes of the public towards European Union, led to the change of government, and initiated multiple reforms.

Most importantly, this tide of revolutionary mobilization transformed into an institutionalized online civic participation. In July 2015 joint advocacy efforts of the civil society and MPs resulted in legal amendments introducing e-petitions. Most popular online petitions were addressed to the president, and by March 2019 as much as over 32,000 e-petitions were submitted. However, the most popular ones, assessed by the number of supporting signatures, were submitted during the first three months – August-October 2015 (Electronic petitions 2019). Public opinion surveys demonstrated that over two years – from 2015 to 2017 – the shares of both extreme skeptics and extreme optimists decreased, as the public gained more moderate views (Khutkyy 2017). As people became more experienced in e-participation, their expectations decreased. In particular, the share of those who believed that an e-petition is a dialogue between the people and authorities, has statistically significantly decreased from 33.8% in 2015 to 26.6% in 2017 (Khutkyy 2017). Other e-participation formats of national scale include e-voting, open data analytics, and journalist investigations. E-voting for candidates to the civic councils at the several ministries and government agencies were held annually starting from 2015 (Electronic Democracy 2017).

But why did the digital engagement occur? First, civic participation itself was massive. As an official recalled, the number of requests sent directly to the government increased dramatically, so they decided to make a separate online platform for them (Interview with Dmytro Shymkiv, 26 May 2017). According to another official, the authorities wanted to increase trust (Interview with Ihor Khatsevych, 24 April 2017). Officials stated that they envisioned themselves as partners with the civil society (Interview with Dmytro Makovskyi, 25 April 2017). Yet, some politicians were eager to

build a better popular image (Interview with Victor Nestulia, 24 April 2017). Perhaps, they did not realize how strongly have they empowered the people (Interview with Serhiy Loboyko, 24 April 2017). Also, international organizations provided financial and mentoring support (Interview with Nadiia Babynska, 28 April 2017). Overall, it was a convergent effect of a mobilized civil society and an open government (Interview with Jordanka Tomkova, 9 May 2017).

Estonia is famous for its online voting (i-voting). The dynamics of its parliamentary and local elections shows that the share of online votes of all votes cast grew from 1.9% in 2005 to 43.75% in 2019 (e-Estonia 2019). A comprehensive quantitative study of 11 years (8 paper and electronic elections) of Estonian population demonstrated that e-voting has diffused among the overall voter population bridging societal divisions, although the potential enabling effects required at least three elections to appear (Vassil et. al. 2016). Evidently, such e-participation in the frame of representative democracy occurs on the occasion of elections and is effectively institutionalized. Estonia also experimented with direct e-participation tools: TOM (crowdsourcing ideas) in 2001, Osale.ee (commenting on draft laws) in 2004, 2005, and 2007, Petitsioon.ee (e-petitioning) in 2010, Rahvakogu.ee (participatory policy drafting) in 2013, and Rahvaalgatus.ee (e-petitioning) in 2016. Of these, Rahvakogu.ee was a response to a political crisis of citizens trust towards the government regarding party funding (Interview with Maarja Toots, 7 March 2017). Its active phase was during January-April 2013 and of 15 proposals sent to the parliament, three became laws (Kogu.ee 2017).

A common vision among stakeholders played a key role. The Chief Architect of the Estonian e-governance system contemplated that trust was the basis for e-democracy tools, and that engineers, bureaucrats, politicians, and citizens have been developing it for the 20 years, building a positive trust cycle (Interview with Andres Kutt, 7 March 2017). Indeed, political consensus for the launch of e-voting was important (Interview with Robert Krimmer, 16 March 2017). And citizens trusted the e-solution of ID card and mobile ID (Interview with Priit Vinkel, 6 March 2017).

But why there is little e-activism beyond elections? One explanation is that the abundancy of e-services creates a kind of consumer e-democracy for everyday activities – having received these services by default citizens do not feel engaged (Interview with Kristina Reinsalu, 16 March 2017). Another version is that people are simply not aware of e-democracy options (Interview with Maarja-Leena Saar, 13 April 2017). Probably, only a huge crisis will create the necessity to use e-participation tools massively (Interview with Hille Hinsberg, 17 March 2017). The government has not linked the e-initiatives to the institutional process of making or monitoring policy decisions (Interview with Maris Jõgeva, 15 March 2017). Although, an official's position is that ministries exercise direct contact with stakeholders (Interview with Liis Kasemets, 17 March 2017).

In 2010, Latvia witnessed a rise of anti-oligarchic movement, so the society was ready for change. Civic activists communicated the message "give people some influence or face consequence," so the parliament introduced e-petitions (Interview with Imants Breidaks, 23 March 2017). Overall, e-petitions collected over 1 million e-signatures (Manabalss.lv 2019). Manabalss.lv claims that of 38 initiatives submitted to authorities, 26 (68%) were supported as laws or government decrees, thereby constituting the world's highest success rate of this kind (Manabalss.lv 2019). Official's position is that the success of e-petitions is due to citizens-authorities cooperation (Interview with Dita Erna Sile, 13 March 2017).

However, the critical perspective that during the last years the e-petition platform usage in Latvia has declined (Interview with Daunis Auers, 23 March 2017). Another civil society expert also observed that e-democracy platforms disappeared rapidly and concluded that e-participation in Latvia is still ad hoc as citizens communicate with politicians via social media, e.g. Twitter (Interview with Iveta Kazoka, 23 March 2017). And it is NGOs, not citizens, who challenge government policies (Interview with Iveta Reinholde, 31 March 2017). Moreover, even civil society needs a pressing issue for collective action: "if there is nothing on agenda, there will be no activity" (Interview with Liene Gatere, 24 March 2017).

Finally, Lithuania has some practice of e-consultations. For example, in 2012, at a national crowdsourcing platform people contributed over 1,000 ideas for the Lithuania 2030 is a national strategy (Lietuva2030.lv 2019). However, it was held only once. E-participation, e.g. via Facebook, happens before elections as a part of political campaign (Interview with Aine Ramonaite, 30 March 2017). Quite vividly, only three e-petitions collected the required number of signatures at an independent platform – this occurred before elections, as some political parties wanted to raise their popularity (Interview with Donatas Simelis, 24 March 2017).

Lithuania clearly lacks collective action in political realm. The citizens are not interested in participating in political processes while politicians do not demonstrate political will (Interview with Agnija Tumkevic, 31 March 2017). There is also a high distrust of population to political institutions (Interview with Aine Ramonaite, 30 March 2017). People are more involved via social networks addressing politicians directly (Interview with Rytis Kalinauskas, 31 March 2017).

3. Conclusion

Each observed country experiences political developments, which generate e-collaboration among the public (see Table 1). What is different, is how these challenges are resolved. In Belarus, crisis-driven e-participation helps mobilize people for protests, but the government oppresses them with coercion instantly. In Moldova, online activism also intensifies around crises, but has virtually little or no impact on policies as the government effectively stalls systemic change. In Ukraine, civic coordination in social media helped mobilize, enact a government change, and carry on the revolutionary momentum to multiple reforms and more institutionalized forms of online policy making. Estonian government largely engages e-participation for e-voting, and experiments with e-consultations, although with minor effect on public policy. In Latvia, a political crisis gave an impetus for legitimizing e-petitions. Driven by the civil society sector, e-petitions help draft and advocate new policies. In Lithuania, the people raise issues, the government initiates e-consultations, but with little effect on policies. These cases demonstrate that election campaigns, political crises, civic protests, and policy initiatives can facilitate massive e-participation. In some cases it can bring new policies or institutionalize new digital participation forms. The latter is possible when a grassroots push from civil society coincides with the openness of authorities.

