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EGOV-CeDEM-ePart 2020

Proceedings of Ongoing Research, Practitioners,

Workshops, Posters, and Projects of the International

Conference EGOV-CeDEM-ePart 2020

31 August-2 September 2020 Linköping University, Sweden (Online)

EGOV-CeDEM-ePart 2020 is organized by the IFIP WG8.5 on ICT and Public Administration

Conference Website:

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Welcome to EGOV-CeDEM-ePart 2020!

In a year marked by extreme unpredictability, one that has borne witness to the deferment or outright cancellation of numerous large gatherings and events, the third edition of this landmark conference has been moved completely online and is nominally hosted in its new digital avatar by the Linköping University, Sweden from 31 August - 2 September 2020. Undeterred by recent global events, these proceedings continue with the time-honoured tradition of showcasing high-quality academic and practitioner research-in-progress as Ongoing Research Papers, Reflections and Viewpoints, Workshop Proposals, and Poster Summaries that critically explore both well-established and emerging research issues, ideas and innovations from across the spectrum of the EGOV-CeDEM-ePart 2020 conference tracks: e-Government and e-Governance; e-Democracy and e-Participation; Artificial Intelligence, Data Analytics and Automated Decision Making; Smart Cities - Governments, Communities, Regions; Social Media; Social Innovation; Open Data - Social and Technical Aspects); the Digital Society; Cybersecurity; and Legal Informatics.

The quality and breadth of this year's submissions once again serve as a reminder for us to never discount the importance of ongoing research within the scholarly canon. This form of research publication constitutes an excellent medium for researchers to engage with emerging research gaps and issues situated either within the mainstream or at the fringe of their chosen disciplinary field. Let us take a look at, for example, work published within these proceedings on the subject of Open Data. Increasingly, every aspect of daily life is being impacted by the data revolution, and the

effective collection of data together with its practical application in real-world contexts is fast becoming one of the top strategic priorities of modern-day governmental actors and agencies. In their research paper, David Osimo, Francesco Mureddu, Vassilios Peristeras, Anita Cioffi, Cristina Moise, and Charlotte van Ooijen take a critical look at a selection of existing self-standing so-called "data strategies" aimed at maximising data-driven innovation in public administration. Their research opts to examine those strategies that have been recognised as pioneer approaches to public sector data governance, and to highlight the reasons for which these initiatives are considered as being at the forefront of data-driven public service provision. In complementing this notion, Ilka Kawashita, Ana Alice Baptista and Delfina Soares provide us with a rigorous assessment of current Open Government Data (OGD) benchmarking instruments, and argue that such an evaluation can be used to help improve both data quality and the conditions under which OGD is shared and reused. Elisabeth Gebka, Jonathan Crusoe and Karin Ahlin attempt to give an experiential twist to the concepts discussed in preceding papers, reporting on the development of a workshop-based technique rooted in design science research that may be used as a facilitator script by practitioners, data providers, or OGD re-users to inspire and inform their handling of open datasets. Similarly, Ahmad Luthfi, Boriana Rukanova, Marcel Molenhuis, Marijn Janssen and Yao-Hua Tan test, through the use of a case study, a Bayesian-belief Network method to demonstrate support for the proposition that a conscious decision to disclose their datasets is required from governmental actors. In recognising that that Open Data research is a crucial component in the creation and maintenance of sustainable Open Data ecosystems, Bastiaan van Loenen and his colleagues develop through their work an interdisciplinary multi-domain research approach that may be applied in so-called Open Data beginner countries such as Croatia to evaluate their efforts in this domain.

Electronic Participation also makes a comeback within the pages of these proceedings as a cutting-edge field of study. Andrei Chugunov, Yury Kabanov and Georgy Panfilov critically explore the quality of e-participation platforms and tools in the Russian context, and present a framework for their immediate evaluation. The authors apply the proposed framework to evaluate over 200 portals across Russia, and posit that their differences are representative of the current e-participation state-of-play in the country. Moving over to the United States of America, Angie Westover- Muñoz, David Landsbergen, and Amanda Girth critically explore how the local authorities in smart cities engage citizens in their digital transformation programmes, and generate popular support for smart city initiatives. Maria Murphy also takes a critical look at mobilising citizens, this time through the enactment of crisis volunteerism, based on data obtained from Sweden during the time of the 2018 forest fires. Extending this idea, Olga Filatova and Radomir Bolgov present us with a rigorous analysis of the digital public sphere in Russia, delineating the prerequisite environmental conditions, as well as the required characteristics of tools, necessary for the establishment of effective two-way communication between government and the general population. Christian Madsen, Willem Pieterson and Sara Hofmann focus our attention further on how channel choice - digital or traditional - and effective multi-channel management are vital in establishing meaningful government-to-citizen interaction. In the light of rapid developments in new and innovative communications technologies, Jesper Holgersson and Max Ellgren caution that some vulnerable groups in society, including senior citizens, are in danger of being excluded. Based on data collected in Sweden, they argue that the negative effects of rapid technological progress might be mitigated through the provision of adequate training and soft-skills development.

Other ongoing research papers published in these proceedings critically explore co-creation and co-production in the context of innovative new technologies. Evrim Tan and A. Paula Rodriguez Müller critically discuss how Blockchain technology, in creating an autonomous, transparent, and secure decentralized system, facilitates the redesign of public governance systems and the adoption of co-production practices in a similarly more transparent, efficient and effective manner. Lieselot Danneels and Stijn Viaene similarly explore open IT-based co-creation practices for public service provision, and report on how the open innovation and technological platform literature can be used to better inform empirical research on the topic.

The term 'smart cities' may be used to broadly identify, describe, and analyse the challenges faced by urban stakeholders when they use ICT to address prevailing urban challenges. One aspect of research conducted within this field focuses on the political actors behind the policy decisions, and the factors that motivate them to pursue a particular course of action. In their ongoing research paper, Aneta Kulanovic, Fredrik Carlsson and Elin Wihlborg examine how political leaders at the municipal level in Sweden perceive their own personal capacity and assess their own confidence in pursuing policies aimed at building more smart cities. Xiaoyi Yerden and colleagues turn to examples of smart city development in Ignacio, Colorado and Chicago, Illinois to provide us with a comparative study of the role of public libraries in promoting stakeholder engagement within these initiatives. In exploring the darker side of smart city transformation, Leif Skiftenes Flak and Sara Hofmann argue that smart city initiatives can at times challenge human rights. They voice concerns that vulnerable groups in society are prone to exclusion, and to the violation of fundamental freedoms including those of expression, adequate standards of living, and access to public services.

Modern administrations, it is argued elsewhere, need to exchange an increasing amount of information in order to pursue their policies and to deliver better services. The study conducted by Maxim Chantillon and his co-authors aims to portray the complexity inherent in current European systems of governance. Through a case study based in Belgium, this research seeks to highlight the importance and usefulness of Multi-level Governance as a concept applied to better understand policy developments in the e-government domain. Leif Sundberg, through the critical examination of data collected in Sweden, similarly aims to explore the demographic parameters of electronic services diffusion resulting from the intensified use of digital technology. Nitesh Bharosa and Marijn Janssen are also concerned with understanding the innovation standards and guidelines necessary for the successful harnessing of digital technologies to promote a more fair and inclusive society. They share experiences of starting a quadruple helix ecosystem for public service innovation in the Netherlands, known as Digicampus, that involves the active participation of governmental actors, academics, and citizens. Our focus then turns towards immigration, within which domain Luz Maria Garcia-Garcia and J. Ramon Gil-Garcia examine the role played by intermediaries in the provision of targeted digital public services. The impact of rapid digitalisation is also examined within the context of service provision in the healthcare sector. Diana Frost and Mufti Mahmud take a close look at the strengthening of healthcare systems infrastructure through enhanced stakeholder engagement, while Pasi Raatikainen and Samuli Pekkola argue for the correct identification of the target users of such information systems to better serve their requirements. Complexity in public administration, and the role played by user-centric information systems design in its reduction, are also explored in the research article by Inayat Ullah and Wafa Akhoubzi. Through a critical

discussion of the Punjab Land Record Management Information System (PLRMIS), the authors report on the results of a thorough systems impact analysis, and evaluate the validity of the approach to digitalisation being pursued by the Pakistani province of Punjab.

Staying with the deployment of advanced technologies in local government, Ida Lindgren presents the results of an ongoing research project designed to map the current use of Robotic Process Automation in Sweden. The ultimate aim of the initiative is to develop an analytical tool that can be used by both researchers and practitioners to decide whether, and to what degree, a specific process warrants automation. In a similar vein, Per Rådberg Nagbøl and Oliver Müller report on X-RAI, a framework for quality assurance that may be applied to evaluate machine learning models in production within the Danish context.

Policy and best practice solutions are discussed in several ongoing research papers as being the appropriate means by which the chances of e-Government project failure are reduced. Colin van Noordt, Rony Medaglia and Gianluca Misuraca compare and evaluate the strategies rolled out in European Union member states aimed at enhancing the uptake of Artificial Intelligence in public administrations. Meanwhile, Martin Lukáš and Miloš Ulman critically examine Enterprise Architecture (EA) projects, and argue for the adoption of best practice in the selection of EA elements to reduce ambiguity in any systematic project evaluation. Björn Lundell, Jonas Gamalielsson, and Andrew Katz address the vital issue of how public sector organisations can, in theory, deploy a proprietary SaaS solution while simultaneously retaining control of their digital assets. Once again considering the development of effective policy, Michael Kizito and Johan Magnusson, take a close look at how healthcare policies in Sweden and Uganda are positioned in terms of possessing ambidextrous balance, arguing that these sorts of policies need to facilitate the concepts of exploitation and exploration in equal measure. In their ongoing research paper, Boriana Rukanova and colleagues attempt to advance our understanding of how collective data analytics capability building processes contribute to the realisation of value by participating organisations.

As the importance of the role played by digital technologies in the generation of social value has increased, Annika Hasselblad and Leif Sundberg argue that the logic underpinning this value creation now needs to be urgently considered. The authors outline and compare the logic of two so-called "ideal-type" societies, and their (in)compatability with an industrial-based NPM logic when it comes to setting and executing policy in key sectors of the economy. The final ongoing research paper of these proceedings critically explores the impact that the Open Government doctrine has on the public disclosure of citizens' personal information. Matteo Pastore, Maria Angela Pellegrino and Vittorio Scarano investigate herein which combination of best practices should be followed, based on data published by the Italian government.

This year's proceedings present to the reader three Reflections & Viewpoints, inviting us to take a closer, more critical look at e-participation and e-democracy from the distinct perspective of the author. Marius Rohde Johannessen and Lasse Berntzen consider the need for an in-between, low-threshold type of democracy that involves the so-called "silent majority" of citizens. Based on their findings from various cases, the authors argue that this type of system can contribute to what they term call "stealth democracy" or "implicit democracy", terms that imply the regular provision of feedback by citizens on particular issues raised by politicians. Ulrika Lundh Snis, Irene Bernhard,

and Anna Karin Olsson reflect on the nature of stakeholder challenges arising during the development of a "smart old town", and examine the possible innovative solutions available to overcome them based on stakeholder involvement and governance. Smart objects, cyber-physical systems and applications based on Artificial Intelligence also open up new possibilities for police forces worldwide. In taking a closer look at the potential benefits accruing from the deployment of advanced technologies to support day-to-day policing, Jörn von Lucke poses some essential questions about the limitations and risks associated with technology-driven law enforcement.

Workshops provide organisers with the means of tapping into the scholarly and experiential knowledge of the participants. Two workshops are featured within these proceedings this year. Bastiaan van Loenen, Ali Mansourian, and Frederika Welle Donker aim to facilitate, during their allotted session, the sharing of experiences from the Geographic Data domain with the Open Data research and education community to promote and strengthen active innovative learning and teaching in both disciplinary spheres. The express purpose of the second workshop, curated by Anne Fleur van Veenstra, Gabriela Bodea, Tjerk Timan, Gianluca Misuraca, and Colin van Noordt, is to validate a methodology that may be used to assess the social and economic impacts of Artificial Intelligence on public services, and to develop a roadmap for its eventual implementation - including the identification of potential opportunities, threats, enablers and barriers.

The selection of posters featured within these pages provides researchers with the ideal platform to showcase their current work, and to encourage conference attendees to think more deeply about specific research questions or topical research issues. Daniel Toll and Fredrik Söderström, for instance, examine the portrayal of Robotic Process Automation (RPA) solutions by vendors to potential public sector clients. They argue that although RPA has been much touted as a means to solve challenges within public administration, new problems and challenges arise continuously during its deployment in the public sector. One reason for this, they claim, may indeed be a mismatch between how the solution is portrayed prior to its purchase, and what it turns out to actually deliver. In their poster, Fritz Meiners and Fabian Kirstein present a prototype of a chatbot for Open Government Data known as ENDA, which is based on the ChatScript framework and the Linked Data specification for public sector datasets DCAT-AP, and is aimed at resolving usability issues prevalent in existing Open Data access points and solutions. The objective of the poster authored by Michele Benedetti, Claudio Russo, Luca Tangi and Irene Vanini is to advance a framework for the measurement, and the subsequent assessment, of the overall impacts of Open Government Data owned and published by public agencies – particularly in terms of value creation and efficiency bolstering.

We hope that you find the conference in its new digital format as enjoyable and as stimulating an experience as in past years! The editors would like to thank the contributing authors for their hard work, dedication, and passion; 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 2020 conference an event to be remembered.

Enjoy reading!

Ongoing Research

EGOV-CeDEM-ePart

Data Strategies, Policies and Agenda

David Osimo*, Francesco Mureddu**, Vassilios Peristeras***, Anita Cioffi****, Cristina Moise*****, Charlotte van Ooijen******

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Abstract: Every sector of the economy is affected by the data revolution – and so is government. Data is becoming one of the top strategic priorities of digital government. Many local, national and supra-national organisations have adopted "data strategies": but the actual content of these strategies can vary substantially. In most cases, there is an overarching digital agenda include a digital government policy. Other data strategies are developed in the context of industrial policy, typically covering the overall economy, beyond government, and are designed to grasp the opportunities of artificial intelligence. This paper looks at dedicated self-standing data strategies aiming to maximize data driven innovation in public administration: the Data Agenda Government for the Netherlands, at the New Zealand Data Strategy and Roadmap, and at the initiatives Barcelona Data Commons and Findata. These strategies are typically implemented by those countries or agencies that are at the forefront of data driven public services. Each case includes a high profile, strategic policy initiative. The cases can be considered pioneers in ensuring a strategic approach to data governance in public administration.

Keywords: Data Agenda, Building Blocks, Data Analytics

1. Introduction

1.1. Background of the Paper

The data explosion is affecting all aspects of the society and the economy – and public administration is no exception. Data is a fundamental resource for carrying out all government activities, from regulation to service provision. And governments everywhere and at all levels are looking into the opportunities of data driven innovation, and in many cases experimenting with it. IDC estimates that central government is the fifth largest industry of the of the big data analytics market, covering about 7% of the expenditure, and growing fast. A recent study by Deloitte (2016) identified 103 cases

of big data analytics in government. In that regard, the Communication on "Data, Information and Knowledge management" calls for a more strategic use of data, information and knowledge. In this context, a data strategy (DataStrategy@EC) and a related Action Plan have been set-up in 2018, with the objective of transforming the EC in a data-driven organisation. The eight actions of the Action Plan are centred around 5 different dimensions: data, people, technology, organisation, policy. The data strategy highlights indeed that these dimensions need to mature and evolve harmonically to deliver a real transformation on how data is used in the decision-making processes. In 2019, an operational governance framework has been set up to closely follow-up the implementation and the evolution of the Action Plan. The 2016-2020 ISA² (Interoperability solutions for public administrations, citizens and businesses) programme funded with a budget of 131 million euro, aims to support the development of digital solutions that enable public administrations, businesses and citizens in Europe to benefit from interoperable cross-border and cross-sector public services. All these initiatives foster data-centric public administration. But where do we stand? To understand that the European Commission has commissioned the study Data Analytics for Member States and Citizens, which provides policy Directorate Generals of the European Commission and Member States public administrations with a knowledge base and guidance on the adoption of public sector data strategies, policy modelling and simulation tools and methodologies, and data technologies fostering a data-centric public administration. Specifically, the study covers three domains in relation to data analytics in government:

1) Data strategies, policies and governance: initiatives in the public sector both at the strategic level, such as data strategies, data strategies, data governances and data, management plans; and at organisational level, aimed to create units or departments, and to elaborate new processes and role;
2) Policy modelling and simulation: initiatives to improve policy analysis through new data sources, robust and reliable models to perform "what-if" scenarios, predictive analytics and hypothesis testing, and tools allowing policy makers to carry out scenario analysis through intuitive interfaces;
3) Data technologies: new architectures, frameworks, tools and technologies to be used by public administrations to gather, store, manage, process, get insights and share data. This domain includes the study of how data are governed as well as data collaboratives, and in particular stresses the joint analysis of governance and technologies.

The paper presents the result for domain 1 building on five case studies selected for the in depth analysis, based on the level of ambition and maturity: Barcelona Data Commons, Data Agenda Government in the Netherlands, New Zealand Data Strategy and Roadmap, Secondary use of health and social data (Finland), and Udbetaling Denmark. The cases can be considered pioneers in ensuring a strategic approach to data governance in public administration. These are not economy-wide data strategies – like the digital agendas or data economy strategies, but initiatives focusing on greater adoption of data driven solutions in the public sector. The pape starts off by providing a basic description of the strategies, their objectives and structure. The third section deals with the fundamental components of its governance, in terms of mechanisms in place. The fourth section looks at three necessary enablers of all strategies: the safeguards, the skills and the monitoring mechanisms. The final section looks at the results, the lessons learnt and the policy recommendations and is built on the insight presented in the analysis.

2. What are the Data Strategies For?

A data strategy can be defined as a set of actions aimed to fully leverage on the potential of available data for evidence based policy making. There is an abundance of data strategies nowadays, but they can mean very different things in different contexts. This section describes what are data strategies for, in terms of objectives and key components (building blocks).

2.1. Cases Under Analysis

The paper stems from an analysis on how Member States approach the concept of defining a data strategy, plus the following cases:

- Barcelona Data Commons. Barcelona has been one of the first cities in Europe to establish a Chief Data Officer. the City Council thought it was a priority to open the Oficina Municipal de Dades (OMD - Municipal Data Office), which is now responsible for the management, quality, governance and use of data controlled and/or stored by Barcelona City Council and all of its associated bodies (both public and private). The current volume of information generated by citizens and the City Council itself through its activities, combined with the existing technology and the science of data, allows to make a leap forward and become more efficient at capturing, storing and analysing data, as well as drawing conclusions that help with decision-making for new public measures. This relates also to the creation of data commons and greater control of citizens over their data, as piloted by the Decode project;
- NL DIGITAAL - Data Agenda Government. The Agenda centres on the value of data as a tool to address policy and social challenges. The Dutch Ministry of the Interior and Kingdom Relations leads the implementation of the agenda, but both central and local governments are responsible for implementing it. The agenda also "pays specific attention to the protection of public values and fundamental rights", thus including policy issues related to data ethics and the algorithm transparency. The agenda integrates policy goals oriented to better data management in the public sector and the publication and reuse of open government data. The relevance of the public sector's organisational culture and knowledge sharing for transformation change are also underlined, which is in line with the OECD approach for the digital transformation of the public sector;
- New Zealand Data Strategy and Roadmap. New Zealand's operational Data Governance Framework provides an interesting example where data stewardship is seen more as a skill to be built up among public officials rather than a formal role. This approach aims to embed "data accountability and best practice data management across all data-handling positions, with the goal of evolving beyond the need for traditional data governance roles (e.g. data custodians, data stewards)". The leading agency for government-held data in New Zealand (Stats NZ) developed a new and improved data governance framework for the New Zealand government. The framework is part of the agency's numerous efforts to promote better data management practices across the public sector, and to leverage data as a strategic asset for decision making. One of the central pillars of the framework is the adoption of a so-called "whole-of-data life cycle approach", meaning public bodies and employees are encouraged to think more strategically about the governance, management, quality and accountability of

their data, over the whole data life cycle (i.e. from the design and source of the data to its storing, publication and disposal);

- FINDATA. Finland has a long history of collecting extensive data in registers but making use of the data has been difficult and inefficient. In 2019 a new Act on Secondary Use of Health and Social Data entered in force in Finland. With the new enabling legislation, Finland has become the first country in the world to successfully enact a law on the secondary use of well-being data that meets the requirements of the European General Data Protection Regulation (GDPR). The new legislation enables and expands the use of social and healthcare data from the traditional areas of research and statistics to those of management, development, innovation, education, planning, and steering and supervision work. The new act facilitates the establishment of a new central data permit authority in Finland, known as Findata. Findata has been established and operates within the National Institute for Health and Welfare, but as a separate entity. Findata is the one-stop-shop responsible for streamlining and securing the secondary use of social and health data. It guarantees a flourishing ecosystem around the secondary use of social and health data streamlining the processes for the issuing of research permits and data collection and ensuring that data is being used in secure environments, thereby maintaining the trust that the general public have in authorities and the public sector. This case study reports how the new Act on Secondary Use of Health and Social Data has been developed, the main themes of it and provides an overview of the Finland legal framework around the use of the health and social data. It also described in detail the Findata one-stop-shop, how it works, the governance, and how it guarantees access to the social and health data. A descrption of the users, data sources and data lakes of Findata it is also provided.

2.2. Objectives

The strategies generally pursue the combined goals of fostering data analytics for public value creation and ensuring trust, accountability and citizens agency over how data are used. Both dimensions are important, although arguably with different emphasis.

The Danish, Dutch, New Zealand and Finnish cases are driven by the primary goal to increase data analytics and reuse, and balance this with a strong emphasis on safeguards, ethical aspects and consent as pre-conditions or enablers of data reuse. For instance, in the case of New Zealand the rationale for the data strategy is to address the disconnect between the rhetoric (which focusses on opportunities) and the reality of data-driven policies (which focus on minimizing risks of data misuse). The data strategy is part of the overarching government goal to get more value from data. In Finland, the data reuse strategy is based on the "National health-sector growth strategy" , which aims to make Finland an internationally renowned pioneer in health business and in well-being. In the Danish case, the strategy addresses a clear concrete need: to fight fraud and detect errors at an early stage.

On the other hand, the Barcelona strategy is the only one originally driven by a strong "political" dimension related to data and technological sovereignty – for instance with data provision requirements in the context of public private partnerships.

This difference is related to the specific policy context. In Barcelona, the data strategy is part of the wider city strategy "Transition towards digital sovereignty", while in the other cases it fits under the narrower strategic priorities related to digital government, social affairs or data reuse.

The role of the private sector is also different. In the Finnish case, the private sector is clearly identified as a data reuser, while in the Barcelona and Danish case it is identified mainly as a data provider. In the Dutch case, companies are considered as both data providers and reusers. What is clear across all strategies is that the private sector and citizens are part of the stakeholders that need to be involved in building a data ecosystem for public value creation.

The very existence of a strategy reveals the long-term importance of the topic. In all cases, governments sought via the strategy to ensure a structural commitment to the data priority (at least three years).

2.3. Building Blocks

The analysis of the different priorities of the strategies reveals many commonalities. All strategies include both the element of data exploitation, and the ethical and data protection aspect. Another common aspect is the recognized importance of data sharing as a fundamental pillar of data driven innovation. The New Zealand and Dutch cases also include a strong emphasis on knowledge sharing and skills.

Table 1: Cases and Related Building Blocks

Case	Building Blocks
BCN	1) Understanding data as an urban infrastructure, just as the provision of water and energy are. Data is seen as a meta-utility that will enable the city of Barcelona to support more effective delivery of public services to Barcelona citizens for greater equity, safety and quality of life; 2) Integrating the use of Big Data & Data Analytics to improve public decision-making (Data-driven projects). 3) Treating data as a common asset, and making it available for social and economic innovation processes focused on citizens' needs. This also means that the immense economic value that citizen-produced data represents should be returned back to those that generate that value in the first place: the citizens. 4) Enforcing data & algorithmic transparency (Data Ethics). This not only requires opening up data, but also encouraging the reuse, providing citizens with the tools and knowledge to be able to verify these, and to be informed about automated decisions and their underlying algorithms. 5) Protecting people's privacy and data sovereignty. This is also about shifting agency and control to citizens themselves that have the right to decide what data they want to share, with whom and on what terms.

NL	1) Problem-solving with a data-driven approach: five social challenges have been selected: energy transition, manure issue, infrastructure and spatial bottlenecks, poverty and the issue of debt, and subversive crime. 2) Focusing on legislation and public values to develop new general principles on a responsible way of dealing with data taking into account legal and ethical frameworks. 3) Improving the quality of government data and using it more efficiently to ensure government has the right data and is able to share (open) data at the right time and in the right way in order to foster a service-oriented and transparent public sector. 4) Collecting and sharing knowledge about a data-driven approach (sharing of best practices.) 5) Investing in people, organisations and changes in corporate culture (to address skills needs and cultural change).
NZ	1) Invest in making the right data available at the right time a) To provide visibility of key data sets and proactively address gaps b) To improve accessibility of government held data c) To open up more non-sensitive, non-confidential data to the public 2) Grow data capability and supporting good practice a) To take a strategic and coordinated approach to uplifting capability across the public sector. b) To make better use of existing data capability. 3) Build partnerships within and outside government a) To co-design the future data system and work together to maximise use and impact of data. b) To co-design with Māori across the data system 4) Implement open and transparent practices. a) To establish appropriate accountabilities and protection mechanisms b) To build public knowledge and understanding of how they can benefit from data use.
FI	1) To enable efficient and secure processing of personal data collected during the provision of social and health care as well as personal data collected for the purpose of steering, supervision, researching and collecting statistics on the social and health care sector; 2) to allow the collected personal data to be combined with the personal data held by Social Insurance Institution of Finland, Population Register Centre, Statistics Finland and Finnish Centre for Pensions; 3) to secure the legitimate expectations, rights and freedoms of individuals when processing personal data.

DK	1) High quality data analysis across registry 2) Trusted collaboration with sectoral department (national and local) 3) Collaboration with foreign authoriy 4) Special initiatives

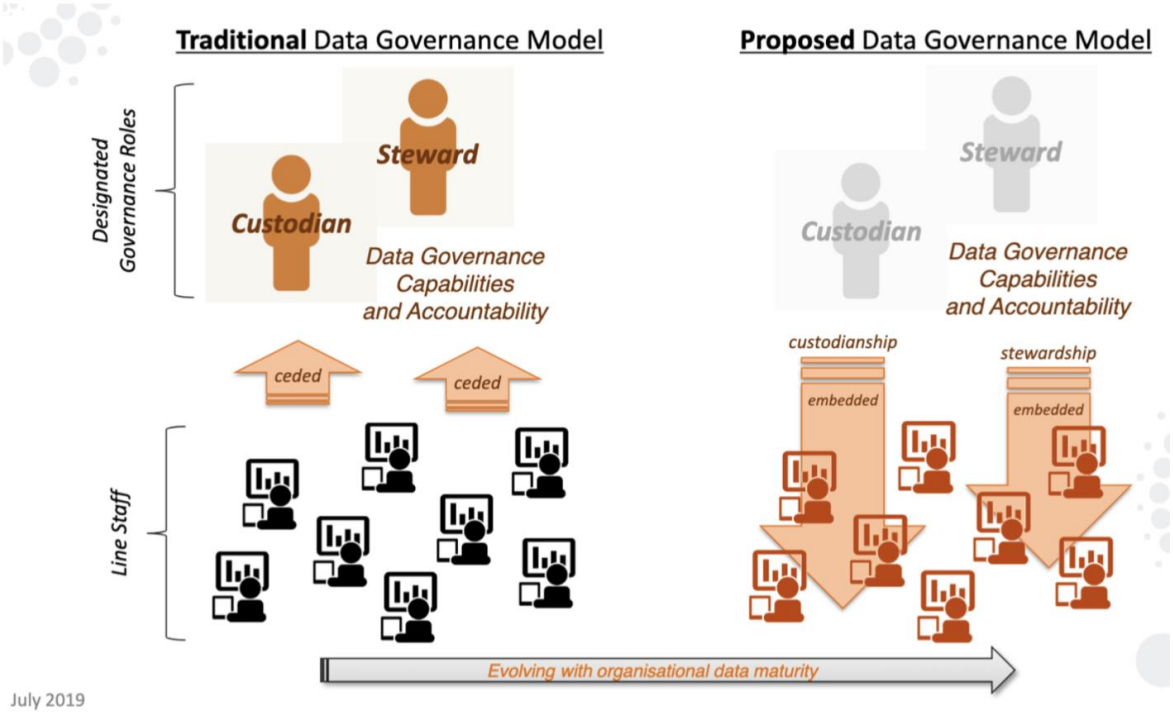
When looking at the actual implementation of the strategies, other aspects emerge. First, there is limited technological investment. The two larger scale, more ambitious whole of government strategies of the Netherlands and New Zealand do not include the creation of any horizontal "infrastructural platform" for data analytics, but focus on enabling services. It is worth mentioning that the initial case selection included one of the most high-profile national data infrastructural service, the Italian Data Analytics Framework: however, in the course of the study the platform has been quietly scaled down. The Dutch strategy instead includes projects on five specific challenges: energy transition, manure issue, infrastructure and spatial bottlenecks, poverty and the issue of debt, and subversive crime. Barcelona, which does have a centralised data and analytics infrastructure also advances its data analytics activities in an incremental way, based on priority policy challenges. Second, all strategies include data mapping. In the case of Barcelona, it is the Data Office itself which carries out the mapping exercise, while in the others it is part of the distributed data stewardship and process tasks.

3. The Governance of Data Strategies

3.1. Governance Mechanisms

Governments adopt very different approaches to the governance of data strategies. The political positioning of the data strategy and related implementation agencies is varied. First and foremost, the strategies do not entail the promulgation of new legal provisions, but remain at the level of strategic document. Only in the case of Finland, because of the sensitive nature of the data a dedicated law has been approved to clarify the scope of reuse of health data. Only in the case of Barcelona, the strategy sits firmly at the executive level under the mayor's office, which is a fundamental factor in ensuring stability and compliance. In the other cases, the data strategy sits under specific ministries: in NL and NZ, under the department in charge of digital government, while in Finland it is the ministry of social affairs, in Denmark it is the social payments agency (Udbetaling Danmark) under the ministry of employment. On the same line, Barcelona is the only case which presents the figure of a Chief Data Officer, and a central "Municipal Data Office". They have a major role as responsible for the management, quality, governance and use of data controlled and/or stored by Barcelona City Council and all of its associated bodies (both public and private). And the Data Office is not only the coordinator but also the implementer of the Data Commons Strategy. In the other cases, the roles are softer. There is no Chief Data Officer, but the effort is conceived as decentralized and collective: in the New Zealand Case, the role is named "Chief Data Steward" and his role is to foster a culture of data stewardship across government. Data stewardship is intended as "the careful and responsible collection, management, and use of data." In particular, the goal is to spread the role of data stewardship across each agency, as illustrated in the figure below.

Figure 1: Role of Data Stewardship Across Each Agency



The case of Findata is also different, as its role is not to ensure data quality or sharing but to manage the data and consent flows. As such, it is a dedicated agency with strong enforcement roles but limited to the data and consent flows. This different degree of centralization is related with the broadness of the strategy: the broader the scope, the more decentralized the approach. The Dutch and New Zealand initiatives have a very broad mandate cutting across all departments and levels of government, while the Barcelona and Finland are more focused (respectively on one institutional level and on a specific data type). In any case, whether more or less centralized, all initiatives have an extensive set of boards and steering groups including a wider variety of participants, as outlined in the table below.

Table 2: Sets of Boards and Steering Groups

Case	Building blocks
NL	• Steering with institutional representatives from national govt agencies and local government organisations • Sounding board with technical staff
BCN	• Executive data committee with the central political and executive management • Transversal data coordination board includes representatives of 21 city departments • Data protection board with 14 departments dealing with sensitive data

NZ	• The Digital government partnership includes the public sector chief executives and four cross government working groups
FI	• Steering group includes social welfare ministries, social insurance, central statistical office, representatives of social and health care providers
DK	• Cooperation forum with municipalities and their national association, more operational • The coordination group with the national association of municipalities , more strategic

Consistently with this "inclusive" approach, all initiatives share a strong emphasis on co-creation with all relevant agencies. The extensive range of consultation and collaboration activities in place is repeatedly mentioned as leading edge and unique with respect to traditional processes. As mentioned in the Findata case, "the unique co-operation between public authorities, companies and associations was key to success." It appears that data collaboration not only aims to break data silos as an outcome, but in doing so it requires the adoption of a systematic silos breaking approach as part of its process. For instance, statistics New Zealand "led multiple workshops and interviews, gaining independent technical guidance and expertise on what was important to stakeholders and where help is needed". In the Danish case, the extensive collaboration with municipalities takes place also online through a Sharepoint platform.

This co-creation activity can also extend beyond public administration, towards external stakeholders such as business and civil society. New Zealand and Finland extensively involved these players in the shaping of the strategy, in order to make sure that it includes the perspective of external users. This activity went beyond traditional consultation, as made clear in the case of Findata: "Experts from ministries, authorities, companies and associations from across the private and public sectors worked together to prepare the implementation simultaneously with the legislation process. It was a unique way of working and something carried out for the first time at the national level." However, this co-creation aspect often is too focussed on the process, rather than on the final output: interviewee mention the lack of user orientation of some services as a clear challenge. In data driven innovation just like in digital government, the motto "build it and they will come" is a path for failure.

The budget assignment for the strategies is typically moderate. In the Dutch case, it includes 10 million euros for three years in addition to agencies' contribution. In Barcelona, the overall budget is nearly four millions euros for 2018/19. In Denmark, 3,4 million euros per year, and in New Zealand there is no dedicated funding for cross agency work. The budget for Barcelona, in this case, stands out taking into account that it refers to a single city, and it reflects the strong role of the municipal data office in implementing the strategy. The Danish case actually generates revenues far in excess of its costs (62 million euros in 2019).

3.2. Data Sharing and Quality

Data sharing and improved data quality is a general priority across all strategies. Greater sharing of high quality of data can be considered one of the main goals across the board: for Denmark, New Zealand and the Netherlands, across ministries and levels of government; for Barcelona, across

different municipal agencies; and for all the different player in the value chain. Data sharing has different levels of compliance. In the Netherlands, it is compulsory for public administration to share and reuse data from the base registries, and some of the base registries are open to the public. Six base registries, the BAG, BRK, BRT, BGT, and BRV are in part or completely available as open data. But beside these base registries, there are no strong compliance mechanisms. In the words of one interviewee, "We can't impose: 'thou shalt work in a data-driven way'". Therefore, one of the key policy levers in both the Dutch and Barcelona cases to encourage public organisations to share data is communication on two aspects: why and how. Why data sharing should happen focuses on demonstrating data-driven value creation in best practices. How data sharing can happen focuses on knowledge exchange between organisations on topics such as quality and standards. Similar soft arrangements with regards to data standards are in place in other strategies, as it remains a challenge to ensure compliance. In New Zealand, a Cabinet mandate empowers the GCDS to direct agencies to adopt common capabilities and data standards. Agencies are enabled and supported by the GCDS to voluntarily adopt those standards. Data standards can be of different sort. Dutch base registries rely on "identification keys" that are consistent across registers, as well as x/y coordinates. Yet the adoption of standards is also mentioned as a clear critical aspect looking ahead – it is not a result fully achieved. All the strategies clearly adopt open standards as a priority.

4. Key Enablers

4.1. Safeguards

All strategies have strong emphasis on safeguards, not just in terms of mere compliance, but to create a shared data culture that maximizes analytical power with ethical values. Typically, the data protection competence is separated from the data stewardship or responsibility competence. The notion of safeguards, accordingly, spans well beyond compliance with GDPR, to encompass a full ethical framework. Notably, the concept includes not only data processing, but the ultimate purpose of what is done with the data, with the goal of keeping the interests of citizens first, rather than those of government. This is why in Barcelona the ultimate goal is to empower citizens with data, citizens are involved through experimentation and consultation, and the activities of the strategy include algorithmic accountability and how public decisions are influenced by data. Wherever possible, data-driven projects will be able to check the algorithms using simulations based on city data. Likewise, using open source code or other means, third-party technology suppliers must reveal the underlying logic behind any IT process for (automated) decisions pertaining to any of their systems used by the City Council. By the same token, the Dutch strategy has developed general principles for the responsible use of data, after several municipalities had indicated running into difficulties regarding data sharing with companies. The Dutch case also shows the importance of the purpose of analysis, namely to avoid that data analytics is carried out with punitive purposes. Similarly, in Denmark, the strong data protection provisions go hand in hand with strong citizens' rights when it comes to the investigation, including the need for notification and the impossibility to access sensitive data in other registries (e.g. criminal records). Citizens control over their data is also an important issue. It is one of the leading principles of the Barcelona data sovereignty scheme, defined as "the need for an individual to have control, at all times and in all relevant systems, over the

collection, storage, use, transfer and publication of their data, whether it be of a technical, scientific, economic, social or personal nature." The Dutch government has launched the policy initiative Control over data (Regie op gegevens), which aims to give citizens and businesses more control on what's happening with their data. At the moment, various appointment systems and solutions are being developed to support citizens and businesses in managing their data. Ultimately, this should result in a generic cross-sectoral framework that enables secure, reliable and user-friendly digital exchange of data between governments, private and social organizations But this broad perspective "beyond GDPR" does not mean that GDPR compliance is a done deal.

In the Netherlands, stakeholders find the application of GDPR quite complicated, especially in the social domain. In the social challenge on poverty and debts, for instance, it is not clear which data are allowed to be linked, whether analysis can be done or not, and whether subsequent policy actions can be taken. Municipalities don't always have the same interpretation on how to proceed. The more cautious approach is to not use the data if it's not 100% clear that it is allowed to do so. On a similar note, On 5 February 2020, a Dutch court has ruled the way in which the government uses the fraud detection system SyRI, which links data from different sources, such as the Tax Agency, The Unemployment Agency and municipalities, as an infringement of Article 8 of the European Convention on Human Rights. According to the court, the SyRI legislation doesn't provide a fair balance between preventing and combating fraud in the interest of economic well-being on the one hand and the violation of privacy on the other. This ruling urges the Dutch government to go back to the drawing board.

4.2. Skills

The lack of adequate skill is a major issue across all strategies, and all strategies include actions to address it.

These actions are basically:

- Training of civil servants. In the Netherlands, data is part of the training provided by the National academy for digitisation (RADIO). In Barcelona, the services provided by the data office are accompanied by training in order to ensure sustainability. In Nez Zealand, GCDS has developed e-learning modules for R coding capabilities.
- Profiles: in Barcelona, a new job profile for data scientists has been created. In New Zealand, GCDS create a data and statistical capability framework to support training and recruitment
- Recruitment: in the Netherlands, a trainee programme was created in the public sector. At the central level, the ministry and the Statistics department have internal expertise and offer support services to other government department. In Finland, Findata has 20 data scientists, while the Danish data mining unit has 25. The issue is then not only recruitment but retaining talent by setting up stimulating working environment that combines IT excellence with public purpose.
- Communities of practice: in Barcelona, an inventory of data enthusiasts has been created to provide training and support, and communities of practice are encouraged in all cases.
- Centre of competence: To deliver support, the strategies create centre of competence that offer services to another department. This is prominent in the Netherlands, with the creation of LED

experts centre and a network of specialised data labs. In New Zealand the data capability hub offers similar services. The municipal data office in Barcelona is also a centre of expertise for other departments

4.3. Monitoring

With the exception of the Danish case, monitoring remains very lightweight across all strategies. There are no KPI in place and no systematic monitoring. In the Netherlands there is a reporting system in place for projects launched under the strategies, which ultimately is presented to parliament. In Denmark, there is strong accountability mechanisms due to market-like relation between the national agency Udbetaling Danmark and the municipalities, with clear Key Performance Indicator, Service Level Agreements and financial accountability.

5. Conclusions and Lessons Learned

5.1. Success, Challenges and Lessons Learned

The first and foremost result of the strategies is putting the topic on the agenda and raising widespread awareness in public administration about the strategic value of data. As the Dutch case shows, the result is that questions like 'Do we use our data fully?' and 'Are we careful enough when using data?' are now on the table. This is also visible in the relation with external stakeholders, for instance in the case of Barcelona it visibly changed the importance of data in the relations with private providers and civil society.

This increased awareness has been reflected in greater access and reuse of data. In the case of the Netherlands and New Zealand, it has enabled greater data sharing between different departments and levels of government. In the case of Barcelona, this has resulted in data clauses in public contracts that allow the municipality to access and use data generated through third party service provision. In the case of Findata, it has cut by an order of magnitude the time needed to access sensitive health data for research purposes – from three years to three months.

It is clear that these strategies led to greater policy awareness and propensity to data sharing. Yet when it comes to visible results of these data sharing, the picture is uneven. Pilots, such as in the Dutch and Barcelona cases, show the potential to use data to improve policy and services, and enable quick delivery on different areas such as renewable energy, public order, housing and poverty. But while pilots are a good start, all strategies also point to the limited uptake and implementation of data analytics projects as a major challenge compared to expectations.

The limited visibility of the results goes hand in hand with the reluctance to share data, in a classical chicken and egg problem. As the New Zealand case shows, there is still a problem in gaining shared ownership of the strategies as many agencies deprioritise work that is very beneficial for the system as a whole, but is not overtly beneficial for their own agency. Despite data sharing being the declared goal of the strategy, it remains one of the most important challenges: this is not only due to technical barriers related to legacy and interoperability, but also to the resistance and lack of know-how to share data as well as the low quality of the data. In fact, one of the issues is that secondary

use of data requires greater data quality and reveals the limitations of data quality, as shown by the Dutch case.

In other words, policy prioritisation is necessary but not sufficient. Just as in other domains such as research data, or open government data, or business data, top down mandates have to be combined with clear benefits and opportunities for reuse: they should be demand driven– whether internal (municipalties in the Danish case) or external (reusers of health data). This is why focussed, thematic intervention such as on health and social data, where the business cases is clear, have more opportunity to grow.

Obviously, one of the expected barriers to data sharing is data protection. Because of GDPR is still relatively new and there is limited knowledge about its practical implementation, several organisations exhibit cautiousness on going ahead with a data project. This continues to be true, but what is clear is that this barriers can be overcome when there is a clear case for it. Again, data protection is a much more powerful barrier when it goes hand in hand with lack of a business case.

The lack of data skills is obviously a problem. But this is not limited to the mere absence of a sufficient number of data scientists in public administration. It refers to the more general problem of data literacy among civil servants, and notably decision makers, which leads to a dangerous cultural gap between the data scientists and policy makers. But this also includes the lack of a policy knowledge by data scientists (policy literacy). This is particularly risky because the ethical implications of data do not concern only the compliance with data protection, but the overall approach to data for policy: for instance, the purpose of data driven policies could spectacularly backfire if it is used with a punitive approach in particular with regard to social issues. The required cultural change concerns therefore all players in the data value chain.

The reason is that data is not a commodity. Extracting value from it requires not only cleaning and preparation, but plenty of assumption and choices in building analytical models. This processing implies that the results of the analysis are to be carefully considered in light of the limitations and assumptions. Data analytics should not be treated as a black box managed by data scientists where data are the input and decisions are the outputs. The recent example of Covid-19, where modelling tools have been at the root of potentially disastrous decisions by policy makers, is a clear demonstration of the need for distributed data competences in every policy domain and of the need of close collaboration between data scientists, data analysts and decision-makers. And the Danish case shows how important the collaboration between data analysts and frontcase workers is.

5.2. Policy Recommendations

The in-depth analysis suggests a set of recommendations for policy makers at EU and national level:

- Start with the problem, not with the technology. Building a data strategy does not necessarily entail an investment in a technological data analytics platform, and certainly it does not start with it. Very few strategies include such investment, and those who do are typically vertically focussed on specific sectors or organisations. On the other hand, there are not many examples

of successful whole of government data analytics platform, but there is room for focussed centralised technological components, as shown by the Reproducible Analytical Pipeline case analysed in task three. A common trait of most advanced horizontal and vertical strategies is a demand driven approach: providing a variety of support mechanisms, from governance to skills to support services, to address real problems, such as health, poverty, urban issues. Focus on the key questions to be answered and the policy problems to be solved. This is important in order to deliver tangible results.

- Analyse permanently user needs. Users include both data holders and data reusers, both internal and external. Too often user needs remain assumed or based on anecdotical evidence. Not only it is necessary to formally analyse them in the first place, but perhaps more importantly to constantly monitor them over time to adapt to how solutions are used. The constant collaboration between the Danish Data Mining Unit and the municipalities frontline case workers is a clear example of this. Iteration of delivery is therefore crucial – no service is designed perfectly the first time.
- Co-creation is a fundamental component of the strategy. Bringing internal and external stakeholders onboard is a necessary (not sufficient) condition of success. But it is equally important to keep stakeholders onboard after the strategy is launched, during the implementation. Other government agencies need to see the benefit to share data and to conform to the required standard and processes, because there are costs in doing so. Of course, there is a shared perception among decision-makers that data is a strategic resource and that investment is needed, but this is only sufficient for kickstarting the process: the difficult part lies ahead.
- It is not sufficient to consult and co-create with stakeholders: what matters is delivering results. There is a lack of business case for data innovation. Existing strategies should focus, as in the case of the Netherlands and New Zealand, on delivering short term results via small scale pilots on topical issues. But pilots should be the beginning of service delivery, as shown by the Findata case, and their results should be well documented and shared. The problem is not only the difficulty in demonstrating impact – the ultimate benefits in terms of quality of public service. It is the actual difficulty to demonstrate deployment and adoption – simple projects that work and deliver. Data strategies should balance long term perspectives to data stewardship with short term delivery of pilots.
- In order to ensure delivery, it is crucial to take a practitioner led approach. The most successful strategies are those were data experts in public administrations are brought together and given a visible role in the process, as in the Netherlands with the creation of a cross department sounding board with data analysts and policy experts. There is a permanent gap between data experts and decision makers, and for data strategies to work, data experts should be empowered. And communities of practices are the fundamental tool to enable mutual learning and empowerment of practitioners.
- Create a data culture across department and institutional level. Data-driven innovation requires cultural change, training and bringing in new resources from the outside. New centre of competences (such as the Dutch labs) have to be created. Data training should be provided to all civil servants, and in particular to decision makers. But it also requires the reinforcement of internal capacity and the creation of effective communities of practice that cut across

government silos, and the creation of knowledge and expertise centre to facilitate knowledge exchange between data champions and novices.

- Because it's a long-term process, expectations need to be managed correctly and hype should be avoided. Delivering data driven innovation is not easy, it's not a low hanging fruit. Data is not a commodity. It requires extensive work for access, preparation and cleaning, but also for processing and reprocessing. There is a constant risk of disappointment that backfires. It is important for data leaders to raise realistic expectations from other stakeholders and to start by focussing on data availability. Pilots should be selected based on two criteria: a genuine need and access to available data. Luckily, the evolution towards a data culture is visible across society and the economy, and it is here to stay – particularly so following the ongoing pandemic crisis. There is no need to overhype the opportunities.
- A robust ethical framework is crucial and can be instrumental to innovation. The results are long term, and it is important to avoid crisis in the short term that would "put back the clock". The safeguards can work hand in hand with more data reuse, by creating a shared data stewardship culture. Actions for data protection compliance should be integrated with those on increased data literacy: in fact, the lack of a data culture is damaging for both data protection and data innovation. But an ethical approach goes beyond compliance with data protection and includes also what is done with the data, for instance to avoid any punitive spirit in the services being put in place to fight poverty based on the data gathered.
- Monitoring should be present and structured but not drive the process. Milestones and KPI should be core part of any strategy – and it is currently very rarely the case. KPI should not concern only outputs, but also the inputs and the process, such as the percentage of datasets in line with the required standards, the access to base registries, and the number of departments taking part in the different activities. In fact, the main compliance mechanism in the case of such soft strategies is monitoring and reporting, as shown by the Dutch case where the most important control mechanism is reporting to Parliament. And they become fundamental in ensuring the long term collaboration of different stakeholders, as in the Danish case. Further, they allow comparison and benchmarking of the strategies for data management developed and adopted in different contexts.

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EGOV-CeDEM-ePart

An Assessment of Open Government Data Benchmark Instruments

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Abstract: Open Government Data (OGD) is heralded as a pillar for promoting openness and e-Government. Several OGD benchmark instruments have been proposed, and so many options could confuse open data users. We intend to help practitioners and researchers decide which benchmark instrument is most appropriate to evaluate a specific purpose. We aim to investigate the different dimensions that OGD benchmarks evaluate to discover what aspects of publishing and using open data they measure. To achieve this goal, we built upon previous research on how the Open Data Charter principles are measured in OGD assessments and enriched the analysis with additional dimensions. Findings reveal that what differentiates these benchmark instruments is their scope or focus, as their creators have varying interests and objectives. All benchmark instruments measure "data openness"; however, each emphasizes different aspects of "openness." Concepts measured are deeply connected with the six Charter principles. OGD impact, use, and usefulness are addressed by half of the benchmark instruments. Measurements can be compared. Their assessments can be used to help improve data quality and the conditions for sharing and reusing OGD.

Keywords: e-Government, Open Data, Open Government Data, Benchmark, Assessment

1. Introduction

Governments produce, collect, maintain, and disseminate significant amounts of data (Kalampokis et al., 2011). Thus, data are the driver of the digital transformation as government transitions to e-Government (Attard et al., 2016). A contemporary definition of Open Government Data (OGD) encompasses not only the idea of open data but also of the e-Government and Open Government (OECD, 2019).

Relevant literature shows that Open Government Data initiatives are often carried out to achieve objectives such as increase transparency, participation (Ubaldi, 2013; Alexopoulos et al., 2013; Lee & Kwak, 2012; Attard et al., 2016), and collaboration (Alexopoulos et al., 2013; Attard et al., 2016); foster innovation; improve economic value (Johnson & Robinson, 2014; Jetzek, 2015; Klein et al., 2018); and create public value (Attard et al., 2016). Researchers, practitioners, and international organizations consider the creation of public value as one of the most important benefits of OGD (Attard et al.,

2016; Zuiderwijk & Janssen, 2014; Janssen et al., 2012; Lämmerhirt et al., 2017; Cecconi & Radu, 2018; Lee & Kwak, 2012). Government data is seen as a valuable resource offering potential benefits to stakeholders if it is openly available (Hitz-Gamper et al., 2019). However, publishing OGD does not ensure public value creation, as value is only realized when data are used (Davies & Bawa, 2012; Ubaldi, 2013).

Over the years, academics and advocacy institutions, such as the World Wide Web (Web) Foundation and Open Knowledge Foundation (OKFn), proposed assessments to improve Open Government Data usage. The International Open Data Charter (IODC) principles (Open Data Charter, 2013) provide a consistent approach to assess the degree of data openness. The Open Data Charter Measurement Guide (Brandusescu et al., 2018) analyzed the Charter principles and how they were assessed based on five current "open government data measurement tools." Davies (2013) identified over a dozen OGD "evaluation and assessment frameworks," which were classified into three categories: open data readiness, open data implementation, and open data impact. (Susha et al., 2015) conducted a meta-analysis of five international open data benchmarks or assessments for evaluating open data progress. In a recent publication, Vancauwenberghe (2018) identified and evaluated 15 open data assessments. In the literature, the terms OGD benchmark, assessment framework, assessment, evaluation, and survey are used indistinctively. For the sake of clarity, this paper adopts the terms "benchmark" or "assessment" to refer to the measurement of the nature, quality, or ability of OGD; and "instrument" or "benchmark instrument" for the measuring artifact itself (e.g., a questionnaire).

Although all those studies compare Open Government Data assessments, the majority of the assessments are not used anymore. They were proposed, executed once, and may not reflect the actual state of OGD initiatives. We intend to help open data users, practitioners, and researchers identify which current assessment (executed after 2016) is most appropriate for evaluating a specific purpose. Thus, this study aims to investigate the different dimensions of contemporary OGD benchmark instruments and determine what aspects of publishing and using open data they currently measure. To achieve this goal, we built upon the Measurement Guide (Brandusescu et al., 2018) by adding the evaluation of a sixth OGD measurement tool to its basket and new analysis dimensions. We also expand the (Susha et al., 2015) study by applying the proposed frame of reference to compare the six current OGD benchmark instruments in terms of metadata, meta-method, and meta-theory. This paper contribution lies not in proposing new ways of evaluating OGD benchmark instruments but rather in drawing new insights into them by combining previous research (Brandusescu et al., 2018) and enriching with the addition of other dimensions such as level of analysis, geographic coverage, frequency, methodological approach and validation, and data collection (data source).

The remaining of this paper is organized as follows. Section 2 presents the research design. Section 3 briefly reviews related work and describes the six OGD benchmark instruments. Section 4 presents results and discussion. In Section 5, we draw our conclusions and suggest future work.

2. Research Design

This study aims to investigate the different dimensions of contemporary OGD benchmark instruments and determine what aspects of publishing and using open data they currently measure. We compare benchmarks instruments to determine how they are developed in terms of metadata, method, underlying theory, and the International Open Data Charter principles. Hence, this study is framed by (1) What are the conceptual differences and similarities of OGD benchmark instruments?; (2) How do OGD benchmark instruments measure the different aspects of the open data?

OGD assessments were identified in the literature (Davies, 2013; Susha et al., 2015; Brandusescu et al., 2018; Vancauwenberghe, 2018). The criteria to include them in this study were (1) benchmark instrument evaluates and may rank countries, organizations, and projects based on the publication and/or use of OGD; (2) benchmark instrument evaluates and may rank countries, organizations, and projects internationally; (3) benchmark methodology and data are publicly available or can be accessed; (4) benchmark instrument is current, i.e., the last assessment is from 2016 or later. Any benchmark that did not focus on government data was excluded. The application of the inclusion/exclusion criteria in over 20 assessments identified in the literature resulted in the selection of six international OGD instruments: the Open Data Barometer (ODB) (W3C, 2019) produced by the World Wide Web Foundation (W3CF); the Global Open Data Index (GODI) (OKFn, 2019a) created by the Open Knowledge Foundation (OKFn); Open-Useful-Re-Usable Government Data Index (OURdata Index) (OECD, 2019) developed by the Organization for Economic Co-operation and Development (OECD); the Open Data Inventory (ODIN) (Open Data Watch, 2019) developed by the Open Data Watch (ODW); the European Open Data Maturity Assessment (EODMA) (Cecconi & Radu, 2018) developed by European Data Portal (EDP); and the Open Data Monitor (ODM) (European Commission & Consortium of Collaborators, 2019) was created by the European Commission (EC) and Consortium (ECC).

Several open data assessments are conducted as surveys, questionnaires, and field studies. Findings and results are available in the form of indexes or rankings published online and sometimes complemented by analytical reports.

To answer the first research question, we adopt the frame of reference (Susha et al., 2015) obtained from the meta-analysis of five OGD benchmark instruments. The framework is appropriate for comparing the scope and focus of the assessments, their theoretical foundations, and the methodology used in rankings. Thus, it can be adopted in this study, as it has been applied in similar assessments. The underlying concepts of the framework are frequency (how often assessments are conducted/published), source (independent, to sell research findings, marking purposes and academic), and scope, or focus (the purpose of the benchmark instrument determines focus/scope). The scope varies with benchmark instruments and with time, and scale (international, regional, municipal) (Bannister, 2007); the methodologies underlying individual studies, including sampling, data collection, and research design; and meta-theory (reflecting on the theoretical assumptions at the foundation of the individual studies).

The rationale and data presented in the Open Data Charter Measurement Guide (Brandusescu et al., 2018) were used to address the second research question. The Guide's reasoning was applied to analyze the Open Data Monitor against the Charter principles. The International Open Data Charter principles (Open Data Charter, 2013) were used to verify whether and how the selected assessments evaluate the several aspects of publishing and using OGD. The Charter principles are Open by Default, Timely and Comprehensive, Accessible and Usable, Comparable and Interoperable, For Improved Governance and Citizen Engagement, and For Inclusive Development and Innovation. Principles represent a global agreement of how to publish and access open data and offer a consistent approach to evaluate and compare assessments. Charter principles and their components are considered as "commitments" governments and institutions pledge to carry out. They aim to improve the quality of the data published and the conditions for sharing and reusing open data (Open Data Charter, 2013).

3. Related Work

Open data assessment is about collecting, analyzing, and providing information on the performance of open data initiatives (Vancauwenberghe, 2018). OGD benchmark instruments can be used to evaluate and rank countries, organizations, and projects based on how they publish and use OGD in different ways (Atz et al., 2015). The process can help disseminate the use of OGD standards across OGD projects and consequently improve accountability. It also helps to understand and communicate what are the best ways to use OGD to solve problems. Maheshwari & Janssen (Maheshwari & Janssen, 2013) define benchmarking as the measurement of specific elements and the comparison of results to a baseline (or assessment). It provides an organization with a diagnostic of its current position and offers paths for improvement and growth. However, the authors argue that OGD benchmark instruments often lack the critical elements required to fuel further development. Although benchmarks may have limited practical meaning, they may have a significant political and potential economic impact (Bannister, 2007). The author cautions that OGD benchmarks outcomes may influence decision-makers with wrong perceptions. Results should be treated with caution, as some of them are grossly simplified.

Davies (2013) classified over twelve OGD assessments into three categories. OGD readiness appraises weather conditions to start or successfully implement OGD initiatives exist. OGD implementation assesses whether data are available and open. OGD impact investigates what economic, social, political benefits OGD initiatives might generate.

Although all categories deal with OGD assessment, each focuses on different aspects of OGD initiatives and practices. The level of analysis also differs. Most readiness assessments operate at the country level. In contrast, implementation assessments may focus on some individual datasets, portals, individual institutions, OGD initiatives, and whole countries. Some assessments aggregate the evaluation of initiatives, portals, or institutions based on summing up numerical scores for the "openness" of the parent entity's datasets. Approaches to measurement include the survey of technical features, specific dataset checklist, domain-specific assessments, added-value features), features of the environment (describe the social, technical, legal, political, economic, and organizational contexts for OGD), and expert surveys. None of the assessments explicitly addressed

the impact or the use of OGD. Most assessments are no longer used; an exception is The Open Data Census (OKFn, 2019b).

The Measurement Guide (Brandusescu et al., 2018) analyzed how the Charter principles are being measured or not by five OGD benchmark instruments. They are the Open Data Barometer (ODB), the Global Open Data Index (GODI), Open Data Inventory (ODIN), Open Useful Reusable Government Data (OURdata), and the European Open Data Maturity Assessment (EODMA). The metrics of these five benchmark instruments are compared against each of the six Charter principles and their commitments. The evaluation was performed by the open data analysts responsible for creating the assessment.

(Susha et al., 2015) conducted a meta-analysis of five international OGD benchmark instruments for evaluating open data progress. Their theoretical assumptions were compared to four existing academic open data maturity models from the literature. They were evaluated in terms of metadata, meta-method, and meta-theory to measure open data progress. The authors reflect that the lack of assessment of the actual use of data is the OGD benchmark missing link. They explain that the use of data is complicated to measure, and therefore is only indirectly accounted for (i.e., as community activity or emerging impacts). The proposed framework reveals important aspects for practitioners and academia, thus our interest in it. Two out of five benchmark instruments provide recent assessments: the Global Open Data Index (OKFn, 2019a) and the Open Data Barometer (W3C, 2019).

Vancauwenberghe (2018) study classified 15 OGD assessments using the four dimensions defined in the Common Assessment Framework (CAF) (Caplan et al., 2014). CAF provides a standardized methodology for the analysis of the supply, use, and impact of open data. CAF dimensions are (1) Context/Environment: the context within which open data is being provided (national, or sectorial such as health, education, or transport); (2) Data: deals with the nature of data (legal, technical and social, openness, and relevance) and quality of open datasets; (3) Use: the types of users accessing data, the purposes for which the data is used and the activities being undertaken to use it; and (4) impact: the benefits obtained from using specific open datasets, or from open data initiatives in general. Benefits can be social, environmental, political, and economical. Eleven out of the 15 assessments focus on readiness and data dimensions. The dimension impact was addressed in six assessments, as was the use dimension. The combination of both dimensions was addressed only in four assessments. These findings suggest that an investigation opportunity exists in terms of OGD use and impact dimensions.

4. Results and Discussion

Table 1 summarises the main characteristics of each benchmark instrument. Methodology information was collected on the benchmark website. Susha et al. (2015) frame of reference was used to guide the selection of relevant concepts.

Data and analysis of Charter principles coverage were gathered from (Brandusescu et al., 2018) for five benchmark instruments. The exception was ODM, which evaluation was carried out by the authors using ODM's methodology document ODM. OURdata index information was

complemented with information from OECD (Lafortune & Ubaldi, 2018; OECD, 2018) documents. The results are shown in the last line of Table 1.

Table 1: Six International Open Government Data Assessments

Benchmark instrument	**EODMA**	**OURdata**	**ODB**	**GODI**	**ODIN**	**ODM**
Developed by	EDP	OECD	W3CF	OKFn	ODW	ECC
Level of analysis	National	National	National	National	Subnational	National
Geographic coverage	2018: EU28+[1] countries	2017: 31 OECD countries	2016: 115[2] countries	2016/17: 94 countries	2018/19: 178 countries	First 2015: EU countries
Frequency	Annual	Biennial	Annual	Annual	Annual	Periodically
Methodological approach / validation	EDP team with government officials analyze and validate data	Analysis by OECD Secretariat	Results are peer-reviewed and have a QA process	Survey and discussions displayed publicly. Qualitative checklist	Two rounds of reviews conducted by ODW staff	International assessment
Data collection / source	Survey completed by government officials	Survey completed by government officials	Mixed sources (expert survey, peer-reviewed, government).	Ongoing crowdsourcing with expert review to create annual Index	Trained researchers with government officials input	Collects metadata (harvest) from external portals and catalogs
Concepts measured	Open data maturity: Open Data Quality, Policy,	Data availability, accessibility, and support for data	Open data readiness, implementation, and impact based on the	Independent assessment of OGD publication from a civic perspective	Coverage and openness of official national statistics	Metadata completeness, open license, formats and scope,

[1] EU28+ encompasses the 28 EU member states plus Iceland, Liechtenstein, Norway, and Switzerland. Hungary did not participate.
[2] G8, G20, most OGP, and OECD countries.

	Portals, and Impact	reuse based on the Charter principles	Charter principles			and data availability
Charter Principle coverage	Partially covers all six principles	Partially covers all six principles	Partially covers all six principles	Covers principles 2 and 3	Partially covers principles 2, 3 and 4	Partially covers principles 3 and 4

4.1. RQ1 - What are the conceptual differences and similarities of OGD benchmark instruments?

Benchmark instruments were compared in terms of the level of analysis, geographic coverage, frequency, methodological approach and validation, data collection/data source, concepts measured, and International Open Data Chapter principles coverage.

Most assessments are conducted at the national level. The exception is ODIN, which context is subnational (administrative levels 1 and 2). All benchmarks are international. European Union members and OECD countries are accounted for in all assessments. ODIN and OBD represent a broader spectrum with over 100 countries, while OEDMA and ODM focus on the European Union. Four benchmarks are annual. OURData is biennial, ODM started in 2015. It runs periodically.

The majority of the benchmark instruments rely on surveys to collect data and validate results with the help of experts, government officials, and the community. Government officials complete the OEDMA government survey. The European Data Portal team, in cooperation with these officials, validate and analyze the data. High-level government officials from OECD countries and partners respond to the survey. The OECD Secretariat conducts the analysis, which includes secondary third-party indicators. The International Open Data Charter (IODC) implementation is monitored. ODB relies on expert surveys and secondary data. Assessment is based on quantitative and qualitative data that combines contextual data, technical assessments, and secondary third-party indicators. Results are peer-reviewed and pass a Quality Assurance (QA) process. GODI uses ongoing crowdsourcing with expert review to create an annual index. A checklist with qualitative justifications is used to validate outcomes. Discussions from the survey and review process are displayed publicly. Trained researchers carry out ODIN research. Input from government officials is taken into consideration. Open Data Watch staff conducts two rounds of review to validate the data. ODM periodically collects metadata from external portals and catalogs (Harvesting).

The study reveals that regarding concepts, each benchmark instrument was created to serve different purposes with varying degrees of specificity, scope, and focus. The variation in countries rankings, which is often important to decision-makers, can be explained by using different methodologies, especially the different data collection techniques. These findings are aligned with (Davies, 2013; Susha et al., 2015). Concepts measured by each assessment are deeply connected with

the six Charter principles, as most commitments were mapped to specific questions of the input surveys and other data sources.

4.2. RQ2 - How do OGD benchmarks measure the different aspects of the open data?

All benchmark instruments cover the six Charter principles. However, each study's focus differs, as each benchmark was developed by different types of organizations with diverse goals, scope, and concepts. A clear overlap of the assessment of the technical aspects of the data and "data openness" exists.

The Open Data Barometer (ODB) measures the impact of open government data on socio-economic outcomes. OBD measures all six Charter principles. A few items, such as commitments related to updating domestic laws or availability of high spatial disaggregation (of environmental pollution levels), are not covered (Brandusescu et al., 2018).

OURdata evaluates the capacity of the government to carry out OGD initiatives. For example, it measures if governments stimulate data reuse, train civil servants, and foster businesses and civil society awareness through the promotion of events. OURdata 2017 (Lafortune & Ubaldi, 2018) reports that the Index does not cover international knowledge sharing. It is challenging to capture the engagement of countries with international organizations in an index. OURdata 2017 does not assess the engagement with subnational levels of government and educational institutions (only acts at the national level). The Index needs to define measurements to assess whistle-blower protection. Lifecycle dataset management is hard to measure, as the concept of "retaining value" is ultimately subjective. The governments' lifecycle dataset management needs to be better understood. All six Charter principles are addressed. However, principles 2, 4, 5, and 6 are partially covered.

Until 2017, EODMA's focus was on the evaluation of the two technical dimensions, while the impact of Open Data was a secondary measurement. Data quality was not yet a concern. Thus, principle commitments such as if data is released in various formats or is easily discoverable were not assessed in 2017 (Brandusescu et al., 2018). The 2018 EODMA was updated and now covers four dimensions: Open Data Policy, Open Data Portal, Open Data Impact, and Open Data Quality (Cecconi & Radu, 2018). Its measurements are likely to change. The 2017 EODMA partially covers all six Charter principles.

GODI focuses on the publication of data. Its methodology assumes that open data is defined according to the Open Definition (OKFn, 2005). It does not measure other common aspects of open data assessment, such as context, use, or impact. The Index does not cover data quality, which is a significant barrier to reuse (Janssen et al., 2012). However, it measures aspects of "practical openness" like data findability that are part of the Charter principles (OKFn, 2019a).

ODIN addresses Charter principles 2, 3, and 4, but not entirely. Of Charter principle 4, only P4.b "Ensure that open datasets include consistent core metadata and are made available in human and machine-readable formats" is partially surveyed. ODIN does not score policies. Thus it does not assess the Open by Default principle, although it only measures open datasets (Brandusescu et al., 2018). The five elements of openness (non-proprietary format, terms of use, metadata availability,

download options, and machine-readable) used in ODIN match the principles of the Open Data definition (OKFn, 2005) and the Open Data Charter (Open Data Charter, 2013)

The analysis of the metrics described in ODM methodology (European Commission & Consortium of Collaborators, 2019) suggests that Charter principles 3 and 4 are covered, but not entirely. Like Open Data Inventory (ODIN), ODM does not survey policies, so it does not assess the Open by Default principle.

ODM, GODI, and ODIN only survey specific data; they do not assess data policies or promote a culture of openness. Their measurements focus on the technical aspect of the open data, such as accessibility, not on governance or impact. What differentiates these benchmark instruments is their scope or focus. All of them measure "data openness" however, each emphasizes different aspects of "openness."

OGD measurements focus on the supply side. Principles 5, For Improved Governance and Citizen Engagement, is measured by qualitative proxy indicators. The following question is an example: "if the government offers support for civil society organizations projects that focus on identifying policy solutions to challenges faced by marginalized communities using OGD." Principle 6, For Inclusive Development and Innovation, is measured by the number and quality of open data initiatives, business products, and services developed, educational programs, and research partnerships created.

The European Union, OECD, and the other organizations that developed the surveyed benchmarking endorse the Open Data Charter. Auditing assessments against the Charter principles provides evidence that these institutions "walk the talk." They use a consistent approach, based on the principles they endorse, to assess open data practices. Their measurements can be compared, and their results can be used to help improve data quality and conditions for sharing and reusing open data. There is a clear overlap in readiness and data assessments, as all six benchmark instruments measure these dimensions. Our findings are aligned with researchers and practitioners (Carrara et al., 2017; OECD, 2018; Vancauwenberghe, 2018). GODI, ODIN, and ODM measurements focus on the data dimension. They measure concepts linked to openness, such as data quality and findability, which are prerequisites of open data use.

Nevertheless, the use and impact dimensions are barely addressed. EODMA, OURData, and ODB measurements include the use of data and the impact of OGD across the political, social, and economic areas. However, benchmark instruments use proxies such as the number of site visitors, the number of dataset views and downloads to gauge the use of OGD. Our findings are aligned with other researchers (Susha et al., 2015; Lämmerhirt et al., 2017; Vancauwenberghe, 2018) as the use and impact dimensions are still the weakest links of all assessments.

5. Conclusion and Future Research

This study was limited by the number of assessments studied. It focused on recent and international benchmarks in which measurements could be compared using the Open Data Chapter principles. To choose which OGD benchmark instrument best suits their purposes, practitioners, and decision-

makers should be aware of their differences and similarities. If they are interested in data, "openness" aspects should look into the Open Data Monitor, ODIN, and GODI as they emphasized the data dimension. EODMA offers the broadest OGD assessment as the data, readiness, impact, and use dimensions are addressed. ODB and OurData stay in the middle, with a strong focus on readiness and data. However, ODB assesses the impact. OurData evaluates usefulness. All benchmarks consistently use the Charter principles to guide their measurements of open data initiatives.

The impact and use of Open Government Data are accounted for in only half of the benchmark instruments. This finding suggests a gap that can be explored in future research. We will investigate OGD prerequisites to determine how they can be used to create practical measurements and indicators of the actual use and usefulness of the data. Another venue is to investigate whether the relation between the Charter principles adoption influences the use and usefulness of OGD.

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EGOV-CeDEM-ePart

Open Data Reuse and Information Needs Satisfaction: A Method to Bridge the Gap

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Abstract: Data providers share open government data (OGD) to be transformed by reusers into products and services. OGD is believed to lead to many benefits but is not reaching its expected level of reuse. Data providers have attempted to use crowdsourcing contests to tackle this issue, but reusers seem to participate more for themselves than the needs of citizens. This paper presents a tentative workshop method to capture activity-based information needs of end-users in an everyday context, in order to inform publishers and inspire reusers to bridge the gap between them and end-users. The workshop is developed using design science research. It is presented as a facilitator script that can be used by practitioners, data providers, or reusers. The outputs can inform data providers about valuable datasets to release and inspire reusers to innovate sought after solutions and be adapted by open data researchers to collect data about information needs.

Keywords: Open Government Data, Information Need, Workshop, User-centred method

Acknowledgement: This research in progress is part of the Wal-e-cities project funded by the European Union (FEDER) and Walloon Region (Belgium). This paper has a sibling paper accepted to the EGOV-CeDEM-ePart 2020 conference that reuses the output of the workshop method (Crusoe, J., Gebka, E., and Ahlin, K., 2020).