Table 1: Links between Triggers, Participation Forms, and Respective Political Outcomes in the Six Countries

Countries	Triggers	Participation Forms	Political Outcomes
Belarus	Elections-related political crises	E-deliberation, E-mobilization	No policy change
	Economic crises	E-deliberation, E-mobilization	Seldom and minor policy change
Moldova	Elections-related political crises	E-deliberation, E-mobilization	No policy change
	Corruption-related political crises	E-appeal	Seldom and minor policy change
Ukraine	Geopolitics-related and regime-related political crisis	E-campaigning, E-mobilization	Extraordinary government change, geopolitical turn, numerous sectoral reforms, institutionalized E-participation
	New E-participation instrument	E-petition	Agenda setting
Estonia	Elections	E-voting / E-election	Institutionalized parliament change, wide and inclusive i-voting
	Political crisis	Online policy drafting	Several new laws
Latvia	Political crisis	E-campaigning	Institutionalized E-participation
	New E-participation instrument	E-petition	Many new laws
Lithuania	Elections	E-campaigning	Agenda setting
	New policy	E-consultation	One new policy

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Practitioner Research

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Connectathons - A Sustainable Path Towards Development in European Large-Scale Pilots

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Abstract: Digitalization and the associated digital transformation are shaping the world we are living in continuously. To reflect the arising necessary changes to existing IT systems, legislation, processes, culture, or education, the European Commission is funding so-called large-scale pilots. These large innovation projects (several million Euros of funding) are aimed at the creation and establishment of European-wide solutions to the before-mentioned challenges, targeting domains such as the Internet-of-Things (IoT), healthcare, 5G, or once-only. An essential part of these large-scale pilots is the cooperation of Member States to ensure a high level of interoperability, once the developed products, services etc. are ready for adoption. Yet, due to existing barriers such as legacy systems, political issues, or organisational and communicational blockers, the joint development and piloting of the developed solutions are potentially delayed or even endangered. Therefore, this paper proposes a solution towards the early detection and solving of these issues regarding the planned demonstrators and prototypes within these large-scale pilot projects in form of Connectathons on the example of the large-scale pilot TOOP.

Keywords: Once-only principle, TOOP, Connectathon, large-scale pilots, sustainability

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1. Introduction

The Once-Only Principle (OOP) is one of the key principles expressed by the EC's eGovernment Action Plan 2016-2020 (European Commission, 2016). It foresees that citizens and businesses alike have to provide information only once, when interacting with public administrations to make use of their services. From this point onwards, the information can be reused and thus OOP reduces administrative burden for all involved parties, resulting in saving time and resources (Stocksmeier et al., 2019). The "Once-Only Principle" was further endorsed via the so-called "eGovernement

Declaration" in Tallinn, Estionia on October 6th, 2017, which was signed by all EU MS and EFTA countries. This action set a clear sign towards prioritization of user-centric digital public services for citizens and businesses in a cross-border context. Taking the before-stated situation into consideration, it is obvious that OOP touches on numerous technological and non-technological areas, such as interoperability, IT architecture, organisational transformation, data privacy, trust, etc. (Wimmer et al., 2017). In order to address these areas and challenges from a cross-border and thus EU-wide perspective, the European Commission issued in 2016 a call for proposals; and thus, TOOP came to life.

The Once-Only Principle Project (TOOP) is a European large-scale pilot, which started its activities in January 2017. Its core objective is to elaborate and - via numerous pilots - demonstrate the application of OOP on the example of cross-border data exchange between companies and public administrations. In addition to this prime objective, the project delivers a federated architecture, which enables Member States to interconnect their systems and thus significantly increase the interoperability of the existing Europe-wide IT landscape of public administrations. Finally, TOOP also takes into consideration existing and future drivers and barriers towards the implementation of OOP, as these represent essential key factors regarding the sustainability of the project's developed architecture and pilots (Krimmer et al., 2017).

Kalvet et al. (2018) describe a set of major obstacles towards the before-described goals. In summary, these include demand-side factors, which represent, e.g., variability of demand for national OOP solutions in terms of migrations flows, business exchange, citizen awareness, or trust in regard to save data re-use and the existing infrastructure. Furthermore, legal and regulatory factors come into play, as there also exist ecosystems of national laws and regulations, which are not necessarily compatible to each other. In addition, organisational, administrative, and political barriers are present, as each Member State has its own implemented processes and organisational units to conduct the required work within public administration. This comes also along with different national but also work-related cultures. Likewise, political influence may not be neglected in this context. Finally, technology and interoperability are imperative, as IT systems grow over time and thus, legacy components present a significant factor in terms of interconnectivity, as well as format and schemata compliance. Similarly, the availability of data and their accessibility is a common hurdle in cross-border data exchange scenarios. It is the last set of barriers - technology and interoperability - that requires special dedication in large-scale pilot scenarios.

2. The Connectathon Concept

A Hackathon is an event (design sprint-like), in which computer programmers and others involved in software development, including graphic designers, interface designers, project managers, and others, often together with subject-matter-experts, collaborate intensively on software projects. This event is also known as a hack day, hack fest, or code fest. Hackathons tend to have a specific focus or subject and a demographic group of programmers. The focus is on a used programming language, an operating system, an application, or an API. The goal of a hackathon is to create a functioning product by the end of the event, by usable software or hardware. In other cases, there is no restriction on the type of software being created (Briscoe & Mulligan, 2014).

A Connectathon, in comparison, features one very important principle and two very important purposes. A Connectathon is an open consensus-built interoperability (connection) specification and an event. The two main purposes of a Connectathon is that i) the written specification can 'connect' to its counterpart; and ii) to prove that the specification is complete. A Connectathon is a safe place for failure and this is the most important principle of a Connectathon (IHE Europe, 2014). There will be no negative consequences of a mistake in someone's implementation. If such as situation occurs, the specification might be refined. While of course these consequences may lead to the overall delay of the project, they are not impacting real-world environments and thus, do not lead to data loss, or even harm individuals.

Based on the before-mentioned description of the Connectathon concept, it shares similarities with the general concept of co-creation of services. The promise of co-creation states that with users involved, the value of the service being designed is higher (Lusch et al., 2007), as collaboration pushes innovation and becomes more and more the fundament of service development (Kristensson et al., 2008). This paradigm goes beyond pure customization, as the degree of involvement is higher and users are not only involved towards the end of the development cycle, but become an integrated part of it, by providing ideas, as well as previous experience (Vargo & Lusch, 2004). Transferring this to the context of TOOP, both, Data Providers and Data Consumers, work together on their respective service endpoints to provide not only a working connectivity, but also compatibility in terms of formats, data attributes, and semantics.

2.1. The TOOP Connectathon

By building on the Connectathon concept provided and experiences made as described by the Healthcare Enterprise (IHE) (IHE Europe, 2014), the authors apply these lessons-learned to the TOOP pilots, therefore creating a TOOP Connectathon, which can be described as follows: i) TOOP is a large-scale pilot; the TOOP Connectathon supports the meaning of large-scale face-to face testing of the TOOP connector interoperability; ii) the TOOP Connectathon has the potential to connect all pilot partners in a structured way. The TOOP Connectathon objective is to test system conformity to TOOP profiles by using validators and interoperability tests between systems or simulators. TOOP use-cases provide the guidance for testing. Thus, the TOOP Connectathon allows test validation in a controlled and neutral environment.

Consequently, the TOOP Connectathon can be seen as a kind of connectivity test marathon, as it allows for week-long, face-to-face testing of the participating products' interoperability. Participants prepare and test with open-source test tools and plans provided in advance. The Connectathon encourages partner countries to work closely together to solve issues, e.g., non-conformities during the event. Via this methodology, hundreds of transactions are verified, using both test tools and peer tests. The tests are recorded, and outcomes validated by neutral monitors. At the end of the event, successful partner countries are registered in the Connectathon result matrix. In addition, there are sanity checks in place to see whether the TOOP use-cases are clear enough and can be implemented consistently.

2.2. Setting up the Scene

Storyboarding is used in software development for a particular set of software (Truong et al., 2006) and as a part of identifying the TOOP specifications. Software connection adapters, which will be used to connect pilot partner countries, are drawn during the specification phase, either on paper or using other specialized software. This helps to illustrate the important steps for connection processes and naturally-derived developer experience. The storyboard will be modified in a way that all specific needs are included by software engineers. To understand exactly how the connection software will work, storyboarding is a useful task during software engineering, and it is much better than an abstract description – a technical drawing can tell a precise story with little words. It is also more cost efficient to make changes to such storyboards than to an implemented piece of software.

In the TOOP Connectathon, the storyboards are used to document the planned use-cases, representing a story, which will connect pilot countries with each other via the TOOP connector over a fixed number of iterations. In each iteration, connection tasks can be changed, e.g., from a very general connection between two pilot partner countries, to a specific data request from a particular register. All stories on the storyboard have to have to be agreed on by all participating pilot partner countries. Therefore, all participations have to acquire the right from their pilot country to agree on stories, which will be executed at the Connectathon. The agenda is the most important task, which has to be planned. At first, the overall envisioned achievement has to be formulised and based on this, the agenda can be planned for the participating pilot countries. It has to be planned how many iterations there will be executed, and which pilot countries have to join. One of the planning maps is the TOOP Super Set Tables, which are aligned between all pilot partner countries.

The authors suggest three different levels for the Connectathon, here as an example for the Adriatic pilot. The suggested levels can be applied to all other pilot partners respectively:

1) Enable data exchange within regional pilot areas (Adriatic, Nordic, …) between DC and DP
2) Enable data exchange between regional pilot areas and between DC and DP
3) Enable data exchange with real OOP alignment.

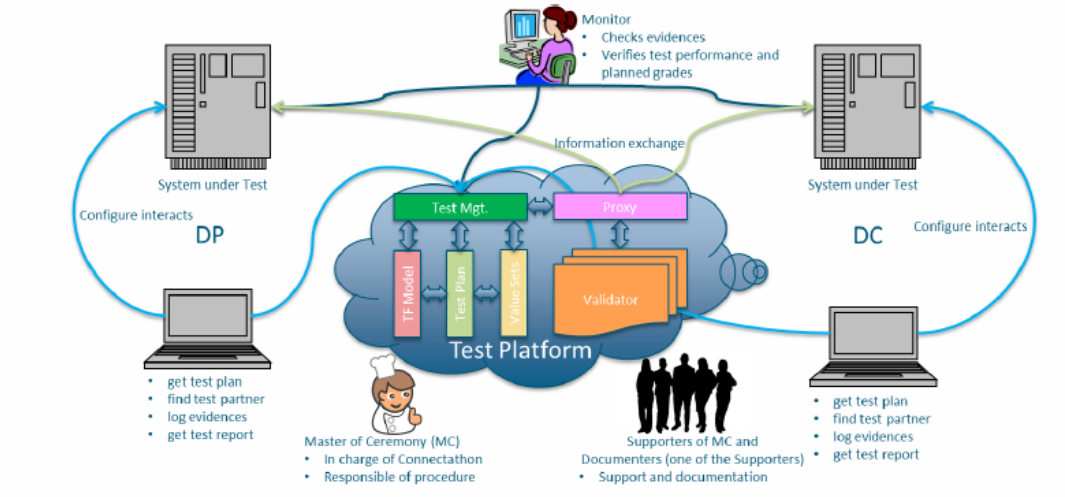
2.3. TOOP Connectathon Interoperability and Conformance Testing

Only two pilot partner countries can work together at the same time. First, all pilot partners have to agree to work in a specific iteration by using a specific set of data out of one or even several use-cases. Then, the joint work can commence and all pilot partners have to work on the given tasks until success. Parallel to this alignment, the same procedure should be executed from all other pilot partners working together. When all have finished, the second iteration will start, up to the last planned iteration. At each iteration, the master of ceremony has to interlock the actual iteration until all pilot partners have finished the goal of this iteration. This ensures that at the end of each iteration, connectivity between all pilot partners of this Connectathon has been reached. After a successful connected and completed iteration, the next level of connection can be entered in an upcoming iteration. This procedure will be repeated until all iterations are completed. All phases have to be documented in such a way that all results remain understandable after the TOOP Connectathon is

over. All processes and findings after each iteration have to be reviewed und discussed (lessons-learned) to improve continuously.

For the TOOP Connectathon tests (see Figure 1), a platform has to be chosen, which will be used during the entire event. There exists a variety of tools, e.g., validation tools to verify that messages or documents are in conformity with specifications, as well as simulator tools to test the interoperability of a service or application, not as a reference implementation, but as a controlled test-case.

Figure 1: TOOP Connectathon Interoperability and Conformance Testing



During the Connectathon, testing is performed by using the chosen test suite. The suite of tools is provided to all Connectathon participants. For now, we are using for our online meetings Adobe Connect. Jira would be another alternative tool for assigning tasks. The management has to monitor the event with the help of these tools. Participants of a Connectathon share configurations and samples and identify test partners through the test management tool. The tool provides them with a list of tests to be performed and enables them to log evidences of the tests being performed. Participants are free to run the test at their own place. Monitors, who are subject-matter experts, verify each test. As for the participants, they have the ability to check the conformance of the exchanged messages that are most critical, using validation services. The management team is provided with indicators that allow them to monitor the testing progress and grade the participants.

2.4. Distribution of Tasks and Responsibilities

A well-thought out organisation, and thus distribution of tasks and responsibilities, is key in an event such as the TOOP Connectathon. Thus, the following keyroles have been defined:

- Master of Ceremony (MC): This role oversees the Connectathon. Amount: 1
- Supporters of MC: This role helps participants towards a successful implementation in the Connectathon. Amount: > 1 person as many as needed, depends on the size of the Connectathon.

- Documenters (one of the Supporters): This role helps to get names and e-mails into Jira and answers questions towards handling and performance of the tool. Amount: > 1 person as many as needed, depends on the size of the Connectathon.
- Monitors: Monitors are assigned to tests, based on their own competencies and skill set. Pilot partners have to convince them that the work, the monitors are effectively grading, is sound; successful pilot partners will always have their logs ready to run and replay again if necessary… Amount: > 1 person as many as needed, depends on the size of the Connectathon.
- Pilot Partners: Amount, at least two.
- Project Managers: This person oversees the pilot in their country. Amount: 1 person.
- DC or DP experts: Technical experts who can support developers. Amount: > 1 person as many as needed, depends on the size of the Connectathon. These are most likely developers in the pilot country.

The Connectathon is a forum, where pilot partners and their technical specialists can exchange implementation experiences and where participants effectively share samples – for example connection experience and specific link documents. These will be checked for conformance to pilot tests using the validation software. It is common for engineers to discuss their own technical issues and to work on the fly with engineers, often from pilot partner organisations, but without pressure. Even though all of them are committed pilot partner members, none of them are commercially aligned. They have many years of experience, often in a commercial environment. The "desire to succeed" is the spirit that is present amongst all participating pilot members. The monitors are not aiming at failing anyone, and the “help-each-other" and "stay-until-it-works" mentality are paramount amongst those present. After all, problems one pilot partner may experience today may invariably arise for another pilot partner tomorrow. There is also the opportunity to meet other experts involved in TOOP project. It is important to recognise that the work is done on a domain-specific basis and in domain-specific sessions, where monitors with domain experience are using their skills, for the benefit and success of all participants.

3. Conclusions

Digitalization and the associated digital transformation are shaping the world we are living in continuously. To reflect the arising necessary changes to existing IT systems, legislation, processes, culture, or education, the European Commission is funding so-called large-scale pilots. These large innovation projects (several million Euros of funding) are aimed at the creation and establishment of European-wide solutions to the before-mentioned challenges, targeting domains such as the Internet-of-Things (IoT), healthcare, 5G, or once-only. An essential part of these large-scale pilots is the cooperation of Member States to ensure a high level of interoperability, once the developed products, services etc. are ready for adoption. To assure sustainable development that will lead to the desired level of interoperabilty, Conncetathons present a more than suitable tool.