1. Introduction

Public organizations, in the new role of data providers, are releasing open government data (OGD) (Davies, 2010). They produce and provide the data to others without restrictions on its use or distribution. Data providers hope that OGD will lead to better transparency, citizen engagement, and innovation (Charalabidis et al., 2018). Reusers of OGD can reuse the data to deliver information and develop or improve products and services (solutions) (Davies, 2010). Solutions can be used by end-users who are anyone seeking information to satisfy their information needs. The information needs can be experienced when they attempt to satisfy a primary need and encounter a gap in their knowledge (Wilson, 1981). However, OGD is not reaching its expected level of reuse (Safarov, Meijer

and Grimmelikhuijsen, 2017), which can come from a lack of awareness or interest (Hellberg and Hedström, 2015). Data providers attempt to tackle the issue and engage reusers to develop innovations with OGD via crowdsourcing and innovation contests, like Hackathons (Johnson and Robinson, 2014). Hackathons can be based on citizens' needs (Hjalmarsson and Rudmark, 2012). However, satisfying the needs of citizens is the developers' fourth motivation to participate in such events, after the fun and enjoyment, intellectual challenges, and status and reputation (Juell-Skielse et al., 2014). These approaches result in technology-driven solutions that seem to have limited impact (Carr and Lassiter, 2017). Thus, the solutions developed on OGD may not meet the needs of the crowd, and that the contests gnaw on a gap between reusers' solutions and real end-users' information needs.

This paper presents a tentative participatory workshop method that can capture information needs that are encountered in activities when trying to satisfy primary needs. The method bridges the gap between a group of end-users, their information needs, and OGD solutions in a specific everyday context of information use (e.g., citizens finding their way to work or keeping up-to-date on changes in their region). The workshop uses an end-user centred approach inspired by service design. The workshop's output aims at helping data providers to identify publicly valuable datasets, and reusers to identify relevant information needs and promising opportunities, which can then be satisfied by solutions they develop. This research is guided by the following research questions:

- How can a workshop method be used to identify end-users' information needs in an everyday context?
- How can its output support data providers and reusers to provide valuable data and desirable solutions?

The paper is structured as follows: we present the background, explain the research approach, present a summary of the workshop method, and conclude on an outlook for future development.

2. Background

The background explains information needs and approaches to capture them, based on a (general) literature review (Grant and Booth, 2009). The authors describe this type of literature review as general, focusing on describing previous work to identify gaps, without maximizing the scope.

2.1. Information Needs

People gain information when they make sense of data, where data can be defined as a representation of objective facts or unprocessed information (Hey, 2004). OGD offers many different reuses. Data reuse aims first of all to produce information (Hey, 2004). When there is an extra processed layer added to the information, it can become a digital information solution (e.g., dashboards and journalists' blogs (Davies, 2010), an improved service (e.g. improved waste collection), or an aggregated service (e.g. an optimized route planner based on different data sources) (Berends *et al.*, 2017). These solutions can be used to satisfy information needs, which (Wilson, 1981) considers to be a secondary need that emerges when people try to satisfy primary needs. When people recognize a gap in their knowledge, information needs arise (Belkin and

Vickery, 1985) that are personal and contextual. Information needs are determined by the roles an individual fill in social life, the environment within the role is performed, and depend on the individual's level of knowledge on the matter (Wilson, 1981).

2.2. Approaches and Methods to Capture End-User Information Needs

Previous research contains schools of thoughts on how to capture needs and information needs of end-users. User involvement is a growing innovation strategy to develop internet-based applications, which can help reusers to understand (end-)user requirements, access to useful information, new ideas, and define the scope of a project. If the goal of a method is to imagine or envision a future practice or product, and to seek inspiration together with end-users, Steen, Kuijt-Evers and Klok (2007) suggest using co-design and empathic design, two approaches to participatory design. In participatory design, tools and artefacts are developed to enable the communication between the end-users, experts in their usage experience, and the reusers, experts in their field and technologies (Sanders and Stappers, 2008). Barbosa Tavares, Hepworth, and De Souza Costa (2011) demonstrate that a collaborative approach and techniques including scene-setting, brainstorming, cards for people to express ideas, individual and group work and discussions are efficient to help people identify their information needs. In sum, previous research shows that collaborative methods with end-users can help capture information needs and support reusers in their attempt to match technology with end-users' experiences, needs, and preferences. However, to our knowledge, this approach has not been applied in the field of OGD.

3. Research Process

The development of the tentative workshop method followed the design science research (DSR) methodology and the steps suggested by (Peffers *et al.*, 2007): (1) problem identification and motivation, (2) definition of the objectives for a solution, (3) design and development, (4) demonstration, (5) evaluation, and (6) communication. In total, we conducted three iterations using step (2) to (5). Johannesson and Perjons (2014) explain that the steps included in DSR can be used in sequence from start to end or as individual steps as iterations. The result of this research is a tentative workshop method artefact that is summarized in this paper. The artefact is presented as facilitation script (extensive description of steps, tasks, and roles to conduct the method without prior knowledge) accessible at https://tinyurl.com/wojwlq4.

3.1. Problem Identification, Motivation, and Objectives

We started the study while discussing the disconnection between end-users' information needs, published open data, and reusers' developed information solutions. We conducted a literature review on citizens' involvement in OGD and methods to capture information needs. We identified the necessity for a method to first, increase the likelihood of generating value for OGD end-users, second, enhance the possible development of solutions that reach their usage objectives. These considerations are also crucial for small and medium cities that want to publish OGD but are cautious regarding the resources invested in publishing OGD and do not have large and diversified reuser communities. The practical motivation for the study is the perceived lack of OGD value for

the end-users, while the theoretical motivation is the contribution to previous research of OGD and information needs (Barbosa Tavares, Hepworth and De Souza Costa, 2011). The objectives of the workshop method are: (1) to enable a defined group of end-users to express their information needs, and (2) to inform data providers and inspire reusers with the output. The output should help reusers develop desirable OGD solutions for end-users and support data providers to identify valuable datasets.

3.2. Design and Development

In this study, OGD is datasets published by municipalities, while end-users are citizens. The first iteration had the objective to capture the information needs of end-users in their everyday life. Observations combined with interviews and scenario were used as preliminary methods. After evaluation, we decided to follow the path of Barbosa Tavares, Hepworth and De Souza Costa, (2011) with a participatory approach using scenarios, as observations did not provide rich data and interviews were time-consuming. At this point, we started to develop the tentative workshop method presented in this paper and designed steps and tools to structure the reasoning process of the participants. The method was tested and developed in the following two iterations.

3.3. Demonstration

For the first workshop, we invited nine Belgian researchers as end-users and citizens of their working city. As researchers, they were critical and knowledgeable participants that contributed to improving the workshop method. For the second workshop, eleven Belgian students participated. All participants were invited as they belonged to a homogeneous group of end-users and citizens, are perceived to share similar needs regarding information related to the city, and could represent a customer category for a reuser. Participation was voluntary, and people were recruited through e-mails, posters, and direct contact. Both workshops lasted one hour.

3.4. Evaluation

The researchers, who developed the study, reflected on and evaluated the artefact after each iteration by comparing the conducted method and outputs with the study's objectives. The participants of the first workshop, researchers, provided methodological feedback and the ones of the second workshop, students, were asked about the clarity of the instructions. Finally, we presented the workshop method and outputs to the intended audience for feedback: potential data providers and experienced reusers. We contacted representatives from two small Belgian municipalities that had no previous experience with OGD and no published data but a strong will to start. We organized a two-hour-long meeting per municipality, attended by one local deputy and one civil servant responsible for OGD. They received the facilitation script per e-mail three days before the meeting. Additionally, we introduced the workshop method and the outputs visualized on mind-maps to a digital company, expert in OGD-based applications. We selected them for their seven years of experience with OGD reuse and relevant field knowledge. The CEO, a UX Designer, and a front-end developer attended the meeting which lasted one hour.

4. The Workshop Method

This section presents a summary of the designed workshop method. The method relies on the roles of participants, facilitator, and workshop sponsor. Participants are voluntary end-users recruited based on the match between their profile and the objective of the workshop. Facilitators are people who take charge of the workshop and enable the discussions. Workshop sponsor is the final beneficiary of the workshop's output and insights. The method follows three phases: (1) preparation, (2) execution of the participatory workshop, and (3) analysis of the output. We elaborate on each of the phases, exemplified with the final workshop run.

4.1. Phase 1. Preparation

The purpose of the preparation phase is to define the participants' profiles and the workshop settings, which are based on input from the workshop sponsor. The workshop settings (general context and activity domains) needs to be linked to sponsor's core activity (releasable data or developable solutions). The choice of context and activity domains can be made based on prior knowledge or prepared with a representative group. The context constrains the participants to situate themselves in an environment and help them to identify their social role and status (Wilson, 1981). For the last iteration, the general context was the city; the relevant participants were students in their social role of citizens; the activity domains (specific themes) were the needs of socialization, eat and drink, discovering the city, and be involved in the local life. Finally, to ease the participation, a sensitization kit (Visser *et al.*, 2005) should be sent a few days before the workshop session. This kit helps the participants to understand the context and the concepts which will be discussed, to become aware of their habits in a reflexive posture, and to note down their first ideas. The kit was added after the last iteration.

4.2. Phase 2. Execution of the Participatory Workshop

In the second phase, the facilitator guides the participants through the identification of information needs by using a scenario to generate knowledge gaps anchored in a particular role and life situation of the end-user. The participants fill out question cards to help them go from basic, satisfied needs to unsatisfied, latent, unexpressed needs. The cards also carry the output of the workshop. Examples of blank cards are available in the facilitator script. Table 1 presents an overview of the workshop, the objectives of each step, the work dynamics, and allocated time.

Table 1: Representation of the Workshop Session

	Objectives	**Description**	**Work Dynamic**
Step 1	Select an activity domain, within the scope of the workshop topic.	The facilitators give the instructions for the entire workshop with the timing and purpose of the phases. The topic is formulated in a scenario, and the activity domains limited to a small number of choices. If done, the sensitization kit's results are briefly discussed and used as a warm-up.	Altogether, by tables of 4 to 6 participants Duration: 5 min (20 min with sensitization kit)
Step 2	Identify activities (primary needs) in the chosen domain and the information needed for them (secondary needs).	The facilitators remind the instructions of step 2 and give a set of cards n°1. The participants brainstorm and report their ideas on the cards.	In pairs Duration: 15 min
Step 3	Identify existing solutions and possible issues (unsatisfied secondary needs)	The facilitators remind the instructions of step 3 and give a set of cards n°2. The participants report their problems and new ideas on the cards.	Alone Duration: 10 min
Step 4	Identify existing solutions and possible issues (unsatisfied secondary needs)	The facilitators remind the instructions of step 4 and give a set of cards n°3. The participants report their problems and dream solutions on the cards, based on the previous cards. They can mix all of them and use ideas and needs from the other team on the same table. When done, they present one dream solution to all.	Altogether, by tables of 4 to 6 participants Duration: 30 min

4.3. Phase 3. Output Analysis

The workshop results in a set of information needs accumulated and developed through the different phases, captured on question cards, and the suggestion of dream solutions explained in context. The content on the cards is analyzed and sorted out by the facilitator. The cards' content has to be repacked for the intended audience. In our case, we used mind-maps that allowed us to track and visually connect the many sprawling activities and information needs.

4.4. Relevancy of the Method and Outputs for OGD Reusers and Data Providers

The reusers' feedback was that the method brings up interesting insights. The visualizations of the output (mind-maps) help to make links between the needs and dream solutions with a context, an end-user profile, and primary needs, leaving the reusers enough leeway to come up with ideas. However, the risks are to open too many doors, go beyond the core business of the reuser and the available OGD, and result in unrealistic solutions. The analysis showed that most of the expressed information needs were data belonging to the private sector. The interviewed municipalities were currently unsure about the method's applicability for their needs. The main impediment was the participation of citizens. It challenged their vision of the data provider's role as the one deciding which datasets to publish as well as taking an interest in OGD solutions and development (assumed to be the reuser's role, a third party). They also expressed their concerns about the provision of information solutions instead of data. They were very cautious about citizens' participation since it commits them as public actor and publisher to provide solutions for the expressed needs.

5. Conclusion and Outlook

The artefact developed is a tentative method to capture the information needs of end-users through a participatory workshop which output can inform reusers and publishers. It was tested with two homogeneous groups of end-users. However, this research's limitations are the number of participants and the workshop's coverage. It does not cover the entire cycle of gathering information needs and improving OGD release and reuse. Nevertheless, compared to interviews and observation, the workshop substantially increased the quantity of the output and the perception of degrees of importance in the expressed information needs. The participants start with what we call their top-of-mind information needs ("What information do I need for X, that I already get from Y), which we also saw in the street interviews. Then through the identification of issues with existing solutions, they can express a deeper level of needs, the latent and not spontaneously expressed needs (frustration and missing features help them to find out the must-have, what information they value most). The creative part, dream solutions, allowed them to express their wishes, the "nice-to-have" (what they would value and are not yet satisfied with present solutions). The final two were only identifiable through the workshops and not the observations and interviews. Future research needs to further develop and test the tentative workshop with more participants, comparing the method's features and outputs with other similar methods and explore alternatives to test and optimize the relevancy of the workshop output on the publisher and reuser work. In this way, we believe we could improve the impact of OGD. We plan to follow this path forward.

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EGOV-CeDEM-ePart

Bayesian-belief Networks for Supporting Decision-making of the Opening Data by the Customs

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Abstract: Open government data initiatives are part of the endeavor process of governments to show that they are accountable and transparent organizations. Opening more datasets to external data analytics providers or other government organizations holds the potential to help governments to improve their processes by promoting a better understanding and enhancing the decision-making. Nevertheless, the decision-making to disclose datasets is challenging. Decision-makers often refuse to open their datasets due to several potential risks. In situations like the Dutch Customs, a dataset can contain competitive sensitive data, and multiple parties have to agree to open it. Given this complex situation, in this paper, we test a Bayesian-belief Network method for supporting the decision to open data. Our work contributes to Customs in their efforts to disclose more datasets and helping decision-makers in the process of evaluating data and defining strategies of how to move from closed to open decisions.

Keywords: Bayesian-belief Networks, Decision-making, Open Data, Customs, Risks

Acknowledgement: This research was funded by Indonesia Endowment Fund for Education (LPDP), the Ministry of Finance of Republic of Indonesia. This study was also partially funded by the PROFILE Project (nr. 786748), which is funded by the European Union's Horizon 2020 research and innovation program.

1. Introduction

Government institutions play an essential role and have the power in opening of public data. Being both a data publisher and a policy-maker, the government has a particular locus to define strategies and tools for opening its data that improves the decision-making process (Luthfi & Janssen, 2019). Besides, opening more datasets can promote a better understanding, stimulate great ideas, enhance transparency, and other value proportions (Janssen, Charalabidis, & Zuiderwijk, 2012; Kucera &

Chlapek, 2014). However, during the decision-making process for opening datasets, the governments and external stakeholders can have different roles and motivations (Gonzales-Zapata & Heeks, 2015).

Regardless of the underlying motivation for opening data, analyzing and making decisions on the status of the dataset before releasing it to the appropriate stakeholders is often challenging and not trivial. The government should take into account several risks (Martin, Foulonneau, Turki, & Ihadjadene, 2013). The possible risks could include unlocking sensitive personal data, competitive information, and opening inaccurate data (Luthfi & Janssen, 2017). As a result, these potential risk factors can influence accountability and even degrade the reputation of the government institutions (Martin et al., 2013).

In this study, we introduce a supporting tool where a conceptual model was previously developed based on the healthcare case study (Luthfi & Janssen, 2017). At that time, the proposed decision-making model was still described in a high-level overview. The prior model employed sequential steps to analyze the selected dataset. For the analysis of the dataset, a non-actual dataset sample and simulated model using the Bayesian-beliefs network method was used. Besides, a quantitative approach was used to estimate the possible adverse-risks level while constructing the causal Bayesian networks. The empirical setting for this study is a pilot project (called the Dutch Living Lab) which is part of the PROFILE[1] EU-funded research project for developing data analytics solutions for Customs (Rukanova et al., 2019). The main research question that we set to explore in this paper is "to what extent the decision support tool for opening data is applicable to the Customs context?". Hence, the objective of this study is to explore the feasibility of the decision supporting tool using Bayesian-beliefs network that was developed for the context of opening data in the healthcare domain (Luthfi & Janssen, 2017) to the context of the Customs case study.

2. Theoretical Background

In this section we first review existing models that have been applied so far in the context of opening data. We then present in more detail the decision-making model using Bayesian Networks method, which is the method we further develop and enhance in this paper.

2.1. Decision-making Models for Opening Data

In the literature study, we found that there are various models for making decisions to open data. The five systematic models that contribute to the open data domain were identified, as follows: (1) Trade-off the risks values (Zuiderwijk & Janssen, 2015). This model provides structured steps for analyzing the benefits and risks of disclosing data. (2) Decision-support framework (Buda et al., 2015). This model provided a prototype that was based on the insight of open data ecosystems. (3) Multiple Criteria for decision-making (Luthfi, Janssen, & Crompvoets, 2018). This model used a fuzziness theory to analyze the uncertainty problems and provide decision alternatives. (4) Costs and benefits of opening data (Luthfi & Janssen, 2019). This model was developed based on the

[1] https://www.profile-project.eu/

Decision Tree Analysis method. This model is used to estimate the potential advantages and disadvantages of releasing data. (5) Interactive decision-making process (Luthfi & Janssen, 2017; Luthfi et al., 2018). This model proposed a Bayesian-belief Networks method to construct the causal relationships of the decision-making process to open data in the case of health patient records. This model contributes an interesting perspective of how to examine the risks and benefits of opening data by providing sequential iteration process. The model uses a suppression technique like k-anonymity to anonymize such sensitive attributes.

The prior research listed above has explored the feasibility of these models in the context of opening data. In this paper we focus specifically on further developing the last model that we listed, namely the one using Bayesian-belief Networks method for opening data (Luthfi & Janssen, 2017)[2].

2.2. Prior Study to Open Data Using Bayesian-belief Networks

In prior research (Luthfi & Janssen, 2017) a conceptual model was developed to analyze the possibility of adverse-risks in the open data domain that makes use of Bayesian-belief Networks theory. The main motivation of the prior research was to deliver new knowledge to the decision-makers and other related stakeholders on how to make decisions to open data by using a scientific and structural manner. This model proposed four main sequential steps to analyze the potential risks, namely retrieving and decomposing dataset, evaluating, assessing, and decision-making. This model examined the health patient records dataset as an example case, and developed a systematic simulation to test the conceptual model.

Besides, to estimate the level of possible risks, quantitative approach was employed. In the assessment step, during the iterative process of decision-making, the model normalizes the table by removing several sensitive attributes of the dataset based on the Bayesian network employment. While this model demonstrates an initial application of how Bayesian Networks theory can be applied in the context of open data (Luthfi & Janssen, 2017), this previous research it did not fully integrate all the Bayesian-belief Network rules.

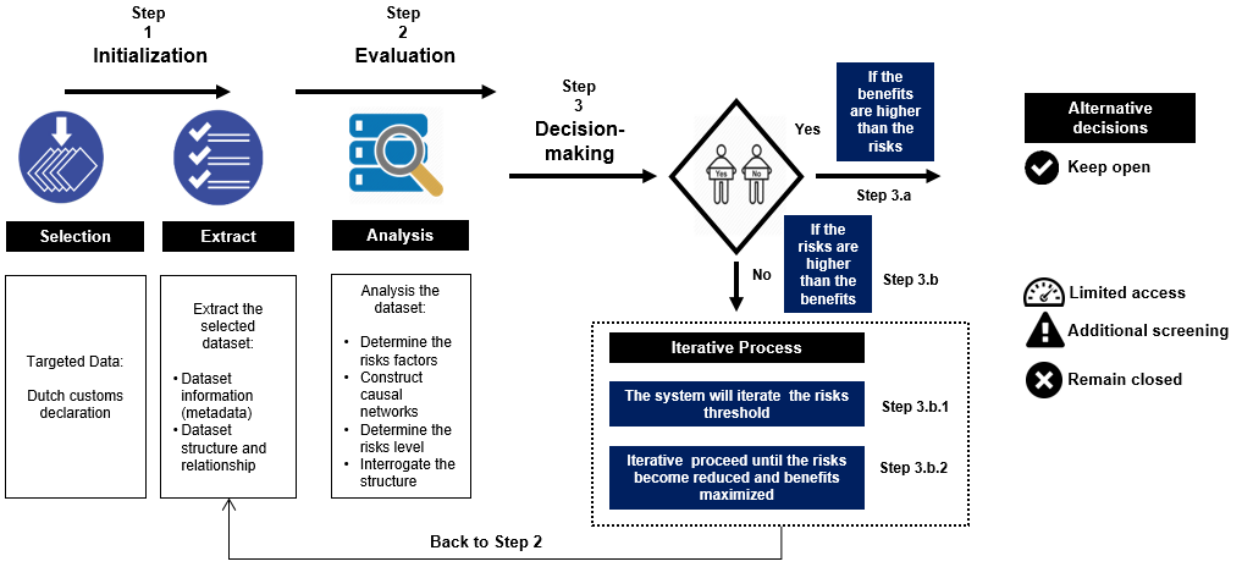
3. A Novel Conceptual Model

In this study, we use a systematic approach to apply the decision-making process to open data from the insight of Dutch Customs. As a starting point for developing our model we used the conceptual model that was initially developed in the previous study by using the health patient records dataset (Luthfi & Janssen, 2017). In this paper, we are adapting the prior decision-support model by modifying some steps to make it more effective but still take into account the comprehensive overview. In the previous model, there are four main steps, namely retrieving and decomposing dataset, evaluation, assessment, and decision-making. In this paper, we propose a new more effective process by merging the evaluation and assessment steps to become a single evaluation

[2] In this paper we focus only on further developing the use of Bayesian Networks theory in the context of opening data. Further research can also examine and further develop the use of the other models or combination thereof in the context of the opening data but this is out of the scope of the current paper.

process by implementing the Bayesian-belief Network rules. The objective to combine these steps is because the tool can employ the steps in the same process. Besides, the previous model was focused on the binary decision (open and closed), whereas in this new model, we can provide more dynamic decisions. The four decisions that are possible to take are as follows: (a) open the dataset; (b) maintain limited access to the dataset; (c) introduce additional screening; and (d) remain closed. The new proposed conceptual model for this study is presented in Figure 1.

Figure 2: A Novel Conceptual Model of Decision Support to Open Data (adapted from (Luthfi & Janssen, 2017))



In the first step (Initialization), we retrieve the datasets from the data provider. In this step, the decision support tool will extract the selected dataset into a machine- readable structure. In the second step (Evaluation), we analyze the dataset using Bayesian-belief networks method. There are four sub-steps, namely (a) determine the risk factors, (b) construct the causal relationship of the risk factors, (c) determine the risks level, and (d) interrogate the structure. Next, we evaluate the latest status of the dataset based on the single classification result in Step 2. In this step, the constructed Bayesian-belief Networks is interrogated to get the final state of the current level of risks ("high", "moderate", and "low"). Finally, the decision is made in the step 3. The expected result from this step is to provide a single classification of the dataset status, namely open, limited access, additional screening, and closed dataset. In the case that the data providers consider reanalyzing the dataset because of potential other risk effects, the decision support tool can iterate the process. The iteration process aims to update the dataset status (back to step 2) to keep certain parts of the dataset is able to be disclosed.

4. Case Study Analysis

4.1. Examine the Decision Support Tool

In order to observe and evaluate the decision support model, we apply the tool to the context of the Dutch Customs case study. In this paper, we employ the three main steps from the conceptual model shown in Figure 1.

Step 1. Initialization

In this step, the authentication process is required to indicate the groups and levels of the users namely: administrator, data analysist (experts), and decision-makers. For example, we give a privilege level from the data analyst or expert. Then, the tool selects the datasets from the data provider. The original dataset structure used in this case study is derived from the Dutch Living Lab, namely Vereeenvoudigde Aangifte e-Commerce. In this process, the decision support tool will extract the selected dataset into a readable and machine structure. The tool can select a data source from multiple database platforms like CSV, XML, JSON, etc. and ensure that the metadata of the dataset is well structured. Afterward, the tool constructs the dataset structure and its relationships.

Step 2. Evaluation

The first sub-step of this process is determining the risk factors. In this step, the tool asks the data analyst or expert to select a single or multiple risks category of the attribute. There are several risk factors provided in this tool, namely privacy infringement, data inaccuracy, data misinterpretation, data sensitivity, and data ownership. In this case, the expert selects the data sensitivity issue as we want to examine the selected dataset in terms of sensitive level. In the second sub-step, the tool constructs a causal network of the risk factors that are determined in the previous sub-step. This causal networks are developed based on the Bayesian-belief Networks formulation. The causal networks can play a role to represent a set of risks variables and their conditional dependencies via a directed acyclic graph, as shown in Figure 2. The third sub-step of this process is determining the risks level. The earlier studies conducted in the healthcare sector (Luthfi & Janssen, 2017) used a quantitative approach to determine the risks level of attributes. For that study the availability of the experts and data analysts in this field was sufficient enough to quantify and estimate the of risk level of the selected dataset. Nevertheless, in the Dutch Customs case, such accurate expertise for estimating the details the risks level is limited. Besides, in practice, doing quantitative approach will take an effort and is time consuming. Therefore, in this paper we adapt the approach to a qualitative approach to level of the risks, namely “high risks”, “moderate risks”, and “low risks”, as can be seen in Figure 4.

The last sub-step of this process is interrogating the dataset structure. In this sub-step, the tool develops the group of the Dutch Customs declaration dataset including the risks level. The goal of this interrogation is to visualize the explicit status of each attribute in terms of the data sensitivity issues. There are three color signals shown by the tool to indicate the risks level. The red attributes represent the high risk level, the yellow attributes indicate the moderate risk, and the green attributes reflect the low risk.

Figure 3: Bayesian Networks Causal Relationships

Figure 4: Determine Risk Level

Recipients

Code	Description	High	Moderate	Low
A5	Recipient's name	☑	☐	☐
A6	Recipient's address	☑	☐	☐
A7	Recipient's residence	☐	☑	☐
A8	Recipient's postcode	☐	☑	☐
A9	Tax/VAT number	☐	☑	☐

Senders

Code	Description	High	Moderate	Low
A10	Sender's name	☑	☐	☐
A11	Sender's address	☑	☐	☐
A12	Sender's residence	☐	☑	☐
A13	Country of offer/origin	☐	☑	☐

Product Description

Code	Description	High	Moderate	Low
A17	Goods description	☐	☑	☐
A18	Customs value	☐	☑	☐
A19	Gross weight	☐	☑	☐
A20	Control location	☐	☑	☐
A21	Date of transaction	☐	☑	☐
A24	Intrinsic value	☐	☑	☐
A26	Number of packages	☐	☑	☐

Reference

Code	Description	High	Moderate	Low
A1	Modes of transportation	☐	☐	☑
A3	Declaration type	☐	☐	☑
A15	Method of payment	☐	☐	☑
A16	Customs commodity code	☐	☐	☑
A14	Indication for use of emergency procedure	☐	☐	☑

Step 3. Decision-making

In this final step, the tool provides the information of the status of dataset attributes into four decision alternatives. Based on the analysis process (step 2), the tool recommends to use additional screening with respect to some sensitive attributes like recipient_name, recipient_address, sender_name, and sender_address. In order to help the data analyst to follow up the additional screening decision, the tool also take into account the action plan. In this case, we propose a salted cryptography algorithm to train the attributes. This method uses concatenating technique to randomly blur the plain text of the data value (Dubrawsky, 2009).

5. Discussion and Conclusions

Based on the entire process of the decision-making process of opening data in this study, we found some positive results. First, for the decision-support tool, it is applicable to use a qualitative approach in estimating the potential risks level of the dataset. The qualitative work has proven to make the time more efficient because the Customs expert does not require such high expertise to define and compare the risk by reflecting on the numbers (quantitative). Second, Bayesian-belief Networks is a suitable method that can analyze multiple datasets with different case studies by using systematic steps. The tool is not only able to construct the causal relationships of the risk factors, but also to interrogate the attributes by grouping the risks level. Third, by examining the real-life environment of the Dutch Customs declaration dataset, the decision-support tool has shown the more rigorous result and is recommended to be used by decision-makers.

Regarding contribution to theory, in this study we extend the method developed earlier (Luthfi & Janssen, 2017) by: (1) merging steps in the method to simplify the process and make it more efficient; (2) by incorporating a more sophisticated use of the Bayesian-belief Networks in the method compared to what was done earlier; (3) by extending the tool and demonstrating that it can support also qualitative analysis in addition to quantitative analysis. Our study also demonstrated a broader applicability of the method and the tool beyond the healthcare domain where it was originally developed also to the Customs domain. which is a very different domain of application. This increases our confidence that the tool can be applied across domains.

With respect to practice, this study contributes new insights to policy-makers and decision-makers, in particular in the Customs domain, to support their decision-making process in opening data. The decision-support tool is applicable to multiple datasets and different case studies. The use of a synthetic qualitative approach could be beneficial for government organizations who have a limited number of experts to assess the risks level. Besides, the tool can make a better understanding of the decision-makers regarding the possibility of changing policy from closed to open data sets. For future work, we recommend using multiple methods to evaluate the dataset, such as Multi-Criteria Decision Making and K-Nearest Neighbour algorithm, to get more rigorous results and findings of the proposed conceptual model to open data.

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EGOV-CeDEM-ePart

Towards an Open Data Research Ecosystem in Croatia

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Abstract: Open data initiatives have resulted in greater availability of data, thereby realising ambitions such as improved efficiency and effectiveness of public services, increased transparency, accountability and citizen participation, and economic and social value creation. Open data research is a crucial component in creating and accelerating sustainable and innovative open data ecosystems. However, not all countries equally progress with regard to implementing open data policies and some countries are falling behind. The project Twinning Open Data Operational (TODO) examines which strategy can boost the open data ecosystem of countries that are just beginning to develop open data policies. We are developing and implementing an interdisciplinary multi-domain open data research approach to increase the maturity of the concept and impact of the open data ecosystem in Croatia and beyond. This paper lays down the strategy to arrive at a sustainable open data research ecosystem in open data beginners countries.

Keywords: Open data, open data research ecosystem, strategy beginners, open data beginners, Croatia

Acknowledgement: The work presented in this short paper is supported by H2020-WIDESPREAD-2018-3 grant agreement number 857592.

1. Introduction

In the past ten years, open data initiatives have resulted in a greater availability of data, thereby realizing ambitions such as improved efficiency and effectiveness of public services (e.g., Huijboom and Van den Broek 2011), increased transparency, accountability and citizen participation (Jetzek 2013), and economic and social value creation and job creation (e.g., Omidyar Network 2014, Global

Partnership for Sustainable Development Data 2017). Moreover, open data are essential for achieving the United Nations' Sustainable Development Goals (see The Open Working Group 2015). It has been claimed that the economic value of billions of Euros will be created by the reuse of open government data (Dekkers et al. 2006, Pira International et al. 2000, Vickery 2011). Open data are data that can be used and reused without any (financial, legal, intellectual and technical) barriers. Open data can be framed as data that is free of charge, licence free, machine readable and provided in open format (Welle Donker and Van Loenen 2016, see also Sunlight Foundation 2010). To realize the benefits of open data to the full, traditional "one-way street" open data practices and initiatives should be replaced by an open data ecosystem, i.e. a concept related to open data, which focuses not only on data accessibility, but also on the larger environment for open data use – its "ecosystem" (Pollock 2011, World Bank Group 2015). Pollock (2011) argued that we should transform our one way open data streets towards an ecosystem where data is cycled and recycled among producers and users with a prominent role for info-mediaries. The ecosystem builds on the open data infrastructure and is "made up of a series of interrelated tools and services that rely on one or more elements of the infrastructure either directly, or through intermediary tools and services, for their sustained operation" (Davies 2010 cited in Van Loenen et al. 2018). The added value of the ecosystem perspective on open data is its focus on the relationships and interdependencies between the social (publishers and users of open data) and technological (data linking, big data analysis, storing, visualising) factors that affect the performance of open data activities (Dawes et al. 2016, Zuiderwijk et al. 2014).

Ongoing open data research is characterised by single disciplinary approaches (Zuiderwijk et al. 2014). In recent years, the concept of open data has been discussed and investigated from a technological perspective (Pollock 2011), a business perspective (Heimstadt et al. 2014), a socio-technical perspective (Ubaldi 2013), an operational perspective (Zuiderwijk et al. 2014) and a process perspective (Janssen and Zuiderwijk 2014). However, some perspectives remain under-studied (for instance, the legal and governance perspective), and ecosystems are still largely described and studied by their individual elements (see Charalabidis et al. 2018). Moreover, international open data research on open data practices are often addressing lessons learned in specific domains (e.g., agriculture, geomatics, statistics, health, big data, research) without identifying challenges that users of data across different domains are being confronted with (Verhulst and Lammerhirt 2016). Provided the many interdependencies in the open data ecosystem, it should be studied holistically, by investigating and developing all elements not only individually, but especially in relation to each other (Verhulst and Lammerhirt 2016). An interdisciplinary multi-domain research approach will provide the required new insights delivering answers and solutions that are far beyond those obtained within single disciplinary, single domain approaches.

Croatia is one such country that is just at the beginning and where the impact of open data is still in its infancy . The Global Open Data Index (Open Knowledge Network 2017) ranks Croatia as 23rd out of 30 European countries. Similar scores were provided by the Open Data Barometer (Web Foundation 2017) (31st out of 40 European countries). While other European Union (EU) member states started to implement their open data strategies in 2005 with the adoption and implementation of the 2003 PSI Directive (Directive 2003/98/EC on the reuse of public sector information), Croatia lagged behind with implementing the Directive, which just started in 2013. As a result, open data

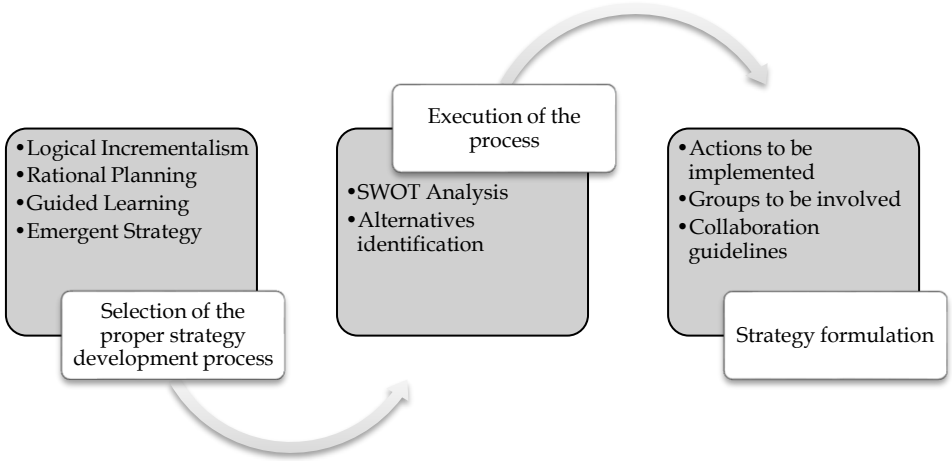
benefits such as increased transparency, innovation and economic growth or a more efficient public sector, have only modestly been realized in Croatia (Information Commissioner Croatia 2017).

An important component in creating and accelerating sustainable and innovative open data ecosystems is a strong academic open data community and an active involvement of research in the development and implementation of the national open data agenda (see Harrison et al. 2012). While open data research in Croatia is advancing and promising, it is not sufficiently mature to support or to steer the open data agenda and to realize the full economic and societal potential of open data. By establishing a sustainable open data research environment capable of addressing key challenges in open data research through the development and application of an interdisciplinary and multi-domain research approach on open data, we explore how we can change the current situation, and establish a sustainable open data research ecosystem at the University of Zagreb (UNIZG). This paper aims to present our ongoing research to create a research environment that explores novel approaches towards researching societal and scientific open data challenges.

2. Methodological Approach

The TODO project is aiming at implementing an interdisciplinary open data research approach in a dynamic setting of 7 faculties of the University of Zagreb and two international universities. Therefore we combined a literature study into performing interdisciplinary research strategies with action research theory (Stringer 2014). Idenburg (1993) explains the four styles of strategy development. The methodological approach follows the procedure described below and depicted in figure 1. The first step is to identify the proper style of strategy development process; then to execute this process and finally to formulate the final strategy fitting our scope. The selection of the proper style of strategy development is decided based on the analysis of the situation in two axes: (a) Goals orientation (what) and (b) Process orientation (how). Rational Planning seems to fit better to our scope since we have strong Goals orientation and weak Process orientation. After a careful SWOT analysis and based on the opinions of external (in the domain of open data) and internal (in the situation in the country/institution under study) experts, the alternatives have been drafted. The final step of the methodology proceeds to the formulation of the actual strategy presented in Section 4.

Figure 5: Methodological Approach for Strategy Development



3. Current and Envisioned Situation

3.1. Current Situation at the University of Zagreb

Open data research in UNIZG is performed in at least six different faculties: the Faculty of Geodesy, the Faculty of Electrical Engineering and Computing, the Faculty of Organization and Informatics, the Faculty of Law, the Faculty of Transport and Traffic Sciences, and the Faculty of Agriculture. We reviewed the current open data research ecosystem within UNIZG through a SWOT analysis. The results of the SWOT analysis of open data research at UNIZG are presented in Table 1.

Table 1: SWOT Analysis Open Data Research at UNIZG

Strengths	•Involvement of researchers from many different disciplines related to open data agenda: law, organization studies, geomatics, ICT, transport, etcetera •Long tradition and international recognition in many scientific and artistic fields •Significant experience of national and international scientific projects •Large number of researchers in scientific and teaching positions •Existence of international recognized researchers and research groups •Researchers cover all scientific and art fields •Well-developed ICT infrastructure in most of the faculties
Weak-Nesses	•Large number of relatively small and fragmented research units •Limited international collaboration with and connection to international open data research community •Different levels of achievements and excellence at faculties regarding open data •Low level of cooperation between faculties regarding open data •Low number of publications on open data in international peer reviewed journals •Limited awareness of the value of open research data •Departure of young and prospective researchers to international institutions, limiting possibility to open new research topics
Oppor-tunities	•Implementation of open data agenda in Croatia requires support from research •Strong desire for education among open data professionals •New generations of researchers and practitioners require updated training and education curricula •National, regional and international universities interested in cooperation with open data projects •Enterprises interested in cooperation with university on technological projects •Raising attention in academic community to open data developments in the Balkan (and similar countries and regions).
Threats	•Lack of national research funding in Croatia •Scientific open data community builds on established research institutions and networks •Low attractiveness of research positions compared to enterprise and international institutions participating in open data agenda •Rather low interest among enterprises to collaborate on open data projects

3.2. Envisioned Situation at the University of Zagreb

In the envisioned situation a sustainable open data research environment is established covering multiple disciplines (ICT, engineering, public administration, law, humanities and social sciences, organisation and informatics) and domains (geospatial, transport, agriculture, law, research and education). This should be strengthened by the close cooperation with two leading international partners (Delft University of Technology and University of the Aegean) and with support from key organizations in the Croatian open data ecosystem. Ultimately this may result in an internationally recognized and competitive centre of excellence in open data research.

4. Strategy Towards Open Data Research Ecosystem

Central to the strategy is the development of an interdisciplinary open data research approach. Interdisciplinary research does not occur automatically by bringing together several disciplines in a research project (Tait et al. 2007). Extra effort is needed to promote formation of a cohesive research

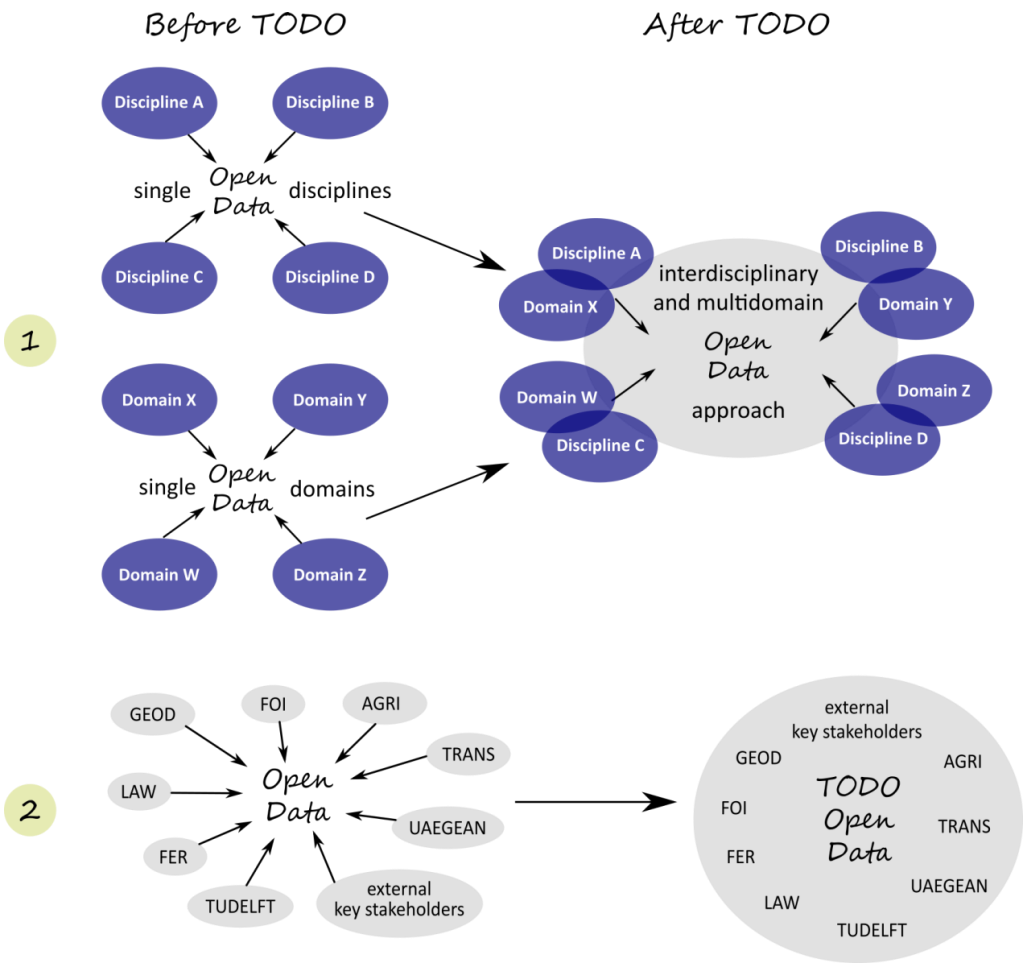
team involving researchers from different disciplines, to combine expertise from several knowledge domains and to overcome communication problems among researchers from different disciplines (Tait et al. 2007). Establishing unambiguous communication between researchers from different disciplines is key to performing interdisciplinary research (Klein 2008, Tait et al. 2007). It is essential that all project participants share a common knowledge base on open data and use the same open data vocabulary (Pollock 2018; Daily and Ehrlich 1999; Wear 1999). In addition, Klein (2008) argues that researchers have to collaborate to develop a common understanding of a phenomenon. An iterative and transparent process should be implemented to arrive at a common stakeholding. External stakeholders can also play an important role in interdisciplinary research, focusing attention on the need for relevance to real world problems and encouraging the uptake of research results by industry or other end-users (Tait et al. 2007).

Provided the interdisciplinary research prerequisites, and the SWOT analysis of open data research at UNIZG, the strategy for stepping up and stimulating scientific excellence and innovation capacity in open data research in UNIZG was designed to encompass five phases:

1) Establishing a new research environment;
2) Building open data capacity;
3) Collaborating and knowledge sharing;
4) Outreach and dissemination; and
5) Creating a sustainable open data research environment.

The strategy should enhance the capacity for open data research at UNIZG by connecting fragmented research groups and researchers across the different research areas and disciplines, in order to arrive at a situation where the UNIZG partners will function as one research unit within UNIZG (see figure 2).

Figure 2: The open data research ecosystem before and after the strategy; from a (1) single discipline and single domain to interdisciplinary multi-domain research approach; and (2) from fragmented groups to a coherent open data research environment.



4.1. Establishing a New Research Environment

We aim to remove barriers and to establish connections between research groups and environments and promoting cooperation in open data research between several research groups at different faculties at UNIZG by providing all open data researchers with a research environment (Open Data Labs) at the level of each partner institution to perform interdisciplinary multi-domain open data research, and to establish good practices to be followed by other faculties and research groups. This is followed by the establishment of a central open data centre of excellence in the UNZIG, strengthened by additional involvement of key open data stakeholders in Croatia and abroad.

The research environment is supported by an online collaborative research environment that will facilitate the communication among the researchers of the different faculties and those of the international partners, including the sharing of information and knowledge (online training material, open data wiki, platform for the webinars, a MOOC, dissemination material, news, and research data).

4.2. Building Capacity

A second component of the strategy is to build open data capacity in UNIZG. This capacity building is aiming to upgrade the general open data knowledge based of UNIZG scientific staff through an online training program, a summer school and site visits to best practices in open data.

The online training program will develop a framework under which a common open data language will be developed and innovative interdisciplinary research conducted. It will further provide all open data researchers at the UNIZG with in-depth knowledge and understanding of the main concepts, theories on and approaches to open data research from different disciplines. To enhance know-how of concepts, approaches and theories related to the different phases of the open data life cycle and different domains of open data through a summer school. Finally, to increase the knowledge on and understanding of real-world open data policies, technologies and initiatives in different domains through site visits at best practices in open data in Europe. Visiting selected institutions and external experts will also foster the exchange of knowledge and scientific collaboration between international open data researchers, practitioners and decision makers.

4.3. Collaborating and Knowledge Sharing

The third component of the strategy is to develop and apply an interdisciplinary multi-domain research approach for open data. This will be performed by the UNIZG staff together with the international counterparts. The collaboration of researchers and research teams within and across disciplines will be stimulated through staff exchanges, seminars, joint publications and presentations, and the supported by the open science collaboration platform. This platform should provide the staff members with effective and innovative means of collaboratively collecting, manipulating and managing research data, as well as collaborative knowledge sharing and creation. In addition to knowledge sharing, partners will also exchange established (inter)national networks among each other. To address jointly and innovatively research challenges that require an interdisciplinary multi-domain approach on open data through the organization of two research seminars dedicated to defining research topics for Early Stage Researchers in the UNIZG research groups.

4.4. Dissemination and Outreach

The fourth step in the strategy aims at increasing the visibility and reputation of UNIZG among the national and international research community, industry, policy-makers and the general public. Outcomes will be communicated to different target groups via a variety of different communication channels, but also participation and knowledge exchange is sought with external researchers by open participation to the national open data conference in Croatia, and scientific workshop, that will be organised. Open data starters will be addressed through the creation of an open data wiki in Croatian, and the development of a Massive Open Online Course (MOOC) on best practices for open data in Croatia.

To implement the knowledge gained in open data education through the review, revision and updating of study programs and courses on open data, as well as pioneering with guidelines for using open data in high school education.

To strengthen UNIZG's international profile and reputation in open data education and research through the organization of an international Open Data conference for open data researchers.

4.5. Creating a Sustainable Open Data Research Environment

The final step of the strategy is to ensure the post-project continuation of the international collaboration and its impact on open data research and practice through the establishment of a cooperative structure. A joint research agenda will be developed and submission of joint project proposals prepared.

5. Conclusion

An important component in creating and accelerating sustainable and innovative open data ecosystems is a strong academic open data community and an active involvement of research in the development and implementation of the national open data agenda. While open data research in Croatia is advancing and promising, it is not sufficiently mature to support or to steer the open data agenda. This paper presented a strategy for establishing such a desired open data research ecosystem in the University of Zagreb, Croatia.

Central to the strategy is the development of an interdisciplinary open data research approach. Stepping up and stimulating scientific excellence and innovation capacity in open data research in the University of Zagreb encompasses five phases: (1) establishing a new research environment, (2) building open data capacity, (3) collaborating and knowledge sharing with international partners, (4) outreach and dissemination, and (5) creating a sustainable open data research environment.

This should lead to an envisioned situation of a sustainable open data research environment covering multiple disciplines and domains, strengthened by the close cooperation with two leading international partners and with the continuous support from key organizations in the Croatian open data ecosystem: the sustainable open data research ecosystem.

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EGOV-CeDEM-ePart

Regional E-Participation Portals Evaluation: Preliminary Results from Russia

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Abstract: This ongoing research presents the framework and preliminary results of the regional e-participation portals evaluation in the regions of Russia. Based on the system approach in Political Science and taking into account the Russian context, we have developed the framework that allows the evaluation of various e-participation tools, as well as cross-regional and cross-platform comparisons alongside the key stages of the e-participation process: the input, "black box", output and feedback. The framework was applied to evaluate 205 e-participation portals in 85 Russian regions, representing six different types of e-participation options. Findings suggest substantial discrepancies in the development of e-participation in Russia. The advantages and implications of this framework for further analysis are discussed.

Keywords: E-Participation, Russian regions, Evaluation, Ranking, System approach

Acknowledgement: The research has been supported by the Russian Scientific Fund (RSF) as part of a project №18-18-00360 «E-participation as Politics and Public Policy Dynamic Factor».

1. Introduction

Evaluation is an important, though challenging aspect in e-participation research. A lot of methodologies have been developed to provide the assessment of e-participation (e.g. see Garcia et al. 2005; Tambouris et al. 2007; Fedotova et al. 2012). Yet, the techniques vary significantly due to different theoretical underpinnings (Panapolou et al. 2008) and usually lack validity because of the inability to consider contextual factors (Sundberg 2018), and, as argued by Kubicek and Aichholzer (2016), "[t]here are no established and valid methods … for evaluating the overall effects and impacts of multichannel participation processes" (p. 23). This "evaluation gap" is further widened by a variety of e-tools, as the taxonomy of e-participation is continuously expanding (Bohman 2014).

This ongoing paper attempts to address these challenges, providing an evaluation framework that deals with the variety of e-participation tools. Based on the system approach in Political Science, founded by Easton (1957), as well as previous research on e-participation evaluation in Russia

(Chugunov & Kabanov 2018; Vidiasova et al. 2016) we present a new methodology that stresses the process of e-participation. The evaluation methodology is designed in a way so it can be adapted to other national and regional contexts, hence can be of interest for both scholars and practitioners. At the same time, it considers the Russian context to get a more nuanced view on the development of e-participation in the regions of Russia. In this ongoing paper, we first overview the methodology and evaluation framework, and then present some of the findings, followed by the discussion of results, shortcomings, and future steps.

2. Background: Challenges of E-Participation Evaluation

There are plenty of evaluation techniques of e-government and e-participation applications, yet there are sufficient discrepancies between them (Berntzen & Olsen 2009). The first challenge here is related to the methodology used. For instance, Machintosh and Whyte (2008) proposed a coherent model including democratic, project and socio-technical layers. Yet, this set of layers is not exclusive, and there is a variety of other criteria used (Panopolou et. al 2008), further expanded by the diversity of methods, ranging from quantitative analysis (Fedotova et al. 2012; Vidiasova et al. 2016) to expert surveys and qualitative assessment (Sá et al. 2016).

The second challenge comes from the multiple channels citizens may use in public policy (Kubicek and Aichholzer 2016), with all these tools requiring their own criteria for assessment. Usually scholars pay attention to certain e-participation technologies, like government websites (Xenaxis & Loukis 2010; Freeney & Brown 2017) or social media accounts (Elsherif & Azab 2019). As the variety of e-tools is rising (Bohman 2014), it is crucial to provide unified criteria in which to evaluate them.

The third challenge is related to the fact that the evaluation of e-participation initiatives should not concentrate on the readiness of the websites on which they are hosted as a goal on its own right: rather this assessment should focus on the substantial outcomes of e-participation for the public and policy-making. For example, Vidiasova et al. (2018) in their evaluation methodology, stress the social efficiency of e-participation, while Chugunov & Kabanov (2018) highlight the importance of the e-participation institutionalization and institutional design.

Finally, there is a challenge of inclusion country-specific contextual factors: on the one hand, the evaluation framework should be rather general and universal to allow cross-country comparisons (Berntzen & Olsen 2009), yet, more emphasis on a particular social and political context can help to provide a more nuanced view on a particular e-participation practice and thus be more relevant for decision - makers. Scholars emphasize the impact of various institutional and policy variables on the development of e-government and e-participation (Gulati & Yates 2011), including the level of decentralization in e-tools implementation (Kassen 2015).

The Russian case is very peculiar in this regard. Russia is a federal state with a high level of power centralization (Busygina 2018). Thus, the development of regional e-participation in Russia is closely connected to the federal initiatives. From 2012 onwards, the federal government has paid special attention to the implementation of regional online services, from complaint mechanisms to

participatory budgeting. Yet the centralization of the policy has not led to the elimination of various divides among the regions, and the latter still perform differently in e-participation development (Kabanov & Sungurov 2016; Chugunov & Kabanov 2018). As a result, currently there are basically six major e-participation tools used in the Russian regions, namely: 1) initiative / participatory budgeting; (2) open budget; (3) e-petitions; (4) crowdsourcing; (5) complaint mechanisms and (6) e-voting. But they neither can be found in all 85 regions, nor they have the same quality of implementation and performance. It is therefore important to estimate these discrepancies of outcomes amidst a relatively centralized policy.

In brief, while there are numerous attempts to evaluate e-participation, the development of a unified technique is far from complete. The new methodology should not only be based on a clear theoretical and methodological framework, but also tackle the e-participation tools diversity, provide a clear assessment of the difference that e-participation makes to political and policy processes, as well as to balance between a general approach allowing cross-contexts comparisons and a more nuanced context-related view.

3. Evaluation Methodology: Framework and Procedure

The methodology proposed here is based on the previous technique developed by Chugunov & Kabanov (2018). Though it allowed to range the regions according to the level of e-participation institutionalization, its scope is quite limited, especially in terms of the tools analyzed. Yet, regional e-participation in Russia is much more diverse, hence the new methodology encompasses the six types of e-participation: 1) initiative / participatory budgeting; (2) open budget; (3) e-petitions; (4) crowdsourcing; (5) complaint mechanisms and (6) e-voting.

Our methodology stresses the importance of e-participation as a facilitator of the normal public policy process on its various stages (Coelho et al. 2017; Scherer & Wimmer 2011). In line with this process orientation, we take a broader vision of the political process, derived from the system approach in politics. As was argued by Easton (1957), there are some crucial elements of the political system: (1) the system itself (the "black box"), (2) the inputs (demands and support from citizens); (3) the outputs (decisions, policies); and (4) the feedback (inputs - outputs correspondence) (Easton 1957). However simplified this vision might be, we argue it still portrays the basic elements of the political process accurately, and in fact, reflects the essentials of the e-participation workflow. Citizens formulate a demand (complain, petition, etc.) and submit it to the "black box", where the system processes the request and provides an output - a certain policy or action. This stimulates the "feedback", and, if necessary, another input.

Each of these four concepts corresponds to a criterion. These criteria include: (1) openness for the "black box", i.e. how open, transparent and comprehensive the available information about the e-participation process is; (2) availability for the input, i.e. how e-participation allows the access for various groups of citizens; (3) decision-making capacity for the output, i.e. the availability of the information related to the outcomes of e-participation; (4) feedback quality, denoting the spectrum of opportunities for the citizens to give feedback on e-participation results. These criteria are

universal for all six types of e-participation tools under analysis. Additionally, a fifth criterion - Specific requirements - was developed to evaluate unique features of each type.

Every criterion was then decomposed to 3 indicators. The selection of this indicators has been based both on the previous studies (Chugunov & Kabanov 2018) and after a series of consultations with the experts on e-government and e-participation. So, the methodology consists of 15 indicators in general (Table 1). Each indicator is evaluated from 0 to 2 points: "0" - the indicator is not present, "1" - the indicator is partially present and "2" - the indicator is fully present. Hence for each e-participation tool a region could get a maximum of 30 points (22 points for open budget portals).

The evaluation of the Russian e-participation portals was carried out in December 2019. We found and evaluate overall 205 Internet resources, attributed to one of the six types of e-participation. Seven online resources were then excluded from the analysis, as they had not been updated for one year and hence were considered irrelevant.

Table 1: E-Participation Evaluation Framework. Source: Authors' Elaboration

Concept	Criterion	Indicator & Explanation
"Black box"	Openness	1.1. Topicality: Has the website been updated within the last month?
		1.2. Information about Responsibility: Is there information about the goals, objectives and operators of the portal?
		1.3. Comprehensiveness: Are there infographics / opportunities to get the basic information within 2 clicks?
Input	Availability	2.1. Special conditions: Is there a version for people with disabilities?
		2.2. Mobility: Is there a mobile version / app?
		2.3. Alternative: Is there an offline alternative to e-participation?
Output	Decision-making capacity	3.1. Legislation: Is there a regional legislation regulating this portal?
		3.2. Reports: Are there reports on activities available?
		3.3. Routing: Are there any markers on this portal allowing to trace the stage at which the application is?
Feedback	Feedback Quality	4.1. Contact: Is there contact information?
		4.2. Evaluation: Are citizens able to evaluate their satisfaction with this portal or leave a feedback?
		4.3. Loop: Can citizens re-apply if they disagree with a decision?
-	Special Requirements	5.1. - 5.3. Narrow technological functionality questions pertinent to types of e-participation portals (e.g. for e-complaints we assess the availability of the GIS to position complaints, the classifier of complaints and the "public control"). Full list is in the online annex (https://clck.ru/MkdWF).
Notes: indicators 2.3, 3.3., 4.2, 4.3. are not applicable to the Open Budget portals, as they do not allow direct citizens' involvement.		

4. Preliminary Findings

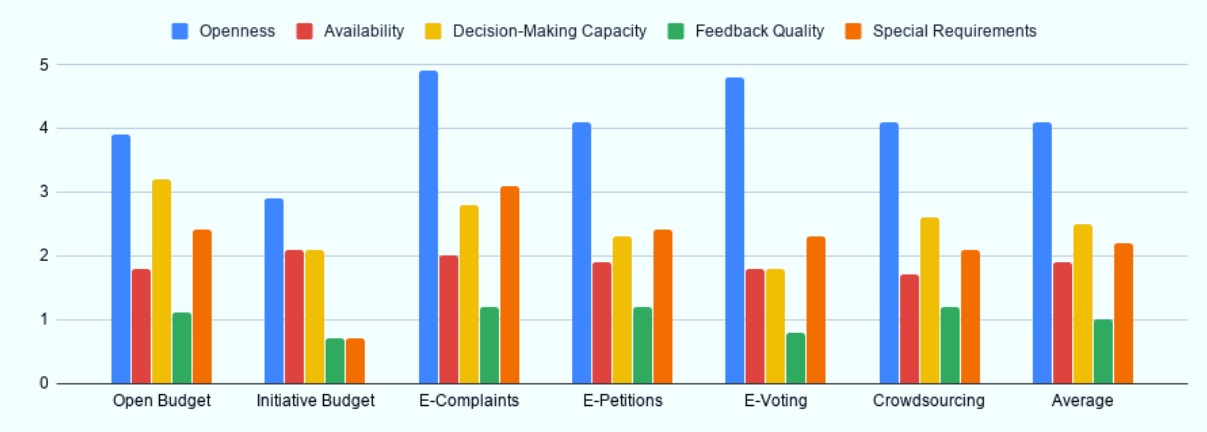
All the results of the evaluation and visualizations are presented in the online annex to this paper (https://clck.ru/MkdWF). The first general finding about e-participation in Russian regions corresponds to previous studies (Chugunov & Kabanov 2018), stressing moderate and significantly disproportionate regional development in terms of e-participation (Table 2): the general score for the regions ranges from 0 to 83 points.

Table 2: E-Participation Evaluation in the Russian Regions Summary. Source: Authors' Calculation

E-Participation Tool	Number of Regions	The Average Score
Initiative - participatory budgeting	51	8 / 30
Open Budget	83	12 / 22
E-Petition	12	12 / 30
Crowdsourcing	9	11 / 30
Complaint Mechanisms	30	14 /30
E-Voting	13	12 / 30

The regions can be divided into three types: those with the high (41 points and more), moderate (21 - 40) and low (20 and fewer) levels of e-participation development. Currently, 17 regions can be referred to as highly developed in these terms. They have, on average, from 4 to 6 online resources, which have the following features: (1) a separate open budget portal; (2) a developed initiative / participatory budgeting portal; (3) a cross-platform solution for e-complaints, e-voting and e-petitions; (4) more rarely, a separate crowdsourcing portal. Yet, the quantity of facilities does not necessarily correlate with higher scores, as these facilities can have problems with performance. Among the moderately developed are 29 regions with approximately 3 online resources, or two highly developed resources (e.g. open and participatory budget, or open budget and e-complaint). In less developed regions there is usually one resource (open budget), or two poorly performing resources. Currently, this group contains 39 regions, which is nearly half of the country (46 per cent). The ranking also reflects the macro-regional dynamics: while the North-Western regions are among the leaders, Southern and Caucasian regions are usually among the outsiders.

Figure 1: The Average Score Across E-Participation Tools and Components. Source: Authors' Calculation



The second finding is the related to the availability of tools (Table 2). The most frequent online tool is the open budget, that can be found in 83 out of 85 regions. On the contrary, crowdsourcing platforms are the rarest: only 9 regions had this facility in 2019. Hence it seems that the regional governments are still keen on developing information portals (like the open budget), prioritizing passive information acquisition rather than active citizens engagement.

Thirdly, there is also an interesting dynamic across the stages of the process reflected by the four concepts (fig. 1). While the "black box" (openness) and the "output" (decision-making capacity), on average, perform well, the "input" (availability), and especially the "feedback", are visibly less developed: in many cases the features that we relate to them were simply non-existent. Many regional governments seem to underestimate the importance the problem of digital divide that hinder the availability of e-participation for all citizens, as well as the feedback quality that ensures the effectiveness of e-participation.

5. Discussion & Conclusion

In general, this pilot analysis has several methodological and practical outcomes. First, it has proven the applicability of the framework to the Russian case, and its usefulness to make interregional comparisons. The preliminary results of the evaluation are in line with the previous findings (Chugunov & Kabanov 2018; Kabanov & Sungurov 2016) that e-participation in Russia is highly disproportionate across the regions. At the same time, we have explored such disproportions further, across the e-participation tools and stages, unveiling important contexts of e-participation diffusion and development. More effort should be put to estimate all the stages of the policy cycle (Coehlo 2017). Though the framework was designed to get a nuanced view on Russia, it is based on the widely accepted system approach and is universal enough. The results obtained can be further used in both large-N studies and for the deep analysis of cases. Secondly, the framework allows cross-platform evaluation, which is especially important when one needs to estimate various types of online tools. Thirdly, the framework has shown its capacity to evaluate e-participation throughout the whole process, from citizens' demands to the government's response, which is one of the key values of the proposed methodology.

Of course, there are still some methodological problems to be solved. First, the genuine effectiveness and impact of e-participation are yet to be further explored: what we can evaluate are rather online manifestations of the real process, and it is hard to ensure that e-participation does make a difference. Secondly, it is difficult to evaluate the level of citizens' engagement with the portals, as these data are usually unavailable. Thirdly, there may usually be problems in access to the online resources due to the necessity for users to register on them. Finally, the next step should be the estimation of the internal and external validity of the scores obtained. We are planning to solve these problems in the forthcoming research. As for the practical results, the survey has allowed us to explore the regional e-participation in Russia, both in terms facility diversity and performance discrepancies. Despite the general federal trends towards digital government, we may however see a variety of outcomes, the reasons for which are yet to be found.

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Citizen Engagement in Technically Dynamic Environments

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Abstract: Cities around the world are implementing technology-based solutions to make better decisions. These "smart cities" not only develop the abilities to process, analyze, and manage the high volumes of data collected but also need to design and implement strategies to engage with citizens. This study explores why and how cities engage citizens in their smart city initiatives by analyzing the results of a nationwide survey of US cities. Results show that cities view the purpose of citizen engagement as more informative or to generate support for smart city efforts. Cities appear to use a diverse combination of mechanisms to engage citizens with smart city initiatives with an emphasis on simple, one-way communications from government to citizens.

Keywords: citizen engagement, smart cities, participation

1. Introduction

Cities around the world are implementing technology-based solutions to address a variety of challenges, including those related to transportation, clean air and water, energy consumption, and health. These technological "smart city" solutions rely on a significant volume of data, created or collected by public institutions (Janssen et al., 2012). While there is no agreed upon definition of a smart city (Chouraby et al., 2012; Gil-Garcia et al., 2015), this study takes the view that smart cities are those that use of information and information technology to make better decisions and improve quality of life (Nam & Pardo, 2011). This perspective reflects a set of related trends or currents within society. One current is the increased interest by cities in using data and new information technologies. The increased use is driven by the internal needs of cities to respond to complex problems by using 'data-driven' solutions (Abella et al., 2017). Another current is that there should be a more "open government" so that citizens have more accountability, transparency, and democratic dialogue (Pereira et al., 2018).

Citizens are engaged in smart cities in any number of ways. They are engaged to the extent that they are consumers of these services; for example, in Columbus, Ohio the public is informed about the availability of new technologies like electric vehicles and how they can use these services. Also, citizens and private, public, and non-profit organizations can passively receive the high volume of data cities collect and make publicly available (Paskaleva-Shapira, 2006). Citizens can also be involved in strategic or operational decision making of smart technologies (Thompson, 2016). For example, Portland, Oregon has developed a city charter that places citizen engagement at the center of all of its smart city efforts (The city of Portland, n.d.). This approach says that Portland is smart to the extent that its citizens are smart and can meaningfully participate in Portland's government. The role and importance of citizen engagement can vary widely from being a central goal that smart city efforts are designed to advance or it can be viewed as one of many instrumental goals towards achieving the city's other objectives.

The purpose of this study is to generally understand why and how cities engage citizens in smart city initiatives. To do this, a nationwide survey was conducted of smart city officials in the US to gather their perceptions of the purposes of citizen engagement and the mechanisms they use to engage citizens. Preliminary results show that cities view citizen engagement as a means to inform the residents, and to obtain residents' support of smart city initiatives. Cities use a diverse combination of participatory, consultative, and communicative mechanisms to engage citizens in smart initiatives.

2. Citizen Engagement in the Complicated Smart City Environment

Cities face an especially difficult task of building internal capacity for data-based decision-making. While a central role of data and analysis in smart cities is to improve quality of life, technological efforts can contribute to undermining the goal of equitable civic engagement unless there are strong and explicit efforts to correct for the inequitable capacity to make use of the data.

Citizens willingness and ability to be part of the process depends on multiple factors. Some of these factors are related to the individuals' profile including educational level, digital literacy; as well as the characteristics of the smart initiative itself (Yeh, 2017). Moreover, citizens may not understand a smart city effort, how to participate, in addition to lacking minimal technical or analytical skills (Olphert & Damodaran, 2007). This may require efforts from the government to close the gap through its design of an engagement plan. The public may not fully realize the value of the data being provided and not be able to use that information to become fully involved in smart city efforts in the absence of wider civic engagement. As a result, one concern is that data-based policy recommendations may reflect the needs of technological experts and elites even more, excluding other groups of the population from the benefits of being in a smart city (Hollands, 2008) unless there is a robust citizen engagement plan.

Even as citizens are continually improving their digital literacy, this improvement is not homogeneous across the population. Moreover, the digital literacy and analytical skills of citizens can determine their ability to understand the information they are receiving, and frame their

perceptions regarding the technology that cities are trying to implement, leading to fear, rejection (Lytras & Visvizi, 2018), or self-exclusion from the process (Kvasny & Keil, 2006).

Whether it is citizens overall or particular subpopulations, citizens could develop negative attitudes towards the use of the smart technologies, determining their frequency of use, their perceived value added and their willingness to participate in and support smart city projects. Lytras & Visvizi (2018) find that most citizens support smart city initiatives but very carefully select the services they will use due to their concerns about security and reliability of the systems. Different kinds of citizen engagement may have differential effects on the degree to which citizens are apathetic, concerned, or advocates for the initiative.

There may also be a deficit of technical skills within the city that make it difficult to generate and implement innovation (Dunleavy, 2006). The introduction of robust citizen engagement mechanisms such as citizens co-creating a strategic vision, may exhaust the capacity of cities to execute projects properly. Significant citizen engagement can compound complexity and the risk of projects. As governments now move to agile management techniques that call for quick simple solutions this may also work against the longer timelines needed for robust citizen engagement. Finally, cities may not have the funds to implement engagement strategies, because resources can be allocated to alternative goals, like direct investment on technology or other operational costs.

2.1. Purposes of Citizen Engagement

Citizen engagement can take place in different stages of the innovation process and it can serve multiple goals. Governments can decide to implement citizen engagement to meet legal requirements, embody ideals of democratic participation and inclusion, diagnose a problem, design a solution, co-produce a policy or program, generate support for an initiative, or create and sustain social capital, among others (Bryson et al., 2012). According to Bryson et al. (2012), identifying the purposes of citizen engagement will serve as the foundation for designing a strategy and to select the criteria for its evaluation. Engagement is recognized as a "potent means to achieve democratic values as legitimacy, justice, and effective governance" (Fung, 2006). They can engage citizens in the decision-making phase, either to collect useful information for the design of a solution, or to include them directly in the decision (Bryson et al., 2012). They could also include citizens in the implementation of the program as a form of co-production, or to simply identify critical factors for the success of the initiative (Mejier & Rodriguez, 2016) **Error! Reference source not found.**. Finally, citizens could also be included in the governance of a program to help make relevant decisions and be a part of the management of the initiatives (Fung, 2006).

2.2. Citizen Engagement Mechanisms

Citizen engagement mechanisms are "the particular ways that cities can engage citizens" (e.g., surveys, meetings, or simply providing information). The mechanisms that cities can use to engage citizens are multiple and scholars have debated the dimensions used to categorize these mechanisms. The operating assumption is that different kinds of mechanisms are useful for different purposes contingent on the ability of a city to use those mechanisms.

Rowe and Frewer (2005)**Error! Reference source not found.** developed a typology for engagement tools sorted into dimensions of communication, consultation, and participation. These three "types of public engagement" (p. 254) vary depending on the directionality of the information. In public communication, local government sends information to citizens or other representatives. In the case of public consultation, the information goes from the public to the government, but the process is initiated by the latter. Finally, for public participation there is a bidirectional exchange of information, in which dialogue and deliberation take place. The degree to which a specific mechanism can fulfill effectively the goals of each typology depends on certain attributes. To date, researchers have not used a national and diverse sample to investigate how cities engage citizens in smart initiatives, what cities are finding successful, and what lessons can be learned to improve citizen engagement.

3. Data, Method, and Measures

This study provides exploratory insights on smart city citizen engagement initiatives in cities across the US. A descriptive empirical analysis is used to report results from a nationwide survey of city officials in the US, and lays the groundwork for future additional analysis. The survey was sent to the 1,000 most populated cities within the US, according to census data (US Census, 2017). The surveys were sent to public officials working in the local governments in the positions of chief information officer, information technology managers, city managers, or similar; individuals were identified through city websites and LinkedIn. The survey was emailed to one individual in each city in late 2019. The maximum response rate for the citizen engagement questions was 10%. There is only one response per city.