Yet, while Connectathons bring together all involved parties - in the case of TOOP DCs and DPs - it does not automatically overcome all existing hurdles of large-scale pilots. Data availability is crucial, as the newly generated services have to be tested for interoperability and compatibility. However, it is often not possible to use real data due to potential data privacy issues. Thus, synthetic

data have to be created and provided to the involved parties, yet without changing the core characteristics. Furthermore, even if enough data are available, semantics play an enormous role. Language and conceptual barriers can often bring data exchange flows to a rapid halt. It is exactly here, where the concept of Connectathon shines, as these issues can be identified immediately at the spot, and then be discussed with the respective domain experts and engineers of the partner. Hence, not only a rapid development pace can be realized, but also an improved understanding of the common domain. As similar challenges may arise in related domains and application fields, the derived lessons-learned, as well as (knowledge) design patterns may be reused by other interested parties, such as other large-scale pilots. Examples of this may be found in the context of the Connecting Europe Facility (CEF) building blocks, which provide the results of former development efforts in form of standard building blocks, e.g., for eID, eDelivery, or eSignature.

The TOOP project has already successfully implemented its version of a Connectathon on the 14th of February, 2019, where data consumer (DC) and data provider (DP) connections between ten Member States took place. Italy and Slovakia deployed data providers (DP) of official company information which were successfully tested by the data consumer (DC) services of Greece, Slovenia and Sweden. Thus, it could be successfully demonstrated that the concept works in the domain of large-scale pilots and that is scalable and suitable for the development of services in regard to cross-border interoperability.

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Workshops

EGOV-CeDEM-ePart

Workshop: Roadmap Towards the Conceptualisation and the Development of the Research Agenda on Compliance Issues of Data Standards

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Abstract: Considering the importance of open standards for government data with regards to the challenge of interoperability, we want to define a conceptualisation of open data standards for data in a digital government context using interactive and engaging techniques.

Keywords: Open Data Standards, adoption, interoperability, framework

1. Motivation

Current eGov literature starts putting focus on the governance and adoption models of data standards, particular standards designed to enhance intergovernmental data exchange (Henning, 2018; Margariti & Stamati, 2018; Balta & Krcmar, 2018). Despite these efforts from existing frameworks and conceptualisations to analyze these governance models, the use of these models have not yet been practiced in innovative projects. As scientific consultants we see questions from the field arising regarding compliance and quality assurement in relation to these governance models.

2. Description and Objectives of the Workshop

The objective of the workshop is to reflect with experts on:

- Current existing frameworks for adoption and governance of data standards and intergovernmental interoperability.
- Inventory of tendencies within the field of data standards and their implementations in software and public administration organisations.

- Challenges: conceptualisation of compliance, quality validation in different governance models.
- Addressing the research agenda to bridge the existing gaps we identified by discussing different cases during the workshop to compose a roadmap for better interorganisational data exchange in governmental ecosystems and with third parties.
- The workshop will start from these existing models and will allow participants to further elaborate and reflect by group discussions.

3. Format of the Workshop

We welcome people with as well technical or non-technical backgrounds to foster the knowledge exchange between disciplines. Participants are recruited via a by a two-track strategy:

a) *onboarding*: the authors will invite practitioners and academia via their own network and via a social media campaign;
b) *including*: the authors will ask the organising committee of the conference to spread our call for participation two months before the due date

The workshop structure, aiming for a duration of 1.5 hours, is as follows:

1) Intro and presentation of the objectives (5')
2) Presentation of the current initiatives and the current challenges;
3) Discussion with the workshop participants on the selected cases
4) Conclusions

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Towards Smart Sustainable City Curricula

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Abstract: City educational modules and courses based on training needs identified by Latin American local stakeholders.

Keywords: Smart Cities, Sustainable Cities, Governance capacity, Latin America.

Acknowledgement: CAP4CITY (Erasmus+ Strengthening Governance Capacity for Smart SustainableCities) project is co-funded by the Erasmus+ Programme of the European Union.

1. Introduction

Smart Sustainable Cities represent a progression of how cities around the world apply digital technology to serve their populations, pursue sustainable socio-economic development, and transform themselves in the process, and require strong capacity for public governance in the digital world. The CAP4CITY project aims at integrating the concept of SSC into various university courses using new teaching and learning tools, as well as developing new curricula in all levels of education process. Given the increasing number of competencies needed and its interdisciplinary characteristic, the curricula for SSC will be implemented in areas such as ICT, Business Administration, Computer Science, Engineering, Architecture and Urbanism, Urban Planning, Political Science, among others, using a collaborative and international network of selected academic institutions in Latin America and Europe. The main outputs of the project include the development, evaluation and implementation of new courses and programmes on SSC, and the provision of an e-learning platform filled with a Massive Online Open Course (MOOC) on SSC.

1.1. Objectives

The objectives of the workshop are to present and discuss the current status of the CAP4CITY project by project representatives, and with an exploratory group work initializing the design of Sustainable Smart City-related, as well as country-specific educational modules and programs, incorporating Latin American needs that are identified by local stakeholders.

1.2. Format of the Workshop

The workshop will be divided into three steps: 1) Workshop opening and project overview (20 min); 2) lightning talks (30 min); and 3) group activity (2 hours).

First we will welcome and obtain brief introductions of participants, followed by an overview of the CAP4CITY project and its preliminary results by Gabriela Viale Pereira (Project Coordinator).

The second part consists of lightning talks on current smart city-related research from project partners. The planned talks are as follows:

- Roadmap for Smart Sustainable Cities in Latin America by Robert Krimmer
- Developments in Smart and Sustainable cities by Marijn Janssen
- Sociocultural Barriers to Smart and Sustainable Cities in Brazil by Edimara M. Luciano

The third step will introduce the training needs identified in workshops that will have been carried out at the Latin American partner institutions with local stakeholders. Then, based on these identified training needs, we will conduct an explorative group activity focusing on:

- Designing the content of the modules in relation to SSCs;
- Identifying courses that should be included in Sustainable Smart Cities programs (Bachelor, Master, and professional education);
- Identifying country-specific modules and courses based on the input of Latin American workshops with local stakeholders.

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EGOV-CeDEM-ePart

Decision Support by Design: Exploring User-Centred Design of Legal Information Retrieval Systems in the Context of E-Government Research

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Abstract: Part of the main objectives of the ManyLaws project is to build a big open legal data (BOLD) database that will contain all legislative information within Europe. We envisioned user-oriented services for public access by all user types. User access and navigation to these services follow a general logic flow, starting from available open legal resources access, through processing and mining, annotation and metadata creation, which are transparent to the final user, towards service provisioning allowing advanced user queries and results visualization.

Keywords: User-centred design, legal information system, decision-support system

Acknowledgement: The ManyLaws project is co -financed by the Connecting Europe Facility of the European Union, CEF-TC-2017-3 Public Open Data.

1. Introduction

The design of everyday artefacts and systems is not always straightforward, and the finished product not always 100% immediately usable. To minimise this tendency, information systems architects have started to adopt a user-centred design (UCD) approach to information system development; a paradigm that places users at the centre of the design process at every stage, from initial system conception to prototype testing and product implementation (Baek et. al., 2008). Although there is a spectrum of ways in which users may be brought into UCD design processes

(ref), the most fundamental aspect of this perspective is the very involvement of users in one form or another. When extended to the domain of e-government, it has been observed that the effectiveness of user interactions, and the quality of their engagement with a given e-government information system, depends largely on the extent to which the information and services being offered are user-centric (Bertot et. al., 2008). It may be argued that an e-government system is not effectively serving its purpose if its users cannot find the information and services they seek, do not understand the results they obtain, do not trust the information they receive or do possess the skills or knowledge required to optimally exploit system functionalities.

The first step in the user interactions with the provided services, is the exploration of national or EU legal corpora in different languages (i.e., English, Greek or Austrian) by using an advanced search function that allows keyword-based or semantic user queries to be posed. The system will then perform a parallel search in targeted EU member-state legal open data sources through parallel translation of search terms.

A number of user-oriented services will be subsequently offered upon the search results, such as further performing a comparative analysis of equivalent or relevant laws from different EU member states and a comparative analysis of connected laws from the same member state by selecting a specific results and selecting the respective service to run. Additionally, by selecting a search result, further user-oriented services that could be selected are related with advanced visual analytics, e.g. tools to enable the monitoring of the status of transposition for a specific law, reference analysis of national laws to European Legislation, or timeline analysis for all legal documents.

2. Objective(s) of the Workshop

The main objective of this workshop is to understand the ways in which user-centred design processes contribute to the development of a successful legal information system within the broader context of e-government. To achieve this, workshop participants will contribute and explore the ways in which they as individuals and professionals use current legal information retrieval systems, evaluate the pros and cons of current search practices and strategies, and identify and articulate previously unrecognised system design needs and preferences.

It is expected that attendees will thus not only understand the underlying vision and concepts fundamental to the ManyLaws project. They will, as prospective users, also contribute to shaping a legal information system based upon their expressed needs. The workshop aims to contribute to the formation of an effective feedback loop, wherein potential users are able to communicate their day-to-day requirements and work preferences to ManyLaws researchers system architects, who in turn have the opportunity to bounce them back in a manner that is at once understandable and easy to validate. In this way, it is envisaged that the workshop will drive the development of the ManyLaws system by enabling system architects to understand how the proposed system will be used by primary users within government, based on which they will be able to develop appropriate services to cater to basic requirements and preferences.

3. Workshop Approach and Structure

The workshop is structured to be highly interactive, and will engage attendees with a mixture of presentations, group activities, and moderated discussions. The workshop is planned as a half day session of three hours, and will be organised as follows: (a) Introduction (5′), (b) Presentation of Session 1 Core Issues: Current use of legal information: context, sources, tools, (15′) (c) Group Activity 1 (40′), Presentation of Session 2 Core Issues: Open Data Issues (15′) (d) Group Brainstorming Session (40′) (e) Presentation of Session 3 Core Issues (15′), (e) Group Activity 2 (40′) Wrap up and further steps (10′).

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EGOV-CeDEM-ePart

Big Data for Policy Making

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Abstract: The objective of the workshop is to present and discuss the Big Policy Canvas Roadmap for Future Research Directions in Data-Driven Policy Making. The aim of the roadmap is to put forward the different research and innovation directions that should be followed in order to reach the anticipated vision for making the public sector a key player in tackling societal challenges through new data-driven policy-making approaches. The road mapping exercise builds on previous projects such as SONNETS, CROSSOVER, CROSSROAD, which adopted a policy-oriented approach including a foresight element by combining road mapping with scenario building techniques. The roadmap defines five main research clusters related to the use of Big Data in policymaking. For each cluster, a series of research challenges and applications are provided.

Keywords: Big Data, Data-driven policymaking, policy cycle, co-creation, crowdsourcing.

Acknowledgement: the research to be presented in the workshop is carried out within the scope of the project Big Policy Canvas, which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769623. Contributors to the research: Esther Garrido, Eleni Kanellou, Panagiotis Kokkinakos, Nuria de Lama, Vittorio Loreto, Ourania Markaki, Gianluca Misuraca, Ricard Munné, David Osimo, Peter Parycek, Nuria Rodrigues, Juliane Schmeling, Giuseppe Veltri, Marcello Verona.

1. Big Policy Canvas Project

Big Policy Canvas - Needs, Trends and ICT Tools for Advanced Data-Driven Public Sector EU funded aims to offer a new perspective on how barriers that impede big data driven modernisation in policymaking can be overcome. Specifically, BPC 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. In this workshop, BPC would like to present to the audience the results produced so far and engage the participants in the co-design of the live roadmap. A cornerstone of Big Policy Canvas is the development of a roadmap for future research directions. The consolidation of such a roadmap, as envisioned by Big Policy Canvas is based upon a highly collaborative and multidisciplinary

approach including discussion and presentation of the roadmap in several high level workshops for gaining input and validation. The roadmapping exercise encompasses three main steps: 1) Identification of the gaps that hinder the rapid and effective uptake of data-driven policy-making and policy-implementation solutions and approaches; 2) Elaboration of a set of future research challenges and application scenarios related to the use of big data in policy making; 3) Definition of a set of practical research directions and recommendations for all stakeholders involved. The aim of the workshop is to discuss and provide contribution in particular to the last two steps.

2. Structure of the Workshop

The workshop will consist of two main sections:

Part One (15') – Data Driven Policy Making and Big Policy Canvas. This first part of the workshop depicts the presentation of the main results of the project and contextualization in the evidence-based policy making area, going into the project's goals.

Part Two (1h 15') – Working session on the Big Policy Canvas Roadmap. The second part of the workshop is a working session on the roadmap, specifically on the part illustrating research challenges.

Specifically, we have defined five main research clusters related to the use of Big Data in policy making: 1) **Privacy, Transparency and Trust**: even more than with traditional IT architectures, Big Data requires systems for determining and maintaining data ownership, data definitions, and data flows; 2) **Data acquisition, cleaning and storing:** when using Big Data for decision making any known limitations of the data accuracy, sources, and bias should be readily available, along with recommendations about the kinds of decision-making the data can and cannot support; 3) **Data clustering, integration and fusion:** combination and meaning extraction of big data stemming from different data sources to be repurposed for another goal requires the composition of teams that combine to types of expertise: data scientists, which can combine different datasets and apply novel statistical techniques; domain experts, that help know the history of how data were collected and can help in the interpretation; 4) **Modelling and analysis with big data:** here the point is to develop effective infrastructures merging the science of data with the development of highly predictive models, to come up with engaging and meaningful visualizations and friendly scenario simulation engines allowing for realistic forecast; **5) Data visualization:** making sense and extract meaning of Big Data can be achieved by placing them in a visual context: patterns, trends and correlations that might go undetected in text-based data can be exposed and recognized easier with data visualization software.

For each research cluster, a set of research challenges will be presented. During the workshop each research challenge will be thoroughly explained and the following topics will be discussed with the audience: 1) External factors hindering or fostering the adoption of Big Data in policy making; 2) Further research challenges to be added to each cluster; 3) Long and short run research prospects; 4) Application cases, tools and methodologies.

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Posters

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Discussing the Twofold Role of Government - Provider and User - in the Open Government Data Ecosystem

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Abstract: This research aims to discuss the role of government in the open government data (OGD) ecosystem as either provider or user. Data collection was performed through a systematic literature review on ninety-four papers and a case study. Interviews, document analysis, and observation were used to study the case of the Government Agency for Law Enforcement and Prosecution of Crimes of one of the Brazilian states. The systematic literature review demonstrated that the use of OGD for government is incipient and, the self motivation of public employees can improve the OGD use.

Keywords: Open Data, Open Government data, Open Data Users, Public Organizations, Brazilian Government.

1. Introduction

Open Government Data (OGD) ecosystem enables the use of data to a broad range of potential users, which includes the government and all stakeholders (Ding et al., 2011). Policy makers, specialists, independent developers, service providers, academics, private organizations, as well as citizens have a potential interest in OGD (Erickson et al., 2013). The motivations to the use of open government data have been attracting less attention than those of providing them. This phenomenon becomes more pronounced when approaching the use of OGD by the government and public organizations, even if the audience of OGD includes government employees (Smith & Sandberg, 2018; Davies, 2010).

Studies have demonstrated that the main interested subjects in OGD are professionals and citizens (Heise & Naumann, 2012), focusing respectively on the development of innovation based on OGD and its transparency and accountability. However, the use of OGD by the public sector is not enough discussed in the literature. OGD are open to both public and private sectors (Jetzek,

Avital e Bjorn-Andersen, 2014). Consequently, it makes sense that public organizations also use OGD (from other OGD public providers) in decision-making and innovation, as well as that the literature covers this topic. Considering the discussed aspects, this research-in-progress aims to discuss the role of government in the open government data ecosystem (provider or user).