The unit of analysis is the city. For all the citizen engagement questions, respondents were asked to refer to their largest smart city project. The largest smart city project was defined as the one with the biggest overall cost, including the total investment by all partners. The largest smart city project has the highest likelihood of showing the wide range of citizen engagement purposes and mechanisms that cities are implementing. The projects total cost range from a $12,000 to $1,000,000, with a mean of $30,799 and a standard deviation of $122,490. In average a 67.80% of that cost is public expenditure (sd. 59%). Most of the projects (63%) have been operating for less than 2 years, 24% from 3 to 5 years, and 13%for more than 6 years.

Nine items included as purposes were adapted form the list present in Bryson and Quick [4]. The frequency of each purpose is presented item-by-item. The survey contained a list of 10 mechanisms adapted from the inventory developed by Rowe & Frewer (2005). Respondents were asked to indicate if they use (1) or not use (0) a specific mechanism. The mechanisms were classified using the three typologies of engagement developed by Rowe & Frewer (2005): communication, consultation and participation.

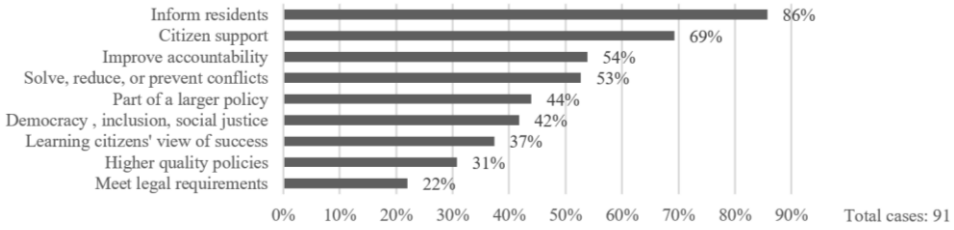
Seven combinations of mechanisms were created (communication only, consultation only, participation only, communication-consultation, communication-participation, consultation-participation, and communication-consultation-participation). Each city was included in one of these combinations where it had one mechanism in one of the basic types of mechanisms

(communication, consultation, or participation). Thus, if a city had two communication mechanisms and one consultative mechanism, it was put in the communication-consultation combination.

4. Results

This section reports the frequencies of the purposes of citizen engagement and the mechanisms utilized. Figure 1 contains the percentage of cities that declared having each purpose as part of their plan to engage citizens in their largest smart city project. The most common purpose is to send information to residents (86%), followed by gaining citizen support (69%). The high prevalence of these purposes is consistent with the results shown in figure 2 for engagement mechanisms. Cities commonly used communication mechanisms (one-way from city to citizen) whose aim is to send information to citizens.

Figure 6: Purposes, Percentage of Cases (As percentage of the total cases)



On the other extreme, the less frequently declared purpose is to meet legal requirements (22%). The small number of cities that declare having this as a purpose for the engagement of citizens is interesting. One potential explanation is that there are not clear or predetermined legal requirements on how and when to engage citizens in smart city initiatives since a large number of these cities are still in an early stage of implementation of these kinds of projects.

Figure 2 presents the percentage of cities that use each one of the mechanisms. The most used mechanisms to engage citizens are information publicly availably (64%) and meetings to provide information (56%). On the opposite side, the less used mechanisms are meetings to design a solution with citizens and meetings to make binding decisions (both 8%). The percentage of cities that implement each mechanism in their smart city initiatives seems to align with the level of intensity of the interaction that each one requires. The most commonly used are communication mechanisms, followed by consultation, while participation mechanisms are the less used. The most frequently used citizen engagement mechanisms are those that require less interaction. These include making information publicly available and meetings to provide information mechanisms that are intended to just send information to the community.

In contrast, the less frequently used mechanisms are those that require the most active interaction between the city and citizens. 'Designing solutions' and 'Making binding decisions', not only have bidirectional exchanges of information, but also involve expressing and forming opinions through deliberation. This intense level of interaction can slow projects down and may require particular skills or involve the expenditure of additional resources that the city does not have. One exception to this general finding of the relationship between intensity and use, are 'Meetings with experts'

which are at a higher level of intensity but frequently used. Relying on experts may be efficient in that they provide useful information including what citizens want and guide governments toward a 'solution.' Another exception are 'Hotlines or 311' with a low intensity but not used frequently. This may owe less to being low intensity and easy to use but are simply less effective for smart city engagement.

Figure 2: Percentage of Cities That Use Mechanisms (As percentage of the total cases)

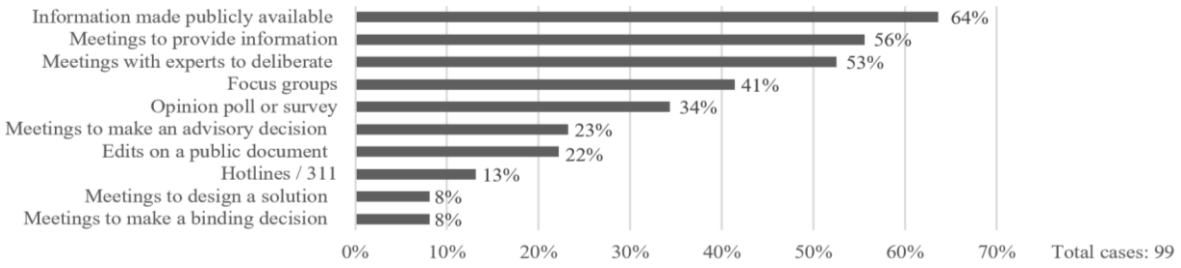
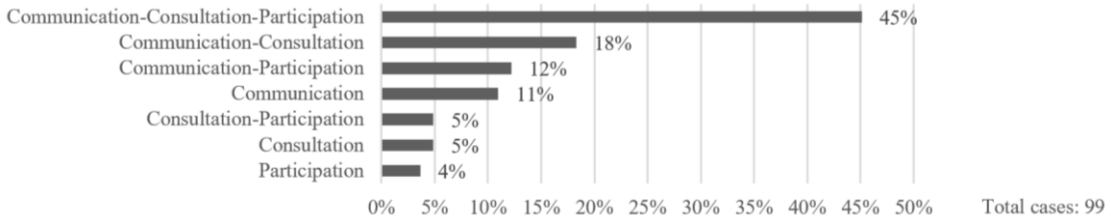


Figure 3 reports how cities combine different type of mechanisms. Most of the cities use a combination of communication, consultation and participation mechanisms (45%). Using combinations of communication with consultation, and communication with participation are the second and third most popular cases (18 and 12% respectively). Only a minor percentage of cases concentrate their portfolio purely in one of the three types of engagement. How they determine and decide what the right combination of engagement mechanisms to achieve their purposes is, could be because of a) the synergies among specific set of mechanisms, b) a response to experiences engaging citizens in the past, or c) a random combination. This question cannot be responded with this data, but could be explored in future case study research.

Figure 3: Combination of Types of Engagement (As percentage of the total cases)



5. Discussion

Overall, the results indicate that cities perceive the purpose of citizen engagement as a way to generate support for smart city initiatives or to inform citizens. There is less emphasis on legal compliance or interactive design of projects. The low emphasis on legal compliance might mean that legal requirements are a floor for citizen engagement. Earlier it was suggested that one potential explanation for the low emphasis on legal requirements is that there are not clear or predetermined legal requirements on how and when to engage citizens in smart city initiatives since a large number of these cities are still in an early stage of implementation of these kinds of projects (reported in table 1). Alternatively, cities could have specific requirements to engage citizens in general, but since this

represents a minimum requirement, it becomes a routine rather than fully capturing why they are doing citizen engagement. Put another way, there are much more important reasons for doing citizen engagement than simply meeting legal requirements.

The different purposes for doing citizen engagement, in some cases, might compete with each other; for example, cities' use of more efficient processes can crowd out democratic participation. Yet the variety of purposes reported by cities might also mean that purposes can be harmonized. In any case, cities might consider giving citizens the opportunity to be heard early in the process as it might lead to better designed solutions. These tradeoffs or congruencies need to be explored creatively by smart city managers.

There may be many reasons why cities seem more reticent to use participation mechanisms. The implementation of more participative mechanisms can require a bigger investment in time and resources from the city, especially in the context of smart city projects, where other survey results indicated that the financial resources seem to be unstable and unpredictable. Moreover, processes that include deliberation increase challenges like lack of interest or capacity to understand and process information, which could make them less likely to participate. Finally, since these process involve deliberation, planning and implementing them effectively could be more difficult than with simpler mechanisms without so many interests at stake.

While the results of this survey show that cities use a variety of mechanisms to engage citizens in smart city projects—which is a good thing—the most commonly used tools are the simpler one-way communication mechanisms. The more intense forms of engagement, such as participatory or consultative are less commonly employed. The presumption is that cities should be matching mechanisms to the kinds of purposes that they are seeking to realize. If smart city purposes are complex, while the mechanisms chosen are simple and easier, there could actually be a mismatch between the goals and the means used to achieve them.. The use of simple mechanisms could be a result of a lack of skills, resources, or understanding of the benefits of robust citizen engagement. Given that a variety of different kinds of mechanisms is preferable, it may be important to identify best practices and understand what experience among many cities has actually shown. This would include knowing what the real costs and risks are, followed by training.

This study is the first step in a larger research project on smart city initiatives. Next steps include comparing administrator and citizen perceptions of barriers to citizen engagement and what constitutes successful citizen engagement. There are interesting dynamics and relationships that should be explored in more detail. Most important for practice is to understand how administrators create pragmatic solutions given the competing purposes and constraints. In depth case studies are another next logical step to build upon the results described here.

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Crisis Volunteerism and Digital Transformation

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Abstract: When crisis volunteerism is enacted, citizens from all walks of life mobilise, and interaction is required between numerous individuals, organisations, authorities and stakeholders involved in the response work. This was evident in Sweden in 2018 when forest fires engulfed parts of the country. At the time, digitalisation and information systems were completely lacking. At the same time, it is noted that many IS solutions that could enable crisis response volunteerism never reach this practice area. Studies have been performed to explore how the crisis volunteerism context needs to be understood with a view to enabling digital transformation and relevant IS design initiatives. Based on these studies, this paper discusses crisis volunteerism and the crisis environment and introduces a preliminary meta-model for understanding these and other components central to the practice of crisis volunteerism.

Keywords: Crisis Volunteerism, Digital Transformation, IS Design

1. Introduction

Previous information systems (IS) research gives insight, both theoretically and practically, on the potential of IS and digital transformation (DT) in the public sector to enhance and support crisis volunteerism (CV). The lack of digitalisation and IS observed during the Swedish forest fires poses questions of why CV is not being transformed in a similar manner to other important practice areas in the public sector and what needs to be done to remedy this? Crisis managements scepticism to voluntary contributions, in particular more spontaneous or unaffiliated contributions may be one problem (Barsky et al., 2007). More recently CV is however viewed as a reality to be dealt with rather than as an optional add-in (Strandh and Eklund, 2018). Rogstadius et al. (2013) discuss the fact that many technical solutions enabling new or improved forms of volunteering are never integrated into response efforts and conclude that there is a mismatch between designs and real world needs. It would appear that several years on, the situation is much the same and there are few real life IS implementations and solutions for crisis volunteerism (ISCV).

The overall aim of the full research project is to facilitate an understanding of crisis volunteerism (CV) that can be used to enable public sector Digital Transformation (DT) in a manner that will significantly enhance the overall societal response in crises and disasters. In this paper, due to space limitations, only one of the main components of CV, the crisis environment, is developed to demonstrate the approach. The more specific research questions posed in this paper are therefore 1) what do we need to know about crisis volunteerism and its environment to facilitate digital

transformation and IS design for CV? 2) What are implications does this knowledge have for crisis management and crisis volunteerism practitioners in Sweden? Finally the question of how future ISCV research needs to be directed in view of these findings is addressed. In this paper the results of a literature study on CV and the crisis environment as well as DT and IS design are presented in sections 2 and 3. The research approach and description of the Swedish forest fires case is relayed in section 4. Results outlining the crisis environment context, based on the study of the Swedish forest fires case, is reported in section 5. These results are discussed and the research questions above are addressed in the final section with discussion and conclusions where a preliminary meta-model for crisis volunteerism is presented.

2. Understanding Crisis Volunteerism and The Crisis Environment

Bénaben et al. (2016) observed shortcomings in conceptualisation and understanding of crisis management in IS research and developed a meta-model for crisis management. They are inspired by business modelling and their model observes four packages of concepts required to describe crisis management with a view to informing IS design; Context, Partners, Objectives and Behaviour. This meta-modelling approach has inspired the organisation of the results from this research, and a review of ISCV literature has revealed seven main components that are required to understand CV. These are 1) the crisis event (e.g. Bénaben et al., 2016), 2) the crisis environment (e.g. Shen and Shaw, 2004), 3) strengths, weaknesses, opportunities and threats (SWOT) and objectives (e.g. Zettl et al., 2017), 5) processes (e.g. Sobiegalla et al., 2017), 6) stakeholders (e.g. Strandh and Eklund, 2018) and 7) volunteer work or tasks (e.g. Waldman et al., 2016).

Within the environment component, which is focused on in this paper, the main issue for ISCV research is collaborative structures and in particular collaborative interactions between stakeholders. Parallels are also drawn to developments within e-government and for example co-production of services (Pilemalm et al., 2016). Four main types of interaction have been observed in the literature study. 1) between authorities and formal CV organisations (e.g. Shen and Shaw, 2004), 2) between authorities (or formal CV) and non-formal CV actors (e.g. Zettl et al., 2017), 3) between citizens (non-formal CV) (e.g. Simsa et al., 2019) and 4) between authorities and non-formal CV (e.g. Middelhoff et al., 2017). Other aspects of the crisis environment addressed in the literature are the impact of legal and ethical issues, resources, the effect of culture and institutional arrangements and not least crisis preparedness. Also social, natural or physical characteristics of the crisis environment can have relevance to the crisis response. For example demographics, climate, timing or natural elements.

3. Digital Transformation and IS Design for Crisis Volunteerism

The terms digitalisation and digital transformation (DT) are defined in terms of a process with the power and potential to restructure and transform organisations, institutions or even society (Riedl et al., 2017). Others also relate to the concepts of digitalisation and DT as an ecosystem (Parida et al., 2019) which emphasises the need to observe multiple components and their relationships in any given context. Morakanyane et al. (2017) relates to DT as an evolutionary process that leverages

digital capabilities and technologies to enable business models, operational processes and customer experiences to create value. Skylar et al. (2017) reflect on the transformational power of digitalisation with reference to broader concepts in society rather than a single business which is most common. Others consider digitalisation and its potential to transform the relationship between citizens and government (e-Government or digital government) (Mergel et al., 2019). Sørensen (2016) observes the considerable capabilities for connectedness, distribution and scaling associated with DT.

Vial (2019) describes the DT process as starting with a disruption (e.g. changes in consumer's expectations/behaviour) that triggers strategic responses that in turn rely on the use of digital technologies (which also fuel disruptions). These technologies enable changes in value creation paths which are influenced by structural changes and organisational barriers. These changes may lead to negative or positive impacts. This description is however lacking from the perspective of CV where we are more interested in citizen's expectations and behaviours than consumers and are often dealing with a considerably more complicated and dynamic context in terms of structures, organisations, events, risks etc. CV takes place to a large degree in another domain, i.e. the private sphere, involving for example inter-citizen interactions and having its own set of required capabilities where the individuals themselves also have digital muscles. IS research on DT has however not yet truly embraced contexts similar to the CV context.

Herwix & Rosencraz (2018) write that paradigmatic boundaries established between Behavioural Science Research and design science in IS are too simplistic and fail to relate to current needs in IS research. They suggest taking steps to integrate design and behaviour orientated IS research. Drechsler and Hevner (2016) also have taken a step in this direction when they broadened their established three cycle design model with a "change and impact cycle". The purpose being to take second-order impacts of the design artefacts, in a wider organisational and societal context, into consideration, and not only those within the encompassing socio-technical system and more immediate application context. They motivate this extension by the need to also perform IS design projects in complex settings or "*wicked*" environments as well as to go beyond "*engineer-like*" simplistic notions regarding the introduction of an artefact into a context. This outlook furthermore poses the important question of how broader understandings required to drive DT in for example CV can be translated into the design of IT applications?

4. Research Approach and the Swedish Forest Fires Case

Extreme fire risk was observed in Sweden from early May 2018. By July the situation had escalated severely, and at the end of July and beginning of August several of the most critical forests fires started. The firefighting efforts that ensued are described by the Swedish Civil Contingencies Agency (MSB) as the biggest to ever take place within the European Union. The two municipalities in the north of Sweden that were observed in this research are among those locations most severely affected by the fires. These are sparsely populated areas where forestry is a key component of the local economy. Many of the individual fires were far beyond the capacity of local fire and rescue services and the, raged at up to five different locations simultaenly. This is when CV contributions escalated to involve in excess of 1600 individual volunteers over a period of more than two weeks.

The volunteer co-ordinators from these two municipalities alone managed in excess of 330 operative volunteers each day during this period.

This research adheres to a constructive ontology and applies an interpretive approach (Myers, 2009). A literature study was performed to gain an overview of key concepts such as CV, DT and IS Design, using a hermeneutic and semi-systematic approach (Boell & Cecez-Kecmanovic, 2014). Initial broad searches using terms related to IS, digitalisation and CV were followed by more refined searches using Google Scholar and Scopus databases. This process resulted in a final selection of approximately 150 ISCV papers and a further 110 papers on DT and IS Design. Semi-structured interviews were performed among an array of representatives for crisis management and crisis volunteerism in Sweden. Those interviewed were 1) Two volunteer co-ordinators (VC 1 and VC 2), one from each of the observed municipalities, 2) Fire and Rescue services Cheifs (FRSC 1 and FRSC 2) from the same municipalities, 3) The SRC crisis manager and a strategic advisor and 4) Two officials from the Swedish Civil Contingencies Agency (MSB Offical 1 and MSB Official 2). Participant observations were carried out on 15 occasions with the Swedish Red Cross (SRC) in the aftermath of the forest fires crisis to observe their CV development. A workshop with approximately 20 participants was performed with a Federation for Fire and Rescue Services in one of the affected regions. The empirical studies were aligned with the aims of participatory design. In the analysis of data from the literature study and empirical study themes and topics were identified, refined, evaluated and developed during the entire research process by reading and re-reading both literature and empirical results and cross-referencing sources to finally produce the CV and DT meta-model and characterisation of for example the environment component.

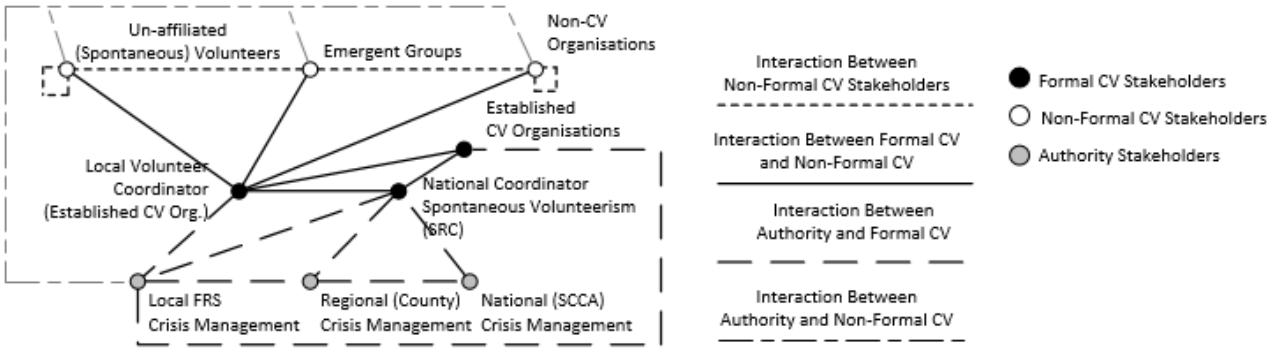
5. Results –The Swedish Crisis Environment

In Sweden the collaborative structures applied and established during the forest fires crisis of 2018 had varying degrees of formality and evolved during the entire crisis event. On the local level in the municipalities studied, two formal established CV organisations became the central coordinators of all forms of volunteer activity, including other established CV organisations, non-CV organisations (e.g. football clubs or churches), emergent groups (e.g. via social media) and unaffiliated individuals. Channels were also open between authorities and non-formal CV stakeholders according to local respondents. On the national level the SRC assumed responsibility for matching requests for volunteer assistance with offers of assistance from unaffiliated volunteers. Figure 2 demonstrates the complexity of the interactive structures observed in the response to the Swedish forest fires.

The social environment in municipality 1 and 2 can be characterised as rural and sparsely populated and was influenced by the fact that many were holidaying in the area at the time. The natural environment was characterised by high temperatures and drought during the spring with lightning storms and winds that influenced the development of the fires. Finally the physical environment included natural elements that both proved to be constraints and opportunities. Numerous lakes facilitated for example water bombing and forestry infrastructure could be used to access the fire locations while long distances and multiple fire locations provided challenges. Both Fire and Rescue Services (FRS) chiefs relate to the invaluable contribution of local farmers and entrepreneurs who provided much needed capacity in the response. They have however difficulties

saying if these resources are in fact voluntary or not. Underlying this confusion is the Swedish Act (2003:778) on Protection Against Accidents which incorporates a form of service conscription (Tjänsteplikt) at the discretion of the FRS. This law gives the FRS powers to conscript assistance among all citizens between the ages of 18 and 65, depending on the individual's health, qualifications and physical capabilities. It is stipulated that first choice should be made among those who volunteer their assistance. Due to the volume of volunteers and scale of operations, it was not possible to follow normal procedure for documenting and compensating those conscripted. FRSC 1 in particular relates to the ensuing difficulties in determining who in fact is a volunteer or not.

Figure 2: Interactions Observed in the Crisis Environment in the Swedish Forest Fires Crisis of 2018



In both local and national coordination volunteers cultural background was at times given relevance, for example noting challenges associated with the participation of volunteers with different cultural backgrounds. The influence of both explicit and tacit institutional arrangements (structures, norms, traditions, logics etc.) are however discussed at greater length. The impact of institutional arrangements in the crisis environment are noted to be relevant in creating and maintaining barriers for efficient and effective CV in Sweden. These barriers or dilemmas are for example a) an involvement exclusion paradox in relation to unaffiliated volunteers (FRSC and MSB respondents) whereby unaffiliated volunteer contributions, while required, are seldom recognised or unwelcomed by authorities, b) Uncertain expectations regarding the capacity of formal CV organisations (MSB respondents) and c) Lack of alignment of institutional arrangements in relation to the current reality of CV including spontaneity, episodic volunteerism and advanced self-organisation (all respondents' answers). These problems are interconnected. The MSB Official 2 points out the failings of public authorities in general, in terms of preparedness to use established CV organisations (18 formal established CV organisations appointed by MSB). MSB Official 1 also expresses extreme wariness and reluctance to consider unaffiliated volunteerism as worthy of development using digitalisation. While the considerable decline of capacity in established CV organisations in Sweden, ongoing for decades, is acknowledged by the MSB, there would appear to be a reluctance to acknowledge CV reality where citizens, thanks to digitalisation, have considerable powers to self-organise and respond spontaneously and independently of authorities.

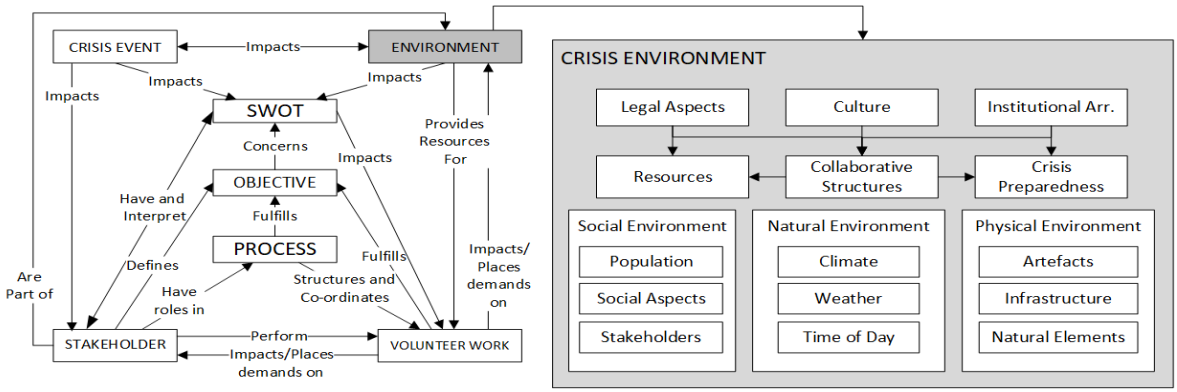
Local volunteer coordinators explain how they stepped in to fill the gaps they perceived in the authorities crisis respone. "*I saw chaos with volunteers stopping FRS from doing their jobs. We offered our services and took over the task (CV coordination)*" (VC1) "*Nobody was managing volunteers, so I grabbed a*

hold (of the task)" (VC2). The local volunteer coordinators demonstrate that institutional arrangements in Sweden were adapted to override the inclusion exclusion paradox and facilitate the participation of relevant volunteer resources, regardless of previous affiliation. The establishment of formal coordination was in other words spontaneous and unsupported by pre-made agreements as MSB Official 2 suggests should be the case. Discrepancies between the answers from local respective national MSB respondents can be presumed to stem from their different roles in crisis response. The local respondents related to their recent experiences from the forest fires and their natural access and capabilities to operationalise large scale coordination of volunteers, regardless of the volunteer's affiliation. The MSB officials on the other hand, are relating to the issue more so from a strategic view point for example emphasising the need for better crisis preparedness, viewing agreements between authorities and formal established CV organisations as the primary tool and do not show initiative to support the interests or needs of the local respondents as experienced during the forest fires. However MSB do recognise the need for a national volunteer coordination function and made arrangements with the national Swedish Red Cross to perform this function during the ongoing crisis which have also been extended in renewed agreements afterwards.

6. Conclusions and Discussion

The findings from the studies have been combined to compile Figure 1.

Figure 1: A Meta-model with the Key Components of Crisis Volunteerism with the Expanded Crisis Environment Component



This model relays the main components of the CV and DT meta-model and their relationships. The model expands the crisis environment component to demonstrate attributes of the component. This modelling approach, although similar to Bénaben et al. (2016) approach, differs in several respects. The model here is designed to embrace the broader concept of DT and not only IS design, the graphic representation is more simplified, and the crisis event component is broken out from the contextual/environment component and given a more prominent place in its own right.

Now to return to the research questions posed at the beginning of this paper. The first question was what do we need to know about CV and the crisis environment to facilitate IS design for CV? In section 3 it is clarified that it is necessary to take in broader (or secondary) contextual factors to a greater degree than has previously been custom in IS research on CV. It is also clarified that there is

a need to find ways to bridge the gap and translate these broader contextual factors into primary factors for the purposes of designing and developing specific IS applications. The literature study reveals a fragmented research area where little or no effort is devoted to providing a broader and more holistic understanding of CV. The meta-model presented here represents an attempt to piece together components identified in the literature study and demonstrate how it is possible to both zoom out to observe broader contextual factors and also zoom in to expand and develop a single component, as for is done with the crisis environment component in the results section.

The second question relates to the empirical context observed in this paper and asks, what are the implications of this research for crisis management and crisis volunteerism practitioners in Sweden? In the Swedish context the lack of digitalisation for CV suggests that the current route chosen by formal crisis management stakeholders (both authorities and volunteer organisations) has not seriously considered DT as an enabler. Input from the respondents suggests that that Swedish authority's visions, both local and national, are not aligned with the reality of CV during a large scale crisis when there are more interactions and stakeholders in play than are planned for. There are clearly institutional barriers. CV, although not fully acknowledged by crisis management, stands out in the results of this research as a distinct practice area in its own right covering a broad range of stakeholders and interactions deserving greater attention by both researchers and practitioners. Future research based on the CV metal-model has the potential to contribute to a significant improvement in the overall understanding required to take further steps to 1) observe what aspects of crisis volunteerism are most relevant to include in future public sector and e-government DT research and initiatives and 2) find better ways to communicate and translate contextual understandings to the IS application design and development stages.

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EGOV-CeDEM-ePart

Digital Government Communications in Russian Public Sphere: A Trend Study

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Abstract: The paper presents the results of two studies conducted with an interval of 9 years, which allow us to identify trends of government communications in digital public sphere of Russia. We analyzed the sites of all government bodies of Russia at the federal level, as well as state communications in social media. The authors draw conclusions about the active, but generally ineffective development of such communications that do not allow citizens to actively participate in political decision-making, as well as the ambiguous development of the digital public sphere of modern Russia as a whole. The wide interactive possibilities of social media, which imply the priority of bilateral and multilateral communication, remain generally unclaimed. Despite the growth of channels, tools, and services provided by Internet technology, they are used by public authorities mainly for information purpose only, without facilitating two-way communication with the public.

Keywords: political communications, public communications, digital public sphere, e-participation, social media, Russia

Acknowledgement: The research has been supported by the Russian Scientific Fund (RSF) as part of a project №18-18-00360 «E-participation as Politics and Public Policy Dynamic Factor».

1. Introduction

Last few decades, the concept of "public sphere" has become so widely and frequently used that there are few intellectuals who did not know who is Jürgen Habermas (Habermas 1982, 1989) and how his works are related to this concept. However, starting from the period of active development of social media, the subject of intense theoretical debate and numerous empirical studies is the emergence and existence of the digital public sphere as the online equivalent of the traditional, seemingly imperfect, "old" public sphere. The advent of the digital public sphere has attracted a lot of attention in recent years because it has been conceptualized as an addition or even replacement of a previously existing, "classical", "old" concept of the public sphere as an essential element of modern democracy (Schaefer 2015). The digital public sphere is mainly defined as the sphere of

online communication, participation in which is openly and freely available to everyone who is interested in discussing issues of common interest (Dahlberg 1998). The contemporary studies show that a distinctive feature of the digital public sphere is the visibility of the discussion or the results of the joint work of all actors in the network and that at least sometimes they affect the decision-making by other people (Gerhards 2010). Among these studies are the ones presented in this paper.

In 2011, we carried out a structural analysis of public communications of the authorities in the Web 2.0 space at the federal and regional levels of government as part of a grant project of the Faculty of Applied Communications of St. Petersburg State University (Report 2011). To compile a sample of the study, a list of servers of state authorities was used, available on the Official Russia website at www.gov.ru. We analyzed 62 sites of all branches of the federal government: legislative, judicial, and executive, as well as blogs, microblogging (Twitter), social networks, video hosting (Youtube). Only 7 federal authorities had official blogs. 6 authorities did not have official blogs, however there were personal blogs, blogs of the public persons, or simply officials of the department. As for microblogging, it turned out that they were much more popular than regular blogs: 15 ministries had official Twitter accounts. 12 official YouTube channels were identified during a 2011 study. The most popular was the russian social network Vkontakte, on which 17 official pages and two personal pages were registered. The local authorities had 12 pages on Facebook in 2011.

In general, the analysis showed that Twitter is the most convenient communication tool for the authorities on the Internet. VKontakte was a popular network. Although it is difficult to talk about any mass activity of federal government bodies on the Internet, because, as it turned out, only a little more than 10% of government departments at the federal level went beyond the boundaries of their own site. Thus, the use of Web 2.0 technologies in public communications of the federal authorities of the Russian Federation in 2011 could not be considered effective. The wide interactive possibilities of social media, which imply the priority of bilateral and multilateral communication, were generally unclaimed.

In January 2020, we conducted a new study, which allowed us to identify trends in the development of government communications in the digital public sphere of Russia. The 2020 study can be called a trend study, since it was carried out on the same sample and relied on the same methodology that was used in 2011.

The main research questions were resolved during the study:

1) Can we see the growth of channels, tools and services used by public authorities to communicate with the citizens?
2) Do social media really open up wide opportunities for communication between public authorities and the audience, or is this just a political myth?
3) Do the authorities have an adequate and effective set of means of participation and cooperation with citizens for making democratically sound and technically rational decisions in the interests of all citizens on the one hand, and creating the image of a modern and effective government on the other hand.

Below we will try to answer these questions.

2. Research Methodology

The study of government communications was developed by us within the framework of the post-classical paradigm, according to which modern communication technologies are not just a way of adapting to the external environment and the interaction of social actors with the external environment. It is, first of all, a way of constructing a social environment, forming public opinion on a variety of scales and the transformation of public capital into "informational" capital in the terminology of Castells (Castells 1996). The foundations of the Castells' concept are close to the ideas of Arendt (Arendt 1998) (the basis of society is the open public space) and Luhmann (society is generated by communication) (Luhmann 1982). Habermas's works on public sphere and comminicative theory are also of great importance for our study (Habermas 1982, 1989).

It should be noted that the term "government communications" seems to us broader than "communications of public authorities". The subject of government communications is information relations regarding the exercise of state power. At the same time, messages have the necessary attributes of public communication. They affect the needs / interests / values of citizens and have a public status. Accordingly, when in the future we will use the term "government communications", we will imply their political nature and public status.

Methods of collecting and analyzing empirical data:

1) The quantitative method is content analysis. It is carried out separately for each site and account in social media. It includes analysis of the total number of messages, the frequency of publications, general topics of messages, the use of special means of expression.
2) The qualitative method consists of adapting the content of a document to a research task based on the understanding, comprehension and interpretation of the content of documents in accordance with the purpose of the study and the rationale for the conclusions made.

In 2020 digital public communications of all 83 federal government bodies of the Russian Federation were analyzed in accordance with the data of the Official Russia. The study was conducted from 10.11.2019 till 01.15.2020. It should be noted that it was completed on the day when the government resigned. The study is divided into two rounds. The first round is the analysis of websites; the second one is the analysis of social media. Tasks of the study: 1) determine the basic state of electronic means of participation provided by government websites by complete analysis of the websites, tools, services and content they provide; 2) identify the most popular social media used by federal authorities for communication between government and society.

3. Research Results

3.1. Websites Analysis

Obviously, by the beginning of the 2020s, almost all sites at the federal level are regularly filled up, updated, have all the necessary sections and, accordingly, there is no need to evaluate their information and interactive components. Moreover, there is no point in evaluating the design of the site, its usability and search new optimization. Therefore, for the analysis of sites, it was decided to apply almost the same list of criteria that was used in our other studies (Bolgov et al 2018, Filatova et

al 2017) related to the measurement of electronic participation opportunities provided by government web-sites (see Table 1). This list of criteria correlates with the methodology for evaluating e-participation, which is used by the United Nations (UN DESA (2017) .

Table 1: List of Criteria for Evaluating Sites in the Context of Electronic Participation

№	Criteria
1	Availability of a website e-Participation activities (calendar of public debate)
2	Reports on work results
3	Feedback (opportunity to write a message)
4	Multilingualism
5	Integration / presence in social media
6	Electronic consultations (opportunity to ask a question)
7	Electronic voting or referendum technologies
8	Use of mobile technologies

In the case of the presence of investigated component, a rating "1" was set; in the case of absence - "0". Then the average value was calculated for each criterion for each authority. The results of websites analysis are presented in Figure 1.

Figure 1: The Results of the Federal Authorities' Websites Analysis in the Context of e-Participation

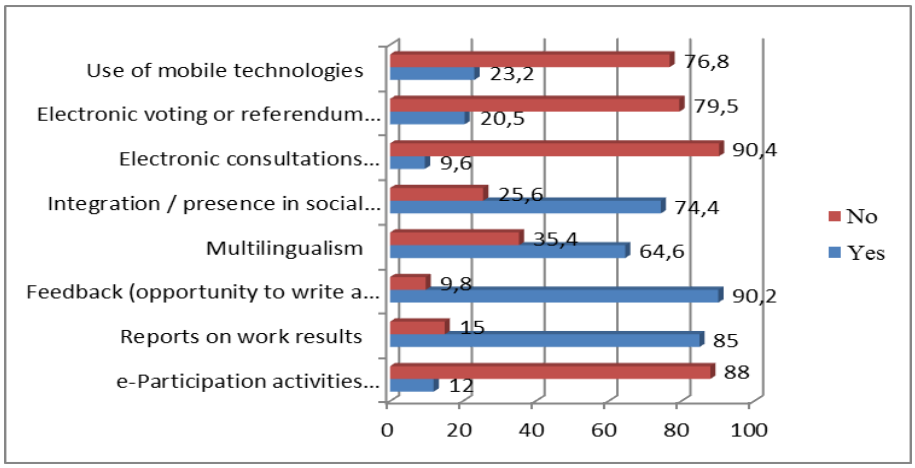


Figure 1 clearly demonstrates that by the beginning of 2020, almost all federal bodies of the Russian Federation provide feedback opportunities (97.3%), faithfully reports on their work (79.7%) and have accounts on social networks (77%) .

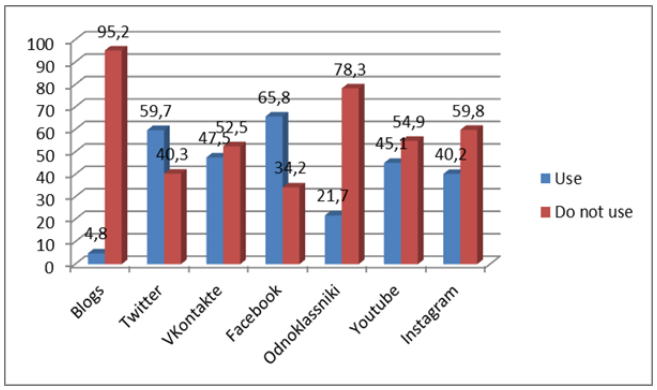
However, only 9.6% of websites provide opportunities for e-consultations, a little more offer to vote on the website (20.5%). And, which is very strange in 2020, almost 77% of websites do not indicate the presence of mobile versions and there are no links to any other mobile applications.

In general, the conclusions regarding the provision of e-participation opportunities on the websites of federal authorities turned out to be disappointing. Most sites are only at the first (information) stage of e-participation (but perform it good). Some websites allow to organize and to hold consultations, but most of the government is still far up to the stage of decision-making.

3.2. Analysis of Communications of Federal Authorities in Social Media

For this analysis, we used those accounts, the link to which is posted on official websites, as well as on the portal of the Government of the Russian Federation. It turned out that the federal authorities are very differently integrated into social media: some of them do not have accounts there at all, some are registered on the same social network, and some try to register on almost all popular networks at once. By the beginning of 2020, Facebook (65.8%) was the most popular social network among the federal government bodies of the Russian Federation. 59.7% used Twitter. Moreover, the government bodies represented on VKontakte (47.5%), Youtube (45.1%) and Instagram (40.2%) (see Fig. 2).

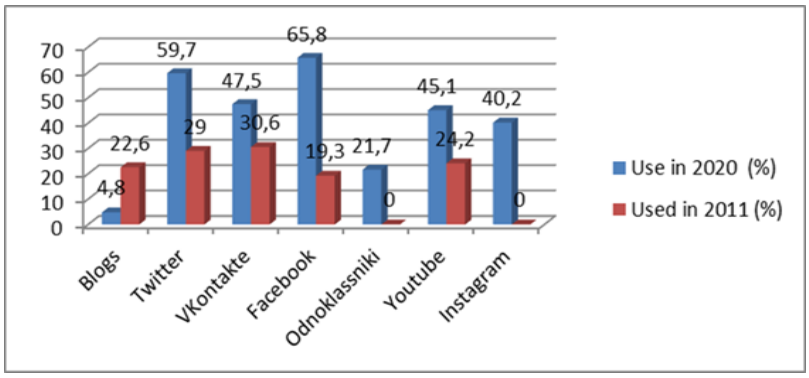
Figure 2: The Number of Accounts of Federal Authorities in Popular Social Media (in percent)



In terms of the number of subscribers to government bodies accounts, Twitter leads with more than 5 million users. The number of famous Russian network Vkontakte subscribers is approaching 3 million. The number of Instagram subscribers is approaching 2 million. Russian network Odnoklassniki with their 18 accounts are ahead of Facebook with 54 accounts in terms of the number of users. About 0.5 million users are subscribed to the channels of government authorities on Youtube.

If we turn to a study conducted in 2011 (see Fig. 3), we can conclude that by 2020, the popularity of text blogs has faded. However, in 2011 it was not large: only 7 authorities had official text blogs, 6 ones had personal blogs of top officials, and one government body had an unofficial blog, that totally accounted for 22.6% of the analyzed authorities. Figure 3 shows that the popularity of social networks is undoubtedly noticeable. Facebook demonstrates the greatest growth. The most popular social network in 2011 (Vkontakte) significantly lost to Facebook. The number of accounts on Youtube and Twitter almost doubled. Accounts on Instagram and Odnoklassniki were not analyzed in 2011.

Figure 3: Russian Authorities in Social Media in 2011 and in 2020



At this stage, keeping social media accounts by federal authorities is rather attributive and image-based instrument than a valid communicative tool. All imagine flats are more like abbreviated press centers. Due to the low activity of the audience, most departments cannot effectively use all the tools of this social network in order to spread their influence on the audience. The lack of feedback from departments in the comments also greatly inhibits this process. Therefore, at the moment, it cannot be said that social media is an effective platform for communication between federal authorities and the public.

4. Conclusion

In conclusion, we note that the digital public sphere of modern Russia is undergoing changes, which Habermas largely foresaw. The Internet is actively developing in all areas of life; "ordinary citizens efficiently and creatively interact with each other online" (Coleman 2017). Like most researchers, we cannot but agree with the thesis that modern Internet technologies have fundamentally transformed and changed communications in all areas. Nevertheless, the impact of the Internet on government communications in Russia today can be called insignificant.

Unlike Western European and American practice, in which social networks are most often a full-fledged platform for communication between public persons and citizens, in Russia, social media in the political sphere serve primarily as a modern and technological analogue of a message board used for information or propaganda. Most of both politicians and officials are trying to apply new technologies to implement outdated communication models. They are not yet ready for dialogue and open two-way communication with users. This situation can apparently be explained by national managerial traditions.

The results of trend study presented in this paper demonstrate that the main achievement of the Russian "digital democracy" was only improved access to information. The government supports e-information rather than e-consultation and, moreover, not joint decision making, as it is assumed by the United Nations e-Governmnet Survey. Government authorities prefer to inform about the decisions made, rather than consult with citizens before the making decisions. Unfortunately, we have not yet been able to detect the tangible impact of existing digital communication platforms, forums that provoke online discussions, on decision-making by "institutional policy" (Van Dijk 2012) and find evidence of an increase in e-participation today compared with a ten-year-old situation.

This is consistent with the observation by a number of scholars that government actors tend to use online campaigns for information and education purposes, while civil society actors usually conduct campaigns in an attempt to influence current political debate or political decisions, mobilizing for certain actions and increasing social pressure (Baringhorst 2009).

The answer to the first research question is positive. But the answer to the research question about whether the Russian authorities have an adequate and effective means of participation and cooperation with citizens for making democratically sound decisions is negative. Despite the growth of the online channels, tools and services, they are inefficiently used by public authorities to communicate with the citizens. The answer to the third research question is the following. The wide interactive possibilities of social media, which suggest the priority of bilateral and multilateral communication, remain generally unclaimed.

So, it cannot be denied that over ten years, Russian ministries and departments have gradually improved the content of their Internet websites. The number of pages in different social networks was increased significantly. However, these changes are more visible than substantial. With an abundance of websites and social media accounts, only a few of them contribute to improving the image of the government or its bodies. The presence of a website or an account on a social network in the government does not mean that it effectively uses these public communication tools.

Of course, it is necessary to continue research in this direction. The research methodology, of course, needs to be improved. In such a dynamic environment as the Internet, many indicators quickly become obsolete, but new ones appear.

We need projects focused on the study of factors contributing to communication, and, in general, the effective functioning of the system of e-interaction between gov-ernment bodies, business and citizens in digital environment. Moreover, an important component of this issue is not only theoretical study, but also the implementation of applied research using social science methods and tools of modern Internet research. It seems that the studies described above allow us to identify problems and areas for further work by communication specialists in government.

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EGOV-CeDEM-ePart

The Relationship Between Outbound and Inbound Communication in Government-to-Citizen Interaction

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Abstract: While many citizens have adopted digital channels for public service interaction, the use of traditional channels remains high, preventing economic benefits from digitalization. The channel choice (CC) and multi-channel management (MCM) fields of e-government study citizens' choice of channels and the management of service interactions across channels. Research has mostly focused on either the citizen or organizational side and single channel communication. Thus, the relationship between public authorities' outbound communication (letters), and citizens' inbound communication (telephone calls and website visits) is understudied. Therefore, we present a longitudinal quantitative study, which analyzes channel traffic data from two service areas, pensions, and parental leave, across three channels (letters, telephone calls, website visits). We apply interactivity theory and the concept of multiplexity to guide our analysis. We seek to offer contributions to the CC and MCM literature by demonstrating a relationship between outbound and inbound communication and the multiplex nature of government-citizen interaction.

Keywords: Channel choice, mixed methods, multi-channel management, multiplexity

Acknowledgement: Christian Ø. Madsen's research is funded by the Research Centre for Government IT, which is a collaboration between the IT University of Copenhagen, the Danish Agency for Digitisation, and the self-owned institution ATP. The Research Centre's external funding partners were not involved in the development of the research questions presented herein, nor the analysis, discussion, or presentation of the study's results.

1. Introduction

Government organizations have spent considerable efforts on migrating citizens from traditional interaction channels such as counter visits, physical letters, and telephone calls towards digital self-service channels, especially websites (Madsen & Hofmann, 2019; Pieterson & Ebbers, 2020). Several Northern European countries, such as Denmark and The Netherlands, have high adoption rates for digital channels (Eurostat, 2019). However, the use of traditional channels remains high among

adopters and non-adopters of digital channels alike (Pieterson & Ebbers, 2020; Rey-Moreno & Medina-Molina, 2016). This traditional interaction form is expensive because it requires the involvement of caseworkers. From public organizations' point-of-view, the continued use of traditional channels in public service encounters is problematic because it prevents organizations from reaping the full economic benefits from digital self-services (Ebbers, Pieterson, & Noordman, 2008). From citizens' point-of-view, this is problematic because it indicates that the current self-service applications are incapable of solving all of their needs and problems (Madsen, Hofmann, & Pieterson, 2019).

Within the e-government field, two related research streams focus on this phenomenon. Channel choice (CC) research studies citizens' choice of channels in public service encounters (Madsen & Kræmmergaard, 2015a; Pieterson, 2009). Multi-channel management (MCM) research studies how public organizations can manage interactions with citizens across multiple channels (Ebbers et al., 2008; Madsen & Hofmann, 2019). Most CC and MCM research regard this interaction as discrete event occurring on a single channel, rather than studying the entire service encounter holistically as it occurs across multiple channels (Madsen et al., 2019). Moreover, existing work tends to focus on inbound contacts only. Few studies have analyzed the relationship between outbound and inbound channel traffic, i.e., how public organizations' communication *to* citizens influences communication *from* citizens (Madsen & Hofmann, 2019; Teerling & Pieterson, 2010).

Therefore, this paper presents an ongoing longitudinal quantitative study which seeks to establish and explain the relationship between public authorities' outbound traffic and the subsequent inbound communication from citizens. We present and analyze channel traffic data from a six-year period covering two public service areas (pensions and parental leave) and across three communication channels (letters, telephone calls, website visits). Following previous CC and MCM studies (Ebbers et al., 2008; Madsen et al., 2019), we will apply the related concepts of multiplexity and intermediality to guide our analysis (Bordewijk & van Kaam, 2002; Haythornthwaite, 2005). Next, we briefly describe the background of our study, followed by related CC and MCM research and the gaps herein we seek to address. Then, we present our study's research aim and method. Finally, we present preliminary and expected results from the study.

2. Background: Mandatory Self-Service Channels and Udbetaling Danmark

In 2015, digital self-service became mandatory for a number of public services in Denmark (The Danish Government, 2011). For these service areas, citizens are required to use digital channels and self-service applications to find information and apply for the services. Citizens who are incapable of using the digital channels can request to be made exempt from them. All citizens can contact public authorities in person, by telephone or in writing for help.

The study presented here revolves around two public services in Denmark, a lifelong pension scheme (Pension) and a parental leave scheme (Parental). These services are administered by the pension's fund ATP, and the public authority Udbetaling Danmark (UDK), respectively. ATP also administers UDK and the two organizations were partly co-located at the time of the study.

Information and self-service applications for both services are located at the national web-portal borger.dk. **The Pension scheme** was established in 1965 as a supplement to the Danish state pension. Most Danish citizens contribute to this scheme by paying a percentage of their income, such as wages or unemployment benefits. The pension is paid out at retirement age, either as a lump sum or as monthly payments. Once yearly, ATP sends out an annual letter to inform pensioners about the coming year's payments. From 2012 to 2019, the number of pensioners in Denmark grew from approximately 950,000 to 1.1 million (Statistics Denmark, 2019). **The Parental leave scheme** consists of four underlying leave schemes (pregnancy leave, maternity leave, paternity leave, and parental leave). The availability and duration of these different leave types depend on the parents' collective agreements. The economic benefits provided by these schemes often constitute a person's sole source of income while on leave. There are approximately 100,000 parental leave cases annually, including parents and their employers.

3. Channel Choice and Multi-channel Management Research

Channel choice (CC) is "an individual's specific decision to use a medium in a particular communication incident" (Trevino, Webster, & Stein, 2000, p. 163). CC studies in e-government literature seek to explain citizens' CC for interacting with government organizations (Madsen & Kræmmergaard, 2015a; Pieterson, 2009). These studies have identified factors that affect this choice and measured their influence. Recent studies from Northern Europe show that online channels are now the most used channels there, while people still turn to traditional channels when problems arise (Madsen & Kræmmergaard, 2018; Pieterson & Ebbers, 2020). Most research has simplified CC as a single binary choice between several channels for a service interaction. Few studies acknowledge that most CC is of multiplex nature (cf. e.g. (Haythornthwaite, 2005; Madsen et al., 2019)). Channel multiplexity describes the sequential or parallel use of several channels in one service interaction (Madsen et al., 2019). Channel multiplexity occurs when citizens encounter problems that they cannot solve with one channel. For instance, a citizen may search for information online and then call a government organization (sequential interaction) for help, or they may be logged into a self-service application while calling (parallel interaction).

Multi-channel management (MCM) concerns how government organizations can improve the public service encounter, integrate channels, and migrate citizens across channels (Pieterson, 2010). Multi-channel strategy refers to public organizations' "selection, rationalization and integration of service delivery channels." (Kernaghan, 2013, p. 124). Ebbers, Pieterson and Noordman (2008) developed a multi-channel strategy for public organizations in response to the discrepancy between the channels that the public sector wants citizens to use and the actual channels citizens prefer. According to this strategy, government organizations should guide citizens to the most efficient channels for a given problem or task based on task complexity (the number of steps involved) and ambiguity (possible and conflicting interpretations). Simple tasks low in ambiguity should be handled online, while complicated tasks high in ambiguity should be dealt with on the phone or in-person (Ebbers et al., 2008). The strategy combines elements from media richness theory (Daft & Lengel, 1986) and interactivity theory (Bordewijk & van Kaam, 2002) with empirical knowledge on channel traffic and service modes. It distinguishes between *channel types*, which describe what

channels citizens and public organizations interact through, and *channel modes*, which refer to how and for what purpose the channels are used. The interaction between citizens and the public sector is divided according to who initiates the interaction (citizens or public sector) and whether the interaction is single-sided or two-sided and allows for feedback. Based on these dimensions, four different channel modes are distinguished. (1) Allocution, the push of information towards citizens typically via mass media and (2) registration where citizens send information to public organizations on their request, belong to the government-initiated channel modes. Citizen initiated channel modes are (3) consultation where citizens consult information sources provided by the public sector to retrieve information without, however, enabling a real interaction, and (4) conversation where citizens request information which is then provided by the public sector tailored to the citizens' needs, for example via phone. A fifth channel mode (5) transaction, refers to financial transactions.

In sum, most CC and MCM studies assume that a government-citizen encounter occurs as a single interaction via one channel and initiated by the citizen. A few qualitative studies have, however, shown that citizens may use several channels in one encounter (Madsen et al., 2019; Madsen & Kræmmergaard, 2015b), as well as a relationship between channel modes. However, to the best of our knowledge, no e-government CC or MCM studies have statistically analyzed the relationship between out- and inbound channel traffic between government and citizens or demonstrated how to connect channel modes in larger service encounters (Madsen & Hofmann, 2019; Madsen & Kræmmergaard, 2015a).

3.1. Research Design

The purpose of our research project is to study the relationship between a public organization's outbound channel traffic and the incoming channel traffic from citizens. First, we conduct a quantitative study, which seeks to establish this relationship by analyzing channel traffic. In the future, we seek to understand why this happens, by gaining insight into the reasons citizens provide for their behavior, and discuss the implications for CC and MCM models in e-government research.

We have collected and analysed outbound (letters) and inbound (website visits and telephone calls) channel traffic data. We collected data from two services; the Parental Leave (Paternal) scheme (four years of data) and Pensions (six years). Data were aggregated on a weekly level. This allowed us to assess a) how outbound communication impacts inbound communication and b) whether inbound communication via one channel (e.g. web) affects the other (e.g. phone). In addition to measuring the direct effect (e.g. an outbound letter leading to inbound traffic that same week), we calculated the effects with a 1-3 week delay as well (e.g. does an outbound letter translate to inbound traffic after two or three weeks?). Previous studies have indicated such a lag (Ebbers & van de Wijngaert, 2020; Madsen & Kræmmergaard, 2018). For this we used the 'lag' function in R to shift the base (outgoing letters) of our time series. Thus, we looked at a number of different models for the individual services (Pension & Paternal) as well as the total.:

- The effect of outbound letters on inbound website traffic, directly or lagged (1-3 weeks).
- Effect of outbound communication on inbound phone calls, directly or lagged
- Effect of inbound web traffic on inbound phone calls, directly or lagged.

There were no missing data fields in the data set: for the years and variables mentioned above, all inbound and outbound communication was recorded. We used R to calculate the sample characteristics (**Error! Reference source not found.**) and the linear regression models discussed below.

3.1.1. Quantitative Sample

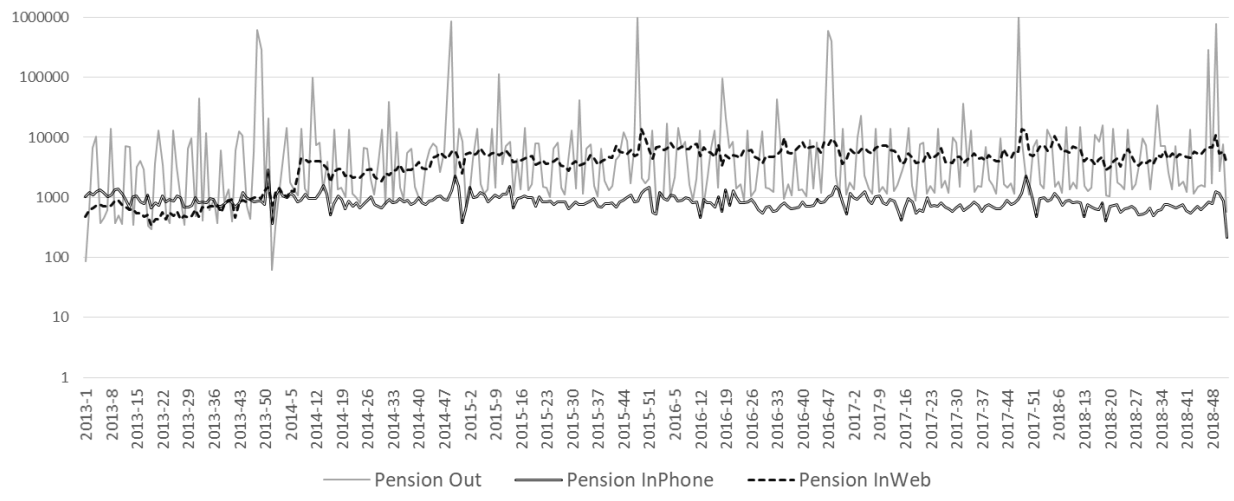
During the sample period, around 12 million letters were sent out, and almost 6 million inbound contacts were recorded. Of these inbound contacts, 67.20% came via the website and 32.80% via the telephone. **Error! Reference source not found.**, below, presents the key statistics for both services and the total.

Table 1: Sample Characteristics

	Parental			**Pension**			**Total**		
	Outbound	Inbound Web	Inbound Phone	Outbound	Inbound Web	Inbound Phone	Outbound	Inbound Web	Inbound Phone
Total contacts	4,333,226	2,640,350	1,665,773	7,841,484	1,334,414	274,514	12,174,710	3,974,764	1,940,287
Mean	20,733.14	10,116.28	6,382.27	25,025.66	4,263.30	877.04	38,896.84	12,698.93	6,199.00
Median	17,503	9,864	6,343	1,873	4,456	835	16,510	12,037	6,949
SD	11,466.95	3,754.19	1,491.84	118,126.02	2,346.56	272.64	119,054.03	5,992.42	2,844.68

The statistics vary strongly for both services. Whereas roughly 4 million outgoing letters translate in an equal number of inbound customer contacts for the Parental leave scheme, twice the outgoing letters for Pension yield roughly 1.6 million incoming contacts. Similarly, the standard deviation of outbound letters for Pension is much higher than that of Parental, suggesting a much higher seasonal fluctuation of this service. The figure below (**Error! Reference source not found.**1) shows the weekly fluctuation in the number of contacts for the Pension service (on a logarithmic scale with base 10). This highlights the annual peak in outgoing letters. The figure also shows smaller peaks in inbound contacts but does not immediately make clear whether that is caused by the outbound contacts.

Figure 1: Outbound and inbound Contacts 2013-2018 for Pension



3.2. Preliminary Results

Next, we briefly present preliminary results. We first discuss the model parameters (Table 2), followed by the model estimates (Table 3).

Table 2: Model Parameters

	Parental			**Pension**			**Total**		
Depen-dent	Inbound Web	Inbound Phone	In phone (web)	Inboun d Web	Inbound Phone	In phone (web)	Inbound Web	Inbound Phone	In phone (web)
Std Error	1031	790.7	924.2	982.6	182.7	184.8	1830	1012	996.4
Df	145	145	197	247	247	248	247	247	248
Adj. R2	0.8751	0.6971	0.6074	0.8221	0.5517	0.5414	0.9075	0.8736	0.8776
F	24.95	8.866	7.628	24.03	7.133	6.98	49.87	35.45	37.31
p	<.000	<.000	<.000	<.000	<.000	<.000	<.000	<.000	<.000

The model parameters show each of the models to be significant at p<.000. However, they vary in the (adjusted) variance (R2) they explain. Furthermore, the models tend to explain Inbound Web traffic better than Inbound Phone traffic and the impact of Inbound Web on Inbound Phone traffic. Nevertheless, all models produced significant results, and were used to calculate model estimates.

Table 3: Model Estimates

Model estimates (βs)									
	Parental			**Pension**			**Total**		
Dependen t	**Inboun d Web**	**Inbound Phone**	**In phone (web)†**	**Inbound Web**	**Inbound Phone**	**In phone (web)†**	**Inbound Web**	**Inbound Phone**	**In phone (web)†**
(intercept)	4156***	2429***	3200***	-379.6	1056***	1054***	4711***	4687***	5024***
Total Out	0.0153	-0.0045	-	-0.0001	0.0001	-	-0.0001	0.0007	-
In Web	-	0.4270***	0.2832***	-	0.0481***	0.0500***	-	0.2383***	0.2745***
In Phone	0.7254***	-	-	1.391	-	-	0.7787***	-	-
T -1	0.0192	-0.0239*	-0.1276*	0.0036***	0.0002	0.0211	0.0039**	0.00053	-0.0756*
T -2	0.0239	-0.0349**	-0.0663	0.0032***	0.0004**	-0.0278*	0.0041**	0.00018	-0.0350
T -3	0.0215	-0.0213*	-0.1013	0.0000	0.0005***	-0.015	0.0011	0.00096	0.0067
2014	-3103***	1317***	1064***	2334***	-127.8***	-85.34	-285.2	-340.0	-365.1
2015	1765***	-1036***	-280.2	4263***	-247.1***	-169.36*	6723***	-2530***	-2106
2016	2910***	-760.3	352.9	5526***	-377.9***	-274.45**	9318***	-2551***	-1885
2017	-	-	-662.3	4877***	-367.4***	-280.58**	11560***	-3013***	-2283
2018	-	-	-	4909***	-463.5***	-376.52***	1864*	-6101***	-6355
† model without mail as a predictor and Inbound Web traffic as the main independent.									
*sign at p=0.05, ** sign at p=0.01, *** sign at p=0.001									

The first of these estimates is the predictive value of outbound communication on any of the dependent variables, and in none of the models, we find significant estimates. This means that overall, the total outbound communication does not appear to impact inbound communication directly. However, when looking at the year (and week) level, we find that the coefficients increase in size and significance for most periods. This suggests that the impact of outbound on inbound

communication is short term. We also find an influence of one inbound channel on the other channel. This suggests that cross-channel traffic always happens, regardless of service or period of outgoing communication. Second, we look at the effects of the delays, and here we do find significant, yet inconsistent, results. The results in the table suggest, on a global level, that outgoing communication causes incoming web traffic (after a delay) and that an increase in (inbound) web traffic translates in a decrease in (inbound) phone (also after a delay). However, this varies per service and calls for a deeper analysis to help understand what triggers this.

3.3. Future Studies

We are currently planning to expand the study presented here with a qualitative in-depth component to explain why citizens contact public authorities. This will be an *explanatory sequential mixed method study* (Creswell, 2014). The quantitative analysis presented here constitutes the first phase of the study. In the second phase, we will analyze the results from 100 observations and in-situ interviews (50 from pensions and 50 from parental leave) conducted in call centers in 2017. The analysis of channel traffic was used to guide the timing of and inform the data collection for the second phase. We collected data during peak call periods: Shortly after the submission of the annual pension letter and during a week where UDK paid out parental leave benefits. Hereby we seek to gain insight into the reasons citizens provide for calling, and the relationship between channel modes. Finally, we plan to use the results from this study to develop an new omni-channel strategy, which covers both outbound and inbound channel traffic and update the previous MCM strategy by Ebbers, Pieterson and Noordman (2008).

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Reducing Digital Exclusion of Seniors - Exploring the Lasting Effects of Collaborative Training Sessions

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Abstract: Today's digital society is developing rapidly and the number of smart and innovative digital services is increasing every day. However, the rapid digitalization may also lead to the exclusion of some groups. Senior citizens are one of these groups at risk. The most common way of combating digital exclusion among seniors is to offer education and hands-on training. The short term effects of such education initiatives have shown positive results but the long term lasting effects of digital training have not been explored to any greater extent. Data was collected via semi structured interviews with seniors who had previously participated in training sessions targeting Swedish seniors with a desire to become more digital. The results show that although the immediate effect of participating in training is positive, more individualized training is needed to achieve a lasting effect.

Keywords: E-government, digital exclusion, senior citizens, local government

Acknowledgement: The authors wish to thank Telia Company, Grums Kommun, and Haninge Kommun. This work was supported in part by a grant from Västra Götalandsregionen.

1. Introduction

For a long period of time, the e-government research agenda has been heavily influenced by the question of how to increase citizens' uptake of digital service provided by public agencies (e-services). One major determinant for e-service uptake is digital exclusion. In short, digital exclusion may be about one out of two things, or a combination of both: 1) limited access to digital technology and a working digital infrastructure, e.g. access to digital devices and the internet; 2) limited abilities to use the internet and digital equipment in order to access digital service, such as services provided by public agencies to its citizens (Ebbers et al., 2016). Among digitally excluded citizens, seniors are an over-represented group. As an example, in Sweden, which is considered to be one of the world's most heavily digitalized countries, approximately 400 000 seniors never use the internet, although 98% of the Swedish citizens have internet access (The Internet foundation in Sweden, 2019). This in turn means that seniors miss out on digital opportunities, and risk being left behind as society

changes. This situation is problematic, not at least for government authorities striving for increased provision and usage of e-services. Senior citizens represent the group with the most need of public service, for example with respect to health-related services but at the same time, senior citizens use digital versions of such services the least (Nishijima et al., 2017). In several research initiatives, seniors have been asked regarding their motives for not using the internet and e-services. Commonly mentioned arguments are: 1) A negative attitude towards internet, often associated with a general anxiety for using digital technology; 2) A sense of feeling too old to learn how to use digital technology; 3) Lacking knowledge and experience of using digital technology; and 4) Traditional literacy issues in terms of elderly citizens having problems with reading and writing (Holgersson and Söderström, 2019). The term senior is not a definite concept and different research initiatives use different definitions of when one become a senior. In Sweden, the age of retirement most often is 65 (The Swedish Pensions Agency, 2018) and since the research in this paper is based on Swedish retired citizens, seniors in this paper refers to citizens with the age of 65 or above.

It can be concluded that increased uptake of e-services in combination with reduced digital exclusion may bring a number of potential benefits for senior citizens, such as reduction of social isolation, IT-supported communication with friends and family, active participation in an increasingly digitalized healthcare system, and prolonged independence and improved cognitive abilities (Niehaves and Plattfaut, 2014). Moreover, reduced digital exclusion of seniors may also contribute to increased sustainability in public agencies provision of e-service when other service channels are used less frequently (Srivastava and Shainesh, 2015). In order to reduce digital exclusion among seniors, the most common actions proposed are education and training. Though there are a number of research initiatives highlighting the importance of training and education, there is a need for more consistent and robust evaluations of such interventions. The immediate effects of training seem positive and promising, the seniors feel more involved and brave enough to start using the Internet to a greater extent than before (Mok and Leung, 2012, Söderström and Holgersson, 2018). However, at the same time, little research is to be found exploring the long-term effects on seniors' digital habits. A notable exception is presented by Söderström and Holgersson (2018) but the results presented are based on a small sample of respondents and the results are therefore hard to generalize. It can be concluded that there is a need for more robust long-term follow-ups with larger samples of respondents. The aim of this paper is therefore to explore to what extent seniors who have participated in training and education initiatives have changed their digital behavior and habits seen from a long-term perspective. Furthermore, the paper aims to explore seniors' opinions on how digital training initiatives can be enhanced in order to promote digital inclusion of seniors.

2. Research Approach

In order to be able to explore the long-effects of seniors' digital behavior we adopted a qualitative interpretive approach (Klein and Myers, 1999, Walsham, 1995). We did so since our main research interest lied in exploring and analyzing the seniors' perceptions of their own digital habits and how these habits had changed after having participated in a digital training session. This approach made it possible to dig deep into the respondents' arguments and motives regarding their own perceptions

of their digital behavior. Data collection was made via semi-structured telephone interviews following a basic interview guide where a set of themes were discussed with the respondents:

i) The respondent's perception of changed digital habits before and after participating in the educational program and the respondent's perception of the amount of digital services used before and after participating in the educational program.
ii) The respondent's perception of their need for additional training in order to become more digitally independent.
iii) The respondents' recommendations for how to design future education initiatives targeting reduced digital exclusion among seniors.

In total, we interviewed 35 respondents. The interviews were held by telephone due to geographical distances. Each interview was first recorded and then transcribed before being analysed. All respondents were seniors (i.e. 65 or older) and had previously participated in an educational program arranged jointly between Swedish municipalities and Telia Sweden AB[1]. The educational program was constituted by a three-hour training session and was directed exclusively towards senior citizens who had an interest in becoming more digital. During the training session, the participants were distributed over a set of tables. Each table had computers, a supervisor employed by the current municipality, and high school students who acted in the role of digital natives. The basic idea was to enable the younger generation to learn seniors about digital technologies and services and they did so in response to what questions the seniors might have. The questions ranged from how to use Google and internet in general to specific needs such as starting an e-mail or Facebook account, as well as how to stream TV-series and participate in an internet auction. The interviews were conducted approximately two months after the training session, thus enabling the respondents to reflect upon what they learned during the training session as well as how their daily life had been affected in terms of using digital technology and services if compared to before partaking in the training session.

3. Results

Based on the three themes that served as a basis for the interviews, we grouped the results accordingly.

3.1. Changed Digital Habits

Most respondents point out that their digital habits have not been changed to any greater extent, at least not to the degree that they themselves considered relevant enough to address during the interviews. Instead, the respondents experienced that participation in the training session did not add much new knowledge that they previously were unaware of. However, they stated that they often had picked up something, but they could not say exactly what it was and they did not experience any major change in their digital habits after participating. Most of these respondents

[1] Telia Sweden AB is Sweden's largest telecom operator. Telia AB sells connections in fixed telephony, data communications, Internet, digital TV, IP telephony and mobile telephony to private individuals, companies and organizations.

exhibited a basic pre-knowledge of digital technology. They, therefore, felt that the knowledge level on which the training session was targeting was a bit too low and general. According to these respondents, it would have been more effective if more participants which a similar competence profile would have been grouped together instead of being randomly distributed together with others with a wide range of basic digital competence. We use the following quotes as illustrating examples of such reasoning: "*I thought I would get more deep insights*", "*Maybe I learned something but not that much, I had a pretty good idea from the beginning*", "*No, I don't think it gave me anything I didn't know already*", and "*Sure I got some updates but I can't say that I learned anything new*".

However, some exceptions were found where changed digital habits were exhibited, not at least concerning a reduced fear and anxiety of using digital technology, as the following quotes indicate: "*Well before [participating in the training session] I didn't dare to go out on the internet but now I have more knowledge and I dare*", "*It turned out that it wasn't so dangerous so to speak. That you might dare a little more when these young people [the digital natives educating the seniors] show how it works*". From what can be interpreted out of the latter quotation, the social aspects of the training session were important and the personal contact with the young digital natives along with practical training seem to be important drivers for the increased interest in using digital technology, even if the digital habits were not changed to any greater extent.

3.2. Interest in Partaking in Upcoming Training Sessions

Given the sparse exhibited changes in digital habits, surprisingly many of the respondents stated that they considered the training session as successful in preventing digital exclusion. The result can be seen as contradictory as the majority of the same respondents had previously claimed that their habits had not changed significantly. How, then, can they claim that the training session was actually rewarding and had succeeded with its original goal of reducing participants' digital exclusion whereas any substantial changes in digital behavior were missing for most respondents? Although the outcome of the training session was not necessarily rewarding for the individual respondents, they found that the occasion itself was generally very rewarding for the other participants at the training session. It seems that the training session managed to succeeded in including practical training and social contacts, both between educators and other participants, in a satisfactory way, as the following quotes indicate: "*You got to test things and then do it yourself so to speak, practically, otherwise it is difficult to learn such things. Just watching when someone else does, you don't really learn that at my age anyway*", and "*We [the seniors] are a group that has not grown up with digital services in the same way as young people today. So mixing high school youth and senior citizens was a very nice way to go*".

A general observation is that interest in participating in further training initiatives seems to some extent depend on skills since before and after the training. Those who already perceived themselves as knowledgeable do not see further training as equally relevant for themselves but at the same time they consider the training session as a good initiative for seniors who have had a hard time adjusting to the digital society. One respondent who was experienced and comfortable in using digital technology and services already before entering the training session pointed out that the training session was, according to the respondent, very instructive for the more troubled and uncertain participants who had limited previous experiences: "*This digitalization of the society has really gone too fast for the older generation, I myself belong to the older generation. I am 83 years old this year and there are*

many in my generation who have no opportunities whatsoever to use it [digital] and who are not able to learn it either, and then society must still take these people into account. You can't just ignore them and say that "you can search this on the internet" or that "you can go in there and do it", and so it has almost become in some areas". It is clear that those respondents who rate themselves on the lower side of the competence scale are in need of training initiatives in order to become more independent and self-confident. Further education initiatives are needed in order to stimulate continuous and long-term competence development of seniors which in turn will enhance the possibilities for substantial changes in seniors' digital behavior. Additional training sessions would also allow for returning participants to ask more specific and advanced questions based on their new insights in digital technologies, which was also something that many of the respondents themselves raised during the interviews. One of the respondents was convinced that there was still a lot to learn and was positive towards further education initiatives in the future: "*Yes, absolutely [about participating in further training sessions]. I am absolutely convinced that I use an incredibly small part of my phone and everything that it does. At my age you have to take a little at a time, so I would very much like to take another step*".