The systematic literature review was carried out as a way to identify what has been researched on government as an OGD user. The case study was performed at the Government Agency for Law Enforcement and Prosecution of Crimes of one of the Brazilian states. Five key-informants were interviewed in February 2019. Document analysis was also used as a way to understand the data used as a source for some data in reports. Preliminary data were analyzed through categorial content analysis.

2. Results

The research about the use of open data by governments is incipient (Smith & Sandberg, 2018), and only recently, in 2017, an investigation on public sector was found - Zhu (2017) analysed the case of a justice department, with jurisprudence and other legal documents in the USA. Two other recent studies investigated the use of OGD in the smart cities context (Pereira et al. 2017, p. 8) and found practical implications for use of OGD in smart cities: "Technology has dramatically altered the way government and citizens relate; help in daily activities; and increase transparency, participation, and collaboration." Vieira and Alvaro (2018) developed an experimental platform using OGD to gain productivity for development of solutions for smart cities. An inquiry therefore emerges in regard to future studies: is public employee motivation or training the critical factors to the use of OGD by the government? To contribute to this discussion, a preliminary data of the case study is presented in this section.

An in-progress case study is reported, illustrating the use of OGD by a governmental agency in Brazil (justice prosecutor). Key-informants were interviewed in February of 2019 to preliminarily understand how that governmental agency uses open data. The internal office that performs activities related to data analysis to support strategies and projects for the Government Agency for Law Enforcement and Prosecution of Crimes, based on the full knowledge of the institution, noted the need for more people within the organization to have at least the basics theoretical and practical knowledge of the use of open data. This finding was based on two different circumstances. The first one is the movement on private sector in investing significantly in data analysis and data science of internal or open data, aiming the generating economic value. The second is that the Agency did not always have sufficient data to decide what prosecution processes should be opened, or even data supporting the operations during a prosecution.

The preliminary result of the case study identifies the strategic use of OGD by a public institution and evidences the use of data to qualify management and to pay attention to social problems. In part, the studies of Gascó-Hernández et al. (2018) and Graves & Hendler (2014) corroborate these results. Technical knowledge, the motivation of public employees and their abilities to transform open data in useful information were discussed during in the interviews. Decision-making process and public service modeling, as cited by Gascó-Hernández et al. (2018), were the targets of the

projects developed by the interviewees. Other aspects demonstrated were the use of OGD without specific training, a bottom-up initiative to use OGD, and the existence of data analysis sector. That aspect involves issues to be investigated in many contexts in order for a new direction to theory and practice in the use of OGD to emerge.

3. Final Remarks

This research demonstrates the role of government in the literature about the open government data ecosystem as a provider, and rarely has the literature analyzed government as a user of OGD. It is not clear why the investigations contemplate less the government as a user of OGD. The explanation from the literature is not complete, because the literature does not converge. The literature recognizes the possibility of government as a user of OGD, but nevertheless most empirical investigations do not study the role of government as a user of OGD.

This preliminary research founded a case in Brazil that evidenced the use of OGD without training and initiated from self-motivated public employees. Contributing to this evidence are the scarce empirical investigations, which do not rebound the possibility of the existence of several similar cases around the globe. The main suggestion for further studies is to broad the view about the use of OGD, contemplating public organizations. It will be observed for the origins of initiatives, the actors involved, type of actions or projects, and the challenge of measuring the social and internal impacts of actions. Other case studies might be developed aspects such as sociocultural aspects of the use of open data need to be approached, addressing issues related to social and cultural barriers that prevent the use of data by governments.

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Omnichannel Public Engagement: from Theory to Practice

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Abstract: In this paper, we outline the research of the potential for application of omnichannel approach in e-governance for public engagement from a theoretical point of view and describe our future research project. We applied systematic literature review to investigate the omnichannel concept and highlight its potential application in public sector. The results show that the approach has the potential for application in e-governance and public engagement, nevertheless, further research from technological and organizational points of view is crucial.

Keywords: digital governance, e-governance, public engagement, omnichannel

1. Omnichannel Approach in the Private Sector

Today the omnichannel approach as 'a synchronized operating model in which all of the company's channels are aligned and present a single face to the customer' (Carroll, Guzman 2013, p.4) is becoming a cutting-edge approach to operation of different business areas and functions (e.g. marketing, sales, logistics etc.). It emerges in replacement of multichannel approach as the results of the growing demand for consistent, personalized, seamless experience from customers independently of channel used for interaction, growth of the number of interchangeable businesscustomer interaction channels (Mirsch et al 2016) and that customers have become 'more complex' (more knowledgeable, demanding, empowered etc.) (Carroll, Guzman 2013, p.2) that requires more thorough collection of data on the customers and their needs.

Implementation of this approach in private sector faces two main types of challenges: (1) technological which consist in the necessity to integrate data silos and make information systems interoperable, (2) organizational, because as some researches show introduction of omnichannel approach in certain aspect of business's activity causes the need for corresponding changes in other aspects or even strategic review in certain areas of their business (Hübner et al. 2016).

2. Omnichannel Approach in the Public Sector

Historically e-governance was developing as a ramified system on the basis of the pattern of existing governance system with multiple isolated channels and forms of interaction with citizens and organizations. Projects removing duplication and providing an integrated experience (e.g. one-stop-shops etc.) have already demonstrated their effectiveness and popularity. For now, omnichannel approach is also gradually gaining its popularity in the public sector (Pieterson 2017). But still, there is a lack of developments specific to the public sector as the public sector mainly refers to private sector experience and practices in this field. In public sector success of omnichannel approach depends on integration on four levels: (1) organizational, (2) services and processes, (3) It systems, (4) data (Pieterson 2017). Certain peculiarities of the public sector (such as more complicated organization, a wider range of types of services, interactions and counterparties etc.) make the implementation of omnichannel approach even more relevant.

3. Omnichannel Public Engagement Perspectives: Estonian Local Governments

Despite yet omnichannel approach was not applied systematically anywhere in the world, technologies enabling omnichannel approach are applied in Estonia in e-governance (e.g. x-Road) and public engagement (e.g. VOLIS and Amphora integrating different public engagement functions) (Pappel 2011). Application of such technologies may be one of the factors behind the high effectiveness of Estonian e-governance system.

4. Future Research

In the future research, we plan to consider a technological perspective on the omnichannel public engagement because the implementation of the omnichannel approach faces a range of technological challenges linked with the necessity to ensure interoperability of information systems and integration of data. Also, the future research will require joint consideration of technological and organizational facets of omnichannel approach, as these facets are tightly interconnected.

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Insights from Natural Language Processing

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Abstract: We present an exemplary text categorization pipeline for online citizen participation and aim at discussing our ongoing research in terms of insights from natural language processing (NLP) application. For each of the steps in the categorization pipeline, we share our experience in terms of challenges and potential measures to address these challenges.

Keywords: NLP, citizen participation, text categorization, machine learning

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1. Text Categorization Pipeline for Online Citizen Participation

Artificial Intelligence (AI) is a current topic in information systems research and technology advances are present (cf. e.g. Gao, Galley & Li, 2019; Mirończuk & Protasiewicz, 2018). As many other domains, the public sector is a domain for which the use and appilcation of AI is considered and even already in use (cf. e.g.Androutsopoulou, Karacapilidis, Loukis, & Charalabidis, 2018). One potential application is the use of AI for NLP in citizen participation processes, since online citizen participation includes usage of information and communication technology in societal democratic and consultative processes focused on citizens (cf. e.g. Sæbø, Rose, & Flak, 2008). For instance, AI can potentially support both the creation and the analysis of ideas contributed by citizens.

Unfortunately, AI & NLP face a number of challenges in the process of their application and citizen participation is no exception to that. The necessary data to train and test AI models is often difficult to access, if available in digital form at all. Furthermore, there is a reluctance of public sector entities to share data across juriditions, which hinders the integration of meaningfull data. Once the data is collected, it has to be pre-processed and standardized to overcome heterogeneity issues. For example, citizen participation processes adapt the categories to the specific purpose of the process and therefor cannot be compared directly. Third, there is a variety of AI and NLP methods and tools

with varying properties. Given these challenges, it is hardly surprising that there are no established pipelines or standardised procedures to build AI & NLP applications for citizen participation yet.

Our research-in-progress aims at understanding how to process data for AI application. Using the application scenario of citizen participation, we aim at working towards creating an overview of buildoing blocks and processing pipeline of NLP by giving an overview of state-of-the-art NLP technologies as well as advantages and disadvantages of their application. In our research, data from 10 participation processes has been collected and pre-processed. In order to be able to compare data from different processes, a data model has been developed. Two different AI models have been trained to categorize ideas based on their description: Lingpipe (Carpenter, 2007) and BERT (Alberti, Lee, & Collins, 2019). The succes rate of the models was evaluated by comparing them to the sucess rate of categorization by experts.

We share our experience regarding the pipeline: starting with data sampling, followed by pre-processing and model selection for categorization of ideas of submitted during citizen participation in a German city and, finally, evaluating the results. For each of the steps in the pipeline, we describe challenges and potential measures to address the latter. Moreover, we give an overview of state-of-the art NLP technologies as well as chances and risks of their application. In summary, the achieved results - even though preliminary - are promising. The categorization of citizen participation ideas with AI comes close to the actual success rate of experts.

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Blackbox AI: What is in the Box?

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Abstract: We present insights from a chatbot prototype for online citizen participation and discuss particular benefits and caveats of artificial intelligence (AI) application in the government domain. We present an argument that AI represents a blackbox not only in terms the reasoning process itself, but also in terms of applying different building blocks "out-of-the-box". Our research shows that customizing an AI application involves a hardly manageable combination of buildings blocks: various machine learning techniques, data sources and user interaction designs. Since those building blocks might not fit the requirements of a particular use case, the required effort to configure the expected behaviour should not be underestimated.

Keywords: AI, architecture, chatbot, citizen participation

Acknowledgement: This research is part of the project "Civitas Digitalis" which is funded by the German Federal Ministry of Education and Research (Funding ID: 02K15A050).

1. Insights from a Chatbot Prototype in Citizen Participation

Being a topic of intensive research, Artificial Intelligence (AI) is expected to change the way we work and live. Particular applications involve providing better predictions based on data and models adjusted by machine learning. AI has found its way in the government domain as well, with applications being already evaluated in practice (cf. e.g. Androutsopoulou, Karacapilidis, Loukis, & Charalabidis, 2018; Hagen et al., 2015).

Despite expectation of its common and ubiquitious use, AI is not clearly defined and can include a diverse range of methods, tools and approaches. Suitable AI applications often require diffrent buildings blocks such as machine learning techniques, data sources and user interaction designs. Given the pace of technology advancement (cf. e.g. Gao, Galley, & Li, 2019; Mirończuk & Protasiewicz, 2018) as well as available tools and frameworks (cf. e.g. Braun, Hernandez-Mendez, Matthes, & Langen, 2017), applying AI can be compared to making use of a "black box". The

complexity and the variety of the potential building blocks of such a black box require additionally extensive domain knowledge and experience. Moreover, the application of AI in government underlies strict laws such as the accountability and transparency of action. Consequently, it is of crucial importance for sustainable AI application to study questions such as: How to manage the complexity of AI applications? What are building blocks of an AI application? What infrastructure do we need to share AI building blocks?

We aim at providing a palpable example that allows for discussing particular challenges and potential courses of actions regarding AI application in government. Therefore, our research goal is to introduce a set of building blocks and corresponding technologies for the application scenario of a conversation agent - a chatbot - for online citizen participation. Consequently, our research-in-progress gives a first glimpse into the black box AI and proposes the development of reusable architectures for AI application. To support our arguments, we build a conversation agent that uses natural language processing technologies for facilitating the ideation of citizens in participation processes. We describe and discuss challenges of four different building blocks: entity recognition, slot filling, intent detection and intent-action mapping.

Our research should be of value for both academia and practice by providing concrete implications for AI design and application in government.

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Measuring Public Innovation in Europe. The STARPIN Methodology

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Abstract: The poster is based on the StarPIN project – Statistical Reporting on Public Innovation- carried out for Eurostat by the Università degli Studi di Urbino Carlo Bo, Italy, with the support of Dialogic of the Netherlands. A theoretical and a methodological framework is proposed for enriching the measurement ability of public sector innovation, and the implications for data collection and analysis are discussed. A preliminary test of the framework is carried out by means of pilot applications to specific public services. The paper focuses on public service innovation as a key locus of value creation for society, choosing an object-based rather than the more commonly adopted subject-based approach. Issues concerning the measurement of public service innovation are addressed in statistical terms and consistently with the official public sector functions classifications. A particular emphasis is placed on web scraping to capture the technological level of websites used by public administrations, and to evaluate the degree of innovativeness of specific services within selected public functions. Data collected through web scraping are combined with administrative data at the level of individual services. Based on pilot applications to specific public services in a limited number of countries, the paper draws the lines for an extension of applications to potentially all public service domains and all EU member states.

Keywords: public service innovation, innovation measurement, innovation data source, web scraping, administrative data

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1. Conceptual Pillars

The StarPIN approach relies on three conceptual pillars: (1) placing public service innovation at center stage, (2) adopting and object based approach, and (3) interpreting public innovation as an increase in public value. We derive these conceptual pillars from two largely complementary strands of literature. The first stream of contributions – focusing on public service dominant logic – draws the attention of scholars and practitioners to the fact that services are the most important dimension

of public sector activities. Hence it is this area that the analysis of public innovation must focus upon. Emphasising this dimension of public sector activities is consistent with the widespread perception that service provision is a fundamental mandate of government at all levels, even in an era of shrinking public budgets. Moreover, the key role of public services also reflects a general trend that can be observed towards the "servitisation" of the economy as a whole. The second strand of literature – the one on public value creation and co-creation – highlights the need for a reflection on the economic and social consequences and outputs of public service development and the identification of aims pursued through public innovation. From this perspective, a focus on public R&D expenditure and technology adoption makes sense only if associated with a consideration of actual usage/effects in terms of new or increased value created for the society, either considered as a whole or in its components.

2. Methods and Tools

The consistency between public functions, public institutions and public service classifications is discussed. The National Accounts' classification by Functions of Government (COFOG) has to be kept as the main reference for international comparison purposes. As an integration, the NACE classification – not always easily matched with COFOG's divisions and groups – was replaced by the Classification of Products by Activity (CPA), where "activities" are just those included in the NACE classification, so a full consistency among the three classifications can be assured.

The project is based on the integration of statistical data, data collected through web scraping and administrative data, all referred to a set of services and to the institutional and geographical entities involved in their provision. Services are associated to specific characteristics that can be ordered according to a hierarchical "ladder" in terms of innovativeness. Institutions involved in their provision can thus be classified as more or less innovative in the provision of each individual service by observing the level they appear to have reached in the ladder of innovation capacity. While the analysis was conducted in view of its application to specific public sector domains, the method described can be applied to any category of public services. The steps described include: the identification of public services, in correspondence with extant classifications, and of institutions involved in their provision; the description of service characteristics that can be associated with different levels of innovativeness; the singling out of descriptive tools (a list of keywords and of logically grouped sets/"baskets" of keywords) that can be managed via web-scraping techniques; the running of web-scraping using appropriate techniques; the organisation of results of data obtained through the web-scraping process; the validation process through the use of complementary data sources, including administrative data.