3.3. The Respondents' Recommendations for Future Training Initiatives

When it comes to the seniors' recommendations for how training initiatives should be designed in order to promote enhanced digital habits, the respondents had several suggestions. Despite the lack of substantial changes in digital habits, a clear majority of the respondents had a positive attitude towards the training session itself and would be recommending future opportunities to needy acquaintances. Those respondents who did not choose to recommend the training session considered that all the acquaintances they knew were already sufficiently knowledgeable in the subject and that the opportunity would therefore not be rewarding for them. However, although the training initiative as such was well received by the respondents, they had a number of suggestions and recommendations for any potential upcoming training opportunities. One of the most sought-after changes to emerging opportunities was to reduce the number of participants per group/table and potentially base these smaller groups/tables on the participants' level of knowledge. When the groupings within the training session in which the respondents had participated did not take into account the different knowledge levels of the participants, frustrations arose within the groups, which was most often reflected in the questions asked by the group members. Questions asked by one group member did not necessarily have to be relevant to the other group members and what they wanted to address. This, together with the limited time available, led to a number of different annoyances for several of the participants, or as one of the respondents puts i: "*Well you might try to have less people at each table so that each participant got a little more time to ask questions. We were three participants around the table and one of us took up most of the time with questions that I didn't perceive as valuable. I tried to tell the participant that I didn't think all those questions were relevant but it didn't help*".

4. Conclusions

The main results point out that the training initiative as such was rewarding and informative, but during the time (two months) between the training session and the interview, just a few of the respondents exhibit any changes in terms of digital behavior. This indicates that the training session initially succeeded in educating its participants while failing to influence them in a long-term

perspective. It is clear that the respondents' previous knowledge about digital technology brought into the training sessions is of importance. Either the initial competence among the participants has been so low that the training session did not help to raise the digital competence enough to bring a lasting change in digital behavior or otherwise the digital competence has been too high which has limited the opportunity to gain any new insights for the participants. As such, we can conclude that the results obtained in this paper partially contradicts with the results obtained by Söderström and Holgersson (2018). There might be several reasons for this contradiction but it is important to point out that the sample of respondents in Söderström and Holgersson (2018) is limited. However, it should be noted that the setting in which the training session is arranged might affect to what extent the participants actually enhance their knowledge. Even if the basic setup of the training sessions have been the same for all municipalities the sessions have not been arranged precisely the same, e.g. the premises have not been exactly the same, the training sessions have been facilitated in different ways, and the personal chemistry between the tutors/digital natives and the participants might have differed. Such factors might affect the end result of the training and should be analysed further.

In addition, we have found concrete suggestions for how to re-design the current training sessions as well as how municipalities should plan ahead in future education initiatives. Among the respondents it seems clear that the current version of the training session in which all respondents have participated could be easily improved in order to enhance the learning curve for all participants. Adjustments such as smaller groups of participants who have the same basic digital competence are commonly mentioned suggestions for improvement. Moreover, it is clear that one single training session is far from enough for most seniors, in particular those who have an absent or very limited digital competence. It is important that the municipalities arranging training sessions are aware of and plan ahead how further training sessions should be conducted. Instead of arranging one lavishly large intervention aimed for everyone, municipalities should prepare training programs based on the needs of the recipients of such initiatives. As pointed out by several researchers, fear and anxiety when using digital technology is a major barrier for senior citizens with limited digital experience (Holgersson and Söderström, 2019, Hill et al., 2015). Thus, one form of training program might address the needs of seniors with limited digital experience whereas other forms of training programs should address the needs of more digitally experienced seniors. In order to allow long-term substantial changes in digital habits among senior citizens there also have to be long-term planning for how to stimulate such as change.

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The Use of Blockchain Technology in Digital Coproduction: The Case of Barcelona

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Abstract: By creating an autonomous, transparent, and secure decentralized system, blockchain technology enables the removal of intermediaries as trustees to be replaced by a peer-to-peer based governance system. This feature upholds important implications to redesign the public governance systems and co-production practices in a more transparent, efficient and effective way. As a first use case example of the blockchain technology in a digital co-production process, the city of Barcelona has initiated the Digital Democracy Data Commons (DDDC) project to integrate into the city's participatory democracy platform 'Decidim.Barcelona'. The DDDC pilot uses the blockchain and distributed ledger technology to share a petition with participants, sign it with a mobile app and count the signatures in a cryptographically secure and completely anonymous way. Through an in-depth case study, this paper analyzes how blockchain technology can shape the coproduction processes and what possible roles can be assumed by citizens for the use of these technologies in digital coproduction. In this paper, we created a novel analytical framework to categorize possible roles imposed on coproducers in blockchain technology-based systems. Our preliminary findings suggest that the compatibility with the legal framework, the interoperability with existing institutions in data governance, and previous experiences and established communities for deliberative and participatory processes are important on the design choices and determining citizens' roles in the blockchain technology-based digital coproduction processes.

Keywords: Blockchain, Digital Coproduction, Distributed Ledger Technology

1. Introduction

Disruptive technologies are increasingly influencing the way coproduction provides value to society and how coproduction processes are implemented. Governments around the globe are conceiving of new ways to engage citizens in coproduction and collaborative efforts via disruptive technologies, such as blockchain and distributed ledger technology (DLT). These efforts lie on the promises of such technologies to increase trust in and security of transactions and reduce transactions cost (Foth, 2017; ITU, 2017). However, the existing literature is limited in empirical cases to show how blockchain and DLT can shape the coproduction processes and what possible roles can be assumed by citizens for the use of these technologies in digital coproduction.

This paper aims to address this gap by focusing on the following research question: How can blockchain and DLT shape citizen coproduction processes? A pilot of the Digital Democracy Data Commons (DDDC) project in Barcelona, which applies DLT to engage stakeholders in a participatory process will be studied in order to answer this research question. Through this case study, the paper will outline a theoretical model to study the applications of blockchain and DLT in digital coproduction processes. The remainder of the paper is structured as followed. Section 2 discusses the background of digital coproduction and the way blockchain and DLT can shape digital coproduction processes. Section 3 presents the analytical framework, while Section 4 describes the case and methodology. Section 5 outlines key findings. Finally, Section 6 concludes the paper.

2. Background

2.1. Digital Coproduction

The conception of coproduction fits in the New Public Governance paradigm that recognizes the provision of public services as a model based on networks and inter-organizational relationships (Bovaird & Loeffler, 2012). In this article, we draw on the concept of coproduction by Brandsen and Honingh (2016, p. 431):

> *Coproduction is a relationship between a paid employee of an organization and (groups of) individual citizens that requires a direct and active contribution from these citizens to the work of the organization.*

Citizens can engage in the coproduction of public services in different stages of the delivery process, including the public service design, public service delivery and execution, and public service monitoring. Each stage, therefore, entails different roles both from the public service provider and the citizen (Linders, 2012).

The ability to perform coproduction activities is seen to be increased by the implementation of technological advances in the public sector (Fugini & Teimourikia, 2016; Johnston, 2010; Lember, 2017; Meijer, 2016; William, Webster, & Leleux, 2018). In that regard, digital coproduction often corresponds to the adoption of information and communication technologies (ICT) in coproduction processes. The adoption of ICT can affect coproduction by providing real-time access and exchange of information. ICT can also transform coproduction by scaling up the collection of citizens' data (e.g. FixMyStret's solutions or gamification strategies). Digital technologies can even substitute coproduction processes with fully (or partly) automated processes (e.g. predictive policing). In this vein, different technologies are strongly shaping coproduction processes and our understanding of coproduction.

2.2. How Can Blockchain Shape Digital Coproduction?

Blockchain and DLT are a class of technologies, henceforth blockchain technologies (BCT), that create a transparent, autonomous and decentralized data governance system that gives users confidence that archived information has not been tampered with (Beck & Müller-Bloch, 2018) without the need of trustees to verify the genuineness of stored data.

We expect this feature of the BCT to have important implications for the coproduction processes in public sector, because it allows the service users and stakeholders to directly shape their service provision without a need of intermediary or administrator to validate or channel their input. BCT can also increase the transparency, auditability and accountability of the information provided in the coproduction processes and thereby builds trust in the coproduction processes. For instance, BCT provides new ways of coproduction by allowing cities to create 'voluntary data repositories' of citizens' personal data in order to co-produce new services. Moreover, BCT, as a communication technology, can enable peer-to-peer public service delivery (Lember, et al. 2019) and a new generation of democratic processes (Saldivar, et al. 2019).

However, there are some caveats and different technological features of BCT can have different implications to the coproduction processes. First, choices of the system designers on the design of the digital platform can affect the role of the coproducers and the scope of the coproduction activities. BCT-based platforms can have permissionless/permissioned and public/private forms (Miller, 2019). The choice between permissioned and permissionless systems calls for considerations of several trade-offs and decisions to be made by policymakers and system designers. These trade-off conditions are context-dependent and factors concerning organizational and technological capacities, provider of technology services, area of application, interoperability with other data platforms, and political preferences might determine the choice of decision-makers. Secondly, the underlying consensus protocol and the associated incentive mechanism can alter the role of the actors involved in the coproduction processes. Incentives are important to attract the validators that contribute to the system with their time and resources (e.g. computing power and/or money). The most common form of incentive mechanism is distributing tokens to the validators, which can hold either a monetary value (e.g. Bitcoin) or another form of value for the beneficiary. However, using tokens to motivate users to participate in coproduction processes may undermine the effectiveness of coproduction processes or have negative repercussions (e.g. adverse environmental impact in Proof of Work (PoW)- based systems).

Thirdly, BCT is not a monolithic technology and auxiliary technologies (e.g. tokens, zero-knowledge protocols, smart contracts, etc.) integrated in the blockchain platform can alter the way coproduction takes place. For example, through tokens and smart contracts, coproducers can enable various voting features for coproduction processes and automatically execute ex-ante agreed rules of transactions for service provision. At the same time, with zero-knowledge protocols, co-producers can preserve their anonymity without undermining the validity of transactions in the blockchain network. Depending on the applications (or decentralized applications), the scope and the underlying features of coproduction in a blockchain platform may vary.

Fourth, the way decisions are implemented in the blockchain platform can impact the legitimacy of coproduction. In blockchain governance, there are on-chain and off-chain decision-making mechanisms. On-chain system brings the trade-off between efficient decision-making and transition processes and risking destabilization due to the political dissonance. Off-chain system brings the trade-off between enhancing the political consensus in the decision-making and transition processes and risking the 'tragedy of commons' where the maximization of private interests of the miners can undermine the stability of the system (Finck, 2018).

The fifth caveat is related to the definition of the digital coproduction and concerns about to what extent different acts of engagement using BCT can be classified as coproduction or co-creation. Veiko et al. (2019) differentiate on the scope of activities associated with coproduction and cocreation based on the level of engagement where activities concerning the service production correspond to coproduction and the services at a strategic level correspond to cocreation. Moreover, they focus on whether citizens provide direct and active input. Here direct refers to whether the input provided by the citizens affects the services individually provided to them, and active refers to whether citizens take part in the design or delivery of services. Yet, this definition has certain shortcomings when applied to the user roles in a BCT-based system. The functionality of the BCT-based systems rests upon the active engagement of the users in validation of the transactions. Even if the input of the validators (be it random or selected nodes) can be rendered as active and direct according to the aforementioned definition, their involvement is arbitrary and indiscriminate to the service provided by the platform. In a way, they are passive service producers without holding an agency about the scope of the services. Therefore, it is important to identify the different roles of the participants engaging in BCT-based coproduction processes and whether they hold an agency in the services provided by the system.

3. Analytical Framework

The literature of digital coproduction is still at its infancy, and only a few analytical frameworks are focusing on how various factors affect the citizen's role in digital coproduction processes. One framework developed by Veiko et al. (2019) provides some coarse assumptions about the impact of four categories of technology (i.e.sensing, communication, processing, and actuation) on motivation, interaction, resources and decision-making processes and the co-producer's role and involvement in coproduction. However, this coarse categorization has its shortcomings when it comes to the roles of the BCT in coproduction processes. As mentioned earlier, BCT is not a monolith technology, and varying applications and different underlying protocols of blockchain platforms may change the implication of the technology concerning decision-making, motivation and participants' roles in coproduction processes. Furthermore, it is difficult to position BCT only under one category of digital technologies. BCT can be categorized as a processing technology- as rendered by the authors- but BCT can be also treated as a communication technology as it 'mobilizes inputs from citizens on a far larger scale' (Veiko et al, 2019). BCT allows users to control and verify the personal data and thereby it allows an on-chain and off-chain engagement at a larger scale.

A second type of analytical model available in the literature focuses on the use and ownership of data in the coproduction processes (Toots et al, 2017; McBride et al, 2018). For instance, Toots et al. (2017) focus on barriers and drivers in the use of open data in digital co-production processes by categorizing the institutional characteristics of the coproduction processes concerning the technology, organizational structure, perception, attitudes and culture of stakeholders, and regulative framework. This framework is useful to analyze the facilitating and debilitating institutional factors in the use of open data in coproduction. However, in BCT-based systems, data is not the only currency for citizens' engagement in digital coproduction processes. Users contribute to the functioning of the system through their computing power and energy consumption, and

thereby the functionality and stability of the system rely on the continuous engagement of the participants with the mining processes. This technical feature of BCT expands the impact of the institutional framework on digital coproduction processes beyond the use of open data to a more complex techno-social interaction. For instance, PoW-based systems are highly energy-consuming processes[1]. Compatibility of the technology with regulations about CO2 emissions, rights to forgotten or GDPR, and the cost of energy consumption for nodes are some additional institutional factors that may affect the scope and the applications of BCT in coproduction processes. Therefore, we infer that a functional analytical framework for the user roles in BCT-based coproduction processes should align the user roles imposed by the technological features of BCT with the institutional dimensions shaping the application of BCT in co-production processes.

As a first step, we developed an analytical model to assess the user roles in BCT-based co-production (see Figure 1). In the construction of the model, we paid attention to matching three dimensions with each other: (1) possible user roles identified by the BCT-based systems; (2) possible citizen and state roles identified by the digital co-production/co-creation systems; and (3) a versatile and evolutionary view on the role of BCT. Accordingly, we identified three stages in the use of BCT in co-production processes.

Citizen-controlled information management: BCT is used to process personal data of citizens. In this simplest form of BCT-based coproduction, a coproducer can have the role of data provider, verifier and data user (Erhan et al., 2019). Coproducers can control and trace the personal data used in the coproduction processes, verify the transaction as a node either in a permissioned or permissionless system, and use the data for the creation of the public policies. In this mode of digital coproduction, choices of public service organizations about the permission criteria to data infrastructure or ownership of data infrastructure can affect the role of citizens or their representative organizations in the coproduction processes. Nevertheless, citizens preserve the ultimate control of personal data shared for coproduction processes. Therefore, we call this type of coproduction as citizen-controlled information management.

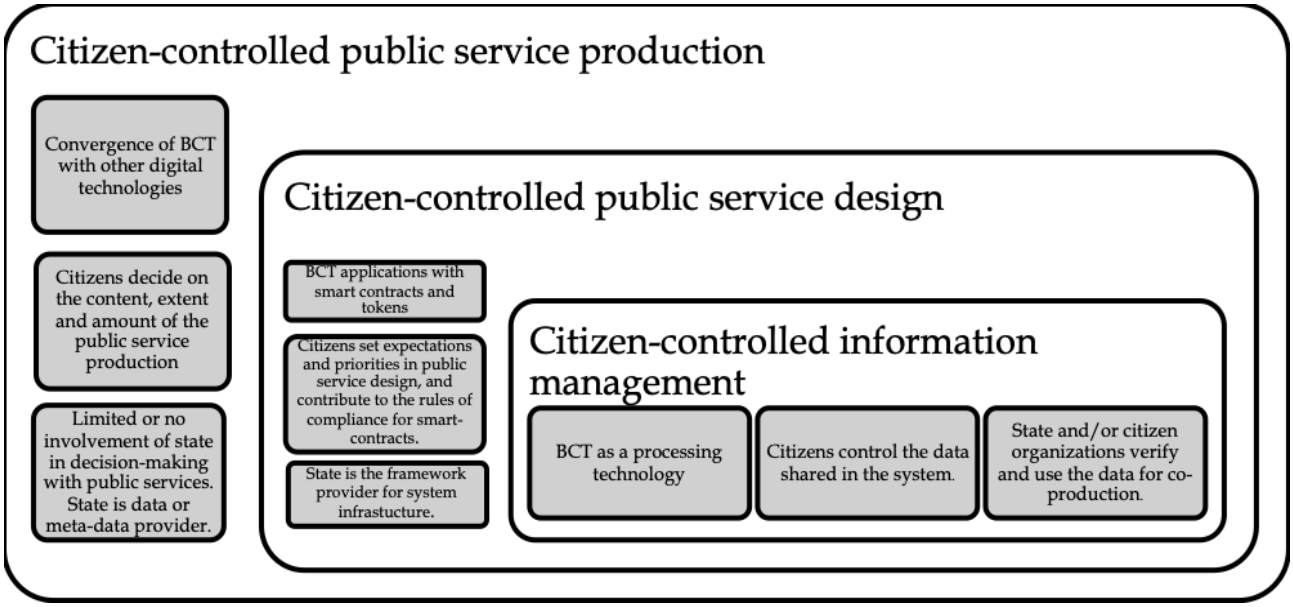
Citizen-controlled public service design: In this mode, applications with smart contracts and digital tokens are used to allow automated, self-enforced service decisions. In digital coproduction, citizens through the use of the tokens can vote on the priority areas and criteria in public service provision and automate the implementation through the use of smart contracts.

Citizen-controlled public service production: In the most advanced form of BCT-based co-production, we expect the convergence of BCT with other digital technologies such as artificial intelligence (AI), internet of things (IoT), or actuation technologies. In this mode, citizens can decide on the content, extent and amount of the public service production. Depending on the combination of technologies, citizens can provide tailor-made services for the specific needs of the communities or groups of people. We expect in this stage, state to have limited or no involvement in public service provision

[1] According to the Digieconomist, PoW-based Bitcoin mining consumes above 70.000 terawatt-hours per year, comparable to the annual carbon footprint of Denmark and energy consumption of Austria. (https://digiconomist.net/bitcoin-energy-consumption)

and instead to provide data or meta-data available in state-sources to contribute to the citizen-controlled production processes.

Figure 7: Modes of BCT-based Coproduction



This framework will help us to categorize the roles imposed on the citizens in a BCT-based system. We will expand our analysis later with the barriers and drivers identified by Toots et al (2017) to understand the impact of institutional conditions on the use of open data on the BCT-based co-production processes. The findings from the case study will allow us to refine and further develop the proposed analytical framework.

4. Methodology

This study is designed as a single exploratory case study to examine how blockchain technologies can shape citizen coproduction processes. A single exploratory case study is a useful design to gain insights about a phenomenon that are thus far understudied or not understood, and to construct new theory or generate propositions about the phenomenon (Yin, 1989). In this study, we will examine the digital government platform of the City of Barcelona 'Decidim', and the unit analysis is the whole process of co-production created by the use of the 'Digital Democracy Data Common (DDDC)'. DDDC is a pilot for a digital participation platform based on DLT that is created as part of the EU funded DECODE project. DDDC uses BCT to share a petition with participants, sign it with a mobile app and count the signatures in a cryptographically secure and completely anonymous way.

We will collect our empirical data from secondary sources and expert interviews. We will gather data from multiple sources of evidence (semi-structured interviews, technical reports and policy reports, government documents) to triangulate conclusions and ensure higher levels of internal validity. Furthermore, triangulation also helps to mitigate against subjectivity in the research and thus strengthens the overall research design.

5. Preliminary Findings

Some preliminary key findings are shared below:

1) The case in Barcelona falls into the category of citizen-controlled public service design. The pilot allows the control of the personal data by the people and creating an immutable and transparent system. Each citizen of Barcelona receives a token for the use of services and functionalities provided by the platform. Through tokens, citizens can vote on the proposals for the municipality agenda on public services. The system operates through smart contracts.
2) Two possible pathways are being discussed on the governance of the DDDC. One option is building a community around the application and creating a self-governance system around the community. The second option is creating an institution for the governance. Whilst the former option refers to a more decentralized system design, where the citizens control the data structure, the second option leads to a more centralized system.
3) Several factors had been influential on the design choices with the platform and integration of the pilot in DECIDIM, the city's e-government platform:
   a) *Need for legal framework*: No personal data in the ledger is being transferred, which gives direct control to citizens, but for further applications with BCT there is a need for a DLT legal framework.
   b) *Interoperability*: Interoperability of the technology with other administrative institutions (e.g. Barcelona Data Office) is important. Further testing of the platform will focus on this dimension.
   c) *Political leverage*: Person in charge should have some political leverage. For this project, Francesca Bria's role in the city council was very critical for its success.
   d) *Building the platform around a communi*ty: Building the technology around an existing community is important for an easier transformation.
   e) *Path dependency*: Previous practices with participative democracy (e.g. 50 men movement) and digital governance (i.e. Decidim) had been influential in the prioritization of citizen-empowering (or more decentralized) systems designs. Furthermore, the emerging business culture in Barcelona in adopting smart city technologies since 2015, allowed the city to cooperate with big corporations on the development of the technology.
4) There are some challenges ahead to scale up the project:
   a) *Technology itself does not create trust*: If people do not understand the technology, it is difficult to create trust only by the technical features of blockchain. Trusted parties/stakeholders can assist in building trust about the technology.
   b) *Compatibility with existing legal/regulative framework:* There are challenges with the current legal framework especially concerning the right to be forgotten and the immutability and transparency of the DLT system. It is possible that some challenges can be solved technically (e.g. zero-knowledge protocol) but some decisions may need to be centralized. Therefore, there may be a need for more complex governance systems (partially centralized, partially through DLT or other decentralized systems). The environmental impact of the PoW technology and its compatibility with the CO2 framework are other concerns and reflect on the decisions with (de)centralization of the platform.

6. Concluding Remarks

DDDC pilot is a unique use case to understand the implications of the BCT in coproduction processes. The case shows that BCT can create a pathway for citizen-controlled coproduction processes where citizens control their own data used in service production, and collectively decide on the policy priorities. However, there are various institutional, technological, social and organizational factors that can affect the design choices of the decision-makers, and thereby the application of BCT in the coproduction processes. In the case of Barcelona, the compatibility with the legal framework, the interoperability with existing institutions in data governance, and previous experiences and established communities for deliberative and participatory processes had been important on the design choices and determining citizens' roles in the governance of the system. Further research is recommended to understand further the underlying factors affecting the choices of decision-makers toward more decentralized systems in BCT-based coproduction.

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EGOV-CeDEM-ePart

Exploring Open IT-based Co-creation in Government: A Revelatory Case Study

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Abstract: Co-creation has mostly been studied in the context of a single organisation and in dyadic, one-on-one relationships, while technological platforms now enable multiple parties to build on each other's assets. More open forms of co-creation could be very promising, especially in contexts where government organisations must do more with less, but empirical research is lacking. In this research-in-progress, we focus on a revelatory case where a public service co-creates an open IT platform with external organisations. We aim to explore the organisational capabilities adopted by both the public service and external organisations. This research-in-progress article reports on how we will use open innovation and technological platform literature as lenses for our interpretive case study approach.

Keywords: Open IT-based co-creation, revelatory case, co-creation, capability

1. Introduction

In 2013, VDAB, the public employment service of the Flemish region in Belgium, launched its open services programme. VDAB opened up its internal information technology (IT) services (including its job-matching engine and an online assistant to improve the quality of vacancies) for use by external organisations in their own IT systems. This fits with VDAB's aim of fulfilling its conducting function in the labour market and stimulating public, private, and non-profit labour-market actors to cooperate and innovate. The open services were developed in collaboration with external organisations (private recruitment and selection agencies, interim agencies, employers, start-ups, and other European public employment services) who co-created the offerings on the IT platform with VDAB. The development of VDAB's open services programme is an example of IT-based co-creation of value, a concept introduced by Kohli and Grover (2008), who described it as a form of co-creation where IT serves as a tool or an output (as is the case for VDAB's open services programme) or is instrumental in generating the co-creation of business value.

As in the development of VDAB's open services, we see more and more organisations co-creating IT-based value cooperatively (Kohli & Grover, 2008). In an increasingly digitised and networked world, the private and public sectors are faced with challenges and opportunities that cannot be addressed by single organisations, or sometimes even single industries (Furr, O'Keeffe & Dyer,

2016). Therefore, organisations no longer limit their focus to what they are capable of on their own but increasingly examine what they can do together with others, including partner organisations, customers, and start-ups (Viaene & Danneels, 2015).

The development of VDAB's open services platform is also linked to other trends on which the IT-based co-creation literature has not focused until now (Mandrella et al., 2016; Kohli & Grover, 2008; Sarker et al., 2012). First, while co-creation typically occurred in one-on-one alliances with customers or suppliers in the past, we now see open partner networks (Furr et al., 2016) innovating based on inflows and outflows of information to and from the network. Second, digital technologies create new possibilities for collaboration. Digital platforms enable new forms of co-creation (Kohli & Grover, 2008), such as allowing organisations to open their assets upon which others can innovate. Examples include open government data platforms such as the London DataStore, through which the city of London aims to openly exploit its data by co-creating an open data platform with the National Health Service, power companies, and utilities (Card, 2015).

By studying the revelatory case of VDAB's open services programme, we focus on a specific context for which open IT-based co-creation might be especially relevant but remains understudied. Many public administrations need to do more with less (Janssen & Estevez, 2013) but have the opportunity to become orchestrators of a network of organisations. However, little is known about what open IT-based co-creation looks like in the public administration context (Feller et al., 2011; Osborne et al., 2016; Voorberg et al., 2015).

For the finished research, our objective is to empirically develop an understanding of the development and first use of a technological platform through IT-based co-creation in an open partner network in the public administration context. Therefore, we investigate the revelatory case of VDAB and its five-year co-creation programme to develop open services through an interpretive case-study approach. In this research-in-progress, we report on the construction of the open innovation and technological platform lenses that we will use in the interpretive case study.

2. Literature

Knowledge of open IT-based co-creation is largely absent in the literature (Kohli & Grover, 2008; Mandrella et al., 2016; Sarker et al., 2012), suggesting that empirical research would be a suitable strategy to develop insights into this new concept. The literature on IT-based co-creation served as an initial guide to our research design and data collection. To identify the capabilities used by a public service to co-create IT-based value with an open partner network, as well as the capabilities used by the partner organisations, we will undertake an interpretive case study of VDAB's open services programme, employing open innovation literature and technological platform literature as a lens. These two literature streams provide insights on capabilities that may be important in open IT-based co-creation.

2.1. Open IT-based Co-creation

Open systems, hyper-competition, increasing specialisation, and shorter concept-to-market time frames make it increasingly difficult to build the infrastructure for new products and services and

bring them to market (Grover & Kohli, 2012). This is why organisations are driven to IT-based co-creation, avoiding investments in hard-to-duplicate assets and increasing the value they capture (Ceccagnoli et al., 2012). IT-based co-creation of value represents the idea that "IT value is increasingly being created and realized through [the] actions of multiple parties, value emanates from robust collaborative relationships among firms, and structures and incentives for partners to partake in and equitably share emergent value are necessary to sustain co-creation" (Kohli & Grover, 2008).

Sarker et al. (2012) describe the mechanisms underlying value co-creation as three different modes of co-creation: exchange, addition, and synergistic integration. In the exchange mode of co-creation, "two participants in an alliance develop value by each providing resources/competencies the other partner needs". In the addition mode, "one of the two parties builds on the contributions of the other in order to create value for both". In the synergistic integration mode, both sides "have to work together with each other, in a mutually reinforcing manner[;] surrender some of their own autonomy[;] have trust in the other to do what is in the interest of both sides of the relationship[;] and invest in the relationship rather than just look for gains in it" (Sarker et al., 2012).

2.2. Open IT-based Co-creation in Public Administration

Although public administration literature does not provide us with theoretical frameworks to study the phenomenon at hand, it does provide us with a focus on the specific context that might have an impact on the case. In the public administration context, co-creation is often used interchangeably with co-production (Voorberg et al., 2015), with both terms focusing mainly on the involvement of citizens as end-users in the design, management, delivery, and/or creation of public services (Osborne et al., 2016) rather than on co-creation with (multiple) organisations. In the research on co-creation and co-production, a technological perspective is often lacking (Osborne et al., 2016; Voorberg et al., 2015).

Open innovation studies in the government context often do not take into account the impact of digital technologies (Feller et al., 2011). The case of Challenge.gov (Mergel & Desouza, 2013), which crowdsources solutions to tackle complex public management problems, is a notable exception. One of the most eminent examples of technological platforms in government are open data platforms. But most research on open data focuses only on the technical aspects of opening up government information, while a focus on the reuse of open data (Maccani et al., 2015), the ways to foster its reuse (Van Veenstra & van den Broek, 2013), and the co-creation of open data platforms are missing (Attard et al., 2015; Maccani et al., 2015).

2.3. Constructing a Lens to Study Open IT-based Co-creation

Table 1 summarises how the open innovation and technological platform literature link to key aspects of open IT-based co-creation, and how they contributed to this study.

Table 4: Key Aspects of Open IT-based Co-creation in the Government Context

Aspect	Literature	Added value to open IT-based co-creation	Insights for this study
Opening assets for innovation through an open network	Open innovation (Chesbrough, 2012; Chesbrough & Bogers, 2014; Chesbrough et al., 2006)	Adds a focus on collaboration in an open partner network	Provides insight on capabilities that may be important in open IT-based co-creation: - Openness in terms of knowledge flows (inside-out and outside-in): internal and external sources for ideas and ways to market them - Moving from organisational to ecosystem-based logic
Designing an IT artifact that can be used by other parties	Technological platforms (Boudreau, 2010; Gawer, 2014; Ghazawneh & Henfridsson, 2013; Tiwana, 2015; Wareham et al., 2014)	Adds a focus on the technological platform that enables a network of organisations to build on another organisation's assets	Provides insight on capabilities that may be important in open IT-based co-creation: - Design platform openness (in terms of access and control of the platform) - Design platform governance (manage trade-offs through different types of control)

Open innovation is defined as "a distributed innovation process based on purposively managed knowledge flows across organisational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organisation's business model" (Chesbrough & Bogers, 2014), in contrast to closed innovation, where "internal innovation activities lead to internally developed products and services that are then distributed by the firm" (Chesbrough, 2012). Open innovation places external ideas and paths to market on the same level of importance as that reserved for internal ideas and paths to market in the traditional closed innovation paradigm (Chesbrough et al., 2006; Gassmann, 2006). Technological platforms

Gawer (2014) defines technological platforms as "evolving organisations or meta-organisations that (1) federate and coordinate constitutive agents who can innovate and compete; (2) create value by generating and harnessing economies of scope in supply or/and in demand; and (3) entail a modular technological architecture composed of a core and a periphery".

3. Methodology

Given the objective of understanding the phenomenon of open IT-based co-creation from different perspectives, this research employs an interpretive approach (Klein & Myers, 1999; Walsham, 1995). We chose to study a revelatory case as a unique and exemplary source of in-depth insight into this phenomenon. To broaden our understanding of the phenomenon, we explicitly built a cycle of the

hermeneutic circle (Klein & Myers, 1999) into our research design by adopting an embedded case study approach (Yin, 2014).

The empirical setting of this research is the open services programme of VDAB, the public employment service for the Flemish region in Belgium (Flanders). VDAB offers eight different open services that continue to be further co-developed with over 20 partner organisations. We consider VDAB's open services programme to be revelatory for at least two reasons. First, it is a unique case, as VDAB is—to the best of our knowledge—one of the only public administrations co-creating with multiple partner organisations. Second, VDAB's case can be seen as exemplary because the public service is one of the forerunners in Europe in regard to the digital innovation of public services (Danneels & Viaene, 2015). Our prolonged collaboration with VDAB ensured the deep involvement necessary to enable a thick description (Walsham, 1995).

Table 5: Organisations and Profiles of the Interviewees

Organisation and brief description	**Interviewee position/role**
VDAB: Public employment service of the Flemish region in Belgium, offering employment services, training, and career guidance to society at large.	CEO CIO Open Services Programme Manager
Konvert: Family firm focusing on recruitment and selection.	CIO/chief technology officer (CTO)
Randstad: Human resources (HR) service provider, focusing on temporary jobs and recruitment and selection, amongst others.	Business Performance Manager
Tempo-Team: HR service provider, part of Randstad Holding, focusing on temporary jobs and recruitment and selection, amongst others.	
Jobwalkr: Start-up that developed an app to inform users when relevant job opportunities are available in their neighbourhood.	The three owners of the start-up
Jobsplus: Public employment service of Malta.	IT Department Manager Labour Market Information Department Manager

Both researchers continually followed VDAB's digital innovation projects, of which the open services were a part, from January 2014 until June 2017 through bi-weekly or monthly steering committee meetings, workshops, and other more informal contacts. As a primary source of data, we conducted semi-structured, open-ended interviews with selected key personnel responsible for the open services programme. We were interested in both the perspectives of VDAB and partner organisations that co-created the open services. This is reflected in Table 3, which summarises the interviewees' profiles. A second important source of data was internal VDAB documentation. This not only included documentation on the broader context in which the open services programme occurred (notes of the steering committees and several workshops held between January 2014 and

June 2017) but also more specific documentation on the open services (e.g., internal and external presentations and payment model), contacts with the partner organisations, and website providing information to the partner organisations.

For data analysis, a dialogical process will occur between data and theory (Klein & Myers, 1999; Walsham, 1995). We reviewed the literature on IT-based co-creation, which served as a sensitising device (Walsham, 1995) to guide our data collection on VDAB's open services programme. After each interview, the first author wrote down impressions. The first author also generated more organised sets of capabilities after a group of interviews and discussed this with the second author. We decided that open innovation and the technological platform literature were the best lenses through which the data may be further analysed.

4. Case Description

Founded in 1989, VDAB is the public employment service for the Flemish region in Belgium (Flanders). It offers employment services, training, and career guidance to society at large. In 2013, VDAB started its open services programme. IT services that were used internally were opened, in small pieces, such that other labour market actors could embed them in their own IT systems. The development of the open services occurred in co-creation with external organisations, such as private recruitment, selection, and interim agencies, employers, start-ups, and other European public employment services.

To understand the open services, it is important to note that VDAB matches job candidates to vacancies based on competences rather than job titles to also include job seekers with a certain affinity to the job and for better reorientation towards shortages of occupations. VDAB is one of the forerunners in Europe in using and promoting competence-based job matching (European Commission, 2016).

Table 6: VDAB's Open Services

Service	Description
CV	Export CVs, if citizens agree to have their data transferred to partner databases
Vacancy	Export vacancies
Comeet	Competences and competence templates
Online Assistant	Automatic comments on contradictory or incomplete items in a vacancy
Study Tree	List of all recognised types of education
Wordcloud	Suggests words that are commonly associated with a vacancy the user is introducing
Matching	Gives a list of matching candidates for a certain vacancy
Matching-as-a-service	Same as above, implemented in the partner organisation's own systems

The first project that was part of the open services programme comprised the development of Comeet, which allows others to use VDAB's competences and competence templates in their own job-matching systems. Comeet was co-created with three recruitment and selection agencies. In 2014, Comeet was opened to other organisations. Today, VDAB offers eight different open services, summarised in Table 4, which continue to be further co-developed with over 20 partner organisations. Most open services are rather small (except for matching-as-a-service, where organisations can use VDAB's matching engine), and, in their current format, the services are paid.

In the next stages of this research-in-progress, we aim to use the two lenses constructed in this research-in-progress, to analyze the case and discuss its implications for research and practice.

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Local Leadership for Public Digital Transformation Towards Smart Cities – Reflections from Leaders

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Abstract: The democratic governance of digital transformation to build smart cities is governed in the interplay between political and professional leaders. This paper presents and discusses how municipal political leaders see their capacity and confidence to build more smart cities in Sweden. The national policy ambitions are to use digitalization in the best ways to build smart urban and regional spaces. The study indicates that these leaders mainly see digitalization and smart city initiatives as a tool for effective administration and improved access. The two main lessons learned from the study are that the size of the municipality is critical for the competences to lead, and that the silo-organization is hampering learning and competence develop-ment. The overall conclusion is that there is a lack of coordinated governance structures to make the most of smart cities and to enhance learning among cities and leaders.

Keywords: Smart cities, public leadership, governance, municipalities, Sweden.

Acknowledgement: We are grateful to all participants who contributed and to SALAR for support.

1. Introduction

'Smart cities' is a broad concept used to grasp urban challenges through the use of ICT. Having previously been more biased towards technology, the concept has become increasingly used as a citizen-centric concept. Smart cities are built in local communities, on the structures and strategies that are formed and set up around the institutional arrangements in an intricate interplay of public values, technology, public management and the local community (Sancino & Hudson, 2020). Smart cities are one of the framed concepts grasping the ongoing digitalization that is influencing most sectors in society.

New smart city applications are predominantly based on new forms of AI (Makridakis, 2017), including robot process automation (RPA). These technologies are based on global market models and principles and the networking approaches guiding social media and other network-based organizations. As cities become smarter in democratic states, the technologies have to be governed in new ways to fit with democratic values and public management. Thus, there is a need for public

leadership to develop these technologies in smart cities to become a sustainable component in democratic welfare states. There is a need to study and develop municipal leadership for digitalization towards smart cities with an awareness of public values (Gröning, Nordqvist & Wihlborg, 2019). Municipal leaders in Sweden have great autonomy and are key actors in the formulation of smart cities.

The Nordic welfare state model compromises economic liberalism and social democracy, in which equal citizenship, impartiality and well-being are core values (Morel & Palier, 2011; Esping-Andersen, 1990). These values have to be reframed in a digital society and the leadership of smart cities. Municipalities, the local and regional authorities, play a key role in the Nordic welfare state model and provide the bulk of the public welfare services (Cox, 2004). They have strong local autonomy and are governed democratically in collaboration by elected laypeople; professional managers leading administration and extensive public services. This is a tricky practice, which is further complicated by demographic and economic changes, as well as policies that change organizational structures (Johansson, Lindgren & Montin, 2018). In this context, the development of smart cities is seen as a solution to the many challenges faced by municipalities and their leaders. To meet the demands for improved governance of local digital transformation, the Swedish Government has reached an agreement with the Swedish Association of Local Authorities and Regions (SALAR). The agreement aims to support and enhance competences for developing smart cities among political and professional leaders in regions and municipalities.

The aim of this paper is to analyse how local political leaders describe their competences to lead the digital transformation towards smart cities, and to discuss its implications for competence-building and change management in the public governance of smart cities.

1.1. A Mixed-Method Approach in Collaborative Action Research Settings

The research presented in this paper builds on a collaborative approach, where the interpretations and actions are formed in a close interplay between researchers and actors in municipal practice. The practical solution to the problem, in this case the need for more competence in digital transformation towards smart city governance, was addressed in lectures for political leaders provided by SALAR. According to Egl et al. (2020), an interactive research study of problem formulation focuses on identifying and creating an understanding of the practical problem within the practices system – in this case the political leaders' setting. The goal is to define a researchable problem, in order to be able to stretch it into a research phase of theorizing – our analytical setting.

The research process was integrated into the work carried out by SALAR, and during November and December 2019 senior staff from SALAR and the researchers delivered the first five lectures for a total of 183 political leaders from Swedish regions and municipalities. The team gave five one-day seminars of lectures including several small group discussions. During the seminars, the participants answered questions and dealt with responses from the small group discussions using the web survey program Menti, using their phones or computers. The results from all the lectures gave a total of 1123 responses, some of which were duplicated responses to questions.

The responses have been analysed inductively by all authors and discussed in relation to former research and our general understanding of the municipal context. In addition to the analysis of the results from the Menti survey, we have conducted telephone interviews with ten leaders who volunteered during the lectures.

2. Digital Government as a Global Policy Agenda and Research Field

Smart cities need to be governed, and there are new challenges when public management is set in digital contexts (European Commission, 2017) that are open to the interdisciplinary research field (Meijer & Thaens, 2010; Yildiz, 2012). As governments engage in rapid digitalization of their organizations and services, competence gaps and cost-effectiveness demands have led to the outsourcing of digital infrastructure development and maintenance to third party suppliers. This has, as OECD points out, generated lock-in effects and decreased the organizations' internal capability for policy and service delivery (Welby, 2019). These consequences have direct implications for coherence between the political strategy, policy aims, and the municipal services.

A recent literature review identified that public values are addressed in digital government to improve public services, public administration and the legitimacy of public services among the general public (Twizeyimana & Andersson, 2019). The orchestration of public services on digital platforms can enable public administration to deliver services in line with public values (Cordella & Paletti, 2017). The review also concluded that there is a lack of studies with a comparative focus and that there has been little focus on organizational change, and on how to deliver services in line with public values (Twizeyimana & Andersson, 2019). Thus, we will here focus on how political leaders see values in relation to digital transformation towards smart cities.

2.1. Local Leadership for Democratic Digital Transformation

Public leadership, in contrast to leadership in market-driven organizations, has to build on public values and deliver results and outcomes such as democratic legitimacy and trustworthy public services(Joyce, 2012; Bergström & Eklund, 2019). To sustain citizens' high trust in local democracy and welfare provision in the digital age, there is a need to analyse and build new types of leadership for change. The public leadership of digital transformation is currently influenced by market-driven organizations (Dunleavy et al., 2006). There is a need for analyses of leadership styles that combine the individual perspective of the public leader with perspectives on the situations within which he acts (Alvesson et al., 2017; Askim & Baldersheim, 2012).

Leadership in the local digital transformation towards smart cities is expressed in strategic decisions, as well as in many daily practices that can range from information security policies to daily struggles with learning platforms in schools. In all such situations, the leaders have to reassemble and act in line with core public values (Gustafsson, 2017).

3. Results

3.1. Values Related to Digitalization and Transformation Towards Smart Cities

The first focus was on values connected to smart city transformation and digitalization. Most of the leaders mentioned values relating to digitalization on very practical levels, e.g. less use of paper. In a follow-up interview, one leader explained: "I don't need to keep or recycle a single sheet of paper… everything is available on my iPad." Other answers referred to values concerning the quality of public services. For example, several respondents highlighted the ease with which citizens communicate with the municipality as a positive value. This was expressed as follows by a chairperson from a medium-sized municipality: "For those who can access and use digital services, it facilitates contact with the municipality." The results are summarized in Table 1.

Table 1: Answers to the Question "What positive values do you connect with digitalization?" n = 122.

Category	**Count**	**Examples of expressions in Menti**
Availability	65	Availability, anywhere, closeness, user support, bridging distances
Ease	52	Ease, smooth, smoothness, free time
Effectivity	50	Effectiveness, cheaper, personnel saving, cost efficiency
Speed	44	Speed, fast, instant, fast answer
Democracy	10	Democracy, participation, openness, transparency, equal for everyone
Rule of law	**2**	**Rule of law**

One of the interesting responses regarding public values concerned the positive effects digitalization could have on more impartial and standardized decision-making for trust-building through digitalization. In a follow-up interview, one of the chairpersons said: "We have a declining level of trust, I feel, and if we are to recover, we should be more correct and clearer, and I believe that digitalization can help us with that."

At two of the lectures, we also followed up in Menti by asking about possible negative values related to digitalization. Here, a common response was that the participants stressed the importance of physical meetings as superior to digital meetings, in terms of both building trust and understanding each other. For example, as one of them emphasized in a follow-up interview: "If we refer citizens to digital solutions that make it more legal many of them might feel a little alienated. They might not trust it." Another example from the interviews: "We must have physical meetings for the democratic processes. This is a sector that is not entirely suitable for digitalization." Taken together, the positive values the leaders identify in relation to digital transformation are commonly related to easy and accessible processes. These results are also in line with what Sancino and Hudson (2020) identify as core values among leaders in the studied well-established smart cities.

3.2. Competence to Lead in a Digital Age

To focus on personal competence as a leader, we asked the question: "Do you believe that you have enough competence to lead in a digital age?" A total of 108 participants responded to the question.

Table 2: Answers to the Question on Personal Competence

Category	**Count**	
Yes	44	44.7%
Unsure	36	33.3%
No	**28**	**25.9%**

We later asked the same question during interviews where the respondents had the chance to elaborate on whether or not they believe they have enough competence, and why. One of the respondents who were confident with their competence said: "It's against my DNA to say I'm not competent. I have managed the situations I have faced and have otherwise gotten help. Competence is about knowing where to get help."

The majority of the respondents answered that they were unsure or did not have enough competence to lead in a digital age, but some were interested in learning more. During the interviews, one of the respondents – a chairperson from a medium-sized municipality – said: "I do not believe that I have enough competence… We have not discussed education. We hand over a lot to government officials in municipalities and then you don't know what happens."

In most of the interviews, digital competence was discussed in relation to age. Some expressed that their feeling about their own digital competence depended on the people they were currently surrounded by. Many of the interviewees said that they believed it is easier for younger people to learn and use digital tools. All the respondents expressed that the older generation risks being excluded when cities become smarter. For example: "We have iPads and the older generation have a hard time with them and using the tools. It takes time for them. The younger have a talent for it." The main topics, examples and reasoning during the interviews concerned specific technical solutions in relation to running the municipal council meetings. This indicates that there might be a specific need for increased strategic competence.

Overall, the interviewees took a positive approach to digitalization and most of them had confidence in their own capacity to lead. However, during the discussions at the lectures there were reflections on how they experienced their competence. Some even said that they believed their competence was sufficient, but others might had evaluated their competence differently.

3.3. Support to Lead a Democratic Arena in a Digital Age

The first part of the lectures focused on the meaning of digitalization and the national digital strategy and some key policies. Following on from this, the lectures developed to focus on transforming the participants' own municipal organizations. Here, the small group discussions were designed to

focus on the leaders' own competences to lead and how they deal with daily changes. In the discussions, there was a particular focus on digital support. In the Menti survey, we asked the question: "From whom do you get support for leading a democratic arena in a digital age?" A total of 67 participants responded to this question, giving a total of 102 answers.

Table 3: Answers to the Question on Support for Competence

Category	Count and share of total responses	Expressions in Menti
Civil servants	42	Administration, the municipal IT department
Elected politicians	20	Colleagues, the board
The general public	7	The general public, citizens
The party generation	3	The party organization, their own party
The presidency	3	Referring to the group of co-chairpersons
SALAR	3	The national network
From own experience	3	Own experience
Don't know and other	21	Education, research

In the interviews, we asked the same question as above and the respondents pointed towards many different sources of support including management and colleagues. One respondent reflected on this in the follow-up interview. They pointed towards the need to identify two aspects of this question, where technical support in using digital tools is one aspect and is different to support from leadership: "It's personal contacts if we're talking about the technology, but when it comes to leading it's not the same as using technology and I don't think I take support from anyone regarding that." During the lectures, the participants reflected on what actually constitutes a local issue and what can be standardized, like different digital systems for patient records, learning platforms, public transport tickets and many more applications.

Taken together, this indicates that the public administration supports the democratic political leaders' policymaking as well as political decisions. The support from political party organizations seems to be less important to those who responded here. However, the reflection expressed in one of the interviews may also show that the question has to be broken down for accurate interpretation.

4. Concluding Discussion

This paper has presented the results of how municipal leaders in Sweden believe their competences lead the digital transformation towards smart cities, and has discussed the implications regarding

the relevance of competence-building and change management in the public governance of smart cities. The results indicate that there is a need to study in greater depth how political leaders develop their competence to lead for transformation towards smart cities combining competences for both technical changes and democratic leadership.

The overall impression is that most leaders are confident that they have the capacity to lead their municipality in a digital era, and they reflect on this (Alvesson et al., 2017; Askim & Baldersheim, 2012). However, the Menti results and the interviews indicate that there is a significant group of municipal leaders who are uncertain about their own competence to lead in a digital era. They also receive support from the municipal administration and experts in different areas. However, when discussing support in the interviews, this could be interpreted as support with both technical aspects and leadership. The participants in this study show a reflective perspective on leadership, combined with the individual perspective of their assignment. During the discussion, they highlighted that in spite of the good organization of support and competence-building, which included the lectures via a national initiative, they came back to issues regarding what they have to do locally and what could be managed in standardized ways through national policies. There is a need for more interactive research in this field regarding the governance of smart cities, in order to understand and define the practical problem and to refine theory on the practical problem.

The political leaders in this study raise issues that are clearly related to the institutional framing of smart cities within smart nations, which must be further addressed in research, in policy and in practice. In all the interviews, the respondents stressed that digitalization is inevitable and that leaders have to adapt. Most of the participants said that they were unsure or did not have enough competence to lead in a digital world. There is a need to include knowledge about public values and the unique institutional setting for public leaders in analyses of smart cities. The leaders in this study are struggling to reassemble and act in line with core public values and to combine the values of digitalization with the context of the Nordic welfare state regime of equality, participation and consensus-building institutions. A more long-term solution to the practical problems might be to re-arrange the division of duties and responsibilities among public agencies and market actors.

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Small Town vs. Big City: A Comparative Study on the Role of Public Libraries in the Development of Smart Communities

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Abstract: Smart city initiatives aim to facilitate sustainable urbanization, promote economic development, and improve quality of life. Due to their socio-technical complexity, some reseachers argued for an integrative view in which multiple dismensions should be considered. In addition, researchers showed that the unique context of each city/community matters for the implementation of smart city initiatives. One important aspect of this context is the collaborations with diverse community partners such as public libraries. However, previous literature on the contribution of these partners to smart commnities often only presents conceptual models and lacks empirical data. This paper provides a comparative study on the smart city/community development in Ignacio, Colorado and Chicago, Illinois with a focus on the role of public libraries on the development of specific dimensions of smartness: (1) technology deployment, (2) innovation, (3) citizen participation, and (4) community stakeholder engagement. We also argue that context is very important when discussing the role of public libraries in building smart cities/communities.

Keywords: smart city, smart community, dimensions of smartness, public library, anchor institution, community institution.

Acknowledgement: This project was supported by the Grant No. LG-96-17-0144-17 awarded by the Institute of Museum and Library Services (IMLS).

1. Introduction

In the process of urbanization, cities have encountered complex issues and challenges that cannot be resolved using traditional process and tehcniques. The development of information and communication technology (ICT) makes it possible for cities to adopt innovative strategies to achieve

sustainable development, improve the quality of life of their residents, and, overall, make the city smarter (Anthopoulos, 2015). Over the last two decades, researchers have been discussing what makes a city smart and how to do it. Most of the early definitions emphasize technology as one of the main drivers of smart cities (Alawadhi et al., 2012), whereas the later ones focus on the development of social aspects: such as quality of life, citizen participation and engagement, etc. (Gasco-Hernandez, 2016; Giffinger et al., 2007). Smart City has been viewed by many researchers as a multidimensional concept (Nam & Pardo, 2011a, Gil-Carcia et al., 2015, 2016). Even though there is not a universally accepted definition (Chourabi et al., 2012; Gil-Carcia et al., 2015), a common view could be derived from previous research: a smart city is a city that adopts a comprehensive view of the city and integrates a double perspective; technology and human development, to pursue a triple goal (Gasco-Hernandez, 2016): 1) improvement in the efficiency of urban operations, 2) improvement in citizens' quality of life and 3) development of the local economy while maintaining the environmental sustainability.

Smartness development is not limited to the urban environment. Back to the late 1990s, the Smart Communities movement had already started. Research about smart city and smart community development, both recognized the usefulness of technology and the importance of collaborative efforts between governments, private sector companies, academic institutions, and civil society (Mora et al., 2019a, 2019b). However, there is limited knowledge about what the roles of other stakeholders are. For example, public libraries, one of the most popular community institutions, have been largely left out of the discussion about building smart cities and communities (Burke et al., 2014). This research is guided by the following question: How do public libraries contribute to the different dimensions of smart city/community development in different contexts?

This ongoing research paper aims to start addressing the question above through a comparative case study of Ignacio Community Library (ICL) and the Chicago Public Library (CPL). We will explore the programs and services currently offered in these two public libraries and discuss how they contribute to different dimensions of smart cities/communities in two very different contexts. The paper is organized into five sections, including the foregoing introduction. In section two, we briefly discuss previous literature on smart city development, the dimensions of smartness, and the role of public libraries in the development of these dimensions. Section three describes the research design and methods used in this study. Section four presents preliminary results from the case studies and section five provides some final comments and next steps for this research.

2. Dimensions of Smartness and Public Libraries

2.1. Dimensions of Smartness

The topic of smart cities/communities has been studied in different disciplines, such as urban geography, information science, and, more recently, public management. Many researchers have adopted multidimensional frameworks to capture and evaluate the different aspects or elements of smartness (Chourabi et al., 2012; Giffinger et al., 2007; Gil-Garcia et al., 2015; Nam & Pardo, 2011a). Based on a review of previous frameworks, we propose the following dimensions of smartness to

guide our analysis of the public libraries' contribution to smart city/community development: (1) technology, (2) innovation, (3) citizen participation, and (4) stakeholder engagement.

Technology as a dimension of smartness. A smart city/community uses data and technology in different areas: traffic, waste management, transportation, health, etc. (Nam & Pardo, 2011b). Depending on the context, data and technology may differ and may be deployed in different ways: sensor technology, smart computing, ICT infrastructure, data analytics, etc. (Kuk, 2011).

Innovation as a dimension of smartness. Smart city was adopted as a strategy to deal with complex problems and challenges in urban development that cannot be addressed using traditional approaches (Nam & Pardo, 2011b). It requires innovation, often technological innovation, to create better and more effective products, processes, services, and ideas that are accepted by markets, governments, and society (Johnston & Hansen, 2011).

Citizen participation as a dimension of smartness. Smart cities/communities should be developed for, by, and with citizens (Mora et al., 2017). Civil society was added as the fourth helix of the quadruple helix model, which emphasizes the importance of citizens in building smart cities/communities (Deakin et al., 2018). As a result, citizen participation processes through different channels, as well as investments in human and social capital, constitute a very important dimension of a smart city/community (Myeong et al., 2018).

Community and stakeholder engagement as a dimension of smartness. In the process of becoming smarter, cities and communities are facing challenges that have surpassed the capabilities of their traditional institutions and methods of governance, therefore calling for increased collaboration between the government and other stakeholders (Mora et al., 2019b; Nam & Pardo, 2011a). Aligned with a quadruple helix model of smart cities/communities, this perspective emphasizes the importance of pursuing social and economic development through the collaboration among governments, universities and research centers, businesses, and civil society (Selada, 2017).

2.2. The Role of Public Library in the Dimensions of Smartness

Due to the strong legitimacy in the eyes of citizens and their role in digital inclusion and civic engagement, researchers have started to explore the role of public libraries in building smart cities/communities (Mersand et al., 2019). In previous research, public libraries are viewed as community anchors institutions that play a very important role in digital inclusion (Bertot et al., 2016). They provide patrons with free and easy access to information and technology, which are not available for them at home, especially in rural areas and low-income neighborhoods (Goodman, 2014). Beyond access to technology, public libraries also offer technological training to help improve residents' digital literacy (Goodman, 2014), and provide space and support that enable patrons to experiment with different technologies for their own purposes, such as business development, civic innovation, etc. (Vilariño et al., 2018).

Public libraries also have been recognized for their role in civic engagement (Hildreth, 2012). As a safe and neutral space within the community, they are open to the public with the goal to understand and support community needs (Hildreth, 2012). Public libraries have created a welcome environment that allow the public to access different resources, participate in activities, and interact

with each other (Lenstra, 2017). However, even though researchers have previously discussed public library's role in digital inclusion and civic engagement, very limited studies have directly analyzed public library's contribution to smart city/community development.

3. Research Design and Methods

3.1. Data Collection

In order to have a better understanding of what strategies, programs and services that public libraries in different cities/communities 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. This effort identified that Ignacio Community Library (ICL) has been creating smart spaces for residents and that the Chicago Public Library (CPL) have been participating in a wide range of smart city initiatives. They were chosen for this study to represent small-size public libraries in rural towns and big-size public libraries in big cities, respectively. Then, taking a comparative case analysis approach, we focus on investigating how these two public lirbaries have contributed to different dimensions of smart city/community development in these two very different contexts. We first reviewed the library's official website and searched for related news articles to get a preliminary understanding of these two public libraries. In December 2018, we visited the ICL and the CPL, and conducted semi-structured interviews with library staff, government officials, and external stakeholders (12 interviews for the case of ICL and 6 interviews for the case of CPL). All interviews were recorded using a digital recorder with the permission of the interviewees and then were transcribed manually for further analysis.

3.2. Brief Description of the Cases

Ignacio is a small and rural town with roughly 800 residents and sits in the southwest corner of La Plata County, Colorado. Another feature of the town is that it is situated in the middle of the Southern Ute Indian Tribe Reservation. The tribal council and the Ignacio Town Board represent two equal governmental bodies that provide separate and overlapping services to the community. Although the Town of Ignacio does not have a formal smart community plan or strategy, it has made some limited yet important investments in making their community smarter. Ignacio has deployed technology in the form of broadband Internet although in a limited way and not available to all households and businesses in the town. At the time of our case study, there was little evidence of technological innovation, but Ignacio is clearly investing in increased collaboration among key community stakeholders to help address town problems and issues.

Quite different from Ignacio, the City of Chicago is the third largest city in the United States, with a population of nearly three million people living in 77 community areas. Chicago does have a formal smart city strategy that is best captured in its 2013 City Technology Plan, which contains five broader strategic areas: 1) Establishing next-generation infrastructure; 2) Creating smart communities; 3) Ensuring efficient, effective, and open government; 4) Working with innovators to develop solutions to city challenges; 5) Encouraging Chicago’s technology sector. In the past few years, beyond broadband internet infrastructure, Chicago has deployed a number of smart

technologies throughout the city. In the deployment of these technologies, Chicago has used both stakeholder engagement and citizen participation in an effort to increase the success and sustainability of these technologies within the community and increase the positive impact on the residents.

4. Preliminary Findings

In this section, we present some preliminary findings about how the ICL and the CPL are contributing to the different dimensions of smartness.

4.1. Technology Deployment

In Chicago, broadband Internet infrastructure and different sensors are deployed throughout the city. As of 2013, The CPL made free Wi-Fi available in 80 branches that span every neighborhood across the city, Wi-Fi hotspot lending program is also available at select CPL branches (13 libraries as of 2016), which allows residents to borrow devices for internet access to use at their homes. By doing this, the CPL is directly supporting Chicago's Smart City's plan : to make free Wi-Fi available in public places (initiative 6th) and to increase options for low-cost broadband (iniatiative 7th). Unlike Chicago, there is a limited deployment of broadband Internet in the town of Ignacio, and it is not available to all households or businesses in the community. Therefore, the ICL plays a crucial role in helping Ignacio residents access and use broadband Internet and other technologies. Besides access to technologies, both the ICL and the CPL offers computer classes at different levels and one on one assistance that help enhance patron's digital skills to effectively use a range of technologies. The CPL also collaborate with community partners to fulfill its role in implementing the city's Smart City's plan: to educate and engage young people in technology and offer digital training and hands-on technology experience to increase all residents' digital literacy (initative 8th, 9th).

4.2. Innovation

In the CPL, different makerspace are designed for different audiences to explore new technologies and use them for creation and innovation. The Maker Lab, initially set up in 2013, provides Chicago residents with the opportunity to learn how to use digital production and manufacturing tools. The other well-known makerspace is called the YOUmedia. It is a space for middle school and high school students that is currently available in 12 libraries throughout Chicago. It allows students to obtain project based learning with a variety of media, technology, and digital tools. In Ignacio, even though there was little evidence of technological innovation, the ICL has designed some programs that allow patrons to get hands on experience with new technology, which prepares them to innovate in the future. For example, with funding support from WebJunction's Small Libraries Create Smart Spaces grant program, the ICL built their Idea Lab, which is based on the library's high-speed Internet access and incorporating modern equipment and staff expertise to create a makerspace for all of Ignacio's patrons to use.

4.3. Citizen Participation

In Chicago, public library branchs has been used by implementers of the smart city plan to inform citizens and gather feedback from them about the deveplopment of smart technologies in their neighborhoods. This has been the case when the Chicago Tech Collaborative planned to deploy the first sensor in the Pilsen neighborhood, and when the city worked on improving its 311 services. In Ignacio, due to the limitation in policy and technology infrastructure, there is no opportunity for citizens to participate in smart community development. However, through access to internet, digital skills training and the makerspace that provides hands on experience on advanced technologies, the ICL is taking advantage of all the available resources to educate and prepare their patrons to be ready for the future participation in building a smart community.

4.4. Stakeholder Engagement

Chicago has a well-documented smart city strategy which specifies the role of each stakeholder. The CPL is identified as directly supporting eight of the 15 initiatives. The active participation of numerous and diverse partners is a key characteristic of this stratregy. For example, guided by the strategy, the CPL has joined with other community organizations to form a "digital skills building ecosystem". In Ignacio, due to lack of formal a smart community strategy and the limited technology deployed in the community, there is no opportunity for stakeholder engagement in smart community initiatives. However, the ICL has been working on building new partnerships with other organizations to better serve the community. While at this point, the collaborations with other community stakeholders do not involve the deployment of or use of smart technologies, the established partnerships could be used in that way in the near future.

5. Final Comments and Next Steps

Our preliminary results clearly show how public libraries are contributing to smartness and how the specific activities, programs and services vary in different contexts. For instance, due to the lack of a formal smart community strategy and the limited technology infrastructure in Ignacio, even though the ICL has fully taken advantage of the available resources to make the community smarter, its contribution to the dimensions of smartness is mostly related to aspect of technology access and use. Whereas in Chicago, the CPL has been a formal and active partner in the city's smart city strategy from the beginning. It is playing an important role in smart city initiatives and contributing to multiple dimensions of smart city development.

As a next step we will continue analyzing the transcripts of the interviews and provide a more detailed account of how public libraries are contributing to the different dimensions of smartness in different cities/communities. We also plan to elaborate on the role of context in smart city/community development and how different public libraries are contributing or can contribute to the dimensions of smartness in different ways. More cases will also be added to have a more comprehensive study in the near future.

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EGOV-CeDEM-ePart

The Impact of Smart City Initiatives on Human Rights

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Abstract: A smart city is a phenomenon where municipalities engage with stakeholders to use ICT for increasing efficiency, sustainability, and quality of life for its citizens and city operations. However, smart city initiatives can at times challenge human rights. While particular human rights such as privacy have been subject to analysis in the digital government field, a complete view on human rights in smart cities has so far been missing in our discipline. It is mainly studies from other disciplines that voice comprehensive concerns about potentially negative impacts of smart cities on human rights. However, they often lack the technological background. This paper reports on a pilot study as an initial exploration of the phenomenon in the digital government field. In our research, we studied both the positive and negative effects of smart cities on human rights by conducting qualitative interviews with citizens and municipal employees with central roles in smart city initiatives. Our results suggest that in addition to privacy and security, the human rights of freedom of expression, adequate standard of living, and equal access to public services are likely to be affected by smart city initiatives.

Keywords: smart city, human rights, qualitative research, interviews, Norway

Acknowledgement: We would like to thank June Lithell Hansen and Andreas Skaiaa for the data collection.

1. Introduction

Smart city is a concept that relates to addressing urgent urban problems by using new technologies. Around 5 billion people are estimated to live in urban areas by the year 2030 (Nam & Pardo, 2011). This is expected to introduce challenges concerning the inhabitants' wellbeing and quality of life, especially regarding demographic shifts, gentrification, mobility, environmental impact, health care support, security, safety and sustainability in housing, food and water supplies (Oliveira & Campolargo, 2015). A smart city generally uses information and communication technologies (ICT) to make a city more livable. This is done by optimizing public services and the citizens' quality of life, better utilizing common resources, increasing cities' productivity and reducing climate and environmental issues (Kommunal- og moderniseringsdepartementet, 2019). The underlying technology of a smart city heavily relies on the active use of Internet of Things (IoT) and Big data.

Integrating and connecting the Internet to physical "things" makes it possible to gather data from sensors, software and other electronics (Plachkinova, Vo, & Alluhaidan, 2016).

However, the quest for the mentioned benefits can also lead to potential negative effects of smart cities and threaten human rights. Human rights represent rights that are "inherent to all human beings, regardless of race, sex, nationality, ethnicity, language, religion, or any other status" (United Nations, n.d.) such as the right to life and liberty, freedom of opinion and expression, the right to work and education, and the right to privacy. For example, some of the data gathered in a smart city context consist of sensitive and personal information such as current location information, habits and personal preferences. This allows the owner of the data to create rich and in part personally identifiable knowledge about consumers, patients, clients, customers and products (Hoffman, 2018). In addition, public services in smart cities move online and replace their traditional counterpart. This will require citizens to have the necessary knowledge needed to utilize these services. However, if they do not, citizens may feel left out of society due to their inability to adopt. As a consequence, smart city initiatives have been criticized for their lack of focus on citizens and for their top-down, industry-driven decision mechanisms (Cardullo & Kitchin, 2019; Marsal-Llacuna, 2017).

While particular human rights such as privacy have been subject to analysis in the digital government field, a complete view on human rights in smart cities has so far been missing in our discipline. It is mainly studies from disciplines such as political science, urban development, and sociology that voice comprehensive concerns about potentially negative impacts of smart cities on human rights (see e.g. Herscovici, 2018; Reuter, 2019). However, they often lack the technological background. We believe that the digital government field can add value to this debate as it integrates both the social and the technological perspective.

Therefore, our aim in this study is to explore if, or how, smart city initiatives can impact the human rights of the citizens that live in a smart city. This work in progress paper summarizes the results of a pre-study that was guided by the research question: *How can smart city initiatives affect human rights?*

In order to get an initial understanding of the phenomenon, we conducted qualitative interviews with four experts working on smart city initiatives as well as ten citizens in a Norwegian city. Our results suggest that smart city initiatives can have a significant impact - both positively and negatively - on human rights. These findings will serve as the basis for a more in-depth analysis of this relationship. Further, our findings can serve to sensitize scholars from both the digital government and the information systems disciplines in their further endeavors.

2. Theoretical Background

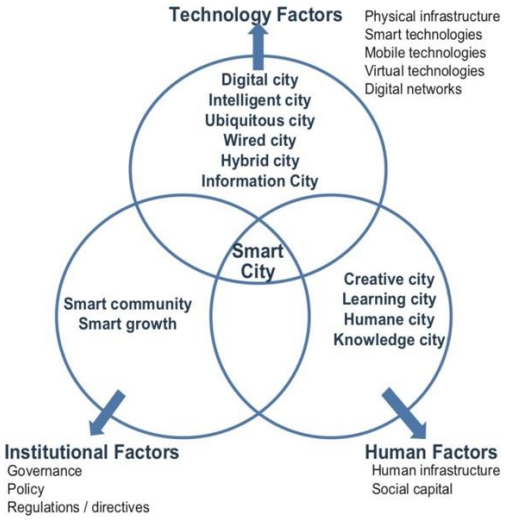
2.1. Smart Cities

The smart city phenomenon emerged in the late 1990s and has gained substantial attention after the turn of the century both among practitioners and researcher (Anthopoulos, 2017; Vanolo, 2014). The key motivation behind the focus on smart cities is addressing challenges related to the increasing urbanization worldwide. Already in 2008, 3.3 billion people lived in urban areas and it is estimated

that by 2030 the number will reach 5 billion (Nam & Pardo, 2011). The increase in population density is expected to challenge life quality in the urban areas in a number of ways, including energy consumption, transportation, pollution levels, waste management, public service provision and participation in democratic processes (see e.g. Hashem et al., 2016; Lombardi, Giordano, Farouh, & Yousef, 2012). To meet these challenges, urban areas need to become "smarter" in order to maintain a status as an attractive area to live, work and study (Canonico, Consiglio, Iacono, Mercurio, & Berni, 2015). The conceptual framework by Nam & Pardo (2011) (see *Figure* 8) suggests that smart city development can be viewed as the interplay between technology factors, institutional factors, and human factors.

Although several technologies are necessary in smart city development, it is generally agreed that smart city development is highly data driven. Phenomena like IoT (Internet of Things), Big data and Data analytics are often seen as key technological enablers of development (Hashem et al., 2016). IoT refers to the increasing number of Internet connected sensors that can be used for various measurements, e.g. energy consumption, traffic, maintenance needs, personal health monitoring and so on. Sensors need to be connected to the Internet to be useful. Connectivity indicates that networks and infrastructure are important factors in smart city development. Connected sensors generate huge amounts of data – often referred to as "Big data". Big data provide the foundation for data analytics – i.e. computerized analysis of large amounts of data. Data analytics are predominantly used for predictions but also as a basis for automation in several areas as suggested by Hashem et al. (2016).

Figure 8: Foundational Components of A Smart City (Nam & Pardo, 2011)



Both practical development of smart cities and most of the research literature in the Information Systems domain seem to assume a techno-optimist stance, meaning that smart city development is considered more or less exclusively positive. Definitions and conceptualization such as the model above consistently use positive terms such as "smart", "creative", "humane" and so forth. However,

as infrastructure and services become increasingly data driven, the potential for harmful consequences such as negative influence on human rights increase.

2.2. Human Rights and Smart Cities

Human rights refer to univeral and inalienable rights of every human being. They have been institutionalised in the Universal Declaration of Human Rights by the United Nations General Assembly after the second world war in 1948 (United Nations, n.d.). Todate, almost 150 countries in the world have acknowledge the declaration.

Human rights have played a special role in urban areas beyond the realm of the smart city context. This becomes manifest in the two narratives that particularly link the concepts of human rights and cities: the rights in the city and the right to the city (Reuter, 2019). Both positions ground their eligibility in the perception that a city belongs to all citizens that inhabit an urban space. While the rights *in* the city refer to the implementation of the universally acknowledged human rights within a city, the right *to* the city encompasses the idea that all citizens should be able to take advantage of the city life and to contribute to it. Several national and international charters such as the European Charter for the Safeguarding of Human Rights in the City (UCLG, 2012) and Global Charter-Agenda for Human Rights in the City (UCLG, 2016) have taken up these ideas and especially focus on human rights in urban areas (Marsal-Llacuna, 2017).

With the ubiquitous implementation of ICT in smart cities, new opportunities to enhance human rights arise. Technology such as mobile applications could, for example, facilitate the inclusion of marginalized groups such as disabled people (Reuter, 2019) and thus contribute to the "right to a standard of living adequate for the health and well-being" (United Nations, n.d., Art. 25). Another example is the use of data mining and analysis in schools that can contribute to more effective teaching. This 'smart education' can help to enhance the right to education (Gomede, Gaffo, Briganó, de Barros, & Mendes, 2018).

However, the increased use of ICT brings several threats to human rights. As seen from a technical perspective, the individual's right to privacy is severely affected. IoT applications massively collect data such as the identity of the user, position or personal communication, which - if being transferred without consensus - violate the human right of privacy (Berrehili & Belmekki, 2017). It is further criticized that rather than including marginalized groups of people such as disabled or elderly citizens, technological solutions even further exclude these stakeholders, thus depriving them of their right to the city. To take advantage of smart city services, citizens need to adapt to the technological procedures but not everyone is able to do so. In the research domains of human rights, urban planning, politics, and sociology, smart cities are recurrently criticized for prioritizing the needs of wealthy and well-educated citizens while neglecting the less privileged ones (Reuter, 2019).

Rather than grounding on political, social and civil rights and the common good, smart city solutions are criticized for being most often market-led (Cardullo & Kitchin, 2019). Another driver are cities and governments aiming to use the label of a ‘smart’ city in order to market themselves and display their modernity (Herscovici, 2018). Although proclaiming that they will increase the life

of their inhabitants, smart city initiatives are said to neglect a human-centric approach and ignore the citizens' needs and wishes (Marsal-Llacuna, 2017). Rather than being able to actively take part in smart urban development, citizens are often left with the role of passive consumers and data providers (Reuter, 2019) and are sometimes even perceived as an obstacle to the smart city vision and need to be forced into doing what is good for them (Herscovici, 2018).

From a digital government and information systems perspective, the tensions between human rights and the opportunities offered by technology in smart cities has not been discussed comprehensively. Therefore, the goal of our research is to move beyond the techno-optimist stance and to shed light on the relationship between smart city initiatives and human rights also in our discipline.

3. Research Approach

This study is considered a pilot to explore if, and eventually how, smart city initiatives can influence human rights. Given the exploratory nature of the research, we adopted a qualitative research approach (Walsham, 1995). Both researchers are interpretivists, curious to study emerging phenomena in their natural context and understand how smart city initiatives are perceived by different stakeholders. To this end, we adopted a qualitative case study design in the city of Kristiansand, Norway. Norway is considered a suitable context to study smart cities and human rights as it is among the most digitalized countries in the world and since it is a high-trust society where human rights are highly valued. Kristiansand was selected as case as the city is in the process of experimenting with a number of smart city initiatives. We used a snowballing approach to selecting respondents, starting with the person responsible for smart city initiatives in Kristiansand. This person pointed us to 3 more respondents, working with smart city initiatives. Additionally, we interviewed 10 citizens representing variation in age, gender, profession and cultural background. The duration of the interviews varied but typically lasted around 40 minutes. All interviews were recorded and partially transcribed. The data were then analyzed using EnVivo software. In addition to the interview data, we collected written material from Kristiansand describing their smart city initiatives. The document analysis enabled a simple form of data triangulation.

4. Preliminary Results

Kristiansand is a city and municipality in the southern part of Norway. In January 2020, Kristiansand merged with two neighboring municipalities as part of a larger, national process to reduce the number of municipalities in Norway. Kristiansand is currently Norway´s fifth largest city with about 112,000 citizens. Kristiansand has prioritized digitalization for years and the merger created new opportunities in this area. The city is currently experimenting with smart city initiatives to better understand how technology can contribute to improved city life and better citizen dialogue. Up to now, however, no comprehensive smart city strategy exists.

The interviews with city officials revealed that the city has 8 ongoing smart city projects. They emphasized different motivation factors for why the city engaged in smart city initiatives, including

improved service quality, citizen centric development, environmentally sustainable city development and improved citizen dialogue. This input was used to develop a thorough understanding of the type of smart city initiatives Kristiansand was working on. This understanding was later communicated to citizens as we invited them to reflect on positive and negative consequences related to human rights. Our findings corroborated existing literature in that smart city initiatives can have both negative and positive impact on the right to privacy, security and freedom of expression. Further, our findings indicate that such initiatives may also affect the right to adequate standard of living, equal access to public service and the right to be innocent until proven guilty. An overview of smart city initiatives and their potential impact on human rights is showed in Table 1 below.

Table 1: Smart City Initiatives and Their Impact on Human Rights

Smart City Initiative	**Description**	**Impact on Human Rights**
GPS tracking snowplow and sweeper truck	Municipality provides an online map with the location of snowplows and sweeper truck to inform where the truck has removed the snow or pebbles.	Negative impact on security for snowplow drivers. Positive impact on quality of service for citizens.
GPS tracking city bikes	Work in progress. The initiative enables citizens to rent a GPS tracked e-bicycle in the city to use whenever they like to.	Negative impact on privacy. Positive impact on quality of service.
Crisis management GPS tracking	SMS service to inform citizens about emergencies, such as floods, power outages, wildfires and terror.	Positive impact on security. Potentially negative impact on privacy.
Measure air quality	Real time air quality measures using small sensors to provide a better overview for citizens and professionals of the actual air quality.	Negative impact on privacy. Positive on quality of service and standard of living – but only for some. May increase inequality.
SMELT	Heated cables in the ground of pedestrian areas linked to the weather forecast site Yr to be turned on when the weather dictates it.	Positive on quality of service and standard of living – but only for some. May increase inequality.
iKRS: Citizen involvement app	Collecting citizens' opinions concerning the city's strategy using push messages. This app enables citizens to share their thoughts on a case within in the city, ask questions, share pictures etc..	Positive and negative on freedom of expression. Potentially negative impact on privacy.
Listen to young immigrants voices	Municipality uses social media to mobilize young people with minority backgrounds to participate in debates.	Positive and negative impact on freedom of expression. Potentially negative on privacy.
Noise cancellation at the harbor and electrification vehicles	The harbor in Kristiansand undergoes many changes to reduce noise, automate and use electricity gathered from renewable energy resources.	Positive impact on quality of service and standard of living for those affected.

5. Discussion and Outlook

Our results sugget that every smart city initiative may affect human rights, either positively, negatively or both. The most frequently affected rights are *privacy* and *security*, which is in line with findings from the literature (Berrehili & Belmekki, 2017; Gomede et al., 2018; Hoffman, 2018). While *privacy* is typically challenged by smart city initiatives such as GPS tracking, sensors and surveillance, *security* is likely to increase due to the same measures. However, also *security* can be challenged as GPS tracking allows finding individuals and harming them. In our case, citizens were able to track the location of snowplowers. Frustrated citizens approached the drivers, challenging them to prioritize the roads that were important to them - often in a threating or unfriendly manner. This caused the city to introduce a delay in the tracking to protect the safety of the drivers. We furthermore identified the *freedom of expression* to be affected by smart city initiatives, which has rarely been discussed in the smart city literature. *Freedom of expression* is assumed to increase by citizens' engagement and participation in municipal politics and online debates as online platforms offer easier access for many. In contrast, *freedom of expression* is challenged as the increase in surveillance can lead to citizens being less willing to express themselves publicly. Furthermore, the technical soluations can form barriers for individuals without the technological skills needed to take part in online debates, who, thus, are excluded. Similarly, our respondents were concerned that the right to *equal access to public services* is challenged as marginalized citizen groups such as the elderly and immigrants may not have the technological skills needed to use online services. The problem relates to the longstanding research theme of digital divide. The right to *adequate standard of living* can be strengthened as smart cities aim to improve the quality of life in a city and to make platforms more accessible, to automize manual processes and to reduce carbon emission. The SMELT case in Kristiansand can serve as an example of how standard of living may improve for residents of central Kristiansand. However, some of our respondents reflected that this might also lead to increased differences as heated streets were limited to the city center.

Since our sample in the study is quite small and we did not consider smart cities as a holistic concept but only shed lights on single smart city initiatives, the results cannot be generalized. However, our findings already provide evidence for human rights violations. Our pilot study provides examples how smart city development can affect human rights both positively and negatively, but more in-depth studies are certainly needed to fully understand these consequences. Although some attention has been paid to this issue by scholars from other disciplines, our preliminary findings suggest that the issue deserves a more prominent place in the digital government field.

A variety of angles can be considered in the pursuit of a better understanding of how smart city development can affect human rights. However, as cities are for citizens, a stakeholder approach might be appropriate. Studies identifying the different interests that motivate development may be contrasted with studies analyzing the broad impact on different stakeholder groups in the city. This is likely to uncover conflicts of interest and potentially dysfunctional or unintended consequences. Further, studies from techno-optimist perspectives may be contrasted with critical studies highlighting with potentially damaging outcomes to the future development of urban societies.

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EGOV-CeDEM-ePart

Analysing e-Government through the Multi-Level Governance Lens - An Exploratory Study in Belgium

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Abstract: Today's administrations need to exchange an increasing amount of information in order to pursue their policies and to deliver better services. This study aims to understand the impact of Multi-level Governance (MLG) on the e-government policies of public administrations. It is argued that MLG helps to understand the administration's e-government. In Europe, public administrations are influenced by each other, and by the European Union in particular. This paper depicts a case study, executed via a triangulation of a document analysis and interviews, of the Inter-organisational Information Sharing (IIS) at the Belgian federal level. The results show that MLG is a highly useful concept to understand the policy developments in the e-government domain and that IIS is only partially impacted and stimulated by MLG.

Keywords: E-government analysis; Multi-Level Governance; Inter-organisational information sharing; European Union.

Acknowledgement: The research pertaining to these results received financial aid from the Belgian Federal Science Policy according to the agreement of subsidy no. [BR/154/A4/FLEXPUB].

1. Introduction

Today's governments need to take the requirements of other actors in society into account. Not only citizens and businesses, but also other administrations have an important effect on the functioning and policies pursued by an administration (Stephenson, 2013). Administrations are impacted by actions and decisions of other administrations, and this affects the administrations' internal relations and the service delivery to citizens and businesses. What appears to be partially missing in the e-government literature, however, is attention devoted to the impact of other public administrations and a theoretical approach to analyse e-government from this perspective (Scholl et al., 2012).

Administrations are no longer self-standing bodies, but actors influenced by each other and by the European Union (EU). Since the end of the 1990s, when different administrative levels started to develop e-government policies, it became clear that supranational actors were going to play a role in this (Chantillon, Crompvoets, et al., 2020). To theoretically conceptualize this relationship between supranational institutions and a national government, the concept of Multi-level Governance (MLG) is highly useful. Paying attention to the impact that MLG has on the e-government policy of an administrations allows to improve the service delivery towards citizens and business and other public administrations.

We investigate the impact of MLG on the e-government policies of a national administration via a single case study of the Inter-organisational Information Sharing (IIS) policy and thereby ask ourselves the following question: What is the impact of Multi-Level Governance on the e-government policies of a public administration?". IIS is one of the policies constituting the backbone of the current e-government developments. On the basis of a content analysis of the Ministerial Policy Notes on the Belgian federal e-government policy of the last five years and of the work of Scholl et al. (2012), the IIS policy area was selected as a case study. The relation between the EU and the Belgian federal administration is studied, as this is also the original focus of the MLG concept. The interaction among the various Belgian administrative layers is not in the scope of this paper. The focus lies on e-government as a stand-alone policy area, and not on e-government actions taken in other policy areas, such as education or taxation policy. An e-government policy is defined as "the use of ICT in order to design new or to redesign existing information processing and communication practices in order to achieve a better government" (Meijer & Bekkers, 2015). We hypothesize that the concept of MLG is highly important to understand the e-government policies of a public administration.

2. Multi-level Governance and e-Government

MLG is defined as "a system of continuous negotiation among nested governments at several territorial tiers – supranational, national, regional and local – as the result of a broad process of institutional creation and decisional reallocation that had pulled some previously centralised functions of the state up and down" (Marks, 1993). It is necessary to underline that the sovereignty of the state is not directly challenged: "states […] are being melded into a multi-level policy by their leaders and the actions of numerous subnational and supranational actors" (Gualini, 2003). It leads to a situation where "[t]he nature of the state […] is redefined according to the institutional compromises that contently result from such interactions" (Gualini, 2003). MLG has its foundation in federalism. The main difference with federalism lies in the nation-state focus: there is a central government and a number of sub-national governments. MLG adds another layer, namely a supra-national actor. Central governments are challenged both from within and outside the nation state, by supranational, regional and local state actors. This refers to the 'multi-level' aspect of the concept: there is a movement from centralised national authority towards multiple centres of authority (Stephenson, 2013). Our research question aims to understand the impact of MLG on a public administration's e-government policies. Bache & Flinders (2004) defined a number of criteria that can be used to test if a central government is indeed being impacted by MLG. Those criteria, referred

to in Table 1, are used in this work to assess the impact of MLG on the e-government policy of the Belgian federal administration. Although the use of those criteria leads to a potential simplification of the understanding of the impact of MLG, they ensure a systematic approach in understanding its impact on the e-government policy, and in particular the IIS.

Table 1: Multi-level Governance Criteria

The identification of discrete or nested territorial levels of decision making is becoming more difficult in the context of complex overlapping networks.
The role of the state is being transformed as state actors develop new strategies of coordination, steering and networking to protect and, in some cases, enhance state autonomy.
The nature of democratic accountability has been challenged and needs to be rethought or at least reviewed.
Decision-making at various territorial levels is characterized by the increased participation of non-state actors.

It has to be recognized that MLG has also been criticized, especially for its lack of explanatory value. This appears to be correct. MLG cannot provide a causal explanation, but provides a theoretical conceptualization to analyse a context (Fairbrass & Jordan, 2004). That is in line with our approach. Our aim is to understand the impact of MLG on the e-government policies of public administrations. Via this research perspective, we aim to deepen the understanding of the complexity of the field and point to the need to take a broader perspective when analysing and developing e-government policies. Whereas the original MLG concept has initially only been used to analyse EU political integration processes, and was only developed in the context of EU cohesion policy, its use has been widened to analyse various policy fields that could benefit from an understanding based on the MLG concept (Piattoni, 2010).

3. Methodology

The research was executed by making use of a single case study. The e-government policy of the Belgian federal administration was selected for this single case study research. Belgium, a founding member of the EU, is considered to be a representative case for MLG (Hooghe, 2012). The single case study is qualitative and interpretative in nature, and was executed by combining a document analysis and interviews (Lieberman, 2005). A methodological triangulation took place to ensure "a confluence of evidence that breeds credibility" (Bowen, 2009). The document analysis allowed understanding how the activities of one public administration have influenced those of another public administration. The triangulation with the interviews allowed gaining a deeper understanding of the motivations of public administrations and of their behaviour towards each other. The documents and interview material were collected during the FLEXPUB Research Project (2016-2020). The main source of information has been the document data, supported by the interview data. The document analysis focused on the retrieval and analysis of the legally binding documents from the EU Institutions and the Belgian administrations. Furthermore, non-binding EU policy documents and the Belgian Ministerial Declarations on e-government were analysed. The documents cover the period 1995-2019 with two exceptions, i.e. a Belgian Law of 1983 and one of 1990 that both had a crucial importance for the set-up of an information sharing system in the social

security sector. As some information was not available via documents, websites of the European Commission related to IIS were also analysed. An overview of the analysed documents can be found in (Chantillon, Simonofski, et al., 2020). A combination of the 'interview guide approach' and the 'standardised open-ended interview' was used (Patton, 2015). Questions focused on the Belgian federal e-government policy developments over the last two decades, as well as on the challenges and requirements concerning e-government in the Belgian federal context. The respondents were selected on the basis of their knowledge and experience with e-government, e-services and/or data use in e-services. In total, 61 interviews were conducted between July 2016 and November 2019. The respondents were: (1) civil servants of the Belgian federal administration (n=27), (2) civil servants from the European, regional and local level (n=27), and (3) actors from the private sector (n=7). The long spanning interview period allowed to gain a complete overview of the IIS in Belgium. The interview data was analysed with NVivo. More detailed information on the interviews can be found in (Chantillon et al., 2017).

4. Results

4.1. Inter-organisational Information Sharing at the European Level

The EU Institutions took actions to improve the IIS within the Member States' (MS) administrations as well as between the different MS. Both legally and non-legally binding actions were taken by the EU concerning information sharing, and the topic has been on the agenda since the mid-1990's, when the first 'IDA' (Interchange of Data between Administrations) program was launched in 1995. It was the start of a subsequent number of Decisions, which focus on interoperability and aim to lead towards an increased information sharing between public administrations (1999, 2002, 2004, 2009 and 2015). Besides those Decisions, the Ministers of the MS have also agreed on several Ministerial Declarations, such as the 2017 Tallinn Ministerial Declaration, which includes several references to the importance of the "once-only" principle. Specific European Commission actions, which intended to influence the IIS, were outlined in the EU Action Plan 2010-2015 and EU Action Plan 2016-2020 and the Toolbox for Practitioners on the Quality of Public Administration (2015, 2017), which devotes attention to Service Delivery and Digitalisation, interoperability and the "once-only" principle. The most important element on which the European Commission, in collaboration with the MS, has been working for the last two decades is the European Interoperability Framework. Interoperability has been defined as "the ability of disparate and diverse organisations to interact towards mutually beneficial and agreed common goals, involving the sharing of information and knowledge between the organisations, through the business processes they support, by means of the exchange of data between their respective ICT systems". What is clear from the above-described action is, firstly, that the different actors at EU level have long been focused on the need for interoperability. Secondly, information sharing is only a smaller part of a much broader policy striving towards the need for interoperability and the delivery of pan-European e-services for administrations, businesses and citizens.

4.2. Inter-organisational Information Sharing Policy in the Belgian Federal Administration

A number of activities show that the Belgian federal administration has already stimulated IIS since the 1980's. This has further continued in the 21st century. Over the years, several actions were taken to improve IIS, and the focus was originally put on two key elements: service integrators, i.e. the mechanisms to exchange data from authentic sources, and authentic sources, i.e. "data bases in which unique and original data is stored". Already in 1983, the first factual authentic source was set-up, the State Registry of Natural Persons, aiming to create a single registry including all natural persons in Belgium. In 1990, this was followed by the creation of the Crossroads Bank for Social Security, which aimed to ensure that data of social security organisations would run smoothly from one organisation to another. No further actions were taken until 2003, when the Crossroads Bank for Undertakings was set-up by the federal administration. This was followed in 2008 by the creation of the eHealth Service Integrator and in 2012 by the set-up of the Federal Service Integrator. Regarding authentic sources, it has to be underlined that the federal administration already committed in 2001 to develop a framework for the development and maintenance of those sources. This commitment was renewed in 2006 and 2013. In 2014, a federal law affirmed the "once-only" principle obliging all federal actors to first check within the federal administration if the required data was internally available. The condition was however that the required data was recognised as authentic source. Until now, the criteria and procedure to recognise an authentic source have not been defined, which makes the effectiveness of the 2014 "once-only" law questionable. Besides the importance of service integrators and authentic sources, interoperability also constitutes a central element in the achievement of IIS, as it is expected to lead to improved information sharing. The first references to the need for interoperability can be traced back to 2006. The described interoperability levels are those agreed in the European Commission's 2004 European Interoperability Framework. According to one of the respondents, the European Commission took the on-going Belgian interoperability work as an example for the European Interoperability Framework. No official document could however be found to support this statement.

4.3. Analysing the Multi-level Governance Criteria

The four criteria will now be tested on the basis of the above collected information. The first criterion refers to the "identification of discrete or nested territorial levels of decision making" (Bache & Flinders, 2004). In a MLG context, this identification becomes more difficult as a result of the complex overlapping networks. This criterion is fulfilled. Actions taken in different overlapping networks, although not always legally binding, do influence the decisions that are taken at other levels. Whereas the Belgian federal administration was independent in its decision-making for the creation of the State Registry of Natural Persons (1983) and the set-up of the Crossroads Bank for Social Security (1990), this changed afterwards. The Belgian federal administration gradually became more part of a network in which the EU, but also the regional actors, influenced the decision-making process of the federal administration.

Secondly, it is assumed in a MLG context that "the role of the state is being transformed as state actors develop new strategies of coordination, steering and networking to protect and, in some cases, enhance state autonomy" (Bache & Flinders, 2004). The document analysis and the interviews

revealed, as described above, that the Belgian federal administration was already, for a longer period of time, working on improving the IIS. What is interesting, however, is the fact that the EU actions on information sharing, both legally and non-legally binding, appear to have influenced the need to take measures, especially concerning the "once-only" principle, the need for interoperability and the further development of the network of service integrators. Indeed, after the set-up of the State Registry of Natural Persons in 1983 and the creation of the Crossroads Bank for Social Security in 1990, no further actions were taken. It was only after the European Commission has put the topic of information sharing on the agenda that the Belgian federal, regional and language community administrations re-launched their common and individual actions. Therefore, it can be argued that state actors have developed new strategies for their coordination, steering and networking. However, those actions are not taken to protect or enhance their state autonomy, but rather to follow the advocated policies at EU level. This criterion has therefore only partially been met.

The third criterion refers to the nature of democratic accountability. This accountability "has been challenged and needs to be rethought or at least reviewed" (Bache & Flinders, 2004). Accountability can be defined as "the need to control misuses of power for those who might not be able to directly participate in decision-making" (Gualini, 2003). In a MLG context, there are different actors involved in the policy-making process, making it hard for the accountability holder to understand how the different actors are handling the policy-making process. The accountability holder is the citizen. It is hard to argue that the accountability concerning IIS has been challenged. Although the EU has taken legally binding Decisions, and suggested a European Interoperability Framework, thereby requiring the MS to develop a National Interoperability Framework, it is clear that the decisions concerning IIS remain to a large extent in MS' hands. In Belgium, it is the federal administration that decided to set-up service integrators and to affirm the authentic source principle as well as the "once-only" principle in the law. Thus, this criterion appears not to be met.

The final criterion is the participation of non-state actors, and in particular whether or not the decision making at various territorial levels is characterized by their increased participation (Bache & Flinders, 2004). Concerning this final criterion, there was no information found on the role of non-state actors in the decision-making process. Private sector actors are involved in the set-up of technical solutions to increase IIS, but no evidence could be found on the private sector influencing the decision-making process itself. However, there is a clear intention from the different public administration actors to work on IIS to improve the service delivery for citizens, businesses and other actors. This motivation is not created because of the involvement of the EU. Already before the EU took any action in the field of information sharing, the Belgian federal administration took specific measures in this respect. The EU actions nevertheless further stimulated the aims of improving the service delivery towards citizens, businesses and other actors. The respondents also confirmed this conclusion. None of them referred to the impact of non-state actors in any assessment activity related to information sharing. Thus, this criterion appears not to be met.

Table 2: MLG – IIS

Criteria	**Status**
Complexified identification of discrete or nested territorial levels of decision-making	Fulfilled
Transformed role of the state	Partially fulfilled
Nature of democratic accountability	Not fulfilled
Increased participation of non-state actors	Not fulfilled

On the basis of the criteria, and with the knowledge that only the first criterion can be considered as fulfilled and the second criterion only partially, it can be concluded that IIS is only partially impacted by MLG. It can be deduced that the Belgian federal administration was already actively working on this topic, long before the EU took actions. Nevertheless, the EU activities stimulated the administration to move forward, and this does indeed seem to have impacted the activities. Without the EU, it seems unlikely that the federal government, as well as other administrations in Belgium, would have taken those actions. It can, as such, be argued that the EU stimulated the federal administration to move forward with the IIS policies.

This leads to the question of how this situation can be theorised. The concept of Europeanisation is highly useful for this theorisation. Olsen (2002) argues that the concept "may help us give better accounts of the emergence, development and impacts of a European, institutionally-ordered system of governance". One of the specific Europeanisation forms that (Olsen, 2002) describes refers to the adaptation of domestic policies to actions undertaken by EU Institutions. This does indeed appear to be the case for IIS. The domestic policy was already in development, and has been further influenced by actions of EU Institutions.

5. Conclusion

Through this work, we aimed to understand the impact of MLG on the e-government policy of a central government, and especially its administration, within the EU. It was hypothesised that the concept of MLG is highly important to understand the e-government policies of a public administration. Although the impact of administrations on each other seems to be partially neglected in the e-government academic literature, it is highly important to conceptualise this influence in order to create improved e-government policies for citizens, businesses and other public administrations. In order to conceptualise this relationship, the concept of MLG was applied, and in particular the IIS of the Belgian federal administration was studied. The results show that IIS is only partially impacted by MLG. From the analysis, it can be deduced that the Belgian federal administration was already actively working on this topic, long before the EU undertook actions. Nevertheless, EU actions stimulated the federal administration to move forward on this topic. Without the EU, it seems unlikely that the federal government would have taken those actions. Other policy areas of national administrations might also be impacted by the EU, and, here as well, the concept of MLG can be relevant to gain a better understanding of the relationship between a national administration and the EU.

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Diffusion of E-services: Data from Seven Swedish Municipalities

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Abstract: Intensified use of digital technology enables new ways for governments to interact with their citizens. One such way they interact is through the use of electronic services (e-services). The diffusion of such services is not yet fully understood. Against this backdrop, this paper aims to study demographic differences in e-service diffusion. The research is conducted by using data from a Swedish region. The novelty of this paper is that it builds on actual usage data. Quantitative data from an e-service platform is presented through descriptive statistics. The results reveal interesting findings related to citizen demographics such as gender, age, and living in a city or rural area, and also findings related to category of e-service. A general observation is that women use e-services more than men, up to the age of 50. Many of these services are aimed towards parents with children in school. One exception from the pattern is services related to building permits and related areas, where men are the most frequent users. The results also reveal that the differences between men and women are smaller in an urban area studied compared to the other municipalities. Overall e-service usage peaks at the age of 40-49, but two rural municipalities deviate from this pattern with an earlier peak. This paper adds to current knowledge on e-service diffusion with data on actual usage, based on age, gender, rural/urban areas, and service categories.

Keywords: e-government, e-services, diffusion, adoption, demography

1. Introduction

Intensified use of digital technology enables new ways for governments to interact with their citizens. One such way they interact is through the use of electronic services (e-services). Lindgren and Jansson (2013) define e-services in the public sector using three characteristics; they are public (rather than private), electronic (digital) and intangible (unlike e.g. goods). By emphasizing the "public" part, Jansson (2012) argues that e-services can be conceptualized as either a swing door or a gatekeeper to public services. E-services often manifest in forms on websites, where citizens may identify themselves using electronic means of identification and fill in information required for e.g. making an application. However, as argued by Lindgren and Melin (2017) (see also Jansen and Ølnes, 2016) it is difficult to establish a precise definition of what constitute e-services. E-services often range from downloadable forms to more complicated self-service systems, and IT systems with specific processing capacity.

Prior research on e-services is heterogeneous (Arduini and Zanfei, 2014). Research on e-government or e-service diffusion is often conducted through the use of technology acceptance models (TAM) in combination with web surveys. These approaches are problematic because they do not capture actual usage (or, nonusage) of e-services since they are senstivite to sampling problems. Web surveys are problematic when it comes to generating representational samples (see e.g. Fricker and Schonlau, 2002), especially concerning large target groups, often the case with public e-services. Moreover, these approaches usually assess individuals' willingness to adopt e-services. Actual diffusion patterns may deviate from what is output by a TAM model (see e.g. Ajibade, 2018).

Henriksen (2004) conducted a study in the Danish context and argues that urbanization, population density, educational level of citizens, and increase in employment appear to be the most significant explanatory factors for a high level of e-service adoption. Seeing the low adoption of e-services in Danish municipalities, this author also argued that the development may be driven by technology fads rather than citizen demands (Henriksen, 2006). As reported by van Dijk et al. (2007), the maturity of e-service delivery is often measured by the number of services produced. However, there is a gap between supply and demand (see also, Sutan et al. 2013). A search on diffusion and e-service adoption in the Digital Government Reference Library (Scholl, 2020) reveals that remarkably few studies have focused on actual use of services. Solvak et al. (2019) explain that there is a lack of understanding of e-service diffusion in the e-government literature. These authors present results from a large dataset of e-service usage in Estonia. Their study reveals that e-government adoption rate increases linearly over time, and that adoption rates are highest among population groups currently in higher education or active on the labour market. Moreover, they suggest that women use e-services at a higher rate than men in many age groups.

Against this backdrop, the purpose of this paper is to study demographic differences in e-service diffusion. The research is conducted by using data from a Swedish region. The material, which will be further described in the next section, allows the analysis of e-service diffusion using four variables: age, gender, service category, and urban or rural municipality.

2. Materials and Methods

This paper builds on data from an e-Service platform used by seven municipalities (Table 1) in a Swedish region. The data from the e-service platform is openly accessible (see e-Samverkan, 2020) and contains data on e-service usage from seven municipalities between 2018-2020. The e-services can be described as an "archetype" of e-services (Melin and Lindgren, 2017): they are mediating eservices, in which the user indirectly interacts with a case handler. Many of the e-services were created in a collaboration project between the municipalities, with the goal to "generate 100 e-services". At the time of the study, the database included 25,177 cases where users identified themselves with an eID. From this dataset four variables were studied: gender, age, urban or rural area, and category of service (services are thematically divided into building and environment [BaE]; care and health [CaH]; culture and recreation [CaR]; childcare and education [CoE]; enterprise and work [EaW]; municipality and politics [MaP]; and traffic and infrastructure [TaI]; see Table 2). It should be noted that the categories are not always distinct. For example, traffic and infrastructure contains both services related to vehicle use and a service allowing parents to apply for replacement

bus cards for their children's commute between home and school. Another limitation is that the municipalities display slight variations on how they categorize their individual e-services.

Table 1: Studied Municipalities

Municipality	**Population**	**Class (SKR, 2020)**
A	99376	Larger city
B	56060	Smaller city
C	25184	Smaller city
D	19275	Rural area
E	18364	Rural area
F	17996	Commute area near larger city (A)
G	9329	Rural area
All	245 584	

Table 2: Service Categories

Service (% of errands)	**Variable**	**Description**
Building and environment (11.5%)	BaE	Building permits and similar e-services.
Care and health (6.3%)	CaH	E-services aimed at people with disabilities, trustees etc.
Childcare and education (38.4%)	CaE	E-services aimed at parents with children in kindergarten and school.
Culture and recreation (1.3%)	CaR	Summer camps, union aid, season cards for ski tracks etc.
Enterprise and work (5%)	EaW	E-services aimed at businesses and citizens looking for work.

Municipality and politics (4.4%)	MaP	E-democracy.
Traffic and infrastructure (30.1%)	TaI	Permits for a variety of vehicle operations, replacement bus cards for school pupils.

3. Results

As revealed in Table 3, women use e-services more than men in all municipalities (men constitute 36% of users, women, 64%). The pattern of use is fairly stable over the years studied: 64.5% of users were women in 2018, 64% in 2019, and 62% in early 2020 (although 2020 only includes 2088 cases at the time of writing). Municipality A displays a more equal use of e-services than the other municipalities (men: 43.1%, women 56.9%) This municipality is the largest (population: 99 376) and includes the largest city (population: 58 248) in the region.

Table 3: Male and Female Users

Municipality (n of errands)	**Men (%)**	**Women (%)**
A (5376)	2318 (43.1%)	3058 (56.9%)
B (7377)	2421 (32.8%)	4956 (67.2%)
C (4995)	1845 (36.9%)	3150 (63.1%)
D (1316)	442 (33.6%)	874 (66.4%)
E (2999)	1047 (34.9%)	1952 (65.1%)
F (2141)	652 (30.5%)	1489 (69.5%)
G (973)	328 (33.7%)	645 (66.3%)
Total 25177	9053 (36%)	16124 (64%)

Figures 1 and 2 illustrate that women use e-services more than men until the age of 50, when the graphs even out. As seen in figures 3 and 4, municipality A follows a similar pattern, but with a smaller gap between men and women. The data for the Under 18 and 70+ age groups should be

interpreted with caution since these groups contain few cases. One service category, building and environment, deviates from the pattern. As shown in figures 5 and 6, men use these e-services more than women in all age groups. This is the only service category that displays this pattern. Most other services reflect a similar pattern to the overall results. For childcare and education e-services (figures 7 and 8) there is a gap between male and female users that closes with age, with slightly more male than female users among those over 60 years old.

As shown in Figure 9, the overall use of e-services peaks at age 40-40, then declines in the older population. It should be noticed that large volumes of services target parents (as displayed in the previous section, Table 3), who are usually of working age. However, two municipalities in Figure 10 deviate from the pattern: the e-service usage in municipalities E and G peaks at age 18-29 and then declines. These municipalities are both rural, but so is municipality F, which peaks at age 40-49, just like the larger municipalities. Hence, whether this phenomenon is more common in rural municipalities should be subject to further research.

Figure 1: Numbers of Users, All e-Services

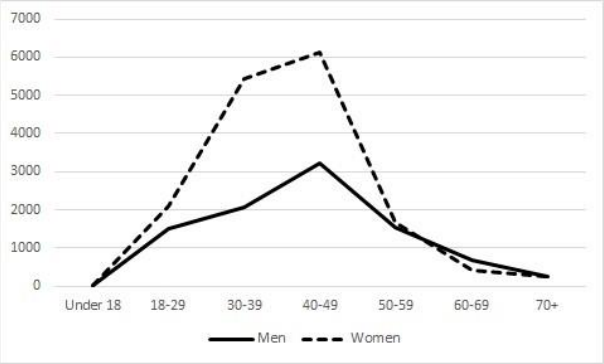


Figure 2: % of Users, All e-Services

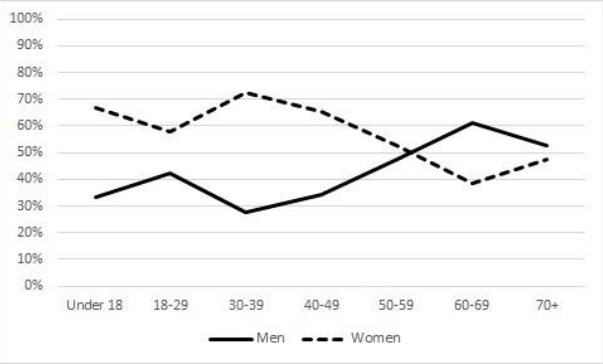


Figure 3: Number of Users, Municipality A

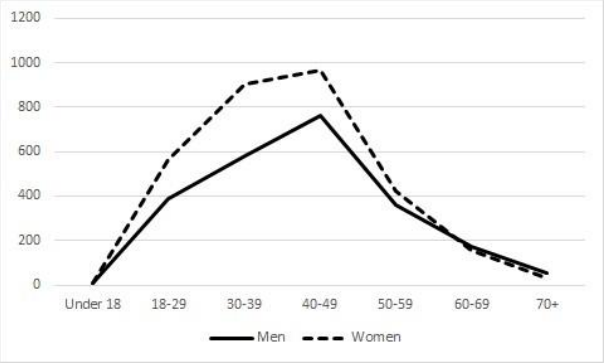


Figure 4: % of Users, Municipality A

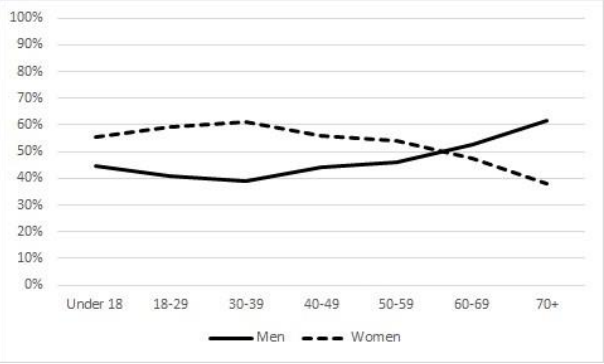


Figure 5: Number of Users, BaE e-Services

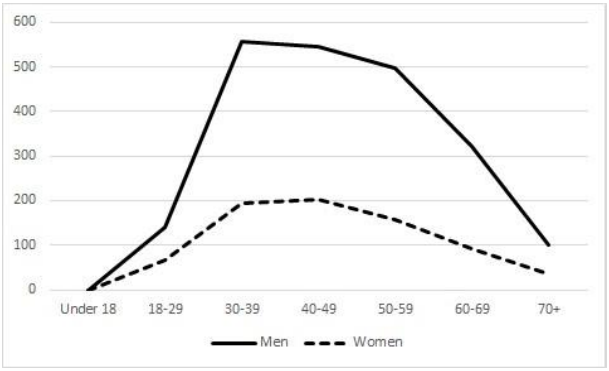


Figure 6: % of Users, BaE e-Services

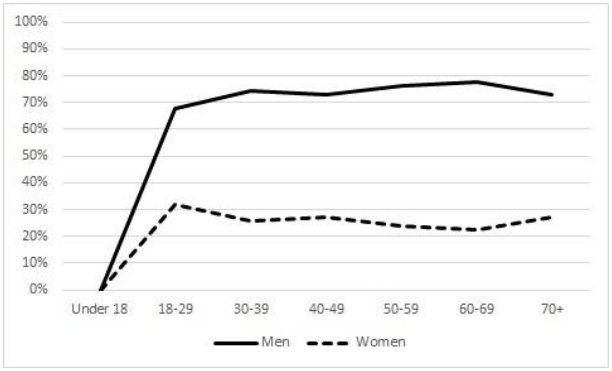


Figure 7: Number of Users, CaE e-Services

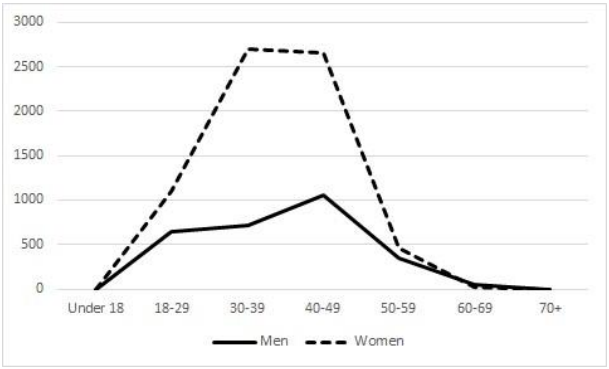


Figure 8: % of Users, CaE e-Services Services

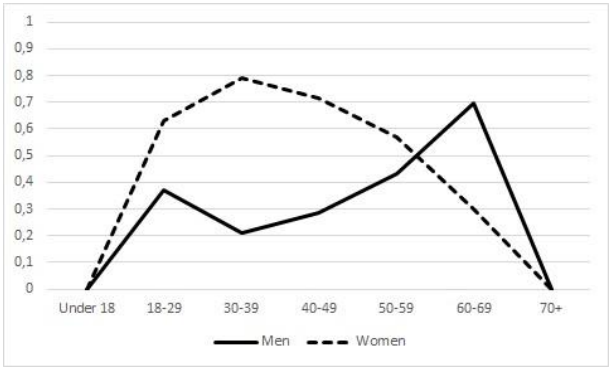


Figure 9: Age Distribution, All Services

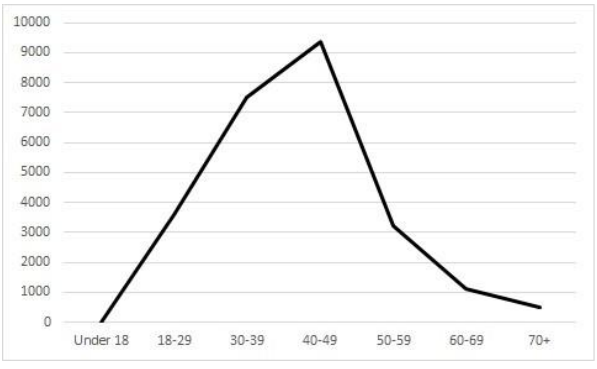
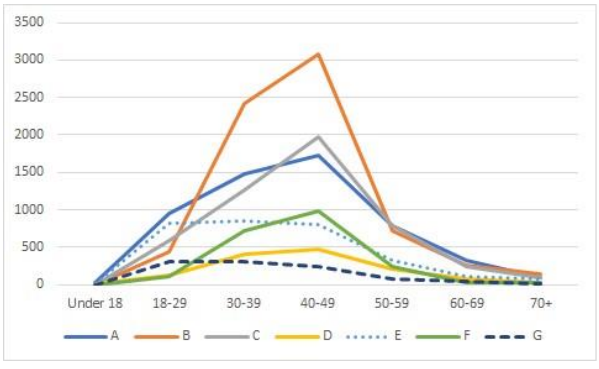


Figure 10: Age Distribution, Municipalities



As shown in Table 4, the most used e-services for people aged 18-49 belong to the childcare and education category. At age 50-59, the results shift. The e-services most used by men over 50 belong to the building and environment category. Women aged 50-59 use the traffic and infrastructure category most, and after age 60, they use e-services in the care and health category most (in the care and health category, women in all age groups use e-services more than men).

Table 4: Most Used Services

Age group	All	Men	Women
18-29	CaE (1739)	CaE (643)	CaE (1096)
30-39	CaE (3407)	CaE (710)	CaE (2697)
40-49	CaE (3718)	CaE (1057)	CaE (2661)
50-59	TaI (894)	BaE (497)	TaI (477)
60-69	BaE (413)	BaE (321)	CaH (165)
70+	CaH (204)	BaE (100)	CaH (144)

4. Concluding Remarks

This study contributes to current research on e-government and e-service diffusion through the following findings:

- Gender. The study confirms recent results that women use e-services more than men. However, this varies based on the category of the service: men use services related to building and environment more than women, and it appears that women use services related to family, such as school, education, bus cards, health care, more than men.
- Age. The use of e-services peaks among the population in working age, and the pattern between men and women in different ages varies. It needs to be taken in account that many e-services are aimed towards people with children in schools, and thus are not relevant for the older population.
- Rural/City. The data showed that e-service diffusion might be more evenly distributed between men and women in cities than in rural areas.
- Category of service. As mentioned above, e-service diffusion is different among men and women. One interpretation of this data is that e-service diffusion reflects traditional gender roles: Men build, women take care of the family.

These results are important given the narrative of digitalization and e-government as disruptive and transformative processes. The use of technology may change some aspects of our societies, while other aspects are reinforced.

4.1. Limitations and Future Research

The current study was limited to a region in central Sweden. As such, generalizations should be made with caution. However, the results are useful for making comparisons with e-service diffusion in other contexts as well. The difference between city and rural areas is one area for further

investigation. The material in this paper did not allow for a deepened analysis of development over time, but more longitudinal studies would constitute a welcome contribution to the e-government research field.

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EGOV-CeDEM-ePart

Digicampus — Preliminary Lessons from a Quadruple Helix Ecosystem for Public Service Innovation

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Abstract: Many governments want to harness the potential of new digital technologies for shaping an progressive and inclusive society. However, they often struggle to translate their ambitions into reality. Drawing on the quadruple helix model, Digicampus is an innovation ecosystem in the Netherlands in which government, academia, citizens and companies explore future public services. Since the launch of Digicampus, more than hundred requests for collaboration were submitted by public organizations. The objective of this ongoing research paper is to share the experiences of starting a quadruple helix ecosystem for public service innovation. We do this by discussing the innovation guidelines, research agenda and lessons learned in the first year of Digicampus. Important innovation guidelines are: embrace design thinking and an agile way of working, facilitate multidisciplinary knowledge exchange, co-create prototypes (make technologies tangible) and foster open experimentation (assess the potential). Other countries looking to explore future public services in a collaborative manner can benefit from the insights presented in this paper.

Keywords: public sector innovation, co-creation, digital government, quadruple helix

1. Introduction

Inspired by the instantly gratifying online services offered by tech-giants and Fortune 500 companies, citizens, entrepreneurs and politicians expect better public services. Compared to the smooth user experience we have when purchasing products online or booking hotels - where you get instant results and gratification - the user experience when requesting a parking permit or social services is still poor in many countries (*UN E-Government Survey 2018*). Nowadays, typical expectations include improved service responsiveness (instant results), pre-filled portals/apps (you already have some of my data), transparency (what is happening and what's next), legal certainty (did I do everything right), personal data management (users decide what to share and what not) and cross-agency interoperability (do not redirect me to another agency). Another challenging expectation is digital inclusion, referring to the goal to make all online public services accessable and user-friendly for all citizens, including the groups of less less tech-savvy citizens.

While looking to satisfy these expectations, politicians demand faster innovation cycles. However, known for their siloed agencies and systems, a risk averse culture, linear thinking in the application of new knowledge and top-down bureaucratic structures, governments are often resistant to experimentation and change (Hansson et al., 2014; OECD, 2014). Government agencies are often not able to deal with the ambidexterity of having to exploit and explore at the same time (Matheus & Janssen, 2016). Innovation seekers and change agents often face a complex political arena and a diversified value landscape. Moreover, e-government services need to comply with a wide range of strict rules and regulations, some of which (e.g. European regulations like the General Data Protection Act) take years to understand, interpret and implement. Furthermore, many government agencies do not have the necessary knowledge and skilled digital professionals in-house, and acquiring these skills in the public sector workforce remains a challenge in many countries (OECD, 2014). All the above makes public sector innovation very challenging (Bason, 2018), resulting in the 'policy-makers innovation dilemma' (Misuraca & Viscusi, 2014).

Recognizing these challenges in the Netherlands, the concept of Digicampus was launched in July 2019 (Bharosa et al., 2020). Digicampus draws on the Quadruple Helix innovation model (Arnkil et al., 2010; Leydesdorff, 2012). The Quadruple Helix model is an expansion of the Triple Helix model that links three helices – Academia, Government and Industry – for societal problem solving, research and innovation (Leydesdorff & Etzkowitz, 1998). The Quadruple Helix model characterizes a shift towards systemic, open and user-centric innovation policy (Arnkil et al., 2010). Activities such as linking basic and applied research with the market via technology transfer and commercialization mechanisms and shaping government–university–industry partnerships can constitute the essential mechanisms for innovation (Carayannis & Campbell, 2012). Since the launch of Digicampus, more than a hundred request for collaboration were submitted by innovators in the public service domain (we come back to this in the research agenda section). This paper provides a first-hand account of the context, conception, design and launch of Digicampus. The objective of this ongoing research paper is to share the innovation guidelines, research agenda and lessons learned at Digicampus.

This paper proceeds as follows. Section 2 focuses on why we need a Digicampus and presents the context that gave rise to the idea of Digicampus in the Netherlands. Section 3 focuses on the main innovation guidelines set by stakeholders for Digicampus. Section 4 elaborates on the research agenda for the coming years. Section 5 presents the lessons learned. This paper concludes with a discussion on public service innovation.

2. The Need for a Shared Digicampus in the Netherlands

The main driver for launching Digicampus is the ambition of the Dutch government regarding the digital society. The Netherlands is often referred to as one of the top performers when it comes to its use of technologies for the benefit of society. In the 2018 United Nations (UN) E-Government Development Index (UN, 2018), the Netherlands is in the top 5 of the E–Participation Index and in the top 15 of the leading countries in e-government development. The current administration has again underlined the importance of an progressive and inclusive digital society and has launched

an ambitious national digital agenda[1]. This Digital Government Agenda is an agenda drawn up together by all levels of government and it promotes collaboration with academia and industry, including start-ups. It focuses on utilising opportunities and protecting rights and acknowledges that innovation will require experimentation and learning. Seeking to achieve the goals stated in the Digital Government Agenda, a consortium of government agencies (Logius and ICTU) together with the Delft University of Technology drafted a proposal to Ministry of Interior Affairs and Kingdom Relations to launch Digicampus. This proposal was approved in February 2019, and Digicampus was launched four months later. Digicampus has received government funding for a three-year period. This is seed funding, participating companies and universities are required to bring in co-funding in various forms, including research challenges with budged, expertise, tools, datasets and building blocks for co-creating prototypes. This ensures that Digicampus does not become a purely state funded lab that is limited to the research interest of the funding agencies.

3. The Guidelines for Open Public Service Innovation

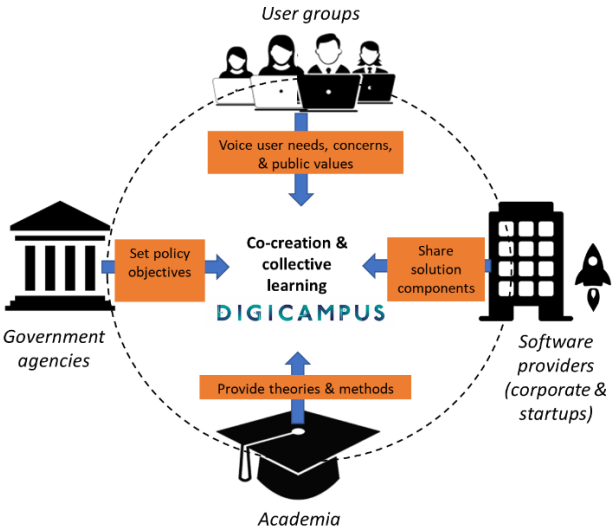
Digicampus has grown into a shared public service innovation ecosystem for academia, governments, industry and citizens. In order to be successful in achieving its goals and build a community with a positive impact on society, the following innovation guidelines were elicited from a dozen interviews and workshops with policy makers, architects, academics and company representatives with a stake in Digicampus:

- Ensure quadruple helix representation on all levels of Digicampus (governance, management and research activities).
- Work with a progressive, yet mission driven research and innovation agenda.
- Facilitate collective design thinking (i.e. using workshops, scenario/policy reflection sessions).
- Work with mockups/prototypes that demonstrate the potential and limitations of new technologies (i.e. UX/interaction design, simulation, proof of concept).
- Experiment as early as possible in order to assess the potential of new technologies/solutions.
- Develop and maintain an overview of the public service innovation landscape, including existing labs, ongoing experiments and lessons learned from previous innovation efforts.
- Develop and maintain and overview of public service building blocks and promote their reuse.
- Build a multidisciplinary community: technical, legal, policy, organisational, economical and ethical expertise is needed to adequately address the challenges for public services.
- Ensure a level playing field: both large companies and start-ups must be able to pick up challenges, experiment and demonstrate solutions.
- Work as a 'lab of labs': focus on connecting labs to challenges and pool existing resources.
- Work tech-neutral: technologies must always follow end user needs.
- Let users express their needs and reflect on ethics and public values in the design of solutions.
- Both proven and experimental technologies must be considered in solution designs.

These innovation guidelines have resulted in the high level design of Digicampus (see Figure 1).

[1] https://www.digitaleoverheid.nl/digital-government-agenda/

Figure 9: High-level Design of Digicampus



The Digicampus design connects the four helices and is tailored to create a community of practice that must connect policy-makers and implementors, users groups, companies and researchers focusing on addressing societal challenges that are grouped into missions (discussed latter in this paper). Depending on the type of challenge, different (research) activities are triggered, ranging from desk research and data analysis to design workshops and prototyping. The scope of challenges is limited to subjects that fit the agenda setting phase and the policy development phase of the policy cycle depicted in Figure 2.

Figure 10: Position of Digicampus in the Policy Cycle

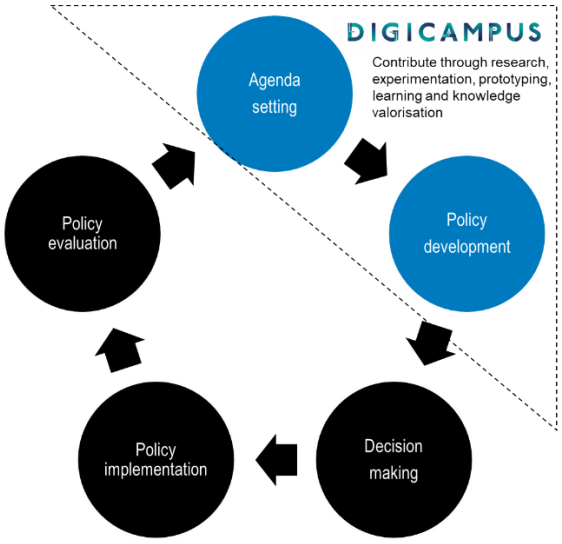


Figure 2 illustrates that Digicampus activities must contribute to policy agenda and decision-making regarding future public services. Many digital society or public policy problems are a class

of wicked problems where no optimal solution or a single answer exists (Rittel & Weber, 1973). The multitude of interdependent actors within society is growing and adds to the complexity of finding solutions acceptable for all. This makes it difficult for policy-makers to assess choices and determine the impact of policy-interventions. The main proposition of Digicampus is that co-creation between government, academics, companies and citizens is needed to facilitate learning for addressing wicked problems. From a policy maker's perspective, Digicampus adds value by experimenting, learning and sharing the lessons learned for policy development and decision making.

4. The Progressive Mission-driven Research Agenda

How do you organize and prioritize research and innovation in a quadruple helix setting? We followed a four step process in order to answer this question. First, we invited the entire Dutch society to mail us their public service innovation challenge: what do you want to collaborate on with Digicampus? This invitation was shared during a nationwide e-government conference and via social media. As a result, more than a hundred challenges (and counting) were submitted by innovators in the public domain. The range of challenges and request are quite broad, and include:

- Help in evaluating an app for small companies that need government support due to the COVID-19 virus and must send various data sets to multiple government agencies.
- Help citizens with personal debt problems to easily obtain a financial overview and share this overview with debt counsellors.
- Evaluate the accuracy of voice authentication technologies for public service requests via phone.
- Help citizens to get more insight in their energy consumption through data analysis and recommendation services.
- Assess the potential of machine learning for data analysis and decision making based on structured financial data from the education domain.
- Create insight in the innovation landscape: what is everyone working on and what can we collaborate on?

While writing this paper, Digicampus employs sixteen people who combined are the equivalent of nine full time employees. This includes management, researchers and innovation designers, but excludes board members and master students that work on specific challenges. By no means is such a small resource pool sufficient to handle more than a hundred innovation challenges. Yet, this first step yielded an overview of what the public innovation landscape in the Netherlands is working on.

Second, and in parallel with the first step, we examined most of the publicly available research and innovation agenda's in the Netherlands. The examination of thirty-seven agenda's revealed a dominant focus on high level policy themes, such as climate change, migration and population aging on the one hand, and key technologies such as Artificial Intelligence and Internet of Things on the other hand. The challenges of public service users are not explicitly mentioned in the research and innovation agenda's across the Netherlands. This highlighted the need to focus on public services and opened the way to position Digicampus as the innovation ecosystem for public services.

Third, we formulated three impact missions based on the insights collected from the previous steps. Each mission is broken down into three concise tracks (innovation projects with a narrow scope and predefined deliverables). The following missions and tracks are on the agenda:

1) Increase the level of data sovereignty for citizens. The tracks in this mission are: self-sovereign identity, personal data management and consent management.
2) Improve digital interactions for everyone. The tracks in this mission are: proactive services, digital inclusion and voice authentication.
3) Transform government agencies from data silos to data partners. The tracks in this mission are: trusted data ecosystems, artificial intelligence in public services and future government data strategies.

Each track follows a pipeline of six successive stages:

- Stage 1 — Exploration: what is the underlying problem, what did we learn from previous efforts, what can we reuse?
- Stage 2 — Coalition building: who is working on solutions and how can we collaborate?
- Stage 3 — Agenda setting: what is needed to progress on this challenge? What are the next activities needed in this track?
- Stage 4 — Prototyping: co-create a prototype of an improved public service, from the end-user perspective.
- Stage 5 — Experimentation: how well does the prototype work for users? How does it score on performance, ethics, compliance, security and implementability?
- Stage 6 — Stimulation of adoption by public agencies: dialogue with the responsible public agencies (who already onboarded in stage 2) on how to take the prototype to the next level so that users can benefit from improved public services?

Finally, we crafted a research agenda and a way of working around the missions and tracks. Basically, each mission has its own sub-agenda and combined they form the research agenda of Digicampus. The research agenda consist of research questions and innovation ideas/propositions, some fuelled by theory and some from practical experience. Research questions are answered via a predefined set of methods, including surveys, workshops, desk research, interviews, design sprints, master thesis projects and PhD research. The goal is to have at least one PhD student for each mission, and at least one master student for each track. Currently, two PhD students and five master students are working at Digicampus. In the summer of 2020, two additional PhD student positions will open up, funded by Digicampus. The funding of PhD research that have a four year perspective ensures that more in depth knowledge development and valorisation takes place at Digicampus.

5. Lessons Learned

While Digicampus is still in its infancy, there are four main lessons learned that can inspire other government agencies that are working on developing public service innovation ecosystems. First is the need to create incentives for collaboration in the quadruple helix design. We found that Digicampus has attracted various actors in the four helices because there is something to gain for all of them. Government agencies can gain an external R&D/innovation team that can help them to innovate their public services more quickly. We found that Digicampus attracts already running

government programs because it can be used as a gateway to collaborate with universities and companies that share an innovation mindset. Companies can meet and talk with policy-makers and implementors, understand their needs and constraints, help co-create prototypes and showcase their expertise and solution components. In some cases, this might lead to future business. The National Association of Digital Technology providers in the Netherlands (NL Digital) acts as the gateway to software providers in Digicampus. Please note that companies that are not a member of NL Digital (e.g. start-ups) can also participate in Digicampus tracks directly. When it comes to knowledge institutes, scholars can collect research data and gain a deeper understanding of the challenges facing the digital society from the perspective of policy-makers, companies and citizens. To date, four universities are participating in Digicampus tracks. Citizens can play a more influential role in shaping public services before they are affected by it. They can voice their needs and concerns, and shed light on ethical dillema's, for instance when considering the use of Artificial Intelligence in public services. Citizens are engaged through for instance interviews, surveys and participation in design sprints. Depending on the challenge at hand, various citizen groups can be consulted.

Second is to work with a mission driven research agenda with room for learning and adaptation to challenges signalled by the innovation ecosystem. The latter refers to 100+ calls for collaboration submitted to Digicampus. Each of these calls is provided with a response, most of them being that we cannot collaborate on this challenge at this moment. However, the goal is to build enough capacity to handle 20% of the external calls for collaboration by 2021. Nevertheless, a clear focus and expertise building within a manageable number of public sector topics is essential.

Third is to organize work into smaller tracks and pipelines. Missions have a mission lead who is an authority on the subject matter and coordinates the innovation tracks needed to achieve the mission. Each track has a dedicated track leader and team, consisting of members from public agencies, companies, research institutes and citizen groups/representatives. This is done in a uniform manner for all missions, making it easier to communicate progress to the environment of Digicampus. While the track leaders are free to choose their methods and tools, they must all follow the innovation guidelines presented earlier in this paper.

Finally, we learned that it is paramount to ensure that the public agency that is responsible for delivering a specific public service (e.g. provide unemployment benefits or childcare benefits) participates in the innovation track that focusses on this public service. This is needed in order to build commitment and ensure that after successful experimentation, prototype solutions can be translated to working solutions for citizens/companies that interact with that government agency.

6. Discussion

Government agencies can no longer solve all social challenges on their own. As policymakers around the globe want to innovate their public services and better serve their constituents they need to find ways to create an environment that is conducive to co-creation, experimentation and learning. The foundation needed for this is a sense of urgency and willingness to open up public service innovation for the entire society. In the Netherlands, the following factors lay this foundation for Digicampus: (1) anchoring in the National Digital Government agenda as a vehicle for

addressing the identified challenges across government agencies (2) awareness and momentum: actor groups have started acknowledging that resource scarcity and small scale/non synergized research and innovation will have little positive impact and adoption and (3) co-governance and co-funding: government agencies, companies and research institutes all need to bring resources to the table, even if it is 'in kind' or already allocated to research and innovation programs that coincide with the challenges on the digital government agenda. In our experience it is also important to frame the required resources as a broad category of items including research funding, people, expertise, data, office space, lab facilities, tooling, methods and access to online building blocks (can be services in a testing environment) in order to allow all actor groups to be able to commit to the concept.

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EGOV-CeDEM-ePart

Understanding the Role of Intermediaries in Digital Government: The Case of Immigration Services

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Abstract: Digital government intermediaries is not a new topic and has been previously analyzed and documented in the literature. There is also a recognition of an evolution in the study of this concept towards open data intermediaries or infomediaries and, in fact, there are many more studies devoted to this more specific topic. However, there are still outstanding issues to be explored with respect to intermediaries in digital government, particularly in certain policy domains and specific services and programs. This study focuses on intermediaries that help users to obtain migration services. Immigrants can be considered a vulnerable population, given that they are not citizens and need to deal with government agencies from a different country and, sometimes, they are also required to do so in a different language and with certain technical skills that they do not possess. This is why they frequently turn to intermediaries. Based on semi-structured interviews with migration intermediaries such as consulates of Central American countries, NGOs, Mexican government offices, and internet café owners; this ongoing research paper focuses on online services for Central American immigrants in Mexico's southern border and analyzes the role of intermediaries. The results show that there are some similarities in terms of the role of intermediaries in digital government in general, but there are also some particularities of migration services.

Keywords: Intermediaries, consulates, NGOs, immigrants, non-citizens, migration services, digital government services

1. Introduction

Recently, the concept of intermediaries in the context of digital government, and particularly in connection with open government, has been extensively studied (Van Schalkwyk, 2015; Yoon et al. 2018; Kassen, 2018; Janssen & Klievink, 2008). This is due to the importance of intermediaries and the role they play in bringing government programs and services closer to citizens as well as democratizing access to the technological infrastructure of government (Van Schalkwyk et al., 2016). However, studies on migration management are few and therefore the issue of intermediaries in immigration services is also pending. The concept of intermediaries previously discussed in e-government studies has considered NGOs, religious associations or groups, and government offices

(Sein, 2011), but no organizations more specific to migration services such as consulates. So far, the intermediaries working with migrants, foreigners who wish to follow a process or obtain a service from a government from another country, have not been reviewed.

The purpose of this article is to analyze the role of migration service intermediaries by recognizing the differences and similarities with other online service intermediaries and also the particularities that this type of intermediation implies. From the analysis of the use of online services for migrants, it was observed that users require the help of public and private organizations to carry out the immigration regularization procedure. Immigration services are mostly requested by migrants from Guatemala, Honduras, and El Salvador who have entered Mexico irregularly, i.e. without immigration documents. Given their status as irregular, they have not established a relationship with the government for fear of deportation. Migrants wish to regularize their stay status by obtaining a temporary resident permit. This procedure is carried out in the offices of the National Migration Institute (NMI) in the city of Tapachula, state of Chiapas, Mexico. The procedure is initiated online by means of a pre-registration form containing each migrant's personal data, then it is continued with a notification in the user's email, and, finally, the last steps are carried out in person.

This paper is organized in five sections, including the foregoing introduction. Section two provides the results of our review of the existing literature, focusing on the role of intermediaries in digital government, the importance of the digital divide, and the characteristics of immigration services users. Section three briefly describes the research design and methods used in this study. Section four presents preliminary results which highlight aspects and characteristics of intermediaries in immigration services. Section five provides some final comments and suggests ideas for future research about this topic.

2. Literature Review

This section presents the results of our review of the existing literature. First, a brief presentation of the concept of intermediaries in general and also the ones devoted to digital government and data, who these intermediaries are, and the different roles they play. Second, the concept of digital divide is revised as it could be considered as one of the main reason why digital government intermediaries exist. Users of immigration services are also discussed, since it is considered necessary to make a review of such users' characteristics to understand their differences with respect to other users, including but not limited to the digital divide.

2.1. Digital Government Intermediaries

In the digital government literature, the concept of intermediaries has been used to analyze the relationship between government and users, which is mediated by a third party. Intermediaries are defined as "any organization that mediates the relationship between two or more actors" (Van der Muelen quoted in Arendsen & Hedde, 2009). Some of the first uses of this concept were in the context of e-commerce. It was initially considered that by moving from traditional commerce to e-commerce, intermediaries would disappear, as each person would find what he or she was looking for directly.

However, the roles played by intermediaries are maintained in many instances, even in electronic media (Baiey & Bakos, 1997).

These roles played by traditional intermediaries are: 1) bringing together buyers and sellers of products to achieve economies of scale and reduce the asymmetry of negotiations; 2) protecting buyers and sellers from the opportunistic conduct of other market participants, becoming a trusted agent; 3) facilitating the market by reducing operating costs; and 4) locating the appropriate buyer with the appropriate seller (matching buyers and sellers) (Bailey & Bakos, 1997). These behaviors have originally been studied from economic theory. Intermediaries are an important part of reducing transaction costs and generating some advantages. These roles have been transferred to e-government intermediaries for some authors (Janssen & Klievink, 2008; Arendsen & Hedde, 2009), which are described as follows: 1) uniting demand with supply; 2) gathering information; 3) providing trust; and 4) facilitating operations by providing organizational infrastructure.

As for Sein (2011), intermediaries are classified into four types depending on the role they play, 1) facilitating intermediaries, those that only provide physical access such as computers and the internet, they are usually Internet cafés; 2) direct intermediaries, they facilitate the use of online services or digital government information and these can be NGOs, local organizations, or citizens; 3) enabling intermediaries, it is the combination of the previous roles, they provide physical access and facilitate the use of services; 4) transforming intermediaries, those that support groups of disadvantaged citizens, act as activists. Studies on intermediaries come from developed and underdeveloped countries. Some of the work that has studied the case of intermediaries in a developed country such as the Netherlands. Janssen & Klievink (2008) point out that intermediaries can be employed to reduce costs and, at the same time, make e-government demand-oriented. Intermediaries, by being closer to users, facilitate the provision of services. In some cases, the government itself has decided to introduce private organizations to function as intermediaries, as in the case of Saudi Arabia, where significant benefits have been found from intermediaries' help to citizens who do not have the skills or access to computers to adopt digital government (Weerakkody, El-Haddadeh, Al-Sobhi, Akhet & Dwivedi, 2013).

In this regard, the literature on intermediaries notes that it is important to study their role in digital government projects in developing countries (Sein, 2011), where intermediaries could be considered to be just as important as the government and citizens. These intermediaries are usually internet cafés, NGOs, socio-religious organizations, private companies, and even other government agencies (Sein, 2011). All of them provide Internet access and also offer support to the citizens to use the services and information offered by government. Dombrowski (2014) and AlSobhi, Muhammad & Weerakkody (2009) mention that intermediaries are not typical end users but that they use digital government for their customers.

The importance of intermediaries is recognized by pointing out that the use of intermediary organizations cannot be easily replaced or internalized through direct interactions. The government should seek a strategy in which all types of intermediaries are used to interact with citizens and businesses (Janssen & Klievink, 2008). More recently, intermediation services went from online services to focus on the intermediation of open data or infomediaries. These intermediaries are usually computer programmers, designers, coders, testers, e-government enthusiasts, and even

technically savvy citizens (Kassen, 2018); that is, those who have the capabilities and skills to reuse and add value to datasets that the government makes available to citizens. The concept of intermediaries has been widely used in the context of open data, because in this topic, most of the datasets the government provide to citizens are often non-processed information and the majority of the population does not possess skills to reuse or analyze that information (Kassen, 2018).

Intermediaries can be a significant part of removing existing barriers while unlocking the potential of data for all, particularly for communities with limited human or financial resources, limited access to existing data infrastructures, and underserved populations (Yoon et al., 2018). Some of these barriers for users are lack of access, low levels of data literacy, and lack of human, social and financial capital to effectively use open data (Van Schalkwyk, 2015). For Van Schalkwyk et al. (2016) intermediaries play a number of important roles (i) they increase the accessibility and utility of data; (ii) they may assume the function of a "keystone species" in a data ecosystem; and (iii) they have the potential to democratize the impacts and use of open data, which is very similar to the roles that intermediaries originally had in the context of e-commerce and e-government services.

2.2. Users of Immigration Services and the Digital Divide

Environmental variables have been identified as important for Internet access and use (Helbig, Gil-Garcia & Ferro, 2009). We argue that the environment clearly affects how individuals use online government services, particularly the digital divide. For some authors (Belanger & Carter, 2009) there are two variables that are important for the digital divide at the individual level: material access and usability. The experience of users about these two aspects is influenced by their social and demographic characteristics. Some of these characteristics are ethnicity, age, gender, education, and income (Gil-Garcia, Helbig & Ferro, 2006).

Many e-government studies have focused on demand needs and specific conditions of users. One of the main aspects being studied is how much these services really respond to the needs of users and adapt to their specific conditions (Bertot, Jeager & McClure, 2008; Gauld, Goldfinch & Horsburg, 2009; Reddick, 2005; Moon & Welch, 2005). In addition, these studies also review the impact of the digital divide on the use of e-government services (Reddick, 2005; Bertot, Jeager & McClure, 2008; Helbig, Gil-Garcia & Ferro, 2009; Jeager & Bertot 2010; Norris, 2001; DiMaggio & Hargittai, 2001; Gil-Garcia, Helbig & Ferro, 2006; Belanger & Carter, 2009). While there are many issues studied in terms of demand, few studies have considered migrants as the main users. Some examples are Wang & Che (2012) and Wang & Gu, (2012), who describe how Chinese citizens migrating from the countryside to the city face a lack of skills when using government online services, due to the digital divide. However, their legal and social status is different from that of international migrants. In fact, internal migrants are by definition citizens of the same country.

Unlike the studies mentioned above, the current study focus on non-citizens. Therefore, the citizen-oriented theory does not match the concept of foreign users, as many of the benefits that a citizen would get from e-government are not accessible to non-citizen users. These include improving the relationship between government and citizens or having access to government online services from home; because of the requirements of the migration procedures, it is almost always necessary for them to be physically present at the government offices at least for certain steps in the

process. In addition, considering foreigners as users is ambiguous and complex (Garcia-Garcia & Gil-Garcia, 2018), because within this category of users is very diverse and there are many differences in terms of country of origin, native language, socioeconomic level, and purpose to enter the host country, among others. For this study, user is the person to whom government services are provided, which include face-to-face and online services. In other words, migrants are the users of migration management services, because those services are designed for them to accomplish certain goals.

3. Research Design and Methods

This research uses a case study approach. Primary data was collected through two information-gathering techniques: semi-structured interviews and direct observation. A total of 31 interviews were conducted with Central American immigrants, non-governmental organizations, government offices of the state of Chiapas, consulates of several Central American countries, and owners of internet cafés. We used "snowball" as the sampling technique for this study. Some of the topics covered in the interviews were the objectives of each intermediary as an organization, their role in supporting migrants, and how they advise them, the problems that users have to carry out the procedure, their opinion on the incorporation of technology into migration services, and how they participate in government programs and services. Analysis of interview data was done through linking content of the transcribed interviews to key concepts and topics from the literature. For example, comments on helping immigrants with government processes were associated to the topic of intermediation, comments on meetings and communication between organizations to the topic of networks, and ease of use of the website to the topic of usability. Following this process, the most relevant comments on the subject of intermediation were identified in each interview and then integrated with the comments of other interviews.

Direct observation was carried out at NMI facilities, NGOs, consulates, and internet cafés. This allowed us to reconstruct the information and get to know more about the migrants who came to request support in some government process, observe interactions between intermediaries and migrants, and provide a lot of information that helped to know the context in which they are immersed, as well as their skills and needs. Interviews and observation notes were coded and analyzed following a qualitative approach and looking for themes that were important from the interviewees' point of view. One of these topics was the role of intermediaries in the provision of migration services.

4. Preliminary Results

This section presents our preliminary results with a focus on aspects that are unique or different in terms of the role of intermediaries for immigration services in contrast with digital government in general.

4.1. Consulates as Basic Intermediaries

Unlike other types of digital government, for migration services the consulates play a very important role. Consulates are a representation of the government of their country, so they are seen as a safe place for migrants to ask for help and advise on services and technology. They are a common intermediary for migrants, especially for those who, given their short time in the country, do not yet have a social network or do not know any NGOs that also support these processes. For example, the role of Central American consulates is predominantly to support their nationals and receive information from the Mexican government, without interfering or making suggestions about work. The role of consulates is primarily as a link between demand and supply and to provide human resources with the necessary expertise to assist migrants in online preregistration for certain services. This function is carried out by consulates that have a larger population of migrants from their country in southern Mexico. For instance, the consulates of Guatemala and El Salvador are the ones with the largest migrant population in southern Mexico and, through their operational staff, they help migrants fill out the pre-registration form and also give them advice on the process. In contrast, the Honduran consulate is an organization with very few employees and they do not give any support to their nationals regarding the procedures of the NMI. In general terms, the consulates have information about the programs of the NMI and thus can advise their nationals. Due to the nature of migration services, consulates are a type of intermediary that is unique in this context and play a very important role.