(A description of the web scraping source is provided in the full research paper and details of the preparation activities for setting and running the tool are organised in the User manual: https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-GQ-19-002?inheritRedirect=true&redirect=%2Feurostat%2Fpublications%2Fmanuals-and-guidelines).

3. Results

The main result of the research consists of the definition of the phases of the process for collecting data on public service innovation based on web-scraping, and drawing from different statistical and administrative sources for additional controls. The main steps of data collection identified are: A. Identifying and selecting the public service; B. Identifying institutions involved; C. Capturing the degree of service innovativeness; D. Defining the tools for web-scraping; E. Running the web-scraping; F. Organising the results according to the innovativeness indicator and analysing the process outcomes; G. Validation phase and cross-sectional data analysis. On this last phase, the innovativeness level score obtained through the described process using web-scraping techniques is then 'controlled' checking its coherence with administrative and statistical data related to the service studied and with the actions and phenomena related to it.

The StarPIN methodology exhibits a high potential in terms of data generation with implications for our knowledge and understanding of innovation in public sector innovation. The main results stemming from the pilot application of the methodology are shown and commented for 5 EU countries, with illustrative analyses based on the newly collected data. The bulk of data collection and elaborations refers to the Waste Management service domain, built and refined in two pilot countries in particular, Italy and the Netherlands, and extended to Portugal, Slovakia and Sweden. It is shown that the methodology has the potential to capture at least part of the innovation phenomenon in this sector. Some expectations, based on previous surveys and data collections at a more aggregate level, have been largely confirmed, as in the case of the positive performance of Nordic countries. Nevertheless, the data allow describing a more substantial heterogeneity across countries in terms of innovativeness of service provision. Furthermore, the StarPIN methodology allows exploring innovation at a much more detailed and significant level, as it allows some inference on innovativeness of municipalities in the provision of individual services. The richness of micro-level data can be exploited to evaluate patterns of innovation, their determinants and effects on (public) value creation.

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In Search for Consensus

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Abstract: We present our research-in-progress on designing Blockchain/ Distributed Ledger Technologies-based IT-architectures in government. Our approach consists of three steps: need analysis, feasibility study, and architecture design based on exchangeable building blocks. We argue that DLT should be defined as a trust layer atop of existing IT-infrastructure instead of replacing existing information systems. To support our claim, we provide an exemplary application.

Keywords: Blockchain, DLT, IT-Architecture Design

1. Designing Blockchain/DLT-based IT Architectures in Government

Blockchain and DLT have recently gained a lot of interest regariding their application beyond cryptocurrencies such as Bitcoin. They are expected to have an impact on the digital transformation of government around the world (cf. e.g. Ølnes, Ubacht, & Janssen, 2017). In particular, novel approaches to manage business process could emerge (cf. e.g. Mendling et. al., 2018).

Still, due to the novelty of the technology as a bundle of economics, cryptography and distributed systems research domains, realizing its particular potential in real-world applications proves challenging. First, there is a diverse landscape of DLTs with a relatively high pace of continuously emerging projects and software platforms, which results is a challenge of selecting a suitable technology. Second, the suitability of DLT building blocks to different requirements is hardly comparable, since DLTs differ in the functionalities and their fitness to purpose. Third, we experience a lack of approaches to estimate the particular need for DLT as means for reaching shared consensus, which leads to less convincing arguments of why to apply DLT vs. a centralized solution.

Our objective is to present our research-in progress work on engineering a method for DLT-based IT-architecture design in government. Our research is, in general, design science oriented (Hevner, March, Park, & Ram, 2004) and, in particular, focused on method engineering (Brinkkemper, 1996). The method we work on involves three steps: need analysis, feasibility study, and architecture design based on exchangeable building blocks. The need analysis is conducted by studying resource

dependencies among stakeholders (Balta, Greger, Wolf, & Krcmar, 2015) of a potential DLT application, including their need for consensus. To study the feasibility of DLT, we focus on governance aspects (Beck, Müller-Bloch, King, 2018) and study suitable building blocks (Wang et. al., 2019). Finally, we design an architecture (Kruchten, 1995), where DLT acts as a trust layer atop of existing IT-infrastructure instead of replacing existing information systems.

Our method is still in a phase of intensive research and is evaluated in various use cases. To present is potential applicability, we introduce the case of facilitated child benefits application in Germany with consensus reached based on DLT. We believe that our research is of interest for both academia and practice and hope to foster fruitful discussions and derive concrete implications.

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Social Media, Transparency and the Question of African Governance

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Abstract: Scholars all over the world have done plenty of research on social media, since it is a topic that has been discussed and argued about its use, its importance, and even its shortcomings. However, while most researchers have dwelt on the use of social media in bringing down authoritarian regimes, not much has been discussed about how governments could be more transparent through social media. The poster is derived from my research on how social media could contribute towards transparency and accountability in African governance. It focuses on two main issues: if and how social media could contribute towards transparency, and also if there really is an issue with good governance in Africa.

Keywords: African Governance, Social Media, Transparency, Transparency and Accountability

1. Introduction

When Americans cast their votes in a highly-contested election is 1948, the Chicago Tribune broke the results prematurely with a banner headline "Dewey defeats Truman". Even though New York Governor Thomas E. Dewey was expected to win the race, it was the incumbent President Harry S. Truman who ended up with the majority of votes. Most people around the world knew nothing of the premature headline. Fastforward 68 years later, widespread news posting and sharing through social media caused many to believe that Hilary Clinton will be the next US president, and everyone was left dumbfounded when Donald Trump was announced winner (Becker, 2018: 119). It was the hottest topic around the globe. It also proved that new media technology has changed the way people interact, and that the world prefers a new communication tool to get into discussion: social media.

1.1. Social Media in African Governance

Unver (2017) says that the last decade has witnessed a change in the use of social media platforms from being a place where friends could meet and catch-up, to becoming inherently political governance systems. By connecting politicians, voters and large businesses, he says, it is completely changing the nature of the initial intended use of the platforms and offering more ground to political participation (Unver, 2017: 127).

Agreeing with this are Oginni and Moitui (2015) who point out that social media platforms have over the last decade managed to alter modes of communication between people and their leaders, opening chances for a wider range of political participation (Oginni & Moitui, 2015: 160). This is evident as the world has been experiencing a whole new wave of political interaction between people from different countries and different political ideologies, but most importantly different leaders scrambling to promote their own political agenda through social media platforms. Nevertheless, not all leaders seem to be embracing this opportunity.

In some parts of the world, people and other institutions are blaming governments for not communicating at all. Africa is a good example of this, with its leaders being accused of having non-transparent governments and not responding to issues raised by their fellow citizens. This, they are told, is against the principles of good governance. On the other hand, however, questions on the right definition of good governance are raised, with some wondering of it is the right terminology or imperialism-influenced.

While scholars like McFerson (2009) rely on the definition referring to the six key dimensions of the Worldwide Governance Indicators (WGI) compiled by the World Bank since 1996, others have actually argued that good governance is moral neo-colonialism (Widdows, 2007: 306) and specifically termed for African countries to be used as the accepted belief for interventions in the continent by development institutions that dominate the world (Onazi, 2013: 75). Regardless of all these arguments, we should note that post-colonial era, the topic of governance has dominated discussions not only from the so-called development partners, but also the ordinary African man. This raises the question: Can governments be more transparent through social media? Is it a platform worth embracing for governments in the 21st century?

2. Research Questions

These arguments will lead my research into answering four questions that are also found in the poster:

Research question one:

- Is good governance really a challenge with African governments, or are these imperialism-influenced observations?

Research question two:

- What have the levels of transparency in Africa been before and after the introduction of social media?

Research question three:

- Should African governments interact more with people through social media?

Research question four:

- In which form could social media contribute to the enforcement of transparency and accountability in African governance?

Results from this research will help improve transparency in Africa, strengthen government-citizen relations, improve service delivery, and most importantly, rebuild a more developed African continent.

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