4.2. Non-Governmental Organizations (NGOs) as Intermediaries and Activists

As an intermediary, NGOs contribute substantially, because they do not only support migrants by filling out the online preregistration, but also provide specific information about government procedures, directly support individual cases to meet the necessary requirements, and help migrants to prepare the materials they need to present at the NMI. They have also been promoting policies such as immigration regularization programs, so their role is the most active of all intermediaries. Therefore, NGOs are considered for helping migrants, not only because they want to do it, but also because the NMI promotes their role as intermediaries on its web portal. That is, a person is encouraged to receive help from an NGO in terms of reviewing their documents and their condition to know if it is applicable for any type of residence document. In fact, if they do not have the support of an NGO, it may take much more time for NMI to review their case and process their services.

4.3. Relationship with a Government from a Different Country

In most cases where digital government intermediaries exist users are citizens. This condition is something that facilitates the relationship between government and users, becausesome service intermediaries help users at the request of a government agency as a strategy that helps them spread their services online. Regarding immigration services, the users are non-citizens, therefore, it is necessary to have special considerations when relating to a population with different social and cultural characteristics. Individuals not familiar with the national language and/or the lexicon of government organizations will have significant difficulties understanding a process or service.

Even documented migrants have difficulty understanding the process of immigration procedures. In addition, since these are services related to regularizing residence in a foreign country, aspects related to security and border control must also be considered, which makes this type of process different due to strict data scrutiny. Above all, the most prominent feature of intermediaries in migration services is their ability to bring government online services closer to those people who, given that they were admitted as undocumented, face the fear of dealing with government.

4.4. Low Level of Digital Literacy, Poverty and Legal Vulnerability

Users of NMI services are migrants based on Mexico's southern border. The immigration regularization process is aimed at foreigners who have entered Mexico in an unauthorized manner and who are already living in Mexico, at least for two years. The low level of digital literacy stems from its low level of schooling and high poverty level. There are users who do not know how to read or write or only have a couple of years of schooling, as the consul of Guatemala says: "There are a lot of Guatemalan who unfortunately cannot read or write". The Consul of El Salvador explained: "Many conationals do not have schooling in which they have learned to use a computer, besides not everyone has access to a computer. We even have to explain to them what the at sign means when we tell them to send a document by email". In addition, users of these services are frequently in poverty. Most people who enter Mexico irregularly do not have a permit to reside or to work in Mexico, so they do not have access to a formal job with a good salary and social benefits. So, in these situations of low schooling, lack of technological skills, and problems associated with legal vulnerability and poverty, intermediaries play a very important role in being a bridge between government and the users of migration services.

5. Final Comments and Next Steps

Early studies on government intermediation were focused on analyzing the benefits of intermediaries in electronic commerce, while more recent studies acknowledge the importance of intermediaries in bringing digital government closer to citizens. The role of intermediaries in immigration services is consistent with previous studies. They help to bridge the gap between supply with demand and they also can reduce the cost for users when they approach these organizations. Consulates are the only intermediary that have not been studied in digital government literature and they have a very important role in migration services, because, for many migrants, the consulate is perhaps one of the safest places, given their legal vulnerability and the risk of being deported. These and some specific aspects about the intermediation in immigration services will be more deeply addressed in the following steps in this research. Besides, the specific characteristics of these intermediaries and the roles they play in the context of immigration services will be deepened.

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Strengthening Health Systems in Low-Income Countries: A Stakeholder Engagement Framework

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Abstract: Failures of e-Government projects in low-income countries are well-documented, though for many countries the adoption of information and communication technology presents the most effectual approach to overcoming some of the challenges faced in service provision. However, the long-term sustainability of e-Government projects may be hampered by an inadequate evaluation of the social and technical environment in which these solutions are placed, particularly with respect to the role of stakeholders during project design. This paper, therefore, proposes a strategic sector-specific exploration of the issues in the design and implementation processes of e-Government projects in low-income countries with a focus on the healthcare sector.

Keywords: e-Government, Information and Communication Technologies, Information Systems, Healthcare Systems, Citizen co-creation.

1. Introduction

Information and Communication Technologies (ICTs) are widely considered as playing a crucial role in today's growing digital economy (Jorgenson, 2016; Lee et al., 2005) and therefore perceived as a significant contributor to socio-economic development in advanced economic systems (Erumban & Das, 2016; Malaquias et al., 2017). Low-income countries thus attempt to leverage on the anticipated opportunities provided by these technologies in order to become effective participants in an increasingly competitive global environment. ICTs have been used to advance progress in key areas including: improvement of healthcare delivery (Cecchini, 2018), integration into agricultural processes (Dlodlo & Kalezhi, 2015), and use of mobile banking platforms (Asongu & Odhiambo, 2019). Yet, often insurmountable challenges such as poor physical infrastructure, inadequate policies, and insufficient level of capacities (Gil-Garcia & Pardo, 2005) , that are particularly endemic in the implementation and sustainability of e-Government projects (Heeks, 2002), have resulted in high rates of project failure (Lal et al., 2018).

Thus, long-term sustainability of e-Government projects in low-income countries are often derailed not only by institutional procedures, policies and capacities, but also by extraneous factors such as the availability of incomplete data, which has led to a modern data divide. Advanced

technologies such as big data analytics (Luo et al., 2016), artificial intelligence and machine learning (Mahmud et al., 2018) therefore further underscore the disparities between those entities that collect and/or own data, and those that have the capacities (and/or capabilities) to effectively analyse and interpret this data.

Additionally, the design of any e-Government project typically necessitates coordination among a broad range of stakeholders including disparate Government ministries and departments, external organisations and businesses, and other principal beneficiaries, including citizens. As such, possible misalignment in stakeholder expectations (Heeks, 2002) needs to be considered due to possible wide variations in stakeholder interests which represents a significant challenge as "the goals of national government, local government, public service providers (both profit-driven and not-for-profit), voluntary and community organisations and individual members of the public are rarely congruent" (Grimsley et al., 2007). However, e-Government initiatives tend to emphasise the technical aspects of delivery rather than the role of stakeholders and their participation in project design (Longford, 2000). Therefore, given the resource constraints faced by low-income countries, an integrated approach to e-Government project design which considers key issues such as resource-sharing and stakeholder participation, needs to be considered.

This paper therefore discusses an integrated and consistent approach to the design and development of e-Government projects in low-income countries, building on existing research in the conceptualisation of a framework for adoption (Frost & Lal, 2019). The framework highlights a multi-dimensional approach to e-Government design with a focus on the engagement of stakeholders for successful implementation and the capitalisation of available resources. This paper examines the possible application of this framework to an e-Government project. Human development projects (such as healthcare systems) however tend to be at the focal edge of e-Government initiatives in low-income countries, with more attention paid to those projects perceived as offering "clearly identifiable socioeconomic costs and benefits, for example, gains in time or money to pay government bills, or to comply with taxes and other dues, or to obtain a registration certificate" (Madon et al., 2007). Therefore this paper discusses a possible approach to application of the framework within the healthcare sector, prompted by current ongoing research within two selected regions - Africa and Bangladesh. It is anticipated that the future results of this research project will contribute to the dialogue on e-Government project design, and further the debate in the adoption of ICTs by the public sector in low-income countries.

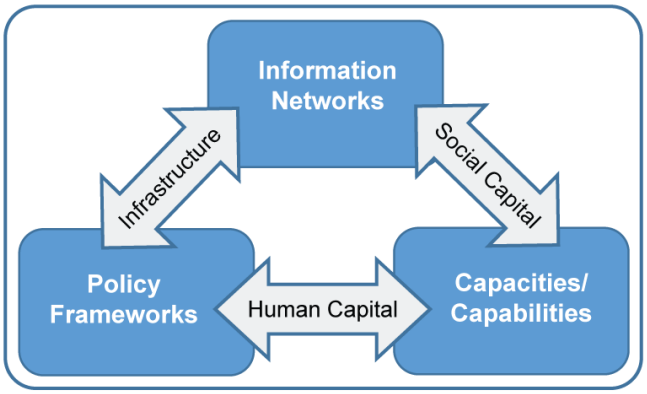
2. Methodology

Previous research (Frost & Lal, 2019), explored the core underlying components for success in e-Government project design and proposed a framework within which relationships among the components could be more effectively investigated. A thorough search of the literature identified key compoents in the design of e-Government projects, namely:

1) Information networks: characterise the individuals, technologies, and processes that facilitate information and knowledge exchange within the system;
2) Policy frameworks: encompass the policies (to include ICT and other sector-specific policies) and other regulations and standards; and

3) Capabilities/capacities: describe the existing capabilities within the system and the potential capacities to exploit the benefits of the implemented system.

Figure 1: Framework for e-Government Stakeholder Engagement.



This research also identified three supporting factors for e-Government project design in low income countries as:

- Social capital: refers to the levels of social cohesion that are formed within communities or that support vertical linkages with external formal institutions;
- Human capital: broadly refers to the ability of actors such as individuals, groups, organizations, institutions and countries to perform specified functions, solve problems, set and achieve objectives within the system; and
- Infrastructure: specifically, within an e-Government context, this is the underlying telecommunication networks or the ICTs that facilitate access to the system.

The developed framework (Figure 1) therefore highlights the key dependencies within the system that should be considered during e-Government project design and which are critical to long-term sustainability. Specifically, these primary relationships were identified as:

- Policy Frameworks ↔ Infrastructure ↔ Information Networks: This relationship emphasises the role of the underlying infrastructure in supporting information and knowledge exchange, and in defining the types of policies to be created to support access;
- Policy Frameworks ↔ Human Capital ↔ Capacities/Capabilities: This describes the individuals and communities that support the development of the network through creation of the requisite policies (e.g., within Government agencies) and the individual or collective capabilities of a society or community for exploiting the opportunities offered by the system;
- Information Networks ↔ Social Capital ↔ Capacities/Capabilities: This inter-dependency underscores the pivotal role of social capital in facilitating and enhancing information and knowledge exchange among individuals and/or organisations, making it easier for people to collaborate and develop requisite capabilities.

3. Application in the Healthcare Sector

Ongoing research therefore further examines the applicability of this e-Government framework to the healthcare sector to examine how technologies can more effectively support and enhance the inter-relationships among stakeholders in a health system. In many low-income countries healthcare projects have been predominantly facilitated and controlled by government agencies, therefore this research offers some generalisations for other sector-specific e-Government projects. Additionally, with the increased use of technologies in the sector to support healthcare provision (e-Health) and information exchange, and recent research pointing to the growing importance of data- driven, evidence-based healthcare (Ong et al., 2018) an exploration of these components in the sector will contribute to the growing literature on the use of technologies for strengthening health systems. Therefore focus is given to enhancements and interactions among the proposed framework components "in ways that achieve more equitable and sustained improvements across health services and health outcomes" (WHO, 2007).

Consideration was given to the differentiation of the framework within a healthcare context, and the specific issues that may contend. Borrowing from the information systems literature to understand these key issues highlights Baxter and Sommerville's assertion that "the failure of large complex systems to meet their deadline, costs, and stakeholder expectations are not, by and large, failures of technology. Rather, these projects fail because they do not recognise the social and organisational complexity of the environment in which the systems are deployed" (Baxter and Sommerville, 2011). Therefore it can be argued that an adopted top-down approach of 'bringing people to technology' - that is to develop and implement the system without a full understanding of the context within which the system will operate - is more likely to lead to failure. Thus in considering the applicability of the framework to the healthcare sector, the researchers decided that a more stakeholder-centric approach is needed where the current and desired outcomes of the project are made explicit (Grimsley et al., 2007), and anticipated contributions - in the manner of available resources and capabilities - of all participating stakeholders are also clearly defined.

The evaluation of multiple stakeholder interests in the design of e-Government initiatives invariably represents a significant challenge as "the goals of national government, local government, public service providers (both profit-driven and not-for-profit), voluntary and community organisations and individual members of the public are rarely congruent" (Grimsley et al., 2007). However identified stakeholders in e-Government projects may necessarily include Government agencies, citizens, and businesses, but can also extend to those stakeholders such as voluntary and community organisations that may be misplaced on the periphery of e-Government design processes (Bowles & Gintis, 2002). Therefore, the refined framework for the healthcare sector highlights the role of stakeholders - individuals or groups that affect (or are affected by) realisation of the project goals or outcomes (Freeman, 2010) - in the design and development of the e-Government project (Flak & Rose, 2005). The refined framework is based on the supposition that the health system is implemented: (i) as an e-Government project with mandatory use by end-users; (ii) as a service provided by health workers in the public sector, but may also extend to private healthcare practitioners; and (iii) is supported by an underlying telecommunications infrastructure where service provisioning may be from private (non-Government) agencies.

Figure 2: Application of Framework in the Healthcare Sector.

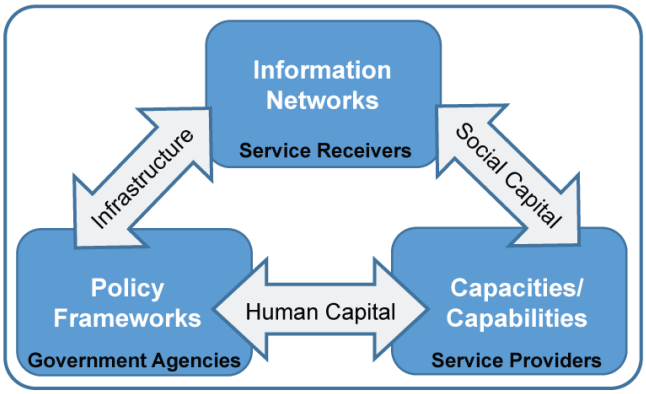


Figure 2 illustrates the proposed primary roles of each group of stakeholders within the general framework, where the following groups are proposed as the primary stakeholders in the health system (Ong et al., 2018):

- Service receivers: This group of stakeholders includes individual beneficiaries and communities, highlighting the use of technologies by these stakeholders to facilitate the creation or enhancement of information networks. The development and sustainability of these information networks are dependent on having access to the relevant underlying infrastructure such as a mobile network, and on the existence of sufficient levels of social capital exist to support trust in the created information networks.
- Service providers: Service providers include for example community healthcare workers and other healthcare professionals that possess the capacities and capabilities for health service provision to communities. Underlying this is the skills or knowledge that these providers possess (human capital) and, it can also be argued, that social capital facilitates the development of trusted relationships for information and knowledge exchange.
- Government agencies: Government agencies are typically the principal regulators responsible for the design of requisite policies. The types of policies may be defined by the underlying infrastructure such as the selected technologies, and these agencies having the relevant human capital to create effective policies.

Ongoing research therefore examines the application of the framework within the healthcare sector, with specific focus on the role of stakeholders and their engagement within the project. Some of the key research aims therefore include:

a) To understand the dynamics of the specific relationships among stakeholders within the framework during project design and development;
b) To investigate, through comparative analyses between the two regions, the socio-cultural factors in the implementation of the project;
c) To understand the key factors that may impact sustainability of the project.

4. Conclusion and Future Directions

This paper explores the application of a framework to understand the inter-relationships among key components and stakeholders for the implementation of an e-Government project, specifically a health system in a low-income country. The framework presents a multidimensional approach to understanding these issues, that may help in identifying misalignment between stakeholder needs and requirements, and the technologies used within that system. Ongoing research will focus on the collection and analysis of data from two low-income countries on the use of technologies within a selected health system. By adopting a structured-case method approach, the longitudinal studies will facilitate more in-depth research on the application of the e-Government framework within a specific sector.

The sector-specific application of the framework is not without its limitations, as it omits extraneous factors such as the pervasiveness of political corruption, measures that are difficult to encapsulate within the current framework. However, the results of this ongoing research between the two selected regions - Africa and Asia - will serve as a broad starting point to discussion of these issues and bring focus to sector (and possibly regionally) specific issues that impact long-term sustainability of the implemented systems in low-income countries. Additionally, the results of the research will contribute to debates on approaches to stakeholder engagement in the implementation of e-Government projects in low-income countries.

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Who is the Target User of a Patient Record System?

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Abstract: Information systems aim to serve different users and their varying needs. This emphasizes user centered development because users, as experts of their work practices and contexts, have insights how the future system should serve their needs. However, it is ambiguous what is meant by the user centeredness, or who actually are the users. The issue is emphasized in large-scale public sector information systems, that are used by and influence myriad of individuals, some of who may be perceived as users or end-users. These users may not necessarily share a common interest towards the system. Under the circumstances the identification and definition of a user is exemplified since the system may not serve all the user groups in a similar manner or at the same quality level. We aim at identifying the users in a large-scale information systems project, namely a patient record system, in a single qualitative case study. Our identification of different levels of users provides a base for conceptualizing the user, and for explicitly addressing them either proactively in the development or later when conducting a post-mortem analysis.

Keywords: Users, Information systems development, Public sector Information Systems

1. Introduction

Public organizations provide different services to citizens (Lindgren & Jansson, 2013). Several public information systems (IS) are used to support the authorities and institutions and their employees, i.e. individual actors providing the services (Sundgren, 2012). While it is common to speak of a citizen receiving public services as a customer (Alford, 2002; Jansson et al., 2012), the notion of a user is not discussed explicitly in context of large-scale public sector IS. Traditionally, and implicitly, the IS users have been assumed to be those who actually use the system (Gulliksen et al., 1999; Bano & Zowghi, 2015). Yet there is a fundamental difference here: public services target citizens (Axelsson et al., 2010; Lindgren & Jansson, 2013) while information systems serve their users (Delone & McLean, 1992). These two are not necessarily the same, meaning the ultimate target actors of the system not being evident or trivial.

For a long time, IS research has explored addressing the users in IS development (ISD) (Swanson, 1974; Iivari & Iivari, 2006; Iivari & Iivari, 2011; Abelein et al., 2013; Oo Tha, 2019; Martikainen et al., 2020). Despite the early taxonomy of end-users (Cotterman & Kumar, 1989) explicit definitions or methods in identifying the IS user in different situations are rare. In fact, IS user has remained largely

untouched in detailed inspection (Iivari et al., 2010; Amrit et al., 2013), although, for example, the users' interests may not be entirely shared (Damodaran, 1996). This is because the stakeholders' interests are intrinsic (Donaldson & Preston, 1995). While a high-level compatibility of different interests could be shared, the stakeholders do not necessarily agree on ends and means (Vidgen, 1987; Kirsch & Haney, 2006). While some stakeholder needs may be fulfilled, some others may not be addressed with a similar emphasis or at all. This underlines the importance of identifying the users and their types (Bano & Zowghi, 2015; Lukyanenko et al., 2016; Abusamhadana et al., 2019), making the question of who is the IS user relevant.

User involvement in ISD is ambiguous (Iivari & Iivari, 2006; Iivari & Iivari, 2011). Practical instructions on how to consider the users are superficial or contradictory (Pekkola et al., 2006). Different ISD methods address the users differently (Iivari & Iivari, 2011) and the developers conceptualize the users in different ways (Isomäki, 2002). Despite this diversity, addressing the users is said to be a key to success (He and King 2008; Hsu et al. 2012; Wing et al., 2017; Oo Tha, 2019; Abusamhadana et al., 2019; Martikainen, 2015; Martikainen et al., 2020). The users are experts in their domain and have insights about their work and work practices which should be leveraged in ISD (Cherry & Macredie, 1999; Abelein et al., 2013). User participation generates psychological buy-in among the participants, result in superior systems requirements, improves the relationship between the developers and the users (Markus & Mao, 2004), and eventually produces user-satisfaction (Abelein et al., 2013). However, who is the ultimate user is not always explicit as different actors have different interests towards the system (Damodaran, 1996).

In the context of public e-service development, discussion on the user participation is scarce (Karlsson et al., 2012) even though an in-depth exploration of the user engagement in IS implementation has been urged (Cherry & Macredie, 1999; Chan & Pan, 2008). In this paper, we seek an answer to the question, "*Who is the target user of user-centred development of a large-scale IS*?" We address the question by conducting a case study in the largest ISD project of Finland. We adopt the grounded theory approach (Urquhart, 2012) to inspect how the developers in the patient record system development project define IS users and how they address them.

The paper is organized as follows: in section 2 we discuss the theoretical background. In section 3 research settings and methods are presented. In section 4 we show our findings. The paper ends with discussion and concluding sections.

2. Theoretical Background

Being user-centered in ISD is a wide concept. User-centeredness could mean e.g. user focus, work-centeredness, or user-participation (Iivari & Iivari, 2006). User involvement has also been defined as a "a subjective psychological state reflecting the importance and personal relevance of a system to the user'" (Barki & Hartwick, 1989). User involvement consequently does not mean that the users necessarily participate in the development tasks (Thakurta, 2014; Bano & Zowghi, 2015; Wing et al., 2017). User involvement has been characterized on the continuum of informative, consultative, or participative user-involvement (Damodaran, 1996). It can be summarized that effective user

involvement is argued as users having possibilities to influence the development process (Damodaran, 1996; Pekkola et al., 2006).

In ISD, the target user has usually been defined as a person who will use the system for performing tasks that are part of his or her work activities (Gulliksen et al., 1999; Bano & Zowghi, 2015). This connotes with the definition of a first level user or an end-user (Cotterman & Kumar, 1989; Damodaran, 1996). Yet the concept of the user of a socio-technical IS is much broader. The second category of users are those who do not interact with the system but either benefit from the outcomes of its use (Damodaran, 1996) or use the system through an intermediary (Alsos & Svanæs, 2011). Damodaran (1996) for example argues that also users who do not directly use the system should be included in a systematic user analysis, as their interests may significantly differ. Further, it has been argued that the needs of those whose lives may be affected by a system should also be considered (Isomäki, 2002, p. 16). Although this has been acknowledged, those users not directly interacting with the system are often overlooked (Alsos & Svanæs, 2011).

Technological evolution and certain development methods (Taylor et al., 1998; Isomäki, 2002) have blurred the distinction between the developers and the users (Pouloudi, 1999). It has become increasingly difficult to distinguish IS users (Iivari et al., 2010). In complex contexts, such as public sector (Alanne et al., 2015) and large-scale systems (Tuunanen & Rossi, 2004), the task is even less trivial as the number of stakeholders rapidly increases and their knowledge becomes scattered. Public e-services may be developed for nationwide user groups (Axelsson et al., 2010). Involving all possible users individually is a daunting task (Cherry & Macredie, 1999; Abusamhadana et al., 2019). The complexity of the context and limitation of resources makes the question of who to address in user-centered IS development very arduous.

Addressing the users in ISD is consequently a multidimensional concept, varying in how it is applied in real life systems development. In general, it is rarely comprehensively defined who the developers consider as the target system users (Alsos & Svanæs, 2011). Most often they are the first level users i.e. those who use the system hand-on while working (e.g. Hsu et al., 2012; Abusamhadana et a., 2019; Martikainen et al., 2020). Consequently, they and their needs, expectations, desires are elicited and addressed. What is not often explicitly discussed is if and how are the needs of the more indirect users considered.

3. Research Setting

Our case focuses on an ultra large-scale IS renewal project for a group of health care and social care organizations in Finland. They include a set of municipalities and specific agencies. The patient record system is estimated to serve around 35.000 social and healthcare professionals and influence around 1.6 million citizens. The system is estimated to cost approximately 200 M€, and the total project around 600 M€. Project is thus one of the largest IS projects ever in Finland.

The decision to renew the patient record system was based on a need to integrate data from hundreds, if not thousands, of individual systems to raise the service level back to an acceptable level. Previous problems include the use of numerous non-integrated systems, and poor usability

and maintenance. Healthcare and social care were also operating in separate silos. While healthcare was the initial driver of the project, social care was decided to be involved and included. The aim was to connect these separate fields of practice through a single system so that the service experience to the citizens is improved and standardized no matter what service they needed.

Our study follows an interpretative qualitative single case study approach (Walsham, 1995) where the focus is on human interpretations and meanings, embracing the importance of social issues in ISD. This approach was chosen in order to draw implications from a large IS project (Walsham, 1995). The case was selected because of its unique nature in size and complexity.

Data collection was conducted between November 2019 and February 2020 by interviewing the main actors in the project organization. They were assumed to have the best information about the development practices and processes, and the users. The interviewees were selected through snowballing sampling (Morgan, 2008). First three interviewees were assigned by our contact person. Later we asked each interviewee to name the next potential person. The list of the interviewees is presented in Table 1 with their corresponding expertise.

Table 7: List of Interviewees

Interviewees' Position and Index	**Expertise**
Management [M1]	Technology
Management [M2]; [M3]; [M10]	Development
Management [M4]	Product
Management [M5]	Operational
Clinical Leadership [Clin1]	Clinical and Social Care
Management [M6]	Usability
Management [M7]	Customer and Product
Consultant [C1]	Social Care
Management [M8]	Product
Management [M9]	Unit

The interviews followed a thematic open interview protocol where the interviewer does not steer the discussion. The interview questions dig into the case details and events, as perceived by the interviewees. All interviews, approximately an hour each, were conducted by two interviewers and face-to-face in the case organization premises. All interviews were recorded and analyzed in Finnish. Only illustrative quotations are translated into English.

Data analysis followed Grounded Theory Approach (Urquhart, 2012). Data was analyzed by the first author line by line without any initial theoretical framework. We were interested in how the interviewees define the user and the development principles, and how they describe the project practices. For instance, the interviewees described the project, and all issues were taken as significant. Each incident was named with a descriptive code. Similar codes then were grouped into larger groups to represent collective conceptions. Finally, the relationships between the groups of codes were drawn. An example of the coding procedure is presented in table 2.

Table 8: Coding Examples

Data Extract	Code	Interpretation
"The system's end-users are healthcare and social care professionals, and those citizens using the client portal" [M2].	"End-users as professionals", "End-users as citizens who use client portal", "End-users as those in direct use-relationship to the system"´.	Those who directly use the system are perceived as the system's end users. Professionals and management use the IS directly through its user interface. Also, the end-users who use the client portal have a direct use-relationships to the system, and are thus perceived as end-users.
"[the user is] organizational management, who uses different reports and management functionalities and such. They, again, are end-users" [M2].	"End-users as organizational management", "End-users as those in direct use-relationship to the system".	

4. Findings

4.1. IS Users Defined

The system users were defined to be those who directly use the system: "The system's end-users are healthcare and social care professionals, and those citizens who are using the client portal" [M2]. Citizens not using the client portal are not perceived as the system's end users or customers. They are rather regarded as the customers of the client organizations: "the customers don't include citizens. Citizens are the customers of the client organizations" [M2]. Citizens not having a direct use-relationship with the system were considered as indirect users: "citizens are indirectly [considered]… while they are end-users in one sense, they are not customers" [M2]. Organizational management, on the other hand, were perceived as being direct end-users as they receive information and use the management support functions provided by the system. All this resulted in user experience including all the professionals using the system hands-on: "If you think about the user-experience, the system is only used by the social and healthcare professionals" [M8].

However, when talking about the person whose needs were to be fulfilled, the customers were placed on the center: "In principle, [the system] is defined to answer the needs of patients and customers" [M2]. Hands-on user relationship was also emphasized: "The system is developed for

the citizens. We have around 1.5 million citizens getting their things done through the system" [M4]. Yet the citizens were not perceived as the direct beneficiaries of the system: "Even though the citizen is at the center, the benefits reach them only indirectly" [M2]. The citizens benefit from the system only through the direct users' improved actions: "[The benefits are gained] indirectly in that sense that work of [healthcare or social care] professionals become easier and they treat patients accordingly" [M2]. Streamlining the professionals' work processes was defined as the "business case" [M5].

The logic of serving professionals was also apparent in the implementation goals. Initially the goal was "to streamline the work of professionals". Later, it was defined as to produce "a unified tool, which serves the work of professionals in all different contexts" [M6]. Also a more high-level goal: "the creation of wellbeing" [Clin1] was also mentioned. To achieve this, streamlining the work of professionals was seen essential. This issue of goal levels indicates that the work of direct users has a causal relation to producing the benefits to indirect, yet the main group of stakeholders.

The user viewpoint was strongly emphasized through the direct users' critical role. Serving the end-users was seen as a key for fulfilling the project goals "because it will lead [the end-users] to producing other goals" [M2]. The citizens were not addressed directly if they had indirect use-relationship with the system. It was assumed that their needs are addressed by involving the direct users (aka professionals): "The way how the needs of citizens were addressed… It is mostly left as our client's responsibility, as they [citizens]are clients of our clients, to bring their needs to us" [M8].

All this underlines a perception that the direct use-relationship directs the definition of end-users, i.e. whose needs the system targets in the first place. Citizens and other indirect users enjoy the system through its services. They benefit the system indirectly, through its direct users. The relationship with the system also seems to define which stakeholders are mostly focused.

4.2. Addressing Users in Development

It is apparent that the system was designed with a strong emphasis on professionals who are its direct users. This is visible in the practice of involving the professionals in the system design: "when comparing [this case] to other IS acquisition projects, the viewpoint of what the users need is exceptional" [M6]. During the tendering, the professionals evaluated candidate systems. They also defined the work processes and aligned them with the system functionalities.

The users were later granted with a possibility to give feedback and propose development ideas. In fact, the amount of user feedback exceeded the expectations: "We opened the idea bank to the end-users for their ideas… we learn that it was a far too open forum. Yet it enabled us to make changes quickly. However, then the others started to moan why such thing were done" [M4]. This put a need for a centralized decisions-making mechanism to coordinate different proposals and change initiatives. This also points out the emphasis on listening hands-on users. They were continuously involved in the development in various ways.

Serving direct end-users is apparent also on the usability efforts. An improved usability was a significant selection criterium in the tendering. In fact, the chosen system was described having the best usability compared to its challengers. This led the usability professionals becoming integrated

in the ISD process so that they could analyze the needs and system usability, and perform usability tests. Direct end-users were participating in those tests.

Some citizens participated in the development of the client portal. For instance, after the client portal had been introduced, the citizen feedback initiated new development actions. For example, "we didn't realize that some citizens still have those shorter phone numbers. First, it was impossible to enter those… we fixed that, and now it is enabled" [M8]. Although this example illustrates only a small action, it exemplifies the influence of the direct users, citizens in this case.

The focus on direct users was also explicit in the user stories. They were used in evaluating the system candidates. The user stories narrated typical scenarios, through which the systems were demonstrated. This exemplifies the professionals being the main target stakeholders. The professionals themselves also used their experiences to create the stories. Altogether the stories were perceived useful as they conveyed information, which could have been easily otherwise ignored.

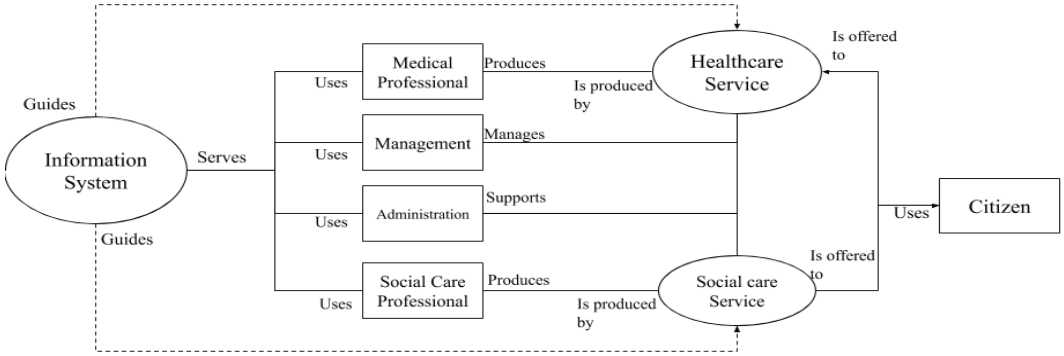
It was apparent the direct users' needs were not aligned. In a large and complex project these diverse needs may have not been treated entirely equally. Social care workers were complaining about the difficulties in adapting to the new scheduling functionalities: "I have tried to explain that the basis [in social care] is that even though the system would enable modern booking functionalities, we should not take them into use immediately because we have to first learn how to use an electronic calendar" [C1]. In this situation the development activities were targeted to healthcare professionals. The functionalities, perceived as unsuitable by the others, were still taken in to use: "Those responsible for the booking functionalities are from the healthcare sector. They are strongly stuck with the healthcare sector model. I just heard that this model still dominates. Since they don't have background in social care, they don't know how people work there" [C1]. The functionalities were also described as not being well aligned with the social care: "Reporting is quite quantitative. It is not understood that we [in the social care] receive a lot of qualitative material" [C1].

5. Discussion

While the user involvement in the ISD has been studied and urged, the practice of involving them has remained ambiguous especially in the context of large-scale systems development. Particularly discussion about who is the target user and what are the implications of such choice are rare. In this paper, we have studied who are the target users of a patient record system development. Figure 1 shows the relationships between different user groups and the IS in a patient record system. It illustrates that the development of a large-scale public sector IS addresses directly healthcare and social care professionals, administration, and management (Thakurta, 2017), considering citizens and even public services only indirectly. Citizens using the client portal is an exception, since they were considered directly in that narrow context. Medical and social care professionals are the primary user of the system as they provide services to citizens. Administration uses the system directly when they support to the actual customer service, such as billing. Management is also in a direct use-relationship as they use the management functionalities towards the professionals (e.g.

monitoring citizen feedback) and to receive information about the services (e.g. about the patient flow).

Figure 11: Use-Relationship to IS



In our case, addressing the users directly was an efficient and effective approach – at least in theory. First, they were given a possibility to influence development (Damodaran, 1996; Pekkola et al., 2006). However, it is uncertain how effective the involvement actually was since measuring their influence or observing large scale system changes remains a mystery. There is a possibility for non-efficient involvement of users (Wing et al., 2017; Martikainen et al., 2020). While both parties may be interested in collaboration, the users perceive their views may not be efficiently considered (Martikainen, 2015). Our findings parallel with the literature that involving only some groups of users (Abusamhadana, 2019) especially hands-on users (Cherry & Macredie, 1999) is a typical user-centered approach.

As Figure 1 illustrates, the citizens were not defined having a direct use-relationship with the system (apart from through the citizen portal which provided only limited functionality). They were defined as indirect users, since their "system usage" took mainly place through the professionals providing services (Thakurta, 2017). Indirect users were not involved in the ISD. They were addressed through the professionals and their experiences of typical users. This approach is common in the form of intermediaries (Axelsson et al., 2010; Karlsson et al., 2012).

Although direct users were addressed, their interests were not aligned but numerous interpretations and opinions were common (c.f. Vidgen, 1997). Especially the users from the social care and from the healthcare had very differing needs and dissimilar expectations. Also the management had different priorities. While they embraced the systematicity with project management, such as holding on to the schedule, the operational level interviews revealed different views: "if you think about the project deadlines, they are being held on a bit too tightly. Of course there is a certain schedule but there are reasons for asking whether we can be bit flexible with it. But the train keeps on going…". This kind of pluralism in user needs is often the case in ISD (Vidgen, 1997; Kirsch & Haney, 2006). The interests of hands-on users may also differ from those of indirect users (Damodaran, 1996). Our findings indicate that the healthcare professionals and their opinions dominate how the citizens' needs are addressed. However, in our case the objectives are twofold. This means both healthcare and social care should be considered. This imbalance may cause

problems later when the social care is becoming more in the focus of the development (Lindgren & Jansson, 2013).

We argue that in large-scale ISD, the services supported with an IS need to be put in the center. Not individual users nor technologies. This emphasis on the service process will shift the perspective of who are the users and how their needs should be considered. While the perspective of patients has been argued relevant (Alsos & Svanæs, 2011) in our case they seem to be the "silent stakeholders" (Pouloudi et al., 2016).

6. Conclusion

We explored how the IS users are addressed in a large-scale public sector IS project. Our findings indicate that only those who have a direct use-relation to the IS are directly addressed. Secondary users, although defined as the main stakeholders, were addressed mainly through intermediaries. The citizens were thought to be at the main focus, but they and the other indirect user groups were actually considered as indirect beneficiaries. This results in the IS mostly its direct users, professionals at healthcare and social care.

Our case demonstrates that addressing the users and user groups in the development of a large-scale public sector IS is not easy or easily balanced. One reason for this is the large number of stakeholders, whose interests' conflict, or at least are not aligned. This is also apparent in our case where the users' interests are not shared but some groups are overemphasized at the cost of others. Those dominate the development, evidently influencing on the perceptions of the final system and its quality.

Our findings illustrate what addressing the users means in practice. This helps researchers and practitioners in defining what the ambiguous concept of user-centeredness means. However, deeper analysis about how the intermediaries address the needs of main beneficiaries (citizens in our case) is still urged. Also, it would be beneficial to explore the user-side perceptions and how their needs are addressed. This should include all user groups, both hands-on users and more indirect users.

Our main limitation is the single case study approach. This surely provides somehow narrow perspective, which should be taken into account when generalizing the results. Second, only the developer organization employees were interviewed, and mostly from the management level. Such perspective does not thoroughly describe the operational-level issues.

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EGOV-CeDEM-ePart

The e-Governance of Land Record and Social Dispute Resolution: An Impact Evaluation of the Punjab Land Record Management Information System (PLRMIS) in the Punjab Province Pakistan

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Abstract: Complexity in administration and limited accessibility of land records have been a long-standing issue in developing countries. In Pakistan, except for the province of Punjab (the treatment province) where land-record has been computerized in 2017, the land record is administered through traditional land registers and cadastral maps in paper formats requiring a hard work of the local administrators called "Patwaris" at the grass-root level. As an important step towards e-governance, the Punjab provincial government in 2017 established a Land Record Management Information System (PLRMIS) that simplified the procedure of land registration and transfer through digitization of the land-records. This research attempts to adopt a quasi-experimental approach to link the introduction of PLRMIS with land-related dispute resolution in Punjab and to scientifically evaluate the social impacts of this project. This paper outlines the importance of the area, research design and proposed Difference-in-Difference method of the program's impact evaluation as well as preliminary tests on the secondary data collected from courts' proceedings. This research is being conducted under the Joint Research Project of the KDI School of Public Policy, South Korea in collaboration with the Department of Management Sciences, COMSATS University Islamabad, Attock Campus, Pakistan. The purpose of this paper is to share the proposed research design with conference participants and elicit important comments on the validity of the approach being adopted.

Keywords: Land Record Digitization, Quasi-Experimental Design, Dispute Resolution, Impact Evaluation

Acknowledgement: This research is being conducted under the joint research project titled "Impact Evaluation of Land Record Computerization in the Punjab Province, Pakistan", funded by the KDI School of Public Policy, South Korea and to be completed in collaboration with COMSATS University Islamabad, Attock Campus, Pakistan.

1. Introduction

Land in the Punjab province of Pakistan is known for its fertility, agricultural diversity and its contribution to the rural economy of the country. However, ownership and administration issues associated with land have been causing significant constraints for both government and the general public in realizing its real value. These issues include inequalities in land distribution, tenure insecurity and difficulties associated with registration and transfer system of land (Ali, 2013; Thakur et al., 2005; Marshall, 1975). The century's old inefficient and manual land record system has increased the land transaction cost (both formal and informal) and land-related disputes in rural and urban areas (Cheema, 2006). As a result, the land market has become contracted while land prices are often unpredictable and in excess of the discounted value of the potential agricultural earnings from it. The low mobility of land contributes to perpetuating the highly unequal distribution of land and related livelihood opportunities across the province.

In the past, land reforms were largely carried out for the purpose of securing property rights (Conning & Deb, 2007). These reforms include land entitling (Zhang et al., 2020), land administration (Conning & Deb, 2007; Enemark, 2009; Gignoux & Wren-lewis, 2013), imposed redistributive reforms (Adams & Howell, 2001; Conning & Deb, 2007), negotiated or market-led reforms (Gauster & Isakson, 2007) and reforms through restitution (Conning & Deb, 2007; Gignoux & Wren-lewis, 2013). Some of them were successful and others resulted in unintended outcomes (Besley, 1995; Deininger, 2003; Feder & Nishio, 1999). Many of the national and international organizations and governments have played a crucial role in such reforms. For instance, the world bank solely committed billions of dollars in different parts of the development world (World Bank 2005; Holstein 1996; USAID 2005). The core components of these reforms include economic, political, credit supply, environment, sustainable development (Hernando de Soto 2000; Douglass North 1990; Conning & Deb, 2007). Failure in land reforms often happens when there are unknown community arrangements, poor implementation, and lack of accountability (Scott 1999; Lauria-Santiago 1999; Swinnen 2000; Conning & Deb, 2007). But the risk can be minimized by efficient monitoring, accountability, participation, and feedback along with pilot studies before scaling up to costly program intervention (World Bank 2005, Conning & Deb, 2007). A strong feedback mechanism is key to the effective monitoring, evaluation and accountability in reforms packages ensuring intended outcomes. For this purpose, different types of impact evaluation studies are carried by qualified researchers to identify the various reasons and to recognize the outcomes associated with the reforms package that contribute in evidence-based policy making.

Digitization of records is an important catalyst to the land reforms. Recently, there have been successful attempts to transform the governance mechanism through e-governance where information technology is used to enhance access to, and delivery of, government services to benefit citizens, businesses and government from local level to national and international levels (Arfeen & Khan, 2012). The introduction of PLRMIS in the Punjab province of Pakistan is one such example of transforming governance mechanisms that is intended to enhance productivity and reduce conflicts arising from conventional record administration. Initially the program was implemented in

eighteen[1] districts of the province (henceforth collectively called Treatment Group 1), while in the 2nd phase expanded to the entire province[2] (henceforth called Treatment Group 2). Following are the key evaluation questions related to the impact of PLRMIS program:

i) To what extent the introduction of *PLRMIS* has affected land-related disputes in the Punjab Province?
ii) Are there differences in changes overtime in the land-related key variables observed between Treatment Group 1 and Treatment Group 2 in the Province?
iii) What challenges are still remaining in the governance, functioning and public participation and how stakeholders view these challenges?

In this paper, the researchers adopt a quasi-experimental approach to finding the true impact of the digitization of the land record in the Punjab Province, Pakistan. The following section describes a brief history of the land administration in Punjab, context, and objectives of the program while section 3 discusses methods, experimental design, data and empirical specification of the study. Section 4 briefly discuss the preliminary results of the PLRMIS data while the last section outlines the future plan.

2. Context and Program Description

The history of land administration and revenue generation in the Indian Sub-continent can be traced back in the 13th and 14th centuries when the first Indian Sultan, Ala Uddin Khilji started the registration and administering the land record (Ali, 2013). Successive rulers initiated and maintained the land record tradition throughout their reigns and extracted land revenue such as Sher Shah Suri of 16th century who introduced fixed crops rates (Thakur et al., 2005) that significantly improved the measurement of land records. Akbar, the most powerful emperor of Mughal Empire in the 17th century, brought substantial reforms in the land administration such as determining different classes of lands and revenue estates (Ali, 2013). The Mughal Empire was followed by the British rule during which the land administration system was enhanced to raise more land revenues (Marshall, 1975). In view of the complication in uniform implementation of laws across sub-continent, the British government introduced and modified state-specific regulations over the course of nearly 90 years (Thakur et al., 2005). The "Punjab Land Alienation Act 1900" that prohibited land transfer ownership from agriculture to non-agriculture class was an important intervention by the British rule in India (Cheema, 2006). Although minor amendments took place over the years, the major land related laws of the British government such as "Transfer of Property Act of 1882' and "Punjab Tenancy Act of 1887", continued to exist after the independence of Pakistan and India in 1947. For example, the "Land Revenue Act of 1887" was amended with "Punjab Land Revenue Act of 1967". The overall land administration system in Pakistan is carried out within the framework of the British Era's laws

[1] Districts in the Treatment Group 1 include, Jhlem, Chakwal, Khushab, Sargodha, Jhang Toba Tek Singh, Khanewal Multan, Lodhran, Vehari, Pakpattan, Sahiwal, Faisalabad, Kasur, Hafizabad, Gujranwala, Sialkot and Narowal.

[2] The remaining eighteen districts that exposed to the 2nd phase of the program include Rawalpindi, Attock, Mianwali, Bhakkar, Layyah, Deraa Ghazi Khan, Muzaffargarh, Rajanpur, Rahim Yar Khan, Bahawalpur, Bahawalnagar, Okara, Nankana Sahib, Lahore, Sheikhupura, Chiniot, Mandi Baha Uddin and Gujrat

and regulations (UN-HABITAT, 2012). Appendix I shows a detail timeline and land related legislations in Pakistan over the course of 140 years.

Considering the importance of improving land administration, the functioning of land market, and linking it to the broader areas of governance and administration, the Punjab provincial government in collaboration with the World Bank (WB), introduced the Land Record Management Information System (PLRMIS) through establishing the Punjab Land Record Authority in 2017. The aim of this system was to facilitate public-access to land and bring transparency into the land records. Initially the program was implemented in eighteen districts in Punjab in late 2013 and later expanded the program to the entire province in late 2016. Figure 1 shows the distribution of districts that exposed to treatment in two phases.

Figure 1: Distribution of Early Treatment and Control Districts in Punjab

2.1. Theory of Change

The *PLRMIS* is expected to influence the stakeholders through institutional, social and behavioral mechanisms. Intuitional mechanism involves the transformation of methods that are followed and written in the standard operating procedures for a task. In the context of *PLRMIS*, various intuitional changes have occurred during and after the implementation of *PLRMIS*. These include, the web-based software development-a crucial output of the project-, establishment of the Arazi Record Centers (ARCs) and the business processing and re-engineering of the land record management system. Information technology development such as software development enhances the institutional performance of an individual as well as organization (Horton, D., & Mackay, R., 2003). Under the *PLRMIS*, a well-standardized monitoring dashboard that enables top-level management to track each activity at all levels. Additionally, the dashboard works a guide for staff following standard operating procedures of all four levels of management record system. The establishment of ARCs enable the issuance of "Fards"-a basic land record document- that expedite the process of land related transactions. ARCs further achieve four objectives including client satisfaction, saving

of time, reducing cost of a transaction and improvement in land tenure security. Finally, the legal and policy framework of *PLRMIS* enhances the institutional capability to work smoothly according to the defined outputs of the project. One of the key objectives of the program is to enhance public services delivery. Unlike the conventional system, under the *PLRMIS*, women have access to land records easily and can perform land transactions with convenience.

On the behavioral side of the program's influence, various trainings and capacity building steps were taken to create a positive attitude among the key stakeholders-employees of the land department-. These measures gained support for the project by decreasing the fears about job security and explaining to the participants about new roles under the new system. Initially, Land Record Staff at the Tehsil level (called "Patwaris") resisted the program by holding strikes and refusing to work. After extensive negotiations, the program included incentives for employees and capacity building such as construction of new field offices furnished with IT facilities, transportation allowance and allocation of 2% of land revenues to Revenue Officers.

Social awareness is an essential part for any project because the general public responds lately especially people who live in rural areas. Under the new program, a number of public awareness campaigns were launched that encouraged the general public to actively benefit from the digitized record management systems. Major awareness measures included conducting of 36 workshops with 5,663 internal key stakeholders namely Officers of the District Administration (District Collectors, Additional District Collectors, Assistant Commissioners) and Revenue functionaries (Tehsildars, Girdawars/Kanungos, Patwaris) between December 2011 and February 2014. Moreover, 250 representatives of the Punjab Bar Association and Field Revenue Staff were consulted about effective implementation of the program.

The main objectives of PLRMIS are given below:

- To reduce number of procedure (steps) to complete a property registration (Efficient Land Registration).
- To reduce the total (transaction) cost incurred on property registration (Cost Reduction).
- To increase the level of tenure security of land-right holders.

2.2. Key Features of the Program

- Automated Issuance of Land Ownership Documents ("Fard") in 23,183 out of the total 25, 709 revenue states (Rural and Semi-Urban) covering 90% of the land in Punjab. The system has improved service delivery standards by issuing "Fard" in 30 Minutes and Mutation in 50 Minutes.
- Establishment of the 151 state-of-the-art Land Record Centers integrated with 45 Sub-registrar offices across Punjab. This has increased collateral value of land due to improved authentication.
- Online availability of land record 24/7 at the website and efficient procedure of land registration.
- Creation of 4000 direct and 10,000 indirect jobs in the province.

2.3. How does the PLRMIS Work?

The PLRMIS Project was designed by the Project Management Unit using the experiences of the pilot projects in districts of Kasur, Lahore, Rahim-Yar Khan and Gujrat ~~and~~ also utilizing the experience from other countries. Currently, the PLRMIS system is fully operational in all districts of Punjab since 2017. It allows the right holder to search, obtain and register the land he owns using simple procedure e.g the right holder has to go to the service center. The staff will search their record by his name, father/husband name, or khewat number using his/her computerized national identity card. The service center staff then asks for the thumb impression through a bio-metric device and a photo. The right holder then gets copy of their record within 10-15 minutes after paying the specified fee.

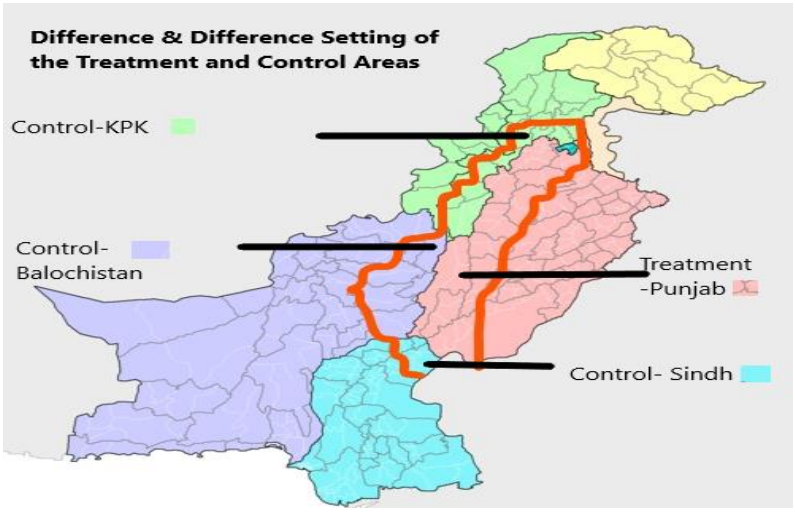
3. Methods

3.1. Experimental Design

The Punjab province occupies a total area of 205,345 km^2, and is the most populated province of Pakistan with over 80 million inhabitants (55% of the Pakistan's total population). Most of the Punjab's population is distributed across the rural areas where agriculture is the dominant sector of economy.

In view of the implementation of the PLRMIS across all districts of the Punjab province and whereas, similar facility doesn't exist in all its neighboring provinces, the researcher attempts to adopt a quasi-experimental approach that involves Difference-in-Difference (DiD) design coupled with qualitative interviews from the field to evaluate the effect of the land record digitization on the land related disputes. For the quantitative analysis, the researcher finds comparable control groups (regions) that have not been affected by the program precisely due to the administrative division of the districts and provinces in Pakistan yet have similar socio-economic characteristics across the border with the treatment province (see figure-2). Given the phase-in implementation of the PLRMIS program in Punjab, we find two types of treatment groups. Firstly, the districts within Punjab Province, that were initially exposed to the program are the treatment group 1 while the remaining districts are considered as control group for the first phase of the program. The second phase of the program expands to the entire province that include all 36 districts of Punjab, called the treatment group 2. For this later treatment group 2, the control regions belong to the districts of the provinces that border alongside the Punjab province. More specifically, there are three provinces that share border with the treatment (Punjab) province. These are the Province of Khyber Pakhtunkhwa, Balochistan and the Sindh province. The bordering districts of these provinces have same geographic, natural, and social characteristics as districts in the bordering region in the Punjab province. We attempt to select districts and associated revenue estates within all districts identified through red line in figure-2, and to differentiate the treatment and control regions in terms of the outcome variables.

Figure 2: Difference-in-Difference Setting of the Program Area and Adjacent Control Regions



3.2. Data

Our data comes from two main sources; primary source that involves collection of data through field survey and secondary sources that include records from government offices including published record of courts proceedings. Data on the outcome variable (e.g. number of land-related disputes) is being collected from the police stations records located within the jurisdiction of each revenue estate. In Pakistan, the distribution of police stations follows similar pattern of division of revenue estates, however the number of police stations depends on the crime rate and population within each sub-unit of a district (See table 1). This research utilizes data on the number of police stations collected through systematic surveys from each police station as an outcome variable. Parallelly, the researchers have obtained data on the number of disputes and related information from the courts official records that allow for preliminary tests on the validity of our research design.

Data on the land record computerization is obtained from the PLRA website as well as designated centres (ARCs) in the province of Punjab. The researchers are working on carefully designing a systematic survey to obtain information about estate-specific incidence of conflicts and their historical records from government records (through police stations) and from concerned parties in the conflict. This survey will enable the researcher to clearly identify the origin of a conflict and if the availability of digital information on the land related record helped them (concerned party) resolve the issue without going through prolonged court cases.

Table 1: Distribution of Police Stations in Pakistan

Province	No. of Divisions	No. of Districts	Police Stations
Punjab [Treatment]	8	35	705
Sindh [Control]	5	22	566
Khyber Pakhtunkhwa [Control]	7	34	198

Balochistan [Control]	6	34	117

Source: Pakistan Bureau of Statistics (PBS), 2018

3.3. Empirical Strategy

The pre-program land legislations that came from the Land Revenue Act (1967) and the Registration Act (1908), did not sufficiently entitle the landowners with the ownership right certified by State. The ownership rights and other related documents associated with land records were merely presumed to be accurate. However, it's evident from several court rulings that this presumptive status of rights had led to many disputes among landowners and concerned parties and the government due to the contestable nature of the land record and insufficient documentation. A number of studies have pointed to the dispersed and duplicative nature of land record in Pakistan causing uncertainties in the land administration and impeding economic development besides threatening the poor and vulnerable communities' rights protection (Qazi, 2006). One of the main reasons of increasing disputes in rural areas is the ambiguity in land records that is often exploited by the relatively upper class of the society rendering the poor land owners deprived of their ownership rights (Mahmood, 2004; Carey, 1997). The researcher's idea is that if the ambiguity or loopholes in the land records are resolved, then, it will reduce the probability of conflict that originates primarily from such an ambiguity. Figure 2 shows the results chain of the program that identifies the functional relationship of the program components with the dispute resolutions in the treatment province.

3.3.1. The Model

Individual-level panel data is a powerful tool for estimating policy effects. Initially, in the simplest case we expect to collect data on two time periods and a binary *Treatment* indicator, Treatment1_{it}, which is unity if unit *i* is exposed to *PLRMIS* program at time *t*. The following is the main specification for estimating all our outcome variables.

Program's Effect Estimation for Phase 1:

$$Y_{ijt} = \beta_0 + \beta_1 Treatment1_{ijt} + \beta_3 X_{ijt} + \gamma_i + \delta_j + \tau_t + U_{ijt}$$

Where

Y_{ijt} represents the outcome variable in unit *i* in district *j* of Punjab at year *t*

$Treatment1_{ijt}$=1 if the surveyed responding unit *i* belongs to district *j* of Punjab province (*treatment group 1)* & *t* ≥2014 (estate is exposed to *PLRMIS* 1st Phase)

$Treatment1_{ijt}$ =0 Otherwise

X_{ijt}= Vector of characteristics at the responding unit level (refer to the variable list section 2.2.1 above)

$\gamma_i (i = 1 \dots n)$ = The unknown intercept for each responding unit (n entity-specific fixed effects).

δ_j $(j = 1 \ldots\ldots n)$ = The unknown intercept for each district in the Punjab province (n district-specific fixed effects).

τ_t $(t = 1 \ldots\ldots n)$ = Time trend. t is time as binary variable (dummy), so we have t-1 time periods.

U_{ijt} = Error term to be clustered at individual responding unit level.

Program's Estimation for Phase 2:

$$Y_{ijt} = \beta_0 + \beta_1 Treatment2_{ijt} + \beta_3 X_{ijt} + \gamma_i + \delta_j + \tau_t + U_{ijt}$$

Where

Y_{ijt} represents the outcome variable in unit i in district j (observed in Punjab, KP, Sindh, Balochistan provinces) at year t

$Treatment2_{ijt}$=1 if the surveyed responding unit i belongs to district j of Punjab province (*treatment group 2)* & $t \geq$2017 (estate is exposed to *PLRMIS* 2nd Phase)

$Treatment2_{ijt}$ =0 Otherwise

Our empirical strategy rests on the following key assumptions.

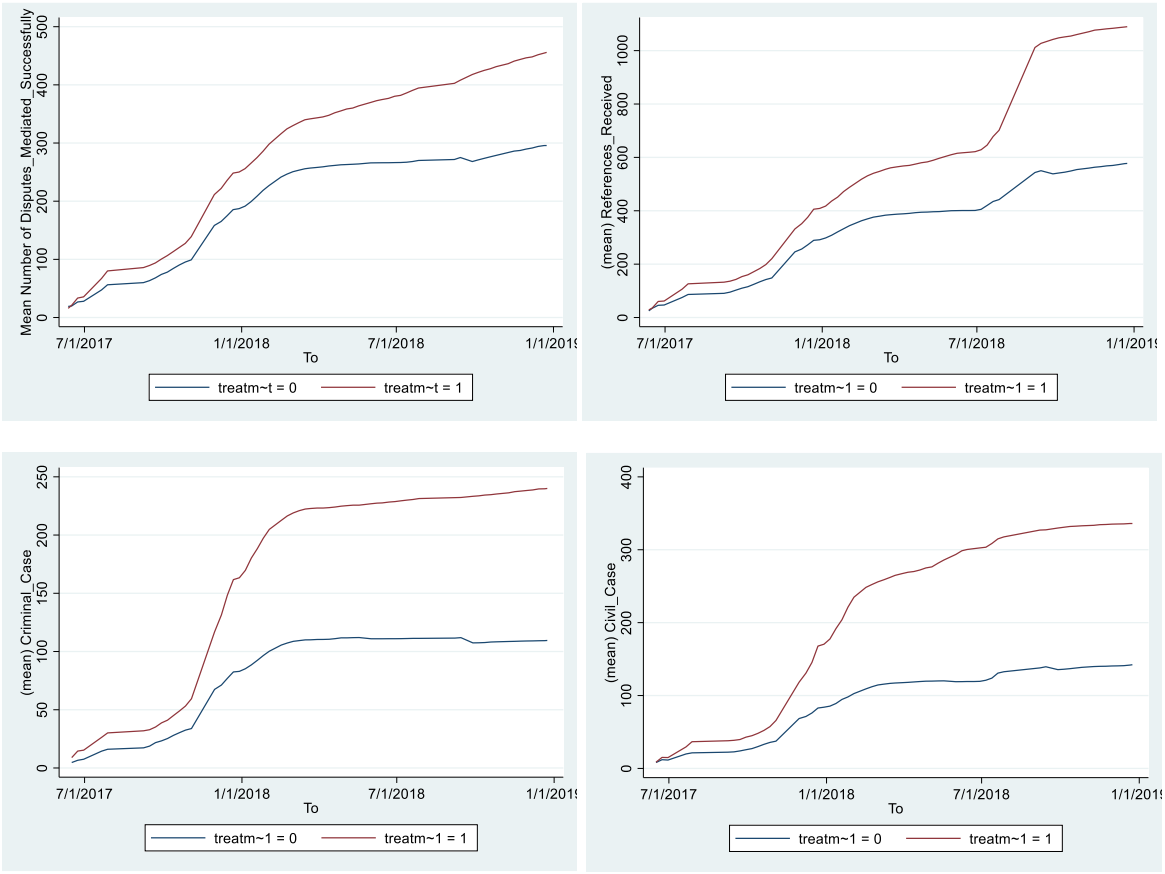
a) **Strict Exogeneity:** Our fixed effect DID design aims to difference out unmeasured confounders using techniques that eliminate biases from group- or time-invariant factors. For this, we assume that the timing of treatment exposures in the DID design is statistically independent of the potential outcome distributions, conditional on the group- and time-fixed effects. There is no such intervention as *PLRMIS* or any other system in the control districts. Although, recently, governments of these provinces are trying to introduce such a system, the existing land related record is still operated manually
b) **The Common Trend:** The outcome variables in the treatment region (treatment group 1 and treatment group 2) follows a similar nature and mechanism as in the control districts in Punjab2, Sindh, Balochistan and KP. Before the introduction of the *PLRMIS* system, the difference in terms of land-related disputes after controlling for province and district fixed effects is expected to be insignificant. Existing research also points to the commonality on key aspects in our design. Despite variation between urban and rural areas, land disputes, registration of land, transaction cost, land use & development, land tenure and land market values follow a similar pattern Punjab, Sindh, KPK and Balochistan. A number of studies such as CPIN (2020), Khalid and Begum (2013), Gazdar (2009), USAID (2010), Niazi (2003), MOCC (2020), NDMA (2020), and LandLinks (2020) have pointed to this commonality.
c) Pakistan has a parallel court structure in all provinces, and the formal court system has powers to hear and resolve the land-related dispute cases. Land related disputes are the most common cases in the courts of Pakistan. According to one estimate, over a million land related cases are pending countrywide covering all four provinces, i.e. Punjab, Sindh, KPK and Balochistan. Significant causes of land disputes are inaccurate or fraudulent land records,

erroneous boundary descriptions that create overlapping claims, and multiple registrations to the same land by different parties (USAID 2008; Dowall and Ellis 2007; Ali and Nasir 2010).

4. Preliminary Results on the Court's Records

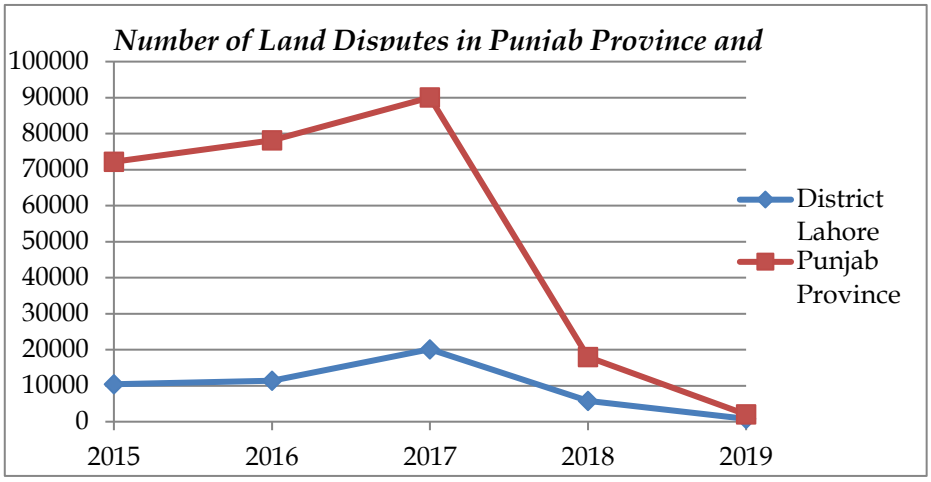
We obtained data from the provincial court's Dispute Resolution Centers' records on the number of dispute references received, references mediated successfully, references for which mediations failed, criminal cases, civil cases and rent related cases across all districts from the Punjab Province for the period 2017-2019. One limitation with this data is that it does not allow us to obtain evidence on the pre-program difference of the treatment and control groups. We conduct an ex-post analysis of the mean difference of the early treated districts in Punjab and the early control districts to see the difference in performance of the court cases. Figure 3 shows the mean differences between the treatment group 1 and treatment group 2 shown in figure 3. Significant difference in terms of court related response growth can be observed from the data that signifies better performance of districts that were early treated compared to later treated districts. This analysis however is preliminary, and we don't conclusively verify the causality of the program based on this data. Our data process has been halted due to COVID-19 pandemic. We expect to come up with our primary data and subsequently test on the specification as soon as the pandemic is over.

Figure 3: Mean Difference Between the Early Treated Districts of Punjab and Early Control Districts.



Preliminary data by the PLRA (Figure-4) also shows a sizable drop in the land related disputes however, these aggregate data of Punjab and district Lahore do not provide causal evidence of the program impact. Analysis of data on the individual police stations and associated revenue estates in treatment and control districts can only provide a basis for causal inference with regard to the program impact.

Figure 4: Land Disputes in Punjab and District Lahore (Source: Researcher own work PLRA data)



5. Discussion and Future Plan

The challenge for valid impact evaluation studies in land related reforms is to find the counterfactual of the treated group. The best idealized method is to assign randomized treatment to households but in most cases, it is costly and hard to implement a program through randomized control trails (RCTs) (Conning and Deb, 2007). The next best alternate to RCTs is the quasi-experimental approach that utilize the program introduction in an area as a treatment region while finding a close counterfactual region that carries similar characteristics except the program introduction

The PLRMIS system is likely to be expanded across Pakistan. Although, the *PLRMIS* success on key outcome such as reducing procedural time and cost etc is known, however, it is not known as to whether the program has contributed into lessening the land-related conflicts. In this proposed project, considering the *PLRMIS* as a quasi-natural experiment, the researcher plans to carry out a rigorous impact evaluation of the program to come-up with evidence-based policy recommendation for the government to bring governance reforms.

The proposed quasi-experimental approach to this one-year research project is expected to be completed in several stages. In the first stage of the project we have reviewed existing literature on land related policy interventions and impact evaluation methodologies with a special reference to social dispute resolution. Our research team is currently engaged in extensively reviewing the literature and preparing for the development of a strong research design in the following months. We plan to develop an effective survey design before going to field for actual data collection. The data collection process may take up to four months that will be followed by the data cleaning and

processing. Data analysis, testing and examining the results are to be done in the middle of the year 2020.

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EGOV-CeDEM-ePart

Exploring the Use of Robotic Process Automation in Local Government

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Abstract: This paper presents an ongoing research project designed to map the current use of Robotic Process Automation (RPA) in local government. The project runs over three years (2020-2022). The empirical foundation consists of multiple qualitative and interpretative case studies, conducted in close cooperation with practitioners working in a set of Swedish municipalities. The theoretical foundation rests on previous work on stakeholder management and public value creation in the e-government domain. Through this project we ultimately strive to develop an analytical tool that can be used by researchers and practitioners to decide if, and to what degree, a specific case handling process can (and should) be automated. In this paper, the background and overall design of the project is presented, together with a discussion on our preliminary and expected findings.

Keywords: Robotic Process Automation, Public Service, Local government, Qualitative Case Study

Acknowledgement: This research is funded by AFA Insurance.

1. Introduction

A new wave of digitalization initiatives is rolling over the public sector; this time involving the technology Robotic Process Automation (RPA). In its simplest form, RPA can be understood as a software that is programmed to perform pre-set series of actions in various IT-systems. These actions can be used to e.g., imitate human users' interactions with IT-systems, and to integrate data from systems that could not otherwise be integrated due to technical or organizational constraints (Lacity and Willcocks 2016). RPA is not a new technology per se, but has just recently attracted attention by actors in the public sector as a relatively cheap and easy form of systems integration. As such, RPA is percieved as a potential stepping stone towards further automation of administrative routines and processes in public organizations, e.g., case handling in public service provision.

In this paper, we look at RPA uptake and use in local government, using Swedish municipalities as the empirical example. In Swedish local government, automation of case handling is currently discussed as a necessary means to reduce costs and increase quality in service delivery processes (SOU, 2016; SOU, 2014; SKR, 2018a). Swedish municipalities make interesting cases for investigating RPA uptake and use due to their relatively slow uptake of e-government in general. Although

digitalization has been on the municipalities' agendas for close to two decades, most of these organizations are still far from reaching the goals set in their digital agendas. There are exceptions, but the municipalities' digitalization initiatives have generally been slow and hampered by technological, organizational and legal hindrances (Goldkuhl et al., 2014). Still, case workers often need to compensate for poor IT-systems and lack of systems integration by transferring information manually from one system to another. This takes time, can be perceived as a boring task, and is associated with a number of risks for errors (SOU, 2014). The municipalities report that there is an increasing demand for systems development and integration, but that - at the same time - systems development and integration is too costly (SKR, 2018a). It is against this background that many municipalities are investigating if RPA can be used to automate some of the administrative work currently performed by case workers. RPA is hence seen both as a means to increase efficiency in local government, and as a means to advance the municipalities' digitalization and e-government maturity in general. Although we use Swedish municipalities as our empirical examples, the results of this project are likely to be of interest for local governments elsewhere.

The objective of this paper is to present the design of and expected results from an ongoing research project investigating the use of RPA in local government. First, a brief description of the background and related research is presented, followed by a description of the overall research design adopted in the project. Lastly, we discuss some preliminary and expected results of the project.

2. Background – Case Handling Processes in Swedish Municipalities

Our ongoing research focuses on automation of case handling processes in local government. In the Swedish context, local government refers to 290 separate municipalities. Despite differences in size, there is no hierarchy or privileges; all municipalities are equal, to a large extent self-governed, and ruled by the same law (the so-called Municipality Law from 1992). According to the municipality law, all municipalities are responsible for providing public services, including social services, care for children and the elderly, public schools, libraries, emergency services, water and sewers, sanitation, environmental services, and building permissions. These services are financed by municipality tax, charges, and government subventions. In the Digital Agenda for Sweden, authored by the government, the public sector (including these 290 municipalities) is asked to make better use of digital technologies in order to increase efficiency in administrative procedures and service provision to citizens. It is, however, up to each municipality council to decide to what degree its operations and services can and should be digitalized. Naturally, the same logic applies for the current call for increased automation of case handling processes; each municipality is responsible for deciding what kind of processes should be automated (if any), and how. Case handling, in turn, is defined as an activity in which "information is collected, managed, assessed, and communicated" (SKR, 2018b, p.5; our translation). Looking at this definition, most municipalities currently have IT-systems for collecting and communicating information (e.g., e-services towards citizens) and IT-systems for managing information internally in the organization (e.g. through ERP systems). Since most case handling processes involve some kind of decision-making, case handling is still very much a manual labor for employees working in Swedish municipalities (SKL, 2018b). This manual labor

is associated with high costs for human laborers (e.g., social workers), as well as a high risk of human error; for these reasons, automation is seen and marketed as a way of reducing costs, and reducing errors in the information handling process.

3. Related Research and Identified Research Gaps

The e-government research field has always focused on the use of digital technologies to streamline and automate work in the public sector; although discussed under other labels. So why has automation of case handling processes (as part of public service provision) surfaced as a 'new' phenomenon at this point in time? Scholars highlight that although the use of digital technologies to automate work in the public sector is not new, the scope of what we can now automate has widened (Wajcman, 2017). Processes that have previously been considered as 'cognitive', and thus in need of human involvement or discretion (cf. Lipsky, 1980), can now be performed, at least theoretically, by machines. This means that automation in this particular context requires some closer attention. We have identified three research gaps related to automation of public service provision in general, and RPA use for automated case handling in particular, that require further attention from the e-government research community.

One of the first research gaps we identified concerns the meaning of *automation*; a concept that is not obvious in this particular context. Automation as a concept has been present for more than a century (Hitomi, 1994; Lacity & Willcocks, 2016), spurring discussions on whether automation and new technologies will replace human labor (Autor, 2015). RPA is yet another digital technology that can be used to replace human labor, considering that it can be programmed to 'imitate' a human user's interactions in one or several systems (Willcocks & Lacity, 2016). The aim is to streamline structured work tasks (Asatiani & Penttinen, 2016). Simply put, the 'robot' is a kind of script that manages information in and between existing systems and thus enables automation to various degrees; it can be used to (1) collect and manage information in a way that can prepare for a case worker's decision. RPA can also be programmed to (2) make decisions in cases that have clear-cut decision grounds, thereby excluding the human case worker from the case handling process. Last, RPA can be used to prepare ground for (3) more advanced and 'intelligent' technologies in the case handling process. Hence, promotors of this technology (e.g., Willcocks & Lacity, 2016), see RPA as a path to and enabler of future implementations of artificial intelligence, e.g. data mining and machine learning technologies. Looking at these different potential applications areas of RPA, what we now discuss under the label RPA is not a clear or fixed phenomenon and can take on different roles and functions in an organization. Hence, we need conceptual and empirical investigations on the nature of this particular technology.

Furthermore, there is a lack of empirical investigations of the consequences of RPA. IT consultants, policy makers and researchers all point to RPA and automation of case handling processes as a way to increase efficiency in local government (e.g., SOU, 2014; 2016). The discourse is however unnuanced and overly positive considering that empirical investigations and theoretical frameworks on the consequences of automation in this context are in short supply (Lindgren et al., 2019). Letting RPA-solutions handle information and make decisions in public service provision processes is likely to bring various (and different) consequences for a multitude of stakeholders; in

particular for employees that are currently performing the actions replaced by RPA (SOU, 2014). RPA can potentially create benefits for municipalities by supporting structured work tasks and diminishing the need for employees to perform repetitive and monotonous work tasks; in turn, reducing cost and reducing lead times (Lacity & Willcocks 2016; Madakam et al. 2019). However, there is also evidence that automation of this kind can lead to increased stress levels for the employees left in the process (Giritly-Nygren, 2009) and hence create new and costly problems for the local government to handle. Based on previous experiences (cf. Hood & Dixon, 2015), we also see an imminent risk that RPA is "hyped" and then fails to meet the high set expectations. It is, however, too soon to see the long-term consequences of RPA use in these organizations; research is needed in order to gain rich insights on what consequences RPA-supported case handling bring for the quality of work and output of local government.

Last, the current discussion on RPA as a means for achieving more efficient administrative routines in local government is too simplified. Previous research on information systems and e-government illustrate how digitalized public service provision can vary greatly in technological and organizational complexity (e.g. Lindgren & Melin, 2017). In contrast, the discussion on RPA in local government typically distinguishes between only two types of public service processes; simple and complex (see e.g., the Swedish Association of Local Authorities and Regions (SKR, 2018b)). What processes should be classified as being simple, versus complex, is however not clearly operationalized. We want to challenge this simplified view on public service provision and contribute to a more nuanced and fine-grained understanding of automation of different kinds of case handling processes. There is, for example, research that indicate that case worker discretion is needed for some types of case handling processes (Busch & Henriksen, 2018), and that these processes might be unsuitable for automation - for equity reasons, rather than technical ones. Automation of case handling processes in this context also challenges our understanding of the actors involved in public service provision (Lindgren et al, 2019) and calls for further research. Today, the people responsible for automation initiatives in local government are given little, if any, guidance from policy makers and the research community on how to assess what services are suitable for automation, and to what degree a specific case handling process can and should be automated. Consequently, we see a clear knowledge gap that we wish to address.

4. Research Design

The project introduced here runs over three years, from 2020 to 2022. The project is lead by the author and is conducted by researchers from Linköping University1 and the IT University of Copenhagen2. The aim of the project is twofold; (1) to map current developments and use of RPA for automated case handling in local government; and (2) to develop an analytical tool that can be used by researchers and practitioners to decide if, and to what degree, a specific case handling process can (and should) be automated. In order to reach these goals and address the aforementioned research gaps, the project is guided by three research questions:

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[2] Christian Østergaard Madsen

1) How is automation of case handling understood and manifested in local government?
2) What are the consequences of automation of case handling for local government?
3) What is required to assess if, and to what degree, a specific case handling process is suitable for automation?

We perceive automation as a socio-technical phenomenon; including social-, organizational, and technical dimensions that are inherently intertwined. As such, automation is seen as a change process, including practices such as changes in work routines, as well as procurement, development and implementation of IT-solutions. Theoretically, we build on previous research on information systems and e-government in general, combined with theories on stakeholder involvement (Axelsson, Melin & Lindgren, 2013; Flak & Rose, 2005; Rose, Flak & Sæbø, 2018) and public value (e.g., Bannister & Connolly, 2014; Cordella & Bonina, 2012; Rose et al., 2015). The empirical foundation of the project will consist of qualitative and interpretative case studies; see below. The overall design of the project can be separated into three different phases: initiation, case studies; and, synthetization.

We are currently in the initiation phase, which covers the first six months of the project. During this phase we prepare ground for our case studies by conducting theoretical work and inviting practitioners from municipalities to participate in the project. Based on principles of engaged scholarship (Van de Ven, 2007), case studies are defined in close cooperation with practitioners and are typically delimited efforts to automate specific case handling processes (e.g., specific projects). This means that multiple cases can be identified within one municipality. The selection criteria for inclusion of cases in the research project involve that the case must enable analysis of multiple stakeholders' perspectives on RPA uptake and use. We also seek to include cases that cover RPA-related projects in different phases; e.g., during planning, design and implementation, and post-implementation. To date, one of the larger municipalities in Sweden (approx. 160 000 citizens) has signed up to participate in the project and two cases studies have been initiated within this particular municipality; (1) a case study following a project developing RPA solutions for HR processes within the municipality; and, (2) a case study following a strategic initiative to develop automation capacity in the municipality's existing digitalization structures and methods. In addition to these two cases, we are conducting in-depth interviews with consultants working at companies designing and selling RPA solutions and services for the public sector.

During the case study phase, which covers approximately two years of the project (from mid 2020 to mid 2022), we will conduct multiple case studies of various sizes. The exact design of these case studies has not yet been decided, but our work is based on a qualitative and interpretive approach (Myers, 2009; Walsham, 1995), meaning that we are interested in how people interpret and experience automation of case handling processes. Data will be generated through several techniques, including semi-structured interviews, participant observations, document studies and evaluation of IT-systems' design and functionality. The generated material will predominantly be transformed into so-called 'thick descriptions' (Eisenhart & Graebner, 2007), in order to prepare for interpretative analysis (Klein & Myers, 1999). Theoretical contributions will be generated through an abductive approach, in which empirical observations will be continuously related to and intertwined with existing theories and knowledge. This approach enables a deep understanding of

the phenomena at hand and allows for multiple perspectives and interpretations of the material to be created (Myers, 2009).

The final phase of the project covers the last six months of the project and aims to synthetize the findings in (1) in-depth descriptions of the current state of affairs concerning RPA-use for automation of case handling processes in local government (using Swedish municipalities as the empirical examples of local government). We also strive to create (2) an analytical tool that researchers and practitioners in local government can use to decide if, and to what degree, a specific case handling process can/should be automated.

5. Preliminary and Expected Results

Our empirical results so far are based on analysis of policy documents on automation of case handling in the Swedish local government context (SOU, 2016; SOU, 2014; SKR, 2018a) and our initial data generated from the two case studies at a large municipality in Sweden. As we are early in the process, the results indicated here must be understood as being preliminary.

Concerning our first research question, our initial findings from the case studies echo many of the challenges reported regarding e-government projects in general (cf. Pollitt, 2012). For the municipality, RPA is a new technology and their initial efforts to understand and implement RPA has highlighted challenges related to e.g., how to understand automation in the municipality context, and how to create interest and commitment in the organization for this type of technological- and organizational development. For example, there are several ongoing initiatives in the municipality, run by members from different departments within the organization, all aiming at increasing efficiency and improving service. These initiatives seem to strive for the same goal, although through different means, e.g., increased efficiency through *innovation,* through *digitalization,* and now, through *automation*. At present, it is not clear how the projects on automation of case handling fits in the already existing landscape of innovation and digitalization projects; i.e., how the use of RPA is similar to, or sufficiently different from, other innovation or digitalization projects already being conducted in the municipality. As a consequence, projects aiming at automating case handling are currently competing with other similar projects for resources and employees' attention. In order to help members of the organization navigate between different types of IT-projects, employees on the strategic level of the municipality are currently trying to design a new method and process for how to run automation-related projects. We are following the incremental development of this method, as it can deepen our understanding on how employees in the municipality make sense of automation, and how they plan to realize automation in practice.

Concerning the second research question, our initial investigation of RPA implementation in Swedish municipalities indicate that RPA is still more talk than action. Most of the municipalities we have been in contact with during our initial search for suitable case studies are still trying out RPA in small pilot projects. This is also the case for the municipality in which we have initiated the two case studies. In fact, we see indications that RPA use is not as widespread in Swedish local government practice as implied in the general discourse on this technology (e.g. in the media and in collaboration forums for municipalities). It is therefore also too early to see any clear impacts of

automation of case handling on municipalities' organizations and output. However, our initial investigation of the pilot projects conducted in the included municipality indicate that RPA is not as easily achieved as the organization hoped. As stated in the introduction, RPA is marketed as an 'easy' way to achieve increased efficiency through systems integration, but the actual procurement and implementation of the RPA applications seems to be the mere tip of the iceberg of work needed to successfully implement RPA for administrative routines in the municipality. In order to automate a process using RPA, a suitable process must first be identified and then thoroughly analyzed and potentially redesigned to fit for automation. The municipality in question does not have a formulated method for this type of analysis yet. Hence, in addition to lacking methods for how to run RPA related projects, the municipality is also lacking ways of identifying what processes are suitable for automation in the first place. Wanting to try out this new and promising technology has therefore set several development initiatives in motion in the municipality, aiming at establishing new ways of working. This organizational development is time consuming and requires collaboration between a large number of stakeholders, making automation using RPA less 'easy' than initially expected.

This is also where our last research question comes in, asking what is required to assess if, and to what degree, a specific case handling process is suitable for automation. On this topic, we do not have results to share yet, as this is a complex question that requires further theoretical and empirical work. The question is kept wide and flexible to allow for this research question to be developed as we gain a deeper understanding of the challenges faced in local government practice (cf. Alvesson & Sköldberg, 2000). As indicated above, we see clear signs of the same kind of determinism and technology optimism in the current discourse on RPA, that we see in other contexts involving new technology in government (cf. Hood & Dixon, 2015). This highlights the need to go beyond the current discourse and explore the consequences of RPA empirically. Previous research also indicate that automation of case handling will bring different value to different stakeholders involved in the process. Using the framework by Rose et al. (2015) will allow us to investigate if conflicting values are at play; e.g., if increased efficiency is achieved at the cost of reduced equity in the case handling process. Based on previous studies of automation in other contexts, there is reason to expect that automating administrative routines will challenge employees' current working life conditions and lead to changes in employees' work content, work situation and skills requirements (cf. Bainbridge, 1983). Based on previous IS and e-government research, we also expect that the implementation of RPA will bring unforeseen consequences for these organizations (Margetts & Hood, 2012). To current date, there are only a few studies that have explored the use and consequences of RPA in the Swedish public sector context (e.g., Wihlborg, Larrson & Hedström, 2016; Ranerup & Henriksen, 2019). We strive to contribute to this body of literature and contribute with accumulated knowledge on what values can be created by automation of case handling processes in local government.

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EGOV-CeDEM-ePart

X-RAI: A Framework for the Transparent, Responsible, and Accurate Use of Machine Learning in the Public Sector

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Abstract: This paper reports on an Action Design Research project taking place in the Danish Business Authority focusing on quality assurance and evaluation of machine learning models in production. The design artifact is a Framework (X-RAI) which stands for Transparency (X-Ray), Responsible(R), and explainable (X-AI). X-RAI consist of four sub-frameworks: the Model Impact and Clarification Framework, Evaluation Plan Framework, Evaluation Support Framework, and Retraining Execution Framework for machine learning that builds upon the theory of interpretable AI and practical experiences tested on nine different machine learning models used by the Danish Business Authority.

Keywords: Machine Learning Evaluation, Government, Interpretability

Acknowledgement: Thanks to all the involved employees at the Danish Business Authority

1. Introduction

Recent years have seen breakthroughs in the field of AI, both in terms of basic research and development as well as in applying AI to real-world tasks. The AI Index 2019 Annual Report of the Stanford Institute for Human-Centered Artificial Intelligence (Perraul et al., 2019), which summarizes the technical progress in specialized tasks across computer vision and natural language processing, attests that AI is now on par or has even exceeded human performance in tasks such as object classification, speech recognition, translation, and textual and visual question answering. However, augmenting and automating tasks previously performed by humans can also lead to serious problems. Research studies and real-world incidents have shown that AI systems–or better the machine learning models they are based on-– can err, encode societal biases, and discriminate against minorities. These issues are amplified by the fact that many modern machine learning algorithms are complex black boxes whose behavior and predictions are almost impossible to comprehend, even for experts. Hence, more and more researchers and politicians are calling for legal and ethical frameworks for designing and auditing these systems (Guszcza et al. 2018). Against this background, the government of Denmark released a national strategy for AI in 2019. The strategy

covers a broad array of initiatives related to AI in the private and public sectors, including an initiative concerning the transparent application of AI in the public sector. As part of this initiative, common guidelines and methods will be created to enforce the legislation's requirements for transparency. As one of the first steps, the government launched a pilot project to develop and test methods for ensuring a responsible and transparent use of AI for supporting decision making processes (Regeringen, 2019). The pilot project takes place at the Danish Business Authority (DBA) in collaboration with the Danish Agency of Digitization. In this paper, we report on the first results of an Action Design Research (ADR) project accompanying the pilot project. The overall ADR project is driven by the following research question: How do we ensure that machine learning (ML) models meet and maintain quality standards regarding interpretability and responsibility in a governmental setting? To answer this question, the project draws on literature and theory on interpretability of machine learning models and practical testing on machine learning models in the DBA.

2. Explainable AI Through Interpretable Machine Learning Models

Modern machine learning algorithms, especially deep neural networks, possess remarkable predictive power. However, they also have their limitations and drawbacks. One of the most significant challenges is their lack of transparency. Complex neural networks are opaque functions often containing tens of millions of parameters that jointly define how input data (e.g., a picture of a person) is mapped into output data (e.g., the predicted gender or age of the person in the picture). Hence, it is virtually impossible for end users, and even technical experts, to comprehend the general logic of these models and explain how they make specific predictions. As long as one is only interested in the predictions of a black box model and these predictions are correct, this lack of transparency is not necessarily a problem. Broadly speaking, there are two alternative approaches to open up the black box of modern machine learning models (in the following see Lipton, 2018, Molnar, 2019, Du et al., 2020). First, instead of using black box deep learning models, one can use less complex but transparent models, like rule-based systems or statistical learning models (e.g. linear regression, decision trees). These systems are intrinsically interpretable, but the interpretability often comes at the cost of sacrificing some predictive accuracy. The transparency of these systems works on three levels: Simulatability concerns the entirety of the model and requires models to be rather simple and ideally human computable. Decomposability addresses interpretability of the components of the model, such as, inputs, parameters, and calculations.

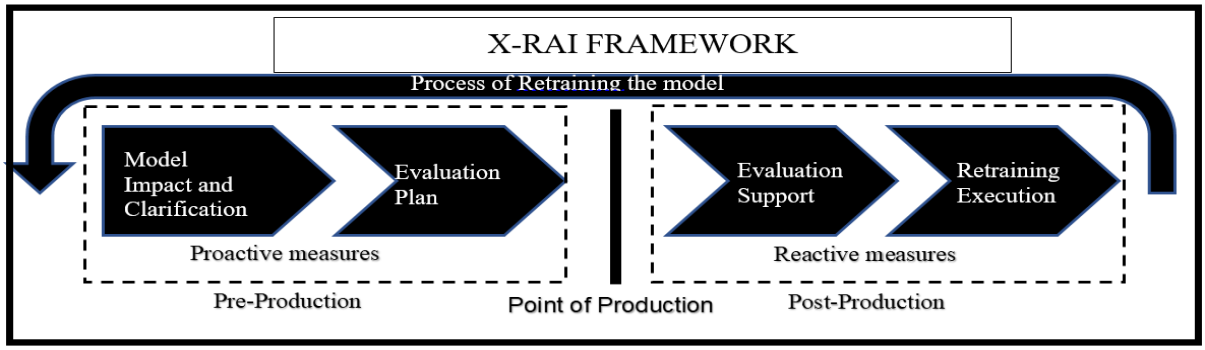
Consequently, decomposability requires interpretable model inputs and disallows highly engineered or anonymous features. Algorithmic transparency concerns the training/learning algorithm. A linear model's behavior on unseen data is provable, which is not the case with deep learning methods with unclear inner workings. Second, instead of using transparent and inherently interpretable models, one can develop a second model that tries to provide explanations for an existing black box model. This strategy tries to combine the predictive accuracy of modern machine learning algorithms with the interpretability of statistical models. These so-called post-hoc examinability techniques can be further divided into techniques for local and global explanations. Local explanations are explanations for particular predictions, while global explanations are explanations that provide a global understanding of the input-output relationships learned by the

trained model. In other words, a local explanation would explain why a concrete person on a picture has been predicted to be female, while global explanations would explain what general visual features differentiate females from other genders. Different types of post-hoc explanations exist. Text explanations use an approach similar to how humans explain choices by having a model generating explanations as a supplement to a model delivering predictions. Visualizations generate explanations from a learned model through a qualitative assessment of the visualization. Explanations by example let the model provide examples showing the decisions the model predicts to be most similar (Lipton, 2016). Local Explanations for particular predictions (Doshi-Velez & Kim, 2017) such as Local Interpretable Model-agnostic Explanations (LIME) (Ribeiro et al., 2016) and SHAP for explaining feature importance (Lundberg, S & Lee, S, 2017). Focusing on the local dependence of a model helpful when working with neural networks being too incomprehensible to explain the full mapping learned satisfactorily (Lipton, 2016). When choosing which approach and technique to use in order to create an explainable AI system, it is worth to consider *why* there is a need for explanation (e.g., to justify decisions, enhance trust, show correctness, ensure fairness, and comply with ethical or legal standards), *who* the target audience is (e.g., a regular user, an expert user, or an external entity), *what* interpretations are derivable to satisfy the need, *when* is the need for information (before, during, or after the task), and *how* can objective and subjective measures evaluate the system (Rosenfeld, A & Richardson, A, 2019).

3. The X-RAI Framework as a Design Artifact

The X-RAI framework is an ensemble consisting of four artifacts (Fig. 1). First, the Model Impact and Clarification (MIC) Framework, which ensures that a ML model fulfills requirements regarding transparency and responsibility. Second, the Evaluation Plan (EP) Framework, which plans resource requirements and the evaluation of ML models. Third, the Evaluation Support (ES) Framework that facilitates the actual empirical evaluation of ML models and supports the decision whether a ML model shall continue in production, be retrained or shut down. Fourth, the Retraining Execution (RE) Framework, which initiates the process of sending an ML model back to the Machine Learning Lab (ML Lab) for retraining.

Figure 12: The X-RAI Framework



The first two artifacts are part of the decisive foundation for a steering committee regarding launching the ML model into production (pre-production). The last two artifacts support the

continuous evaluation and improvement of the ML model after it goes live (post-production). The design artifacts in ADR are solutions to problems experienced in practice and with theory ingrained. The problems must be generalizable outside the context of the project (Sein et al., 2011). X-RAI is a solution to problems experienced in the context of the Danish Business Authority where government officials are the intended end users. The government officials are, in our case, educated within the sciences of law, business, and politics as well as data scientists with plural backgrounds. Their expertise varies according to the governmental institution. X-RAI must be capable of involving and utilizing stakeholders with variating expertise without excluding some by setting an unachievable technological barrier of entry.

3.1. Model Impact and Clarification Framework

The MIC Framework has been applied and tested on four ML models--three times in its initial version and one time in its current version. The MIC is a questionnaire that enables the questionee to describe and elaborate on issues related to different aspects of ML related to transparency, explainability, responsible conduct, business objectives, data, and technical issues. The primary purpose of the MIC Framework is to improve, clarify, and guide communication between various stakeholders, such as developers with technical expertise, caseworkers with expertise in the ML models decision space and management. The idea of the MIC Framework derives from an analysis of the Canadian Algorithmic Impact Assessment (AIA)[1] tool that was found to have a strong link to the Canadian directive on automated decision-making[2]. MIC differs from AIA since it is grounded in theory and business needs instead of legislation. The algorithmic information in Box 1 contains information about the ML model. Box 2 is filled out by the future owner of the system enabling them to state their needs concerning the use, explainability, transparency, users, and accountable actors. Box 3 builds directly on Lipton's descriptions of transparency with the following three sub-levels: simulatability, decomposability, algorithmic transparency. In addition, it builds on types of post-hoc interpretability with the following approaches: text explanations, visualization, local Explanations, and explanation by example (Lipton, 2016). These are supplemented with three concrete explainability methods, Local Interpretable Model-agnostic Explanations (LIME) (Ribeiro et al., 2016) and SHAP (Lundberg, S & Lee, S, 2017). The output verification is bound to the fact that ML models in the DBA are decision-supportive, not decision-making, which reduces the need for an explanation if the end-user can validate the truthfulness of the model output instantly. Box 4 focuses on the data dimensions of the ML model including the relation to data sources and other ML models. Box 5 explains every feature to avoid opaque ML models due to highly engineered or anonymous features (Lipton, 2016) and supplements methods such as SHAP (Lundberg, S & Lee, S, 2017). Box 6 draws on the special categories from the 2016 European Union's General Data Protection Regulation[3] and the 2018 Danish Data Protection Act[4], repeating the questions on other data

1 See https://canada-ca.github.io/aia-eia-js/ and https://github.com/canada-ca/digital-playbook-guide-numerique/tree/master/en

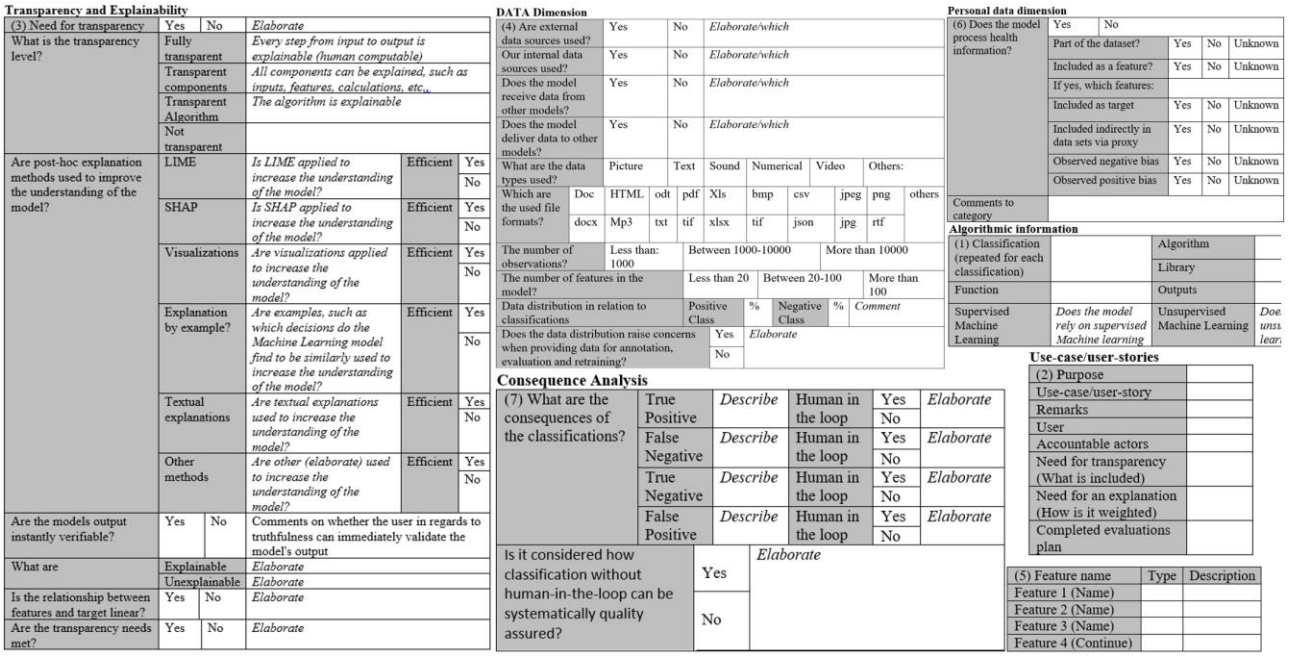
2 See https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32592

3 See https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02016R0679-20160504&from=EN

4 See https://www.retsinformation.dk/Forms/r0710.aspx?id=201319 (all links last checked 01/06/20)

categories to avoid discrimination. Box 7 focuses on the consequences of the output, mitigation of consequences, and ensuring the responsible application of ML models. It takes inspiration from the confusion matrix enabling an easy estimate of the frequency of each outfall.

Figure 13: Model Impact and Clarification Framework



3.2. Evaluation Plan

The Evaluation Plan (EP) was applied and tested on eight ML models in three incrementally different versions. The EP structures the ongoing evaluation of a ML model throughout its lifetime and thereby illuminates the necessary resources for maintenance. The Evaluation Plan clarifies uncertainties such as time and frequency for the evaluation meetings, involved actors including roles and obligations, data foundation, and meeting preparation. The goal is to ensure that all ML models fulfill the defined quality requirements from the cradle to the grave. The theory is ingrained indirectly in the EP through the MIC framework. The choices made when using the MIC framework influences how the ML model can be evaluated. The ML model's degrees of transparency and explainability influences the possibilities of the evaluations. The evaluation detects data drift in a procedure similar to the application-grounded evaluation where the ML model is evaluated accordingly to domain experts performance on the task (Doshi-Velez & Kim, 2017). The EP encourages the first evaluation to be as early as possible due to the difficulties in predicting complex methods such as neural network on unseen data (Lipton, 2016).

Figure 14: Evaluation Plan Framework

(1) The name of the model and version number
(2) Participants for an example the application manager, caseworkers, ML lab etc.
(3) When is the first evaluation meeting?
(4) Expected evaluation meeting frequency: (How often are we expected to meet? And are there peak periods which we need to take into consideration?)
(5) Foundation for evaluation: For an example logging data or annotated data (Annotated data is here data where the domain experts classification is compared to the machine)
(6) Resources: (who can create the evaluation/training data, internal vs. external creation of training data, what is the quantity needed for evaluation, time/money)
(7) Estimated resource requirement for training, training frequency, and complications degree (procedure regarding regular bad performance)
(8) The Role of the Model: Is it visible or invisible for external users.
(9) Is the models output input for another/is the models input an output from another model.
(10) What are the criteria of success and failure (When does a model perform good/bad. How many percent?)
(11) Is there future legislation that will impact the model performance? (Including: bias, introduction of new requirements/legal claims, abolition of requirements/legal claims, bias, etc..
(12) When does the model need to be retrained?
(13) When should the model be mutet?

3.3. Evaluation Support

The Evaluation Support (ES) framework was applied five times on three different ML models in three incrementally changed editions.

Figure 15: Evaluation Support Framework

(1) The name of the model and version number
(2) Date of evaluation
(3) When was the last evaluation of the model?
(4) What was the result of the last evaluation?
(5) Participants in the evaluation meeting
(6) Who is doing the current evaluations?
(7) How many cases/documents has been processed in the evaluation (find minimum)
(8) Was the data used for the evaluation satisfying?
(9) Was is the result of the evaluation
(10) Has the performance of the model decreased?
(11) Has the performance of the model increased?
(12) What is the threshold set at?
(13) What is the history of the threshold setting?
(14) Should the threshold level be changed?
(15) Why is the threshold setting changed?
(16) Does the model still satisfy a business need? If not should the model then be shut down?
(17) Is there future legislation that will impact the model performance? (Including: bias, introduction of new requirements/legal claims, abolition of requirements/legal claims, bias, etc..
(18) Should the model be retrained based on the evaluation?

A fourth edition is ready for testing. The ES facilitates the evaluation of the ML model at the evaluation meetings. The domain specialist responsible for the ML model answers relevant fields in the framework before the meeting. The stakeholders complete the remaining framework collaboratively at the meeting and decide if the ML model shall continue in production, be retrained, or shut down. The ES strives to evaluate the ML model accordingly to the task as described in the

applications-grounded evaluation (Doshi-Velez & Kim, 2017). In our case, we let the caseworker that normally would do the task of the ML model evaluate the classifications and report it in the ES framework. The ES primarily focuses on fulfillments of performance requirements while it lets transparency and explainability be subcomponents of interpreting the reason for ML model performance. The reason is important if the model needs retraining.

3.4. Retraining Execution Framework

The Retraining Execution (RE) Framework was applied and tested two times on two different ML models in two incrementally changed versions. The RE initiates the process of sending a ML model back to the machine-learning lab for retraining. The retraining occurs when the ML model needs to improve performance and will continue to provide value. The RE framework focuses on the reusability of evaluation data and old training data for retraining, the occurrence of new technological possibilities, the detection and elimination of bias, changes in data types and legislation, the urgency for retraining, and if the input and output are related to other models. Transparency and explainability of the ML model become relevant when explaining a root cause for the need for retraining.

Figure 16: Retraining Execution Framework

(1) The name of the model and version number
(2) What is the reason for having the model retrained?
(3) What is the result of the last evaluation?
(4) Own suggestion of root cause, why does the model need retraining? (changes in document type, legislation, tenders etc..)
(5) Is new training data available for retraining (including estimation of required resources)
(6) How important is it to have the model retrained?
(7) Is the model dependent on other models? Yes/no – what is the status on them?
(8) What is the status of training data in the current situation? (Changes in document form, legislation, tenders, etc..)
(9) Can new data be added to the existing data or is there a need for a whole new training dataset? (What old training data is reusable?)
(10) Observed suspicion (bias against industry, gender, business type, etc.) Is it a problem? Yes/No
(11) Is the models output input for other models? Yes/no – status on them
(12) Is there developed algorithms that can solve the problem better since the model was put in production?
(13) "concluding text felt" Is there taken a decision regarding the model need to be retrained? (Has all stakeholder agreed on that the model has to be retrained?)

Data distribution becomes relevant if the data are skewed and slows down and thereby increases the cost in a data annotation process with the focus on providing training examples for the minority class. The use of the retraining execution framework restarts the X-RAI process by leading to the use of the MIC framework.

4. Conclusion and Outlook

The X-RAI framework was successfully developed, applied, and tested on nine different ML models used in the Danish Business Authority accordingly to the ADR principle of authentic and concurrent

evaluation (Sein et al.. 2011). The iterations have let to incremental changes in the frameworks. The frameworks are currently standard procedures and mandatory for all ML models developed by the ML Lab in the Danish Business Authority, which we conclude to be successful in the aspect of organizational adoption of artifacts and procedures. Artifacts must have theory ingrained accordingly to ADR (Sein et al.. 2011). Interpretability theory, including the subcategories of transparency and explanation, is ingrained into the frameworks. The lens provides a strong foundation for informing how the ML models work. Future work will focus on analyzing the evaluation data and using it to design IT artifacts and integrate them into the Danish Business Authority's IT-ecosystem. An additional theoretical lens will be ingrained in the artifacts to create a theoretical foundation for responsible conduct in the design.

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Stimulating the Uptake of AI in Public Administrations: Overview and Comparison of AI Strategies of European Member States

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Abstract: There is an interest in governments to stimulate the uptake of AI technologies within their administrations. However, little is still known about the policy initiatives countries are taking to facilitate the development and usage of AI within governmental organizations. This paper analyses, through the lens of policy instruments, existing AI strategies of European Member States to give a first overview of the different policy actions proposed to tackle adoption challenges in the public sector. Our findings suggest that there are significant differences between the number and type of policy actions taken and that many of the countries favour the exploitation of soft policy instruments over harder, regulatory approaches or active funding and other financial incentives.

Keywords: Artificial Intelligence, Public Sector, Strategy, Policy Instruments

Acknowledgements: Work on this paper has been in part conducted under the contract CT-EX2019D361089-101 funded by the ISA2 ELISE Action, and in support of the activities on AI for the public sector of the AI Watch, a joint initiative of DG CONNECT and the European Commission's Joint Research Centre.

***Disclaimer**: The views expressed in this article are purely those of the authors and may not be regarded as stating the official position of the European Commission.*

1. Introduction

Governments across the world have increasingly committed themselves to actively stimulating the development and diffusion of Artificial Intelligence (AI) in the public sector. In particular, AI in Europe has been regarded as highly important on the political agendas already since the Tallinn Declaration signed in 2017, where political leaders took notice of the potential of AI to enhance political decision making (European Union, 2017). Currently, there are numerous European actions to further stimulate investments in AI, such as the signed Coordinated Action Plan on AI (European

Commission, 2018). As part of this document, countries were asked to draft national AI strategies to further detail their policy plans on stimulating AI development and adoption. In general, AI includes systems which perform human-like cognitive functions, often by making predictions, recommendations and decisions (OECD, 2019). What makes AI different from earlier technological waves is its potential to be delegated with decision-making capacity, rather than solely providing information (Just & Latzer, 2017; Latzer & Just 2020). However, challenges lie in the adoption and use of AI solutions within government. As illustrated by Wirtz et al. (2019) in a recent review, there are currently four major dimensions which are limiting the use of AI in the public sector: technology, laws, ethics and social factors. For example, the development and usage of AI technology requires high levels of data quality and integration, and specialized staff to develop and work with AI solutions – resources that are often missing in government.

Thus, considering the wide amount of identified challenges on AI adoption already identified by recent research, there is a great need to understand how governments are planning to overcome these adoption barriers in government (Wirtz et al., 2019; Sun & Medaglia, 2019). The swift emergence of different national strategies for AI in Europe has led to a mushrooming of diverse policy instruments designed by governments to stimulate the uptake of AI. The aim of this paper is to provide an overview and a first analysis of the policy instruments highlighted in these strategies, enabling the identification of different policy styles with regards to the use of AI in the public sector. Analysing the AI strategies is likely to give fruitful insights on the intentions – as well as the importance – of stimulating AI within government and outline possible directions for policy and research.

2. Theoretical Framework

In our analysis, we adopt the lens of policy instruments to capture the diversity of national strategies for AI in the public sector. Policy instruments are generally defined as "techniques of governance that […] involve the utilization of state authority or its conscious limitation (Howlett, 2005). ". As such, policy instruments "encompass the myriad techniques at the disposal of governments to implement their public policy objectives" (Howlett, 1991).

The study of policy instruments arises from the need to both unpack the connections between policy formulation and implementation, and to understand public policy decision-making processes [9]. In the research area of innovation, policy instruments are emphasized in their purposive nature, as a "set of techniques by which governmental authorities wield their power in attempting to ensure support and effect (or prevent) social change" (Vedung, 1998).

Nevertheless, attempts at classifying policy instruments provide useful heuristics for comparison, benchmarking, and cross-country learning processes (Linder & Peters, 1998), in particular in relation to the digitalization of the public sector (Hood & Margetts, 2007). While there is no agreement on a single approach to all classifications of policy instruments, a general, three-fold typology of policy instruments has been proven useful in a variety of practical contexts (Bruijn & Hufen, 1998; Tools of Government, 2002). This three-fold typology includes regulatory instruments,

economic and financial instruments, and "soft" instruments also referred to, respectively, as the "sticks", the "carrots", and the "sermons" (Vedung, 1998).

Regulatory instruments (the "sticks") include bindings laws and regulations, ranging from e.g., the establishment of Intellectual Property Rights, competition regulation, or ethical regulations. Economic and financial instruments (the "carrots") refer to the allocation of economic resources and economic incentives. Examples include direct cash transfers, tax incentives, competitive research funding schemes, venture and seed capital support. "Soft" instruments (the "sermons") represent a residual category, often used in conjunction with the other two categories of policy instruments. Soft instruments include, for instance, communication campaigns, private-public partnerships, and voluntary codes of conduct.

We adopt this categorization as a lens to systematize the diversity of policy instruments for AI in public sector within the AI national strategies of European Members States. Besides allowing us to make sense of the complexity and the diversity of such strategies, this categorization lens can contribute to define shared criteria of the choice and implementation of future policy instruments to stimulate the uptake of AI in the public sector.

3. Methodology

In order to understand which policy instruments are adopted to stimulate the use of AI in the public sector within national strategies in Europe, this research uses a comparative policy document analysis approach. Comparative policy document analysis is a well-established approach in public administration research that aims to understand the intentions, plans and political interests in policy-making (Karppinen & Moe, 2012; Pollitt & Bouckaert, 2017).[1] For such an approach, comparability is essential. This study analyses all the official governmental AI strategies published by European Member States by the 25th of February 2020, taking note of the comparative overviews of the strategies in the AI Watch (van Roy, 2020).

Only the final published AI strategies were considered for the full review. Upon further inspection into the published AI strategies, some countries have published AI-related policy initiatives in other documents rather than – or in addition to – the official AI strategy. These initiatives have been excluded for this overview, to ensure the comparability and to avoid some countries being under- or overrepresented. Due to language barriers, only the AI Strategies which have been available in English, Dutch, Italian, Danish and Spanish were considered for the full text review. Therefore, 13 AI strategy documents[2] have been considered for this research.

During the document review, the AI strategies were analysed to discern any actions governments are considering or have already taken to stimulate and facilitate the development of AI in their

[1] Often, a report was published with these recommendations which may or may not have ended up on the official AI Strategy. However, these 'expert' reports were not considered in our analysis.

[2] Those from the Czech Republic, Denmark, Estonia, France, Finland, Germany, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Sweden and the United Kingdom.

public administrations, by scoping mentions of "public administration", "public sector", "public services", "government", and "state". Strategies consequently analysed and discussed by at least two of the authors and, when discrepancies in the categorizations arised, documents were further discussed until a consensus emerged. Following, a summary was written including the policy initiatives mentioned in the full strategy report to exclude non-relevant information (e.g., regarding actions boosting R&D in AI in universities). Lastly, these different policy initiatives were then analysed using the three-fold typology on policy instruments.

4. Findings

Following our analysis, a variety of different policy initiatives are considered by the countries to stimulate the use of AI in the public sector, tailored to their specific situation. Some initiatives are tasked with stimulating the awareness of the potential of AI technologies among civil servants. This should improve their understanding of the technological potential and perhaps discover use cases to explore AI in their line of work, through holding awareness campaigns, organizing regular meetings between civil servants with AI experts or by creating opportunities to participate in (European) AI policy events.

Related to these awareness campaigns are policy actions aimed at improving the internal capacity of public administrations to develop and implement AI into their daily workflows. Hence, some governments are exploring the creation of internal AI training: either a general AI training course for all civil servants to assist them with working with AI technologies, or a specialized training course for technical personnel to stimulate in-house development of AI applications, potentially facilitated by new AI related positions or departments. In the Danish example, an internal academy will be established to provide general training courses for civil servants, while there are plans to develop specialist AI courses in collaboration with universities (The Danish Government, 2019).

Other initiatives are tasked with improving the data on which the AI applications are built upon. Common actions are establishing data management programmes, organizing internal training for civil servants to improve data literacy and by creating a new technological infrastructure for data governance across the public sector as methods to improve the overall data quality. Another set of policy initiative focus on improving access to public sector data among different institutions.

Unique for the public sector, however, it is mentioned to consider improving the access to data held by private sector institutions, potentially valuable for public organizations. This is why the UK government is exploring the use of 'data trusts' to facilitate private sector data exchange to the government in a responsible and trustworthy way (HM Government, 2019).

As many organizations and governments have expressed the possible ethical concerns associated to the development and use of AI, many strategies mention the consideration of the ethical implications of adopting AI, especially when they are used in the public sector. Such a framework document could assist in establishing trust – among both civil servants and citizens – that the AI used in government is of high quality and in line with ethical values. In Finland, there are plans to

create an ethical code of conduct as part of the AuroraAI public sector reform programme (Ministry of Economic Affairs and Employment of Finland, 2019).

Other initiatives aim to conduct legal reforms to facilitate AI development and use in various policy areas, while the Estonian strategy mentions the possibility to explore general AI laws which – among other goals – has the objective to clarify the accountability and transparency issues related to the use of AI in public services (Government of the Republic of Estonia, 2019).

Some strategies also mention the need for revisions to existing public procurement regulation in order to provide more accessible ways to contract with the public sector. As an example, the Dutch strategy mentions the plans to use innovative procurement processes to assist SMEs in developing AI for government, such as hackathons (Ministerie van Economische Zaken en Klimaat, 2019).

In addition, some strategies mention the allocation of funding to stimulate the development and uptake of AI in the public sector. As an example, the Danish strategy mentions that the government is planning to allocate 27 million euros to test and deploy AI in municipalities and regions (The Danish Government, 2019). While some of these funding programmes are aimed at administrations themselves, others focus on stimulating the GovTech Startup landscape, assuming they will bring innovative AI solutions to the market for government organizations.

Lastly, some of these initiatives aim to facilitate the experimentation of this technology to learn from the challenges in developing and applying AI in public sector contexts. Therefore, a variety of countries have mentioned some AI flagship projects which will be used to learn from AI implementations and its effects. Based on the experiences of these initiatives, knowledge could be shared among institutions and revisions of the AI strategies made in the future. As part of this experimentation, some mention that regulatory sandboxes are being established to provide an experimental setting or safe area to test AI applications before they are deployed on a larger scale.

In the following table, an overview of each of these initiatives in all countries under investigation can be found.

Table 9: Overview of Policy Initiatives per Country

Policy actions	CZ	DK	DE	EE	FI	FR	LIT	LU	MA	NL	PT	SW	UK	Total
Awareness campaigns on AI		X		X		X	X	X	X	X	X		X	9
Hosting regular AI meetings	X			X						X				3
Participation in EU events				X				X		X		X		4
Improving Data quality	X	X	X	X			X	X			X	X	X	9
Improving Data accessibility	X	X	X	X	X		X	X			X	X	X	10
Access to private sector data													X	1
General AI training		X		X		X	X		X	X	X	X		8
Specialist AI Training		X		X					X	X	X	X		6
New positions or institutions				X	X		X			X	X		X	6
AI pilot projects	X	X		X	X	X		X	X	X	X	X		10
Regulatory Sandboxes for AI				X	X		X					X		4
Development ethical framework		X			X	X	X			X	X	X	X	8
Reform of data sharing laws	X			X									X	3
General AI Law				X										1
Funding for AI projects		X		X				X					X	4
Stimulation of GovTech Startups	X						X				X		X	4
Revising procurement processes	X			X	X				X	X				5

The analysis of the policy actions proposed in the different AI national strategies shows that not all countries have explored the same depth and scope of initiatives to stimulate the adoption of AI within the public sector. As it can be seen in the overview, there are considerable differences in what actions Member States are taking to ensure the uptake of AI in the public sector. Nevertheless, some of these initiatives seem to be more reoccurring than others, as most strategies mention to improve the data used for AI in the public sector, having flagship AI projects, hosting awareness campaigns, training programmes and developing ethical frameworks.

Following, these different policy actions have been classified according to the three-fold typology of policy instruments sticks, carrots and sermons, as shown in Table 2.

Table 2: Overview of Policy Instruments in AI Strategies

Policy instrument	Sticks	Carrots	Sermons
Policy initiatives	Creating regulatory sandboxes for AI	Starting AI pilot projects	Holding awareness campaigns for civil servants
	Developing ethical frameworks	Special funding for AI experiments	Organizing regular meetings within institutions regarding AI
	Reforming data sharing regulation	Stimulating GovTech Startup	Participating in related policy events
	Drafting of a General AI Law		Internal, general AI training courses
	Revising the procurement process		Internal, specialist AI training courses
			Establishing new positions or institutions
			Facilitating access to private sector data
			Improving data quality of public sector data
			Improving data accessibility within the institutions

As can be seen in the overview, many of these policy instruments could be classified as the 'sermon' policy instruments, meaning that they are relatively soft policy instruments aimed at facilitating AI development and usage. By comparison, far less of these policy instruments could be

regarded as either 'sticks' or 'carrots'. In total, we count the frequency of policy instruments belonging to the 'sticks' as 13, the 'carrots' as 15 and 'sermon' as 55.

In sum, many of the existing and planned policy initiative which are aimed to tackle would be relatively soft policy instruments, aimed at facilitating civil servants into experimenting, while far few policy initiatives are of regulatory or financial nature. While it is too early to say what this will mean for the future development and usage of AI in the public sector, having limited financial resources and regulatory policy support might mean that many of the other well-intentioned policy initiatives might not be effective to promote AI adoption. Further research is very much needed into further assessing each country's policy action, their effectiveness, and limitations in stimulating AI usage in the public sector.

5. Conclusion and Future Research

In conclusion, the analysis of AI national strategies reveals a wide variety of initiatives and techniques that Member States are putting in place or intend to put in place to foster the use of AI in the public sector, both directly and indirectly. Using the vocabulary of a classic categorization of different policy instruments (Vedung, 1998) into "sticks" (i.e., regulatory instruments), "carrots" (i.e., economic and financial instruments), and "sermons" (i.e., soft policy instruments, such as training and dissemination programmes), we can observe that, for the time being, most of the emerging national strategies on AI in the public sector in Europe seem to focus more on a "sermon approach" over "sticks" and "carrots". Soft policy instruments, such as campaigns for awareness, encouragements to improve data quality, and employee training, are in fact prevalent across almost all countries. Regulation and financial resource allocation, such as project funding and procurement process reviews, on the other hand, are instruments that are less uniformly distributed at this stage. This overview of national approaches to fostering the implementation and use of AI in the public sector is a snapshot of a swiftly developing scenario, which is very likely to transform over time. However, such an attempt to capture the "spirit of time" of European initiatives for AI in the public sector can serve as a practical first step to systematically assess potential impacts of AI in public services in the European Union. Ideally, most public policy reviews combine document analysis with expert interviews to ensure that necessary information regarding the policy is not lost or misunderstood (Bowen, 2009). We notice this limitation, as it is likely that some policy actions regarding AI are included into other initiatives, such as the Digital Government strategies. Therefore, as part of the AI Watch studies, additional research activities such as a workshop (van Noordt et. al., 2020 *forthcoming*) and a survey on AI policy initiatives with Member States' eGovernment representatives have already been held, which can be consulted in the full report (Misuraca & van Noordt, 2020 *forthcoming*). The future research activity will build on these insights, by including additional policy documents, and interviews with stakeholders to further interpret the strategies, the rationale and possibly, the effects, of different policy initiatives.

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Lost in Translation: Enterprise Architecture in e-Government Projects

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Abstract: e-Government projects in public administration are inherently complex and prone to delays and failures. Enterprise architecture (EA) is increasingly used as a method of practice to tackle the organization complexity and offers a common communication platform between various EA stakeholders. However, the attempts to translate EA terminology to audience who uses English as the second language (ESL) often result in misunderstandings and ambiguity. We present preliminary results of a survey among various stakeholders, ESL speakers, who are using ArchiMate, an EA modeling language, in e-Government projects. We found that using an EA standard created in English speaking environment and then translated or mixed with original language version creates issues with understanding among ESL speakers. Although, the agreement on meaning and usage of elements at the pragmatic level was prevailing, experts disagreed more often on the elements use at the semantic level. We suggest selecting a minimum viable set of elements and examples of their use for EA projects in the given domain in order to reduce ambiguity.

Keywords: Enterprise architecture, public administration, ambiguity, ArchiMate, ESL speakers.

Acknowledgement: This work was supported by the Faculty of Economics and Management, Czech University of Life Sciences Prague grant no.2019MEZ0009

1. Introduction

e-Government projects in public administration are inherently complex and prone to delays and failures. Many public agencies promote enterprise architecture (EA) as a method of managing organizational complexity (Hiekkanen et al., 2013; Lankhorst, 2017) and more efficient implementation of e-Government and ICT projects (Tamm, Seddon, Shanks, & Reynolds, 2011). Besides being a time-consuming exercise, the common pitfall of EA creation is bias owing to expert's subjective perception of the organization goals, strategy and operations (Perez-Castillo, Ruiz-Gonzalez, Genero, & Piattini, 2019). The problem is then multiplied by a lack of mutual understanding between subject matter experts and a number of other involved stakeholders namely

project portolio managers, and enterprise architects who are often hired as external consultants. The misunderstandings stem from a gap between perception and communication about real world objects (Gustas & Gustiené, 2004). Additionally, the threat of ambiguity and misunderstanding rapidly increases when the enterprise architects translate the EA terminology from English to another language in an attempt to convey the message to other stakeholders who use English as the second language (ESL). Surprisingly, this topic is underresearched in the literature.

The more complex the area for which the enterprise architecture should be developed, the bigger the gap, and also the bigger ambiguity of perception and interpretation of real word objects can grow. This is especially intensified in public administration with its complex, multifaceted and rule-based nature (Hiekkanen et al., 2013). The subject matter experts in public administration are mostly struggling with a lack of systematic and architecture approaches while portfolio project managers and enterprise architects lack deep knowledge of the public administration domain. A deficit of communication and collaboration then results in unwanted project and program delays and running off the scope and budget. We assume that the gaps in conception between experts working on large e-Government projects can be closed by using the visual and easy understandable elements. These elements might stimulate willingness, mutual cooperation and knowledge sharing among teams (Banaeianjahromi & Smolander, 2019).

The objective of our research is to focus on closing the gap in the way of thinking of subject matter experts and portfolio project managers as well as enterprise architects in the public sector. We use the ArchiMate modeling language to develop a high-level view of the enterprise architecture for the State Land Office of the Czech Republic. The purpose of the proposed enterprise architecture is to align e-Government initiative with the agency's efficient ICT operation and development. Based on the collected data we formulate following research questions:

- RQ 1: What is the common understanding of enterprise architecture between ESL experts in e-Government projects?
- RQ 2: How can the enterprise architecture elements assist with closing the gap in understanding between ESL experts in e-Government projects?

This paper presents an overview of literature on the enterprise architecture levels and its creation, and ArchiMate modeling language. Then we describe our research methods, present preliminary findings of the survey and the proposal of EA for the public agency. Finally, we discuss the implications of the findings and outline future research.

2. Literature Review

Enterprise architecture (EA) is a practice method for describing and managing an organization's structure, infrastructure and processes in order to reduce the complexity of doing so. Enterprise architecture core purpose is to describe altogether business, IT and evolution of an organization, i.e. essentials that are more stable than particular information systems or software (Lankhorst, 2017). The process of EA creation and management starts with description of the current state and future state, then development of a transition plan and its implementation (Kotusev, 2017). EA creation is realized at three levels: (1) the pragmatic level that concentrates on a strategic description of a long-

term intention or a vision of the enterprise (the "why"); (2) semantic level that describes static and dynamic structures of business processes across organization and technical system boundaries; and (3) syntactic level which defines implementation details needed for the data processing in a specific application or software component. (Abraham, Aier, & Winter, 2015; Gustas & Gustiené, 2004). Shared understanding of all stakeholders involved in the EA creation process is a precondition for success (Abraham et al., 2015).

The Open Group ArchiMate standard provides an independent modeling language that aids enterprise architecture (Open Group, 2019). ArchiMate provides graphical representation for all three EA creation levels formulated by Gustas & Gustiené (2004). The strategic aspects are covered in motivation and strategic layers, static and dynamic structures of business processes are included in the business layer, implementation details are part of the application and technology layers, while the transition from a current to future state is described by the implementation layer. The standard is supposed to model the enterprise architecture but also to serve as a communication tool between various EA stakeholders. Due to the subjective bias each stakeholder often comes up with his or her own interpretation of ArchiMate graphical elements (Perez-Castillo et al., 2019) which hinders the modeling effort (Chiprianov, Kermarrec, Rouvrais, & Simonin, 2014) and undermines the ArchiMate intended purpose. Therefore, the agreement between the experts on the definition of what each element means in a specific area of public administration, especially in order to deliver projects and programs in expected quality, is critically important (Brožek, Merunka, & Merunková, 2010).

3. Methodology

In order to indicate the level of EA elements understanding among ESL speakers we formed a convenient sample of subject matter experts, portfolio project managers and IT experts working on e-Government projects in the Czech Republic. We administered a survey via email including a short explanatory letter and then followed up over the phone. As this is an ongoing research, we further present only preliminary results drawn from **9** responses.

The instrument consisted of 19 questions divided in four sections: demographics, enterprise architecture practices, understanding of architecture elements, and their usage. We asked whether the expert and his organization use English or Czech or a combination of both when speaking about and using EA elements. The answers could inform about potential causes of ambiguity. In the section about the architecture elements, we presented two motivation layer elements (stakeholder, driver), three strategy level elements (course of action, capability), two business layer elements (business service, business role) and two implementation layer elements (work package and deliverable). This allowed us to learn about the perceived understanding of the elements. In the practical usage section, respondents answered how they use various elements in different scenarios within the public administration domain. This would allow us to compare the answers with the previous section and measure the gaps between perceived semantics and actual use.

In order to demonstrate how enterprise architecture elements can assist with closing the gap in understanding between various experts, we proposed a high-level enterprise architecture view for the State Land Office of the Czech Republic, a recently established Czech government agency. The

first author of this paper has been involved as a consultant in the agency EA development project. The enterprise architecture serves as a common communication framework for experts with the aim to support achieving both operational and developmental goals of the agency.

4. Results

The results presented in this section are preliminary as the survey is still ongoing. The respondent demographics is described in Table 1.

Table 1: Basic Demographics of the Sample (N=9), Source: Own Work

Industry	**Freq.**
Banking	1
Energy	2
Public administration	5
Automotive	1
Employees	
Less than 250	**2**
250-500	**1**
500-1500	**3**
More than 1500	**3**
Position	
Enterprise Architect	**3**
IT Architect	**3**
Project Portfolio Manager	**1**
Chief Ministerial Officer	**1**
Business Process Consultant	**1**

While being ESL speakers, more than 55 % of the respondents used combination of both Czech and English and 45 % used only Czech or English in the EA communication within the team. However, the communication with the client occurred in all three ways equally by one third. For each element, four possible answers were offered; and we measured the frequency of equal answers. The respondents in majority understood the elements meaning equally except for the Course of Action where answers altered between 'direction' (5), 'approach' (2) and 'procedure' (2) (Table 2).

While the respondents were quite confident in indicating the EA elements meaning, the answers about the practical usage of the elements were more diverse. The Resource and Goal elements usage

were presented as multiple-choice items, and the other three (Business Service, Business Role and Deliverable) were described as illustrative cases with options to agree or disagree. The most uniform answers were given to the Goal element which all respondents marked as 'goal' (9) but also as 'ambition' (4) or 'path' (1). The least uniformity recorded answers to the item Deliverable where only two respondents answered about the meaning and five agreed upon its use in a practical example. Business Service and Business Role were understood and used almost equally with the least discrepancies. On the contrary, the use of the Resource element was perceived as 'workers' (7), or 'machines or vehicles' (7), or 'energy' (4) (Table 2).

Table 2: Understanding and Use of the EA Elements (N=9), Source: Own Work

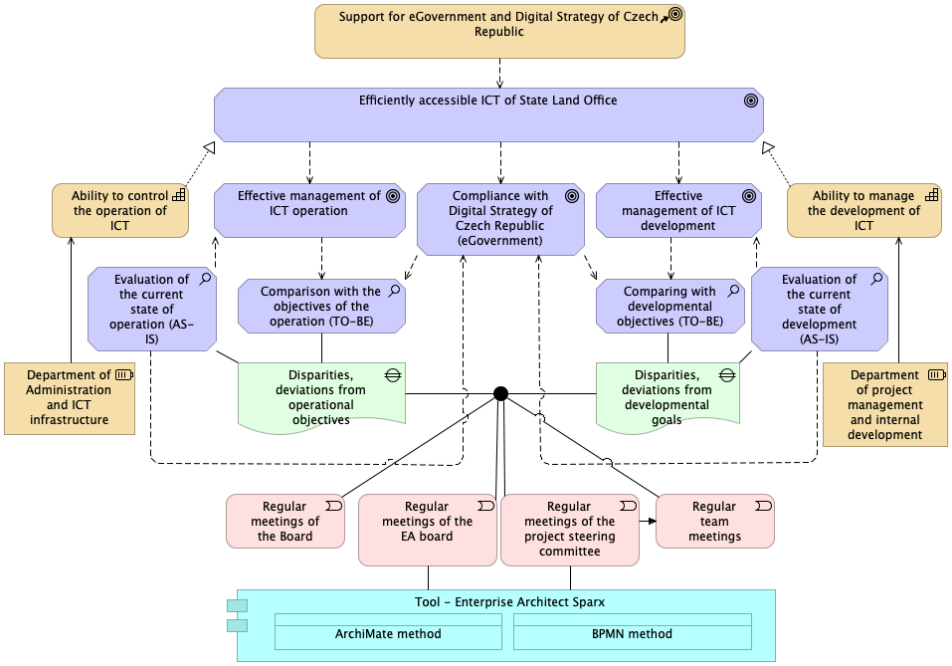
Layer / Element	**Understanding (freq.)**	**Use (freq.)**
Motivation		
Stakeholder	8	-
Driver	8	-
Goal	-	9
Strategic		
Capability	8	-
Course of Action	5	-
Resource	-	7
Business		
Business Service	8	7
Business Role	6	6
Implementation		
Work package	6	-
Deliverable	2	5

4.1. A Case Study of the State Land Office of the Czech Republic

The State Land Office of the Czech Republic has been established by the Act on the State Land Office in 2013 in order to administer state property. The agency has replaced former land authorities and has been given competences to manage and transfer agricultural land, consolidate land, settle restitution and property claims, and privatize state property (SLO, 2019). The management of the Office decided to actively apply the enterprise architecture principles in order to fulfill the long-term e-Government initiative promoted by a nation-wide Strategy of Coordinated and Complex Digitization of the Czech Republic 2018+ (Ministry of Interior, 2018).

The objective of the agency is to improve efficiency of the ICT management both for meeting the operational and developmental objectives. This should be done by creating the enterprise architecture that would allow to continuously analyze the current state, identify and close the gaps by implementing projects. To meet the set objective, the agency launched the enterprise architecture initiative and invited consultants to create a high-level schema describing objectives, capabilities and ambitions (Figure 1). The first author of this paper created the schema of the agency EA initiative.

Figure 17: The State Land Office Enterprise Architecture Initiative, Source: Own Work.



The State Land Office strategic goal is to support the ambitions of e-Government and the Digital Strategy of the Czech Republic and, at the same time, to make its own ICT efficient and accessible. This goal breaks down to a number of partial goals: effective management of ICT operation, effective management of ICT development, and compliance with the Digital Strategy of Czech Republic. Each of the partial goals are assessed from the current state and future state viewpoints. It means that a continual and repeatable evaluation of the current state of ICT operations at the Department of Administration and ICT infrastructure and development at the Department of project management and internal development must be ongoing in order to effectively innovate ICT operations and improve ICT developments. The gaps between the current and future state should be discussed, consulted and mitigated through meetings at all managerial levels, i.e. board meetings, EA board meetings, project steering committee meetings, team meetings and also subject matter expert meetings. SPARX is an enterprise architecture tool adopted by the agency. The enterprise architecture framework depicted on Figure 1 proposes a single enterprise architecture communication platform reflecting all strategic aspects and requirements enforced by the Digital Strategy of Czech Republic and also has potential to reduce the misunderstandings about the nation-wide e-Government goals as well as the ambiguity of perception of enterprise architecture elements.

5. Discussion

Although results of the survey are not yet conclusive, we can observe that the motivation and strategic layer that describe "the why" of an organization are less ambiguous than the business layers that represent the semantic aspect of the enterprise architecture. Particularly, the implementation layer seems to be challenging both for the meaning perception and the usage of the elements. The ambiguity of elements meaning across EA layers has been reported in a number of EA projects and initiatives particularly in the public sector (Banaeianjahromi & Smolander, 2019). One of the factors causing the ambiguity is the mixed usage of English and another language versions of EA standards in communication between EA and other experts, ESL speakers. Apart from the lost meaning due to translations, the misperceptions of elements may be a root cause of the mixed use of various elements which further hampers smooth and flawless communication (Gustas & Gustiené, 2004). Despite being non-conclusive and unfinished, our survey findings were similar.

We argue that although the holistic approach of the ArchiMate language was used in the proposed EA, the target audience perceived the ArchiMate elements and their graphical symbols differently which would result in further problems in the enterprise architecture management and consequent projects (Hiekkanen et al., 2013; Perez-Castillo et al., 2019). Each element might have at least more than one essential interpretation in the real world, while each person might use a particular element in a different context which adds to the ambiguity. By gathering more empirical evidence both from Czech and other language speakers, we would be able to prove or disapprove whether the EA elements can clearly contribute to less ambiguity, better communication and efficient ICT management in public organizations in ESL environments. Consistent with other research (Brožek et al., 2010), we argue that instead of assuming that ArchiMate is a language that allows to communicate the enterprise architecture in an unambiguous way, it should be rather used to unify the meanings of elements and their projections onto real world objects.

6. Conclusion

The views of the various stakeholders involved in enterprise architecture creation in public administration are different due to language barriers, diverse domain knowledge and EA experience. Therefore, EA modeling language such as ArchiMate is often used in contradiction to its original purpose to express, analyze and model structures that are important for an organization. This ambiguity can be mitigated by reducing the freedom of expression of the language and providing use cases of ArchiMate elements application in e-Government projects.

By completing the survey and result analysis, we shall be able to make several contributions. First, we found that using a standard created in English speaking environment impedes understanding among ESL audience. This is a practical implication for all stakeholders working on an EA project especially in public sector. Due to a small sample consisting of Czech speakers only the findings cannot be yet generalized to all ESL speakers. Second, as ArchiMate has become the most used EA modelling language with many types of elements it has also broadened the gap between their meaning and usage. This in practice will require to devise a minimum viable set of elements and examples of their use that could be used in the given domain for EA projects in order

to reduce ambiguity. As the research on ambiguity in EA projects due to language barriers is scarce, we aim to gather a large sample of EA professionals both from public and private sector and continue are investigation.

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EGOV-CeDEM-ePart

Addressing Lock-in Effects in the Public Sector: How Can Organisations Deploy a SaaS Solution While Maintaining Control of Their Digital Assets?

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Abstract: As software as a service (SaaS) adoption increases in both the public and private sectors, so does dependency on specific providers and technologies and the consequent danger of lock-in. This paper reports on how public sector organisations (PSOs) can, and should, avoid lock-in throughout the lifecycle (commissioning, deployment and decommissioning) of their deployment of the Microsoft Office 365 SaaS product (O365). We investigate how 33 PSOs address different lock-in effects, focussing on the City of Gothenburg, and show that none of the PSOs determined possible lock-in effects prior to implementation or were able to provide documented evidence that they would be able to independently access, process and maintain the digital assets processed by the SaaS solution after decommissioning. We also report on jurisdictional and data processing issues, with consequent impact on digital sovereignty.

Keywords: lock-in, public sector, SaaS solutions, cloud, open standards

Acknowledgement: This research has been financially supported by the Swedish Knowledge Foundation (KK-stiftelsen) and participating partner organisations in the LIM-IT project. The authors are grateful for the stimulating collaboration and support from colleagues and partner organisations, and for valuable discussions with Mathias Lindroth.

1. Introduction

Digital and data sovereignty is an increasing concern for countries wishing to maintain control of digital assets. At the same time, there is an increasing dependency on international providers of ICT solutions, and particularly cloud-based SaaS solutions (e.g. EC, 2020; Försäkringskassan, 2019; GAIA, 2020; Lundell et al., 2016; Radar, 2019) which process those assets. Research shows that lock-in effects can impose many different types of technical, legal, economic and societal challenges for public sector organisations ("PSOs") (Contreras, 2015; EC, 2014; Egyedi, 2007; Ghosh, 2005; Lundell et al., 2016; Lundell and Gamalielsson, 2018; Lundell et al., 2019). The overarching goal of this study is to investigate and explain how use of commercial SaaS solutions may cause different types of lock-in effects that impact on a PSO's ability to maintain control of its digital assets.

A number of initiatives that seek to mitigate problematic lock-in effects from technical, legal, and societal perspectives (e.g. Ghosh, 2005; Regeringen, 2009; SOU, 2009; NPS, 2016, 2019; Lundell et al., 2019) have been proposed. For example, several countries have published policies and strategies for open standards (e.g. NOC, 2007; UK, 2015; NPS, 2016) initiatives and proposals addressing digital and data sovereignty (e.g. GAIA, 2019). The public sector has seen significant deployment of SaaS solutions. For example, in August 2019 it was reported that, in Sweden, all large municipalities and about half of all municipalities used a specific SaaS solution, namely Microsoft Office 365 ("O365") (Radar, 2019). Such use implies that the municipalities' digital assets are processed and maintained in jurisdictions outside Sweden.

When using SaaS solutions to export files in closed file formats and closed standards it may be impossible to implement such formats and standards in third party software projects for a number of technical and legal reasons (Lundell et al., 2019), even if patent rights are available under so-called fair, reasonable and non-discriminatory (FRAND) terms. Research shows this may also be the case for open source software (OSS) projects (e.g. Blind and Böhm, 2019; Lundell et al., 2015, 2019). Accordingly, PSOs must ensure that, before adopting a SaaS solution, all processed data and metadata can be exported in files using open file formats (NPS, 2016) enabling them to be processed after use of the SaaS solution has ceased, through software sustainably implemented in OSS capable of processing all the relevant formats (Lundell et al., 2019).

The use of SaaS by PSOs also raises legal issues: a report from Radar (2019) shows that 88% of the 290 Swedish municipalities have undertaken a legal analysis on the use of cloud services (such analysis being undertaken either in-house or by external experts). However, previous research shows that there are several technical and legal challenges related to exit from a SaaS solution in terms of long-term maintenance of files after an organisation has ceased using it (Lundell et al., 2019). The study investigates the following research question (RQ): How do, and by which strategies should, public sector organisations address lock-in effects before use of commercial SaaS solutions?

The study explains how PSOs that have adopted SaaS solutions have considered and taken actions for maintaining control of their digital assets during the entire life-cycle of those assets. The investigation focuses on O365 and considers its adoption and use in the public sector. O365 is a widely deployed SaaS solution (which shares similar functionality with SaaS solutions from other vendors such as Google Gsuite), and a representative example of a cloud solution that has recently gained significant interest amongst PSOs.

The paper presents three principal contributions. First, we identify critical strategies for what to consider and how to take action before an organisation adopts and uses a SaaS solution. Second, we present insights from the adoption of O365 by 33 PSOs focusing on the risks for different types of lock-in effects, and in doing so we report on actions taken before adoption and identify strategies that would allow for a sustainable exit. Third, we report on strategies for how digital assets can, and should, be maintained after exit from a SaaS solution and specifically present novel findings concerning file format lock-in after exit from O365.

2. Research Approach

Through a review of the literature, which also considered published policies and strategies, strategies for how a PSO can avoid lock-in effects prior to adoption and use of a SaaS solution were identified (see Table 1). The review also considered strategies for how to maintain digital assets after a PSO has ceased to use a SaaS solution.

We initially investigated an influential large scale deployment of O365 in a large PSO – the City of Gothenburg ("CoG") (Gothenburg, 2018), a municipality with over half a million citizens and 56000 employees – that gained public exposure and public debate concerning the lawfulness of using O365 under Swedish law (Lindström, 2017; Nordström, 2020; SLK, 2017, 2019). We randomly selected 30 PSOs (and it was discovered that 29 of the 30 used O365) and selected 3 further PSOs that had publicly contributed to a report by SALAR (2019). Hence, public documents for a total of 33 PSOs were investigated for their adoption and use of O365.

The standards-setting process used by many standards setting organisations (SSOs), including ISO and ITU-T, allows organisations which claim to hold patents affecting implementation of standards to declare their claims in a publicly-accessible database maintained by the SSO. We reviewed such declarations which may impinge both on aspects of use of O365 and also the ability of customers to interpret and process files exported from their deployment of O365. Drawing from previous research, including Lundell et al. (2015, 2019), we reviewed how the PSOs have analysed patent risks and assessed if they have obtained third-party patent licences as mentioned in the Online Services Terms for O365 (e.g. OST, 2019). To investigate if PSOs have established sustainable exit strategies we investigated, through use of an action-case research approach, if it is possible to obtain patent licences allowing long-term maintenance of digital assets even after O365 is no longer used. To investigate whether it is possible to obtain necessary third party rights related specifically to the ITU-T H.265 standard (as detailed in the Online Services Terms for O365), we investigated all declarations made in the two relevant patent databases (ITU-T and ISO) and requested patent licences from all declarants. This phase of the study extends previous research (see Lundell et al., 2019) which seeks to obtain all necessary rights from third parties in order to allow for use and implementation of relevant standards (including the ITU-T H.265 standard) in software. The ITU-T H.265 standard investigated is jointly developed and provided by the ITU-T and ISO, so the investigation covered relevant information from patent databases provided by both ITU-T (2019) and ISO (2019). Specifically, we seek to obtain patent licences for the ITU-T H.265 standard essential patents which relate to all declarations in the specific patent databases. So that these licences can be used by a range of OSS projects, we explicitly request conditions compatible with establishing OSS projects under one (or several) of the three specific OSS licences: GPL 3.0, MPL 2.0, and Apache 2.0 (Lundell et al., 2019).

3. Results

Table 1 presents a conceptualisation of results, in the form of a set of factors with associated issues that a PSO should consider before adoption and use of a O365 solution, which evolved during the

review of the literature. The evolved factors and related issues constitute a basis for subsequent presentations of how PSOs have addressed the identified issues.

Table 1: Factors and Associated Issues to Consider Before Adoption and Use of a SaaS Solution

Factors (F1-F4) & issues	**Basis for evolved factors & issues include**
F1: Availability of all contract terms. Have all relevant contract terms been obtained, understood and accepted? Are relevant contract documents maintained?	Have you reviewed the agreement and understood the terms of the agreement, for example if the terms unilaterally can be changed by the supplier? (eSam, 2018)
F2: Availability of all necessary licences. Have relevant licences been identified? Have relevant licences been obtained?	Lawful use of certain file formats both during and after use of the SaaS solution may require patent and other licences. (Blind and Böhm, 2019; Contreras, 2015; Lundell et al., 2015, 2019; Lundell and Gamalielsson, 2018)
F3: Impact assessment. Is an impact assessment available? What are implications of data processing and potential disputes in different jurisdictions?	Impact assessment needs to show GDPR compliance (GDPR Article 35(4)), technically, procedurally, and legally (DI, 2019).
F4: Exit strategy. Is an effective exit strategy available? Have licences been obtained that allow for reuse of digital assets after exit? Is software (from different providers) available that allows for interpretation of files after exit from the SaaS solution?	Is there a strategy that allows for abandoning the cloud service in the future (an exit plan)? (eSam, 2018); Digital assets need to be exported in open standard formats (NPS, 2016; Lundell et al., 2019); PSOs need to obtain all licences and technical specifications to allow for interpretation of files after exit from a SaaS solution (Lundell et al., 2019; Lundell and Gamalielsson, 2018)

Concerning **availability of all contract terms** we find that no PSO has undertaken any action to obtain all contract terms related to third party rights as detailed in the online service terms (OST, 2019). Further, none of the PSOs have obtained and retained documentation of all contract terms despite having accepted the "Program Signature Form" which states: "By signing below, Customers and the Microsoft Affiliate agree that both parties (1) have received, read and understand the above contract documents, including any websites or documents incorporated by reference and any amendments and (2) agree to be bound by the terms of all such documents."

Concerning **availability of all necessary licences** which allow for use of digital assets we find that no PSO has obtained all licences from third parties as detailed in the contract terms for O365: "Customer must obtain its own patent license(s) from any third party H.265/HEVC patent pools or rights holders before using Azure Media Services to encode or decode H.265/HEVC media." (OST, 2019) Therefore, the customer must obtain its own licences from any third party rights holders related to the H.265/HEVC standard. Based on the information that has been provided during the study, it is currently unclear if it will be possible to obtain all necessary rights from all third party rights holders for the ITU-T H.265 standard that the PSOs are bound by when using O365. Crucially, this standard is normatively referenced (via other standards) in the ISO/IEC 29500 standard (OfficeOpen XML). Results from the investigation have found no indication to suggest that any of the 33 PSOs have obtained (or even considered the need to obtain) such licences. Hence, under the

assumption that the ISO/IEC 29500 standard is implemented by O365 it follows that data that is exported from O365 (and stored locally as ".docx" files) may impinge on patents that have been declared as standard essential for the ITU-T H.265 standard (in the ISO and ITU-T patent databases, see Lundell et al. (2019) for details). If, on the other hand, the ISO/IEC 29500 standard is not implemented by O365 it follows that a customer signing the contract is exposed to certain risks (for no reason), but more importantly that customers exporting data from O365 may be unable to interpret and maintain the files since the files (stored in ".docx") would in such a scenario fail to implement the ISO/IEC 29500 standard, which in turn may lead to loss of data since the file format actually implemented in O365 is unknown.

Concerning **impact assessment** we found that CoG and the most other PSOs have not undertaken an impact assessment (as detailed in GDPR's Article 35(4)) and, further that there is general unawareness concerning in which jurisdictions data processing and maintenance of each PSO's data has taken (and can take) place. It is clear that analyses of contract terms need to take into account different jurisdictions and legal systems, since jurisdiction and choice of law clauses covering the provision of O365 extends beyond Swedish law. Further, documentation provided by some PSOs referred to information provided by Microsoft which shows that many subprocessors based in different third countries (including Brazil, Chile, China, Egypt, India, Malaysia, Serbia, Singapore, South Korea, USA, and United Arab Emirates) are authorised to access customer data and personal data for provision of O365.

Concerning **exit strategy** which allow for reuse of digital assets we find that no PSO has access to an effective exit strategy that can be implemented after exit from O365 at short notice. An effective exit strategy will cover a PSO's continuing ability to make it possible to read and write files exported from O365, which will require software and associated licences covering those formats . It is clear that no PSO has sought to obtain licences to standard essential patents (SEPs) potentially impinging on the file formats referenced in the Online Services Terms for O365. There are a number of declarants of SEPs related to the ITU-T H.265 standard and there is no indication (in any of the responses) and no documentation from any of the PSOs that they have even considered the implications of the Online Services Terms for O365 they are bound by. Further, based on information provided during the study, we find no evidence that PSOs have considered potential risks related to SEPs that may arise from use of closed file formats. In addition, some files received during data collection from PSOs (including ".docx" and ".pdf" files) were themselves provided in several closed file formats that may impose significant challenges for any organisation that seeks to maintain files being exported from O365. These findings extend results from previous research, namely that it may not be possible to obtain licences necessary for legal reasons to interpret files in the PDF/A-3 format during the lifespan of SEPs declared in the ITU-T and ISO patent databases, potentially for many years (e.g. Lundell et al., 2019). Further, previous research also shows that it is unclear if the complete technical specification for ".docx" files exported from O365 can technically and legally be interpreted (Lundell et al., 2019). We find that PSOs are generally unaware of the complexities involved in interpreting the ISO/IEC 29500 file format standard (and all normative references included in several levels) and associated risks related to use and reuse of files represented in closed file formats that have been exported from O365. Overall, there is an overwhelming lack of documentation

showing analysis of the legal and technical challenges arising from continued use of files that have been exported from O365 without continued support from the current supplier.

4. Discussion and Conclusions

The study shows a widespread practice amongst PSOs to adopt and use a widely deployed SaaS solution from a global supplier under potentially problematic contract terms. The City of Gothenburg and most other PSOs use their adopted SaaS solution to process data on a large scale with users that are in a position of dependence without having carried out an impact assessment, despite the fact that PSOs are unaware of in which jurisdictions data can be, and have been, processed. Some PSOs identified prior to their adoption and use of their SaaS solution that the terms allow for data processing in several third countries. None of the organisations present any evidence to suggest that they have tried to obtain all necessary patent licences for the ITU-T H.265 standard from third parties which would allow for use of the adopted SaaS solution. Since these licences, in addition to licences for a large number of other standards, would also be needed to allow for implementation of the closed file format standards in software that can be provided by other suppliers it follows that organisations are potentially exposed to significant risks of losing control over their own digital assets.

Findings from the study also show that none of the investigated organisations present any strategy that would allow them to cease using the SaaS solution in a way that exported digital assets can be used and reused by other software applications in the future. The study shows that amongst the few PSOs that present some documented risk analysis there is strong faith that their current supplier will assist in a potential future situation if the PSO decides to abandon their current supplier.

Further, findings show that recommendations presented in the literature for how to maintain digital assets during their entire life-cycle have been ignored by all investigated PSOs. Before adoption of a SaaS solution, none of the organisations had investigated whether digital assets created and maintained in the SaaS solution can be exported in open file formats and open standards to allow use and reuse after exit. Further, none of the investigated PSOs have presented any analysis which addresses how to obtain all licences they require when, and after, the adopted SaaS solution is used. Hence, it is unclear if any of the organisations will be able to interpret their own files without support from their current supplier in a potential future situation when they have ceased to use the SaaS solution.

In summary, all investigated PSOs have failed successfully to address critical issues that need to be considered before adoption and use of a SaaS solution.

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Ambidextrous Policy: Cross-Country Comparison of Policies for the Digitalization of Healthcare

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Abstract: Healthcare constitutes a fundamental challenge in the ongoing digitalization of society, partly due to its complex, integrative and critical nature. With healthcare regulated through national policies, we posit that the said policies need to afford a parallel facilitation of exploitation and exploration. This study explores how healthcare policies in Sweden and Uganda are positioned in terms of ambidextrous balance. Through content analysis of select national policies, the study finds that policies regarding IT are identical in terms of ambidextrous balance, whereas policies regarding digital healthcare/eGovernment display a difference, with Uganda being more focused on exploration than Sweden. For the general healthcare policies, Uganda's focus is on exploitation, while Sweden has a mix of exploitation and exploration. We discuss the implications of different balancing points to the continued digitalization of healthcare, and present our conclusions in terms of propositions for the future study of ambidextrous policy for the digitalization of healthcare.

Keywords: Policy, Digital healthcare, Ambidexterity

1. Introduction

The digitalization of society involves a dual aspiration of increased efficiency on the one side, and, new operating models and means of value-creation on the other (Nambisan et al., 2017). As such, digitalization is laden with connotations from both operational excellence, disruption and innovation. This dual perspective on digitalization is core to much of the extant literature on digitalization (Nardi and Ekbia, 2017). In viewing digitalization as the parallel strive for exploitation and exploration, there is a growing body of literature utilizing findings from the field of organizational ambidexterity to study digital initiatives (Haffke et al., 2017). Organizational ambidexterity, here understood as the organization's ability of parallel attainment of exploitation and exploration (March, 1991), mirrors the dual characteristics of digitalization.

As societies increase their digital intensity, few sectors are left unaffected. This holds true also for healthcare, where digitalization has been advocated as a means for enhancing quality while simultaneously reducing cost (Locatelli et al., 2012). Given that healthcare constitutes one of the most complex and critical practices in society (Nilsson and Sandoff, 2015), it is often highly regulated

through national policies (Ayimbillah Atinga et al., 2011). In this study, we regard policies as a collection of principles, rules, and guidelines formulated or adopted by an organization to reach its long-term goals, typically published in a booklet or another form that is widely accessible (Hill, 1997). Policy designs have been recognized as a field of study since the 1950s, though in the early 2000s there was still a dearth of research available (Schneider and Sidney, 2009). Recent findings highlight the necessity for more intently studying policies related with digitalization, such as digital government (Greve, 2015). By bridging the fields of policy and organizational ambidexterity, the objective of this study is to contribute to the emerging literature on digital policies, through the comparison of healthcare policies of two national healthcare systems. The policies are analyzed in terms of ambidextrous balance in order to derive propositions for future studies of digital policy This study is guided by the following research question: *How can the study of policy for the digitalization of healthcare be informed through an organizational ambidexterity perspective?*

This paper is organized accordingly: After the introduction, the precursory findings are presented, along with the theoretical framing. This is followed by a presentation of the results. Then, the discussion of the findings by relating them to previous studies in order to theorize on the role of ambidextrous policy in digitalization is done. Finally, the implications and limitations of the study are presented along with calls for new research.

2. Precursory Findings and Theoretical Framing

2.1. Digitalization and the Need for Ambidexterity

There have been numerous attempts at describing the evolution of digitalization. In early work by (Zuboff, 1988) the technology is seen to evolve from automation through information to transformation. In more recent work, Nardi and Ekbia (2017) take a socio-materiality informed perspective and describe the shift in agency, from automation, to augmentation to heteromation.

As these two examples show, digitalization and digital technologies are laden with both evolutionary and revolutionary characteristics. Digitalization has two parallel consequences. First there is the automation of menial labour, with the intent of increasing efficiency through economies of scale. Second, there is the introduction of new operating and business models, where digital innovations bring new opportunities for value creation and revenue generation through economies of scope.

With digitalization comprised of two parallel activities (exploitation and exploration), it also comes with the necessity for organizations to be able to handle both activities at the same time. Previous research has referred to this capability as organizational ambidexterity (Junni et al., 2013), and there are numerous studies of both its impact on performance (Raisch and Birkinshaw, 2008) and how to achieve it (Janssen and Van Der Voort, 2016).

2.2. Studying Policy in the Digitalization of Healthcare

Organizations in nearly all sectors are aware that they need to adapt to the changes that come from time to time as a result of digital innovations (Linders, 2012). In as much as some of these changes

can be disruptive, the ability of many of the organizations to adapt is affected by institutional arrangements and patterns of decision making and governance. Governance thus requires that governments foresee and develop sound policies to help in the management of the new innovations.

2.3. Investigatory Framework

Core to this study is the conceptualization of ambidexterity as activities directed towards exploitation or exploration (March, 1991). In line with (Benner and Tushman, 2003), we regard exploitation as activities related to the exploiting of existing opportunities to achieve efficiency. Exploration, is regarded as activities related to the exploring of new opportunities towards innovation, whereby ambidexterity becomes the capability of dynamically balancing parallel activities of efficiency and innovation. Following Luger et al. (2018) and Zimmermann et al. (2018), this implies that we regard ambidexterity as a continuous process rather than a steady state. Through this dynamic perspective, balance is not static but continuously evolving. We develop a method for assessing the current ambidextrous balancing point from secondary material such as policy documents supported by the findings from (Uotila et al., 2009) that content analysis holds great potential for studies of ambidexterity.

3. Method

The study was done in two settings with varying levels of dynamism in their institutional environments. The rationale for this selection was related to the underlying assumption within organizational ambidexterity that the level of dynamism in the environment impacts the optimal ambidextrous balancing point (Raisch and Birkinshaw, 2008), with high dynamism being linked to a higher emphasis on exploration than in lower levels of dynamism. Dess and Beard (1984) define environmental dynamism as the rate of change and the degree of instability of the environment. Sweden is deemed as a developed economy with a longer track-record of automation and its larger installed digital base coupled with a stable political and geo political environment. As such Sweden was selected as an example of a country with lower level of institutional dynamism. Uganda is deemed as a low and middle income (LMIC) country with a low installed digital base and rather unstable in regard to the political and geo-political environment. As such Uganda was selected as an example of a country with higher level of institutional dynamism.

With the intent of studying existing policies, the data collected in this study was secondary in the form of existing policy documents at the national level in each country. In both settings, the policies were searched and downloaded from the websites of the ministries (or bodies) of Health and IT in the respective countries. An inductive categorization of the policy documents was conducted. This resulted in three categories namely IT, Digital healthcare/eGovernment and Healthcare (general). All collected documents in Sweden were in Swedish, whereas the documents in Uganda where in English. A total of 26 (16 versus 10 in Sweden and Uganda resp.) policy documents were collected, displaying an expected difference in the level of policy formalization in the two settings.

Following (Uotila et al., 2009) and their recommendation for future research into ambidexterity, we used the selected policy documents as a basis for calculating the ambidextrous balance through

content analysis. On the basis of March (1991) and Uotila et al (2009), we use the associated words (and search strings). Using the search strings, we identified the number of word counts associated with exploitation versus exploration in each policy document in order to arrive at a percentage in terms of balance. In other words, identifying 10 occurrences of exploration and 30 of exploitation in a document meant the balance was calculated to 25% exploration and 75% exploitation. We also calculated the mean balance in each category, as well as the total for each country. The frequency analysis was done through the qualitative analysis software Nvivo.

In terms of validity, the use of March (1991) and his explicit identification of words associated with exploration vs exploitation safeguards this. Keeping as close to the possible foundational source of exploration and exploitation was important, with the only change being the aforementioned equivalence of efficiency vs innovation with exploitation vs exploration (Xue et al., 2012). As noted by (Krippendorff, 1980), the issue of semantical validity is also central when conducting content analysis. In terms of reliability, there have been numerous examples of studies that have used coding and scoring of words with reliable results in the past (Tetlock et al., 2008), and hence these deem the method to be reliable. As a final step in the analysis, propositions were derived logically from our findings. This study is utilized as a means to identify how organizational ambidexterity can inform the study of policies for the digitalization of healthcare, and hence the propositions are seen as the main contribution.

4. Results

4.1. Sweden: Exploitation for Exploration

The main focus in the policies related to IT, digital healthcare and healthcare (general) is that of exploitation rather than exploration (average of 81% vs 19%). Out of the three different types of policies, the policies related to IT are the ones with the highest bias toward exploitation (84%). On the basis of this, we conclude that the area of IT is still primarily focused on exploitation rather than exploration, whereas the other policy areas are more open to address issues of exploration. Despite this, we can see that ambidextrous balance of Swedish policy is primarily geared towards exploitation.

4.2. Uganda: Exploration for Exploitation

The main focus in the policies related to IT, digital healthcare and healthcare (general) is that of exploitation rather than exploration (average of 77% vs 23%). Out of the three different categories of policies, the policies related to Healthcare are the ones with the highest bias toward exploitation (100%). On the basis of this, we conclude that the area of Healthcare is still primarily focused on exploitation rather than exploration, whereas the IT area is open to address issues of exploration and the digital healthcare focus is more on exploration. Despite this, we can see that ambidextrous balance of Ugandan policy is primarily geared towards exploitation.

4.3. Comparison

From the results, there are distinct differences between the ambidextrous balance of the two compared countries. In the Swedish setting, there is a relative alignment between the three different forms of policy. Healthcare and digital Healthcare policies are completely aligned in terms of ambidextrous balance, whereas IT policies display a somewhat higher skew toward exploitation rather than exploration. In the Ugandan setting, there is no sign of alignment between the three forms of policy. In terms of the general healthcare policies, these are completely skewed towards exploitation (100%), whereas the digital healthcare policies display an almost even balance between exploitation and exploration (46% vs 54%). The IT policies are primarily focused on exploitation (81%).

5. Discussion

The discussion focuses on developing five propositions intended to guide future research into ambidextrous policy. With this study being one of the first to target policies for digitalization from an ambidextrous perspective, we believe that this is valuable for future research. Propositions are presented and not conclusions since we acknowledge the necessity for additional studies in order to falsify or prove them.

In terms of the IT policies and the identified alignment between the two settings, we see this as an effect of IT policies being subject to isomorphism. As noted by Gregory et al. (2018), there is a tendency within IT Governance practice to fall subject to mimetic behaviour. The configuration for governing IT, as well as the policies that guide the said configurations should display contextual contingencies, yet as the findings show they do not. The effect of a potential mis-alignment will become visible in the effectiveness of the IT policies. On the basis of this, the following propositions are posed for future research:

Proposition 1a: The ambidextrous balance of IT policies will display isomorphic traits between dynamic vs stable institutional environments.

Proposition 1b: There will be a difference in the effectiveness of IT policies in dynamic/stable institutional environments.

In regards to policies for Digital Healthcare/eGovernment, sharp differences are identified between the two settings. With Uganda being more focused on exploration than exploitation, Sweden is still primarily focused on exploitation. We interpret this in light of recent findings from the study of the constraining aspects of digital heritage (Rolland et al., 2018) and the phenomenon of technological leapfrogging (Steinmueller, 2001). Uganda has only recently begun an investment into a digital infrastructure for healthcare, whereas Sweden has a long tradition of digitization. Hence, there is a significant level of path-dependency involved in digital healthcare in Sweden. Uganda does not, comparatively, have a strong digital infrastructure and is hence freer to utilize emerging technologies. Thus, they will have more opportunities for leapfrogging, making exploration more relevant than exploitation. On the basis of this, the following proposition is posed for future research:

Proposition 2: Digital Healthcare/eGovernment policies in dynamic institutional environments will focus more on exploration than in stable institutional environments on account of leapfrogging.

In terms of healthcare (general), the findings showed a reverse phenomenon, where Sweden was more focused on exploration than Uganda. Uganda was completely focused on exploitation rather than exploration. This is interpreted in light of a lower level of general maturity within healthcare in Uganda than in Sweden. Sweden is ranked as one of the leading nations in the world in terms of the quality of their healthcare, and have for a long period of time been able to invest in assuring economies of scale and high levels of exploitation. Uganda, on the other hand, has not had the opportunity of consolidating its resources and achieving exploitation. Hence, the complete focus on exploitation in general healthcare policies in Uganda is deemed as a cap on exploration and risk, since reaching a sufficient level of exploitation is necessary. On the basis of this, the following propositions are posed for future research:

Proposition 3a: Healthcare policies in dynamic institutional environments will to a higher extent strive for exploitation than in stable institutional environments.

Proposition 3b: Healthcare policies in dynamic institutional environments will avoid exploration, until reaching a sufficient level of exploitation.

In addition to these propositions related to policies, we also believe that this study offers insight into general organizational ambidexterity theory. First, the findings summarized in propositions 3a and 3b indicate the relative simplistic assumption in organizational ambidexterity that the primary contingency for ambidextrous balance is environmental uncertainty (Jansen et al., 2006). According to (Peng and Lin, 2019), the higher the degree of environmental dynamism an organization faces, the more it needs to spend on exploration rather than exploitation. The findings suggest that there are threshold values for exploitation which need to be met before exploration is considered an option. This leads to the following proposition:

Proposition 4a: Optimal ambidextrous balance is not a sole function of the level of dynamism in the institutional environment.

Proposition 4b: Optimal ambidextrous balance is contingent upon the status of development in the country.

Here, we see promising signs from studies informed by the punctuated equilibrium theory (Gregory et al., 2018), where an organization is expected to shift balance between certain semi-steady states. Further research into the role of the status of economic development, and a nuancing of contingency variables for optimal balance (temporary) is hence called for.

This study has two main implications for practice. First, organizations should carefully assess the alignment of ambidexterity between their strategies and the policies governing them. Second, as noted by Zimmermann et al. (2018), the enactment of ambidexterity is done by front-line managers. Hence, managers should consider not merely the ambidextrous balance, but also the actual enactment of ambidexterity.

This study has two main implications for policy. First, if policy is supposed to facilitate digitalization and the attainment of benefits from digitalization, policies need to be designed to

facilitate the parallel activities of exploration and exploitation. On the basis of this, the method used in this study could inform future digital policy-designs for healthcare through offering a manner in which candidate policies could be analyzed before finalization and propagation. Second, given the relative level of misalignment between the different types of healthcare policies in Uganda, we believe that policy makers could benefit from analyzing existing policies in respect to their ambidextrous balance.

The study has two main limitations. First, the empirical selection of two countries such as Sweden and Uganda will invariably lead to issues of comparability. This makes the potential value of comparisons laden with limitations. Second, the elicitation of ambidextrous balance from policy documents may be regarded to contrast with the mentioned perspective on ambidexterity from Zimmermann et al. (2018). What we are able to identify in this study is merely a snap-shot of the existing balance, and the study offers no insight into the potential balancing practices present in the two settings. This will be necessary to study through more longitudinal studies of the policy documents, or through other methods.

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Collective Data Analytics Capability Building Processes: a Governance Model

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Abstract: Collective data analytics capability building offers opportunities for government organizations to develop capabilities that would be difficult to develop on their own. However, research on that topic is scarce and there is still a limited understanding of how collective data analytics capability building processes contribute to the value realization of the individual participating organizations. In this paper, drawing from the governance literature and by analyzing a case study from the customs domain we develop a governance model that allows to analyze collective data analytics capability building processes. Our governance model is a contribution to the literature on the use of data analytics in government, with the specific focus on understanding the collective data analytics capability building processes. For practitioners, the model can be used for identifying scenarios for engaging in collective data analytics initiatives in a multi-level context.

Keywords: Governance, collective, data analytics, capabilities, value, customs

Acknowledgement: This research was partially funded by the PROFILE Project (nr. 786748), which is funded by the European Union's Horizon 2020 research and innovation program. Ideas and opinions expressed by the authors do not necessarily represent those of all partners.

1. Introduction

Governments today are facing big challenges in the domain of international trade. They face increase in international trade due to developments such as Brexit and eCommerce, and at the same time they need to ensure safety and security while at the same time facilitating trade (Tan et al., 2011). To address such challenges governments are starting to explore the possibilities that big data and data analytics can offer. Big data refers to data that is high in volume, velocity and variety and that requires specific technology and analytical methods for transforming it into value (De Mauro et al.,

2016). Despite the promises of big data and analytics and successful examples from businesses, earlier research reports that many organizations have failed to reach their strategic goals after significant investments (Gunther et al., 2017) and there is a limited understanding of how social and economic value can be created (Grover et al., 2018). This is especially problematic for government organizations as they traditionally to do not have advanced data analytics capabilities in-house and the risks of failure pose a big barrier. Government agencies from different countries are now starting to explore whether they can collaborate to collectively develop data analytics capabilities. From a practical point of view such collective capability building offers opportunity to share efforts and resources to develop capabilities that would be difficult to develop on their own.

Previous research on value of data analytics has discussed value by looking at the data itself (e.g. Kim, 2015; Sammon & Nagle, 2017), or focusing more on the organizational perspective (e.g. Gunther et al., 2017; Grover et al., 2018; Rukanova et al., 2019). Of particular interest is the study of Grover et al. (2018) which examines the strategic processes that lead to data analytics value creation in an organization. Two key strategic processes can be distinguished (Grover et al., 2018), namely: (1) big data analytics capability building processes, and (2) big data capability realization processes. The latter is followed by a learning loop which can initiate new big data capability building processes. The first process (i.e. data analytics capability building process) relates to developing data analytics infrastructure (including assets such as data sources, platforms, analytics portfolio and human talent) and data analytics capabilities. The second process relates to the capability realization processes include value creation mechanisms, value targets and impacts where the impact can be seen as functional value for organization (e.g. improved performance) or in symbolic value (e.g. reputation).

Nevertheless, previous research that examines value from an organizational perspective is focused on understanding value by looking at a single organization as a unit of analysis. While in some papers it is acknowledged that managing relationship with external stakeholders is important to create value (e.g. Gunther et al., 2017), this relationship management is still seen from an internal perspective of an individual organization and its ability to manage such relationships. Thus, there is lack of research that focusses on identifying value from collective data analytics capability building processes, where multiple organizations join forces to jointly develop data analytics capabilities which they can then exploit individually in their own organizations. To address this gap, the objective of this research is to develop a governance model to support the analysis of collective data analytics capability building processes and how these link to value realization processes in individual government organizations.

2. Research Background: Multi-level and Multi-actor Governance

In this study we take a broad perspective on governance and define governance as all processes of governing, whether undertaken by a government, market, or network, whether over an entire system, formal or informal organizations, or individuals part of such a system, and whether through laws, power, contracts, norms, language (adjusted from Bevir, 2012, p. 1). Thus, governance is also initiated by other parties than governments, such as citizens, non-profit organizations, companies,

lobby organizations and associations. In fact, to realize a state of governance it is essential that multiple actors combine their efforts and apply combinations of governance arrangements.

Previous research emphasizes different aspects of governance. Given the nature of our domain and our research objective (i.e. we are interested in understanding collective data analytics capability building processes) we were particularly interested in understanding governance in a multi-actor context. One focus of the governance literature that is relevant in our study concerns multi-level governance. This is particularly interesting as in the international trade there are complex interactions among businesses, as well as national and supranational government agencies such as the EU. In multi-level governance, governance and decision-making encompass multiple levels, such as local, national and international levels of public administration (Marks et al., 1996). Another governance study that is particularly relevant in the context of this paper is networked governance. Networked governance focuses on the use of organizations and structures of authority and collaboration to assign resources to network participants, and to control collective action across the network as a whole (Provan & Kenis, 2008). In contrast to hierarchies and markets, in networks there is decentralization of power and decision-making and a blurring of roles and responsibilities (Stoker, 2018). Provan & Kenis (2008) developed three basic models of network governance, namely participant-governed networks, lead organization-governed networks and network administrative organization.

Table 1: Governance Framework for Case Study Analysis; Adapted from Provan & Kenis (2008), Emerson et al. (2012), and Ostrom (1990)

Networked governance – Three basic models of network governance (Provan & Kenis, 2008) •Participant-governed networks; •Lead organization-governed networks; •Network administrative organization)
Collaborative governance – Dimensions and components of collaborative governance Emerson et al. (2012) •System context; •Drivers; •Principled engagement; •Shared motivation; •Capacity for joint action; •Outputs / collaborative actions; •Impacts; •Adaptations
Collective governance – Eight design principles for sustainably and effectively managing common resources (Ostrom, 1990) • Clearly defined boundaries; •Proportional equivalence between benefits and costs; •Collective-choice arrangements; •Collective-choice arrangements; •Monitoring; •Graduated sanctions; •Conflict resolution mechanisms; •Minimal recognition of rights to organize; •For groups that are part of larger social systems, there must be appropriate coordination among relevant groups

Another stream of governance literature focuses on collaborative governance, which refers to "the processes and structures of public policy decision making and management that engage people constructively across the boundaries of public agencies, levels of government, and/or the public, private and civic spheres in order to carry out a public purpose that could not otherwise be accomplished" (Emerson et al., 2012). Emerson et al. (2012) developed an integrative framework for collaborative governance, which consists of dimensions such as system context, shared motivation and capacity for joint action. Each dimension contains a number of underlying components, such as mutual trust, knowledge and resources. Finally, we draw from literature concerning collective

governance and the management of commons. Ostrom (1990) investigates how communities co-operate to share resources in common pool problems and states that such problems are sometimes solved by voluntary organizations rather than by a coercive state. Ensuring collective action, however, is not straightforward as e.g. parties may have conflicting interests and pursue other goals. Ostrom (1990) shows that, under certain conditions, groups of people are capable of sustainably and effectively managing their common resources. These conditions are presented as design principles. Using the insights derived from the above-mentioned literature, we developed our governance framework (Table 1).

3. Research Approach

For this study we followed an interpretative case study approach (Walsham, 1993). In our study we are interested in data analytics and the broader organizational context where data analytics capabilities are developed. We conducted our case study in the context of the H2020 PROFILE[1] research project funded by the European Commission. The project aims to develop and demonstrate the use of data analytics for customs risk analysis. The work in the project is carried out in demonstration projects called Living Labs which provide real-life setting in which data analytics solutions are developed and piloted. A brief description of the Living Labs that we used as an empirical ground is provided in Table 2.

Table 2: Living Labs Overview

Living Labs (LL)	**Short description**
(1) Dutch LL	Focus on use of data from eCommerce platforms to cross-validate declared price of goods on customs declarations
(2) Belgian LL	Focus on behavior of traders by using data analytics and machine learning on historic data sets and external data sources
(3) MS- N MS LL	Comparing results of analytics performed on customs declaration data of two neighboring customs administrations (one in the EU and one outside the EU)
(4) EU LL	Providing an infrastructure for sharing data among customs administrations in the EU

Data was collected in the period 2018-2020 through interviews, participation in meetings and project workshops, participation in bi-weekly calls, review of project deliverables and policy documents. In our case analysis we analyzed the four Living Labs as well as the PROFILE project as a whole in order to understand the complexity of the domain and identify examples of collective capability building efforts which enabled us to build our governance model which we present in Section 4. The Living Labs are still in pilot stages and results have not yet been implemented in practice. Nevertheless, each of the Living Labs sheds light on complexities of setting up collective data analytics initiatives. The data collection and data analyses evolved through a number of iterations. The initial understanding of the empirical context guided us in our search for suitable theories. In this process we arrived at our initial governance framework (Table 1) which we further

[1] https://www.profile-project.eu/

applied as a conceptual lens to structure our empirical observations. As a result we developed our model for governance of collective data analytics capability building processes (Figure 1) discussed in the next section.

4. Results: A Governance Model of Collective Data Analytics Capability Building Processes

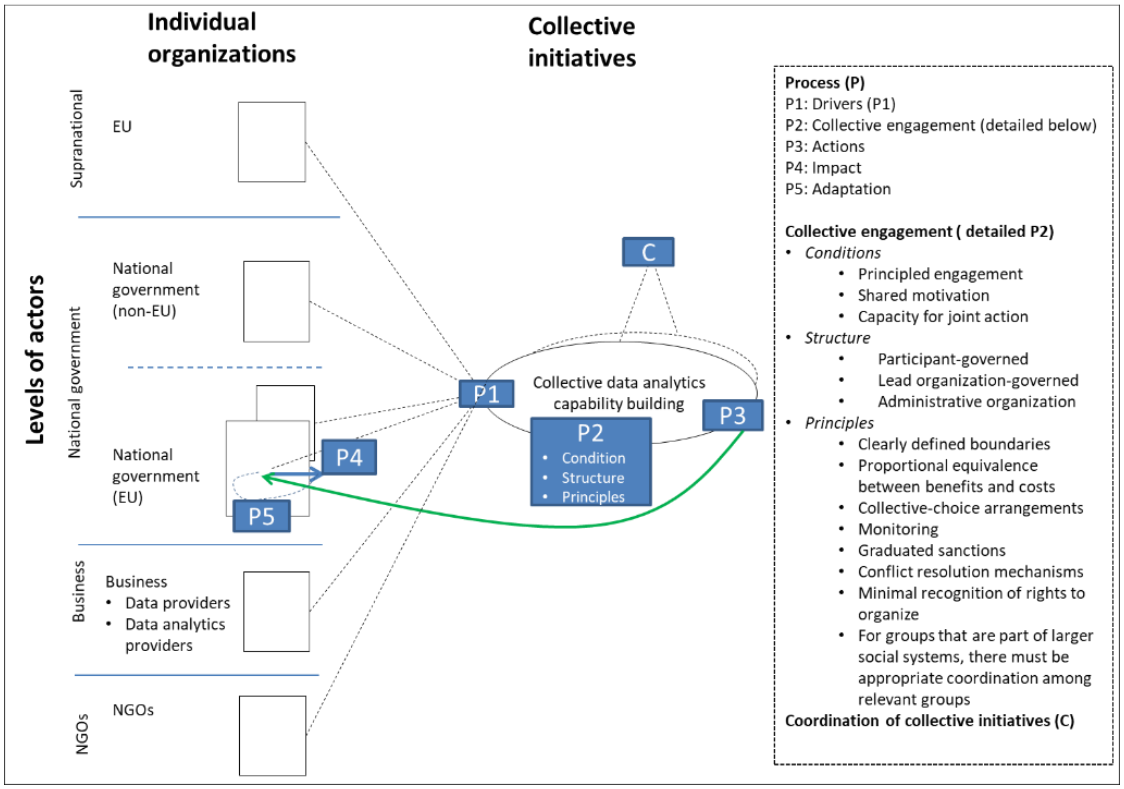
Based on the insights from literature and insights from the case domain we derived our model for governance of collective data analytics capability building processes (Figure 1). This model is intended to serve as a conceptual foundation to: (a) identify governance scenarios for collective data analytics capability building initiatives; (b) analyze specific collective data analytics capability building initiatives; (c) allow to reason how these collective capabilities developed jointly feed back into the individual organizations; (d) provide an oversite of the different collective initiatives to allow parties to reason about synergies among them. Our point of departure for developing our governance model was the model of Grover et al. (2018) where strategic data analytics processes are viewed as (1) capability building processes and (2) value realization processes, where the impact of analytics is visible in real life, followed by learning loops. In our model, however, we took part of the process related to data analytics capability building outside of the organization. The capability building takes place now as part of a collective initiative.

With this idea in mind and building on the rich empirical material from the PROFILE project, as well as the conceptual framework (Table 1), we arrived at the model as presented in Figure 1. Our model captures explicitly on the one hand individual actors (at multiple levels), and on the other hand the collective data analytics capability building initiatives. The individual actors are further divided into business and government actors, where the government actors are positioned at multiple levels, namely national and supranational. Our model distinguishes further the national actors as national governments that form part of the European Union (EU) and government actors that are outside of the EU. On the supranational level we position the EU as a supranational government. This identification of levels of actors is consistent with earlier multi-level analysis research in the area of international trade (Rukanova et al., 2015). On the collective side, our model captures the collective data analytics capability building (illustrated with an oval in our framework). The dotted oval indicates that multiple collective data analytics capability building initiatives can be started. For simplicity we will focus on explaining only one. The dotted arrows from the actors to the collective initiative suggest the diversity of actors that potentially may join an initiative. In practice we foresee that different scenarios of collective initiatives may evolve having different actor compositions.

In order to analyze a collective data analytics capability building initiative we make use of and adapt the high-level categories of Emerson et al. (2012) (see Table 1), namely: (1) drivers; (2) collective engagement; (3) actions, in terms of outputs as a result of the collective engagement; (4) impact; and (5) adaptation. These are numbered P1-5 and in the list of concepts that are listed at the right-hand side of Figure 1. The second concept, (2) collective engagement in the list above, is aimed to better understand how the collective initiative functions internally. In our model we list explicitly the relevant concepts from our framework (Table 1) that are relevant for understanding the internal

collective action processes under the concept collective engagement. More specifically under the concept collective engagement we distinguish among: (a) conditions; (b) structures; and (c) principles. Under (a) conditions we adapt several of the categories of Emerson et al. (2012). Furthermore in our model we further enrich the concept of collective engagement by adding also the three structures proposed by (Provan & Kenis, 2008) and the 8 governance principles proposed by Ostrom (1990). The full list of concepts that we use to understand collective engagements can be found in Figure 1. Finally in our model we also include the concept of coordination among collective initiatives (marked with C in Figure 1). By adding this concept to the model it becomes possible to reason about interdependencies among different collective initiatives.

Figure 18: Model for Governance of Collective Data Analytics Capability Building Processes



Some elements of our model deserve further attention. In the model of Emerson et al. (2012), the concepts impact and adaptation are related to the collective initiative. This is often the case when parties collaborate to jointly bring some desired change. In our case however the outcome of the collective data analytics capability building process (be it new analytics methods or cheaper access to new data sources) is fed back to the individual participating organizations (in our case e.g. the participating customs organizations). This is indicated with the arrow in our model pointing from the collective to the individual organizations. The individual (in our case customs) organizations are those that will deploy these outcomes in their own organizations, as part of their capability realization processes as described by Grover et al. (2018). They will combine the data analytics capabilities that they have acquired via the collective initiative together with their internal data analytics capabilities. They will then employ these combined capabilities in their processes (in case of customs in their customs risk assessment processes). By doing this they can observe the impact

(see symbol 4 in Figure 1). In terms of Grover et al. (2018), this impact can be functional or symbolic. As such the impact of the outcome of the collective process to the real world is not visible as a result of the collective process itself but becomes visible only when this output is used in by the individual organizations, which with their individual actions contribute to societal goals (e.g. better revenue collection and safety and security). By using the collective capabilities in their own processes and observing the achieved impact these individual organization then accumulate learnings and can initiate adaptations (see symbol 5 in Figure 1). These adaptations can be seen also as the learning loops in the model of Grover et al. (2018). These adaptations can then can be fed back to either the same collective initiative or can serve as a basis for initiating new collective initiatives if needed. For simplicity in our model we illustrated the feedback loop from the collective initiative to one organization only. In practice this loop is also directly relevant for all the organizations. In our case these loops would be directly relevant to national customs administrations. These loops can be also relevant for other organizations such as businesses or the EU as supranational government but these parties may not directly use the outcome of the collective process in their operational processes, but they may use them in other strategic processes such as new service delivery or drafting new policies. The impact and adaptation for these organization may be of different nature.

5. Discussion and Conclusions

In this paper, building on insights from the governnace literature and by using a case study from the customs domain we developed a governance model to support the analysis of collective data analytics capability building processes and identify how these processes relate to value realization processes for individual government organizations. Our governance model contributes to science by providing rich ground for analyzing collective capability building in a wider context and by giving insight into the complex dependencies. The societal contributions of our study are in the provision of a model that can be applied to identify scenarios for collective data analytics initiatives for government in a multi-level and multi-actor context and to aid in their governance processes. Future research can investigate the applicability of model in other domains. Future research could focus on how collective data analytics capability building processes evolve, how they can be implemented and funded.

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When Worlds Collide: Comparing the Logic of the Industrial and Welfare Societies

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Abstract: As governments around the world are increasingly using digital technology to generate social value, it is important to consider what types of logic underpin this value creation. Previous research has identified a dominant market logic, associated with new public management (NPM) in the public sector, which has had certain adverse effects. Against this backdrop, the purpose of this paper is to outline and compare the logic of two ideal societies: the industrial society and the welfare society. The study examines core works of literature on these two 'ideal-type' societies, each with its own logic. The results reveal important differences between these societies. While the welfare society neglects factors related to the mode of production and time, the industrial society lacks several important values, including human rights, solidarity, community and equality. By comparing these societies, this paper generates an understanding of why it is highly problematic for an industrial-based NPM logic to dominate in sectors such as education and health care. Such dominance is likely to lead to important values being overlooked.

Keywords: Welfare, Industrial, Society

1. Introduction

Governments around the world are increasingly using digital technology to generate a variety of (public) values. Rose et al. (2015) describe how values in the public sector are associated with different traditions that may not always be in harmony with each other. Thornton and Ocasio (1999) refer to the concept of institutional logic: 'the socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality.' Alford and Friedland (1985) describe three contending institutional orders of modern western societies: capitalism, state bureaucracy, and political democracy. Related to these orders is the notion of rationality, which has been identified as a dominant factor in the western culture (Meyer et.al , 1987; Meyer et.al , 1997), affecting the popularity of market logic found in the institutional order of capitalism. By having its heritage in the Industrial Revolution, market logic builds on the creation of efficient production, competition, and profit. From the prosperity of market logic in the private

sector, it has later been applied to the welfare state in the form of the new public management (NPM) paradigm (Hood, 1991). This paradigm has faced criticism for its dominant focus on competition, results assessment, and the primary activity of writing contracts (Deakin and Michie, 1997:1; Walsh, 1995). Lagergren (1999) argues that welfare organizations in the public sector have been affected by NPM in a negative way when they deviate from a welfare logic to a market logic. Bornemark (2018) argues that the application of market logic to welfare services, which might be less suitable for quantitative assessment, creates certain tensions. For example, it might not be desirable or even possible to quantify values such as 'quality of life'. However, there is a tendency to apply NPM, in non-industrial contexts, including the public sector. While the NPM ideal of quantification might improve transparency, it might also lead to de-professionalization and pseudo-quantification, leading public servants to focus more on achieving assessment goals than on tasks that belong to their professions (Liedman, 2012).

Against this backdrop, the purpose of this paper is to outline and compare market logic to welfare logic by using two ideal type of societies: the industrial society and the welfare society. The study examines core works of literature on these two societies.

This paper proceeds as follows. In Section 2, the industrial and welfare societies are described in more detail. In Section 3, the methodology is described. The results of the study are presented in Section 4, followed by concluding remarks in Section 5.

2. Ideal-type Societies

The ideal-type methodology was first used by Weber (1978) to explain ways of understanding the distinctive character of the reality in which we live. He reflected on specific elements of ideal sociological types, which he summarized as configurations of generally intended subjective meaning to which modes of recurrent social action are oriented in the context of communal or associative social relationships. Weber insisted that it was possible and valid for social scientists to order empirical reality even though all humans have an independent perspective, which affects their objectivity. With this in mind, this study focuses on certain general structural elements of the ideals of the industrial and welfare society to describe their characteristics.

2.1. The Industrial Society

Today, the term 'industrial society' is so widely used that its theoretical construct is seldom questioned. It achieved popularity in 1816 when it was used by Henri de Saint-Simon and later by Aguste Comte to argue that the future would be industrial. It emerged in clear opposition to the rationalist critique of theological-feudal authority and the ideals of liberty, equality and freedom of conscience, meaning that the theory of industrial society was opposed to the ideal of democracy. Weber believed that rationalization was the central force in the development of industrial theory, encompassing the realms of economics, politics, public administration, law and culture. Advances in science and the rise of intellectualization led to increased use of machine technology and the development of modern rational capitalism, rational law, legal-national authority and bureaucratic administration (Badham, 1986). Polanyi (1944) described the industrial society as a 'market society'

related to the human invention of the market economy. Darenhof (1959) highlighted a difference between the concepts of 'capitalist society' and 'industrial society', noting that they are often assumed to refer to identical concepts. When Darenhof described the industrial society, he drew on Marx, emphasizing private ownership of the means of production, the 'free' sale of labour, the production of surplus value, mechanized factory production and the existence of classes. Multiple descriptions of the industrial society exist in relation to theories of a post-industrial or post-capitalistic society. Bell (1973), Toffler (1980) and Beckford (1989) have described a transition from a pre-industrial to an industrial society and, finally, to a knowledge-based information society called the post-industrial society. In summary, the concept of an industrial society or industrial civilization has been discussed and used for many decades to describe how society has developed. Although reducing the rich material on the industrial society to an 'ideal-type' may generate a rather restrictive concept, this approach can also be a useful tool for understanding the main characteristics of this society.

2.2. The Welfare Society

The welfare state is often related to the idea that all citizens are entitled to a minimum standard of living and basic social services. It is built on a combination of elements both from socialism and capitalism: two political ideologies are combined in the idea of the modern welfare state (Kananen, 2014). Daily (2011) argued that the concept of welfare has a strong moral content, which means that it not only entails how we, as individuals, live but also how we believe others should live. As this study aims to describe the vision of an ideal-type of a welfare society, 'social welfare' is the phenomenon that represents this society to the greatest extent. The key work of literature describing the vision of an ideal welfare society used in this paper is by Lagergren (1999). She described the political vision of the Swedish 'peoples home' (folkhemmet), which represents an idealized cognitive model of a safe society built on solidarity. Lagergren described the ideology of the 'peoples home' as collectivism, where the moral base stems from solidarity and societal motherhood. The nature of ethical properties is that they are built on moral premises, whereby norms are separated from their historical context. Lagergren (1999) interprets various political metaphors connected to the 'peoples home' and identifies several core values from political statements: free rights, the provision of safety and care, order and organization, common solutions in everyone's best interest, solidarity, fairness, thoughtfulness, cooperation, helpfulness, trust, community, togetherness, a society built on both genders, functionalism, equality and no privileged or revoked. The main building block of this society is an assumption of human morality. If humans in a welfare society do not have morals, that is, the motivation to make the 'right' choice instead of the 'easiest' one, the entire society will fall apart. Hall (1959) argued that the basis of a welfare state rests on 'the obligation a person feels to help another in distress, which derives from the recognition that they are in some sense members one of another'.

3. Methodology

As aforementioned, this study revolves around two types of societies as depicted in previous literature. These societies are studied by using Weber's ideal types: the ideal industrial society and the ideal welfare society. These societies were outlined in the section above. The methodology of

ideal types has been further refined by Rex (1977) and Gerhardt (1994). In this paper, two sets of factors are used to describe the main characteristics of the two societies in more detail. The first group, economic factors, are derived from Bell's comparative schema of the industrial society, which consists of ten factors: mode of production, economic sector, transforming resources, strategic resources, technology, skill base, methodology, time perspective, design and the axial principle (Bell, 1976). These factors relate to a market logic associated with the industrial society. The second group, welfare factors, is derived from Lagergren's (1999) description of the welfare society. This group consists of nine factors: human rights, provision, order and organization, solutions, solidarity, community, social structure, functionalism and equality. These factors relate to a welfare logic found within the welfare society. The welfare and market logics are described using factors gathered from previous research on the industrial society identified by Daniel Bell (1973) and those of the welfare society and the concept of 'the peoples home' identified by Lagergren (1999). These factors can be described as concepts that explain the purpose and mindset behind the ideal types. An expected outcome of this comparison is the identification of gaps between the two ideal types of society, meaning certain aspects may be overlooked when the one is applied to the other. These gaps can later be used to generate an understanding of the problems caused when one type of logic becomes dominant and is applied to areas for which it is inappropriate.

The methodology of applying factors relating to the welfare and industrial societies to the opposite ideal-type society consists of multiple steps, in which interpretation is particularly relevant. To ensure the study's reliability, we position it in previous research by Bell (1973) and Lagergren (1999). While the use of ideal types has been criticized for being incoherent and overly abstract (Aronovitch, 2012), we argue that the ideal-type methodology is useful for highlighting certain characteristics of a society: ideal types do not necessarily describe how societies 'are' but rather how they are represented, for example, in literature.

4. Results

This section consists of two parts. In 4.1, the industrial and welfare societies are compared based on economic factors. Then, in 4.2, these societies are compared based on welfare factors.

4.1. Economic Factors

The aforementioned economic factors are presented in Table 1, together with the logic associated with them in relation to both ideal types. These factors are outlined in more detail below.

Table 1: Economic Factors

Economic factors	Welfare society	Industrial society
Mode of production	-	Fabrication
Economic sector	Service provision	Goods-producing
Transforming resource	Moral	Created energy

Strategic resource	Social goods	Financial capital
Technology	Supportive	Machinery for production
Skill base	Service work	Engineer, semi-skilled worker
Methodology	Common solutions for everyone's best	Empiricism, experiment
Time perspective	-	Adaptation by experimentation
Design	Inclusion of all people	Game against fabricated nature
Axial principle	Equality	Economic growth

Under the economic factor *mode of production* no welfare ideal-type characterization could be identified. The ideal welfare society does not strive for production but rather focuses on how to create a society where every citizen is included and their individual needs are satisfied. The welfare society is related to the provision of services to citizens and, therefore, does not have a mode of production: citizens cannot be treated as a product. It is important to note that the welfare society was born out of industrialization and that without economic growth and production, the financing of the welfare state would not be possible. *The economic sector* of a welfare society focusses on service provision rather than on goods production. The provision of welfare services, such as health care and social support, is vital (Pierson, 2006). However, as mentioned above, income from taxation is vital to support the service provision that the welfare society is built on. The *resources that transformed* pre-industrial society into an industrial society included oil, gas, coal and nuclear power, which provided new ways of creating energy. The resource that creates a welfare society is human morality: the ability to differentiate right from wrong through moral consensus (Lagergren, 1999).

An industrial society uses financial capital as a *strategic resource, whereas* the earlier pre-industrial society used raw materials. In the ideal welfare society, the strategic resources are social goods, which represent the services provided to citizens to increase welfare. In a welfare society, the purpose of *technology* is to support rather than to provide profit and support production, as in the ideal industrial society. Hall (1959) argues that the basis of a welfare state rests on people supporting each other which derives from solidarity. The *skill base* for the ideal industrial society includes the skills of engineers and semiskilled workers, which can enhance the production process, improve working rates and, therefore, increase profit. The vital skills in an ideal welfare society are those related to service work. As mentioned above, the service supporting citizens and the moral principle of helping our fellow humans are the basic principles of the ideal welfare society (Lagergren, 1999). The *methodology* behind the development of an industrial society is based on experimentation, empiricism and the scientific method. The methodology of the creation of a welfare society is based on finding a middle way to construct a society that supplies every citizen with the support they need (Lagergren, 1999). In the account of the ideal welfare society, time or *time perspective* are not discussed. Therefore, the economic factor of 'time perspective' is not considered for the welfare society. The ideal industrial society has an ad hoc adaptive time perspective, whereby experimentation is used to solve problems. According to Bell, an industrial society is built on a game against fabricated nature. By contrast, the ideal welfare society is built on the inclusion of all people.

This is similar to the design of a post-industrial society, which is based on a game between persons. The main focus in an industrial society is on economic growth through production. In the welfare society, the *axial principle* is the pursuit of equality (Lagergren, 1999).

4.2. Welfare Factors

The aforementioned welfare factors are illustrated in Table 2, together with the logic associated with them of both ideal types. These factors are then outlined in more detail below.

Table 2: Welfare Factors

Welfare factors	**Welfare society**	**Industrial society**
Human rights	Freedom	-
Provision	Safety and care	Economic growth
Order and organization	Policy	Rationalization
Solutions	For everyone's best	For profit
Solidarity	Thoughtfulness and helpfulness	-
Community	Togetherness and cooperation	-
Societal structure	Built on two genders	Built on consumption
Functionalism	Social and cultural	Design and construction
Equality	No privileged or revoked	-

In a welfare society, free *human rights* is a core value. However, no equivalent is mentioned in the account of the ideal industrial society. Industrialization emerged as a rationalist critique of secularization, theological-feudal authority and ideals such as liberty, equality and freedom of conscience (Badham, 1986), which means that it is also in opposition to the ideal of democracy. Another aspect of the industrial or production society that contrasts with the core value of human rights is an alienated workforce (Harbison & Myers, 1959), which results in depersonalized individuals. The industrial society aims to *provide* economic growth but not from a communal or individual perspective: owners do not want to increase profit for society but rather for themselves (although profit increases provide increased taxation that can later be used to provide safety and care to citizens). Marcuse identifies characteristics such as a 'concentration of individual enterprises in more effective, more productive corporations'. He also points out the aim of replacing obsolescent material and intellectual culture by a more productive and rational culture. An ideal industrial society uses economic rationalization to create *order and organization* (Dahrenhof, 1959; Aronovich, 2012). Rationalization, in turn, leads to standardization, which provides a common language, thereby improving communication between companies and increasing efficiency. Standardization often demands categorization and simplification, which can result in information loss. In a welfare society, order is achieved through government policy. *Solutions* in an industrial society are directed

by profit and production efficiency with the aim of reducing costs and striving for maximal profit (Bell, 1973). The most profitable solution is preferred.

In a welfare society, solutions should benefit everyone. The factors *solidarity and community* are not found in the account of the ideal industrial society. Solidarity is not a priority in an industrial society as evidenced in effects such as alienation, inequality and anomie (Botomore, 1974). Post-war descriptions of modernization and industrialization by Comte, Spencer, Tönnies, Tocqueville, Durkheim and Weber (Badham, 1986) show the decline of community and the rise of urbanism and centralization, which indicates that the reformation of society through urbanization runs counter to the creation of community. The main purpose of an industrial society is to increase production and reduce the prices of goods. This results in a new *social structure* that is built on increased consumption. The *functionalism* factor relates to the design and construction of technologies to increase production. Kerr et al. (1960) identify those who construct and design these technologies as revolutionary intellectuals. Advances in science and the rise of intellectualization resulted in increased use of machine technology (Banham, 1986). The factor *equality* could not be found in the account of the ideal industrial society. According to Botomore (1974), inequalities are inescapable, tolerable and even desirable in an industrial society: societies may be egalitarian in inspiration but hierarchical in organization. An alienated workforce is said to be one of the requirements of a production society (Harbison & Myers, 1959).

5. Concluding Remarks

This paper compared the logic of two ideal societies: the industrial society and the welfare society. The factors that determine these societies were gathered from existing literature, and the societies were described using an ideal-type methodology. The results of the comparison between the economic factors related to these ideal societies reveal that two factors were missing in a welfare society: mode of production and time perspective. This result does not come as a surprise since the welfare society is not focused on production values. The comparison between the ideal societies in relation to welfare factors generates some interesting results, especially in the context of the economic factors frequently applied in welfare organizations, such as health organizations and social services. The account of an industrial society showed gaps in relation to the following factors: human rights, solidarity, community and equality. This research adds to the current literature by demonstrating that a welfare organization evaluated in relation to economic factors lacks important values. In parallel, without a market logic, the welfare society has no mode of production.

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EGOV-CeDEM-ePart

Detecting and Generalizing Quasi-Identifiers by Affecting *Singletons*

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Abstract: In order to adhere to Open Government doctrine, Public Administrations (PAs) are requested to publish Open Data while preventing the disclosure of personal information of their citizens. Therefore, it is crucial for PAs to employ methods that ensure Privacy-preserving data publishing by distributing useful data while protecting individual privacy. In this paper, we study this problem by providing a two phases approach. First, we detect privacy issues by recognizing the minimum number of attributes that expose the highest number of unique values (that will be referred to as singletons) as Quasi-Identifier. We test our approach on real datasets openly published by the Italian government, and we discover that the quasi-identifier (year_of_birth, sex, ZIP_of_residence) discloses up to 2% unique values in already anonymized datasets. Once accomplished the detection phase, we propose an anonymization approach to limit the privacy leakage. We investigate which combination of attributes must be generalized to achieve the minimum number of singletons while minimising the amount of modified and removed rows. We tested our approach on real datasets as in the previous phase, and we noticed that by generalizing only rows corresponding to the singletons, we achieve nearly no singletons while affecting only the 2% of rows.

Keywords: Privacy, Quasi-Identifies, Anonymization, Generalization

1. Introduction

Data owners are spur in opening up their data to enable informed decision making, ensure transparency, audience engagement, and release social and commercial value (OKF). *Open data* (OD) is any information that people are free to use, re-use, and redistribute - without any legal, technological, or social restriction (OKF). Unfortunately, data in their raw and original form could contain personal and sensitive information about individuals. Publishing such data violate individual privacy (GDPR, 2016). Thus, data providers should perform *Privacy-preserving data publishing* (PPDP) (Chen, 2009) to provide useful data without violating individuals' privacy. According to the PPDP principles, data publishers have tables containing *(Identifiers, Quasi-*

Identifiers, Sensitive Attributes, Non-Sensitive Attributes) where Identifiers (IDs) are a set of attributes that identifies record owners; Quasi-Identifier (QID) is a set of attributes that could potentially identify record owners; Sensitive Attributes are person-specific information, such as, diseases, salary, religion, political party (GDPR, 2016); while all the remaining attributes are Non-Sensitive.

Data owners, such as public administrations (PAs), health care, and financial institutions, may release the data they collect by de-identifying them, i.e., by masking, generalizing, or deleting IDs. However, even anonymized public information may be re-identified by exploiting other pieces of available data. A 2002 study found that 87% of the U.S. population can be identified using gender, birthdate, and zip code as QID by matching anonymized hospital visit records and voting lists (Sweeney, 2002). These data are not problematic if isolated but lead to the re-identification of individuals by exploiting additional information. The individuals whose data are re-identified risk of having their private information, such as their finances, health or preferences, and their identity, sold to organizations without user conses (Porter, 2008) or disclosed to undesired end-users (Porter, 2008), or even it can cause the refusal of an insurance provision (Sweeney, 2002).

The choice of the QID is an open question (Fung, 2010) since it depends on attributes that the attacker can exploit to link actual data to any external source.

In this article, we aim to prove that PAs current anonymization practices are not as waterproof as first perceived. We propose an approach to identify the *best* QID by counting the number of uniquely occurrences of a combination of values in a dataset. These unique occurrences will be referred to as *singletons*. We define the *best* QID as the *minimum* number of columns/attributes that leads to the disclosure of the *highest* number of singletons. By recalling that PPDP is interested in minimising both the information loss and the privacy leakage (Fung, 2010), we interpreted privacy leakage as the number of occurred singletons, and we estimate the information loss as the number of suppressed and modified rows, decreasing thereby the overall dataset quality. We focus on the following Research Questions (RQs):

- RQ1: What is the best QID according to our approach, and how many singletons does it disclose?
- RQ2: The generalization of which attribute or set of attributes among date of birth, ZIP and sex (one of the most common QID in the literature) leads to the minimum number of singletons while minimising the affected rows?

The main contributions of this article can be summarized as follows:

- We designed and implemented an algorithm that classifies the minimum set of attributes that exposes the greatest number of singletons as the best QID where singletons are the unique occurrence of a combination of values for a set of attributes. Its implementation is freely available on GitHub (https://github.com/isislab-unisa/qid_identifier_and_anonymizer);
- We observed that by generalizing only singletons detected by the QID (sex, ZIP, date_of_birth), we obtain nearly no singletons, and we just affected up to 2% of rows. The experiments have been performed on real open datasets released by the Italian Ministry of Infrastructure and Transport (freely available on GitHub https://github.com/isislab-unisa/driver-license-datasets).

The rest of the article is structured as follows: in Section 2, we overview alternative approaches proposed in the literature to detect QID and perform anonymization; in Section 3, we present our approach to detect privacy issues by the number of occurred singletons, and we propose an anonymization approach based on the generalization and suppression; in Section 4, we report and discuss the performed evaluation; then, we conclude with some final considerations and future research directions.

2. Related Work

In this section, we aim to overview the alternatives in detecting QIDs and corrective actions to sanitise a dataset. According to the PPDP principles, we focus on microdata, i.e., data records about individuals instead of data mining results.

2.1. Detect Privacy Leakage Algorithms

Braghin et al. (2016) defined an approach to detect QIDs by considering both single columns and their collections and counting the unique occurrence of values. All the QIDs are returned. Our approach works similarly, but it elects the *best* QID as the smallest combination of columns enabling the most extensive identification of singletons.

Motwani and Xu (2007) exploit the *separation* and the *distinct ratio* to quantitatively describe the ability of attributes to distinguish an individual from another. While the distinct ratio measures the percentage of distinct values, the separation ratio measures the proportion of tuple pairs that can be uniquely distinguished. We aim to find the QID by the separation ratio while keeping the distinct ratio as a metric that does not contribute to the best QID election.

2.2. Anonymization Approaches

The *anonymization* approaches explicitly removes IDs and hide the sensitive information assuming that the latter should not be used in data mining algorithms. ID removal might not be enough: it is still possible to recognise individuals by QIDs. To prevent linking attacks, the datasets must be *sanitized* (Samarati, 2001) by applying *anonymization operations* among generalization, suppression, anatomization, permutation, and perturbation (Federal committee of statistical methodology, 2005).

Among the most famous privacy models, we cite *k-Anonymity* (Ciriani, 2007) that is based on the fundamental concept that if a record has a particular value for a QID, at least other k-1 records will have the same value for that QID. Multiple versions of k-Anonymity have been proposed to overcome some of its limitations. For instance, (X-Y)-anonymity (Wang, 2006) face the case in which multiple rows of the dataset are related to the same individual; MultiRelational k-Anonymity (Nergiz, 2009) focuses on the anonymization of multiple relational tables; l-diversity (Machanavajjhala, 2007) guarantees that each equivalence class has at least *l* well-represented values for each sensitive attribute overcoming the risk of the homogeneity attack; (α, k)-anonymity (Wong, 2006) experiences local recording by reducing data distortion; t-closeness (Li, 2007) requires that the distance between the distribution of a sensitive attribute and the distribution of the attribute in the overall table should be no more than *t*.

Our approach is a modified version of k-Anonymity where:

- k is at least equal to 2;
- we discourage suppression in favour of generalization;
- k-Anonymity operates at a global level, we can also locally work.

3. Our Approach for Detecting and Solving Privacy Issues

Our approach is based on privacy issues detection, followed by an anonymization approach based on generalization and suppression. The workflow starts from the human provision of the dataset to test, and it automatically returns the best QID. If the best QID matches (year, municipality, gender), it also provides the corresponding generalization.

3.1. Detection of Privacy Issues

We interpreted the detection of privacy issues as the occurrence of unique values by considering a single column or a combination of them. These unique values are referred to as *singletons*. We elect IDs and QIDs by the number of occurred singletons. The implemented pseudo-code follows:

```
def detect_ID_and_QID(dataset):
    identifiers = []
    stats = {}
    for size in range(1, num_columns):
        # all the dataset column subsets of "subset_size"
        subsets = get_subsets(columns_to_check, size)
        # IDs: columns containing all distinct values
        temp_IDs, still_to_check = get_IDs(dataset, subsets)
        IDs += temp_IDs
        # for each subset, it stores the singletons number
        stats.update(get_stats(dataset, still_to_check))
        columns_to_check = list(set(still_to_check))
    # best QID: the smallest subset of columns exposing the greatest number of singletons
    best_QID = get_best_QID(stats)
```

In the best QID election, we first consider the number of singletons detected by each set of attributes. If more than one set of columns share the same number of singletons, we elect as *best* QID the minimum set of columns.

3.2. Anonymity Based on Generalization and Suppression

To ameliorate the detected privacy issues, we propose an anonymization approach based on generalisation and suppression. We suppress incomplete rows at the beginning of our technique; then, only the generalization is permitted. We favor the generalization to the suppression since we prefer to publish *incomplete* information rather than preventing the publication at all.

We focus on the QID (date_of_birth, ZIP, sex) since it is a well-known QID. In particular, we focus on a slightly simplified version of this QID, where we only have access to the year_of_birth. It is simplification without loss of generality since it can be easily generalized to the entire date. However, by only considering years, we can straightforwardly generalize dates by the mean value

of a range. Moreover, in Italy, there is a two-way correspondence between ZIP codes and Municipalities. Therefore, they can be used interchangeably. We aim to detect which column or combination of columns is *worth* to generalize to achieve the minimum number of singletons by modifying the minimum amount of rows.

For the numerical attribute (i.e., year_of_birth), we consider the standard approach of substituting values by intervals. Therefore, we sort rows by year_of_birth, split all the rows into groups of at least k values. If we split two rows containing the same year in creating groups, we iteratively merge those rows in the same group until the cut splits rows with different years. Each year is substituted with the interval [*min_year, max_year*). We also apply a second strategy where the average value of the interval replaces each interval. We hypothesize that if current years mainly correspond to the mean value of the range, fewer rows will be modified while still reducing the number of singletons.

About the sex column, we replace *male* and *female* values by *any gender*. In this case, the generalization plays the same role as cell suppression. About the municipality column, we exploit the hierarchy induced by our national administrative levels: municipalities are generalized by provinces, provinces by regions, regions by states. In our experiments, we only consider the first level of this hierarchy by generalizing municipalities by provinces. For categorical attributes (i.e., sex and municipality), we apply both a global and a local recording. While in the global recording we affect the entire dataset, at a local level, we only modify rows related to the singletons disclosed by the best QID. We hypothesize that the local recording can introduce a sufficient level of privacy protection while affecting a minimal number of rows (i.e., slightly decreasing the overall dataset quality). The implemented approach can be resumed as follows:

- the rows containing empty values are dropped out, and the removed rows alter the counter of affected rows. The full version of the dataset (i.e., only rows without any empty cell) is considered in the following steps;
- the following generalizations are performed:
  - all the municipalities are generalized by the corresponding province;
  - only the municipalities of the rows corresponding to the singletons detected by the best QID are generalized by the corresponding province;
  - all the values of the sex column are generalized by any gender;
  - only the values of the sex columns corresponding to the singletons detected by the best QID are generalized by any gender;
  - all the birth_years are generalized by the corresponding intervals;
  - all the birth_years are generalized by the mean value of the intervals generated as before;
  - all the attributes are generalized by combining every pair of the generalizations described so far and by generalizing all fields at once;
- for each performed generalization, we compute the number of singletons, the percentage of singletons, the number of distinct values, the number of modified and removed rows;
- we elect the best generalization by considering the one that achieves the minimum number of singletons while affecting the minimum number of rows.

4. Evaluation

We tested our approaches on real datasets released by the Italian Ministry of Infrastructure and Transport. These (anonymized) datasets contain information related to the driver licenses of all the Italian regions. We downloaded them in October, 2019 from the official site (http://dati.mit.gov.it/catalog/dataset/patenti). In January 2020, the Ministry updated the online version by significantly reducing the (already minimal) available content. The tested datasets (in their original form) are available on the GitHub (https://github.com/isislab-unisa/driver-license-datasets).

4.1. Detecting Privacy Issues

We selected only the columns related to personal information (i.e., the municipality and the province reported as the driver residence, the year of birth, and the sex), while we discarded all the Non-sensitive information, such as the driver's license details, and the numerical ID. The algorithm is linearly correlated to the dataset size. It takes 0.0152 seconds for processing datasets with 6M rows.

Results of the QID identifier. The results of our privacy issue detecting approach are available on GitHub, here omitted due to the lack of space. [Birth_year, ZIP, Sex] is reported as *best* QID in all the regions. Even if datasets are anonymized, our approach highlights the possibility of distinguishing up to 2% (1.93%) of singletons uniquely. If 2% seems to be a negligible amount of disclosed identities, it is worth noticing that the maximum number of disclosed singletons is more than 25K. It implies that removing IDs is not enough, and further anonymization actions must be performed to publish sanitized datasets. These results reply to **RQ1**.

4.2. Anonymization Approach Based on Generalization

We considered three datasets used in the previous analysis, heterogeneous in the disclosed percentage of singletons. Results are provided in Table 1.

Year range VS Year mean value. By comparing the year generalization by intervals (row **Y_ran** of Table 1) and by mean values (row **Y_avg** of Table 1), we observed that the mean value gains 95% fewer singletons while affecting 7% rows less than the range approach.

Global VS Local recording. By comparing the global generalization of the Municipality (**M** row of Table 1) and its local recording (**M_loc** row of Table 1), we observed the local recording achieves results close to 0, while the global recording succeeds in completely avoiding the disclosure of singletons. On the other side, the global recording affects the entire dataset, significantly decreasing the dataset quality, while the local recording affects only the 2% of the rows. We consider a good thread-off between privacy-preserving and data quality the generalization of the municipality (and the sex) only of singletons disclosed by the QID (year_of_birth, sex, ZIP) (**RQ2**).

Comparison with k-Anonymity. We used the *Valle d'Aosta* dataset to compare our approach and k-Anonymity (*https://dzone.com/articles/an-easy-way-to-privacy-protect-a-dataset-using-pyt*). We run k-Anonymity by generalizing Municipalities by their Provinces, Sex by any gender, and the Year by intervals of width 4. We consider the generalization of any set of attributes. We allowed suppression

equals to 0.01 in all cases, but in the sex, generalization is set to 0.05. At the global level, both our approach and k-Anonymity modify almost the entire dataset. While we obtain a generalized version of the dataset information, k-Anonymity removes many rows. When a small number of singletons occurs, k-Anonymity drops the corresponding rows. In all the other cases, it drops at least 200 rows and modifies all the other ones. Thanks to the local recording performed by our approach, we can obtain a minimum number of singletons (near to 0) while affecting a small portion of the dataset (up to 2%). Concluding, we achieve the same results in privacy-preserving, while our results lead to better data quality thanks to the local recording.

Table 1: ***Results of the anonymization approach****.* ***#S*** *is the number of singletons, and* ***%S*** *its percentage,* ***size*** *is the full dataset size,* ***DV*** *stands for Distinct values. The first row of the table reports the number of singletons disclosed by the best QID (year_of_birth, sex, ZIP). Then, we report the effect produced by our generalization algorithm obtained by affecting the columns reported in the first column of this table. The rows entitled with the suffix* ***loc*** *are related to a local recording approach, while the others correspond to a global one.* ***S*** *is related to the sex column;* ***M*** *to the Municipality column;* ***Y*** *to the Year_of_birth column. While* ***Y_ran*** *represents the generalization of years by range,* ***Y_avg*** *exploits range mean value.*

	Valle d'Aosta				**Molise**				**Umbria**			
	#S	**%S**	**Size**	**DV**	**#S**	**%S**	**Size**	**DV**	**#S**	**%S**	**Size**	**DV**
	1,684	1.93	87,464	9,174	869	1.30	597,243	13,391	2,569	0.15	198,312	16,628
Cols	**#S**	**%S**	**MR**	**DV**	**#S**	**%S**	**MR**	**DV**	**#S**	**%S**	**MR**	**DV**
S_loc	1,264	1.45	1,684	8,964	745	0.12	869	13,329	2,219	1.07	2,569	16,408
M_loc	4	~0	1,679	7,501	7	~0	860	12,539	7	~0	2,556	14,078
S, M_loc	1	~0	1,684	7,785	32	~0	860	12,680	3	~0	2,569	14,446
S	621	0.71	87,464	5,166	295	0.05	597,243	7,101	909	0.46	198,312	9,490
M	4	~0	87,464	167	127	~0	414,584	338	7	~0	198,312	324
Y_ran	198	0.002	87,464	2,739	1	~0	556,875	3,641	325	~0	198,312	4,806
Y_avg	9	0.001	81,476	607	1	~0	597,243	736	3	~0	198,312	1,089
S, M	1	~0	87,464	85	48	~0	597,243	171	7	~0	198,312	324
S, Y_ran	70	~0	87,464	1,442	0	0	597,243	1,895	116	~0	198,312	2,606
S, Y_avg	5	~0	87,464	308	0	0	597,243	368	1	~0	198,312	545
M, Y_ran	0	0	87,464	43	0	0	597,243	44	0	0	198,312	4
M, Y_avg	0	0	85,948	8,817	0	0	584,794	8	0	0	194,932	16
S,M,Y_ran	0	0	87,464	22	0	0	597,243	44	0	0	198,312	43
S,M,Y_avg	0	0	87,464	4	0	0	597,243	8	0	0	198,312	8

5. Conclusions and Future Work

In this article, we propose to detect QID by counting *singletons* in a dataset. We observed that the best QID (date_of_birth, sex, ZIP) discloses up to 2% (and up to 25K) of singletons in already anonymized datasets. When a privacy leakage is reported, PAs usually react by closing data or publish poorly informative datasets. As an example, the datasets we analyzed were substituted with a version with significantly lower informativeness, as only the province of residence, driving license category, and release date are provided. These datasets, in our opinion, are reduced to *pointless Open Data*. Instead of making data useless, we suggest investing in further sanitation actions. In this article, we observed that we achieve the minimum number of modified rows (up to 2% of affected rows) while obtaining the number of singletons close to 0 thanks to a local recording. We aim to provide our proposal as a framework to support PAs in publising datasets significantly more informative than the currently available on their websites while preserving citizens privacy.

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Reflections & Viewpoints

EGOV-CeDEM-ePart

Stealth Democracy? Searching for a Democratic Middle-Ground

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Abstract: In this paper, we present a reflection on the need for an in-between, low-threshold type of democracy for involving the so-called "silent majority" of citizens. Based on our findings from various cases, we find indications that this type of system can contribute to what we call stealth or "implicit democracy", i.e., citizen feedback on particular issues raised by politicians. In a recent study, both politicians and participating citizens report that they were happy with the pilot results and would like to continue using the system. The second round of testing, with an extended version of the system, is planned for 2020/21.

Keywords: eParticipation, implementation, survey, pilot study, implicit participation, evaluation

Acknowledgements: The work presented in this paper was partially funded by the Oslofjord regional research fund, project 289252.

1. Introduction - eParticipation Systems and Complexity

In this reflection paper, we ask the question "What is the 'correct' fit between system complexity and democratic outcomes?", as we over the years have observed issues with existing eParticipation systems:

Many technological systems have been, and are being, developed to enhance democracy and participation. In the 1990s, open discussion forums were popular but had limited success (Sæbø, Rose & Molka-Danielsen, 2010). In later years, we have seen a number of complex and advanced systems, designed top-down for decision-makers to receive input on concrete issues. EU FP7 had several calls for the development of participation systems, and in the early and mid-2010s many different tools were presented in academic journals and conferences (See, i.e., Porwol, Ojo & Breslin, 2014)), along with evaluations of pilot projects (Taudes & Leo, 2014). The evaluations seem to conclude that these types of systems provide excellent feedback but are also complicated and time-consuming and therefore struggle to attract enough participants. In social media, the threshold for participation is lower and more people discuss politics (Elvestad & Johannessen, 2017; Enli &

Skogerbø, 2013), but the quality of communication is lacking, and it is difficult to extract meaningful information and handle the conversation (Majumdar, 2017).

As a middle-ground between complex tailored systems and the anarchy of social media, authors such as Hibbing and Theiss-Morse argue for what they call "stealth democracy" (Hibbing & Theiss-Morse, 2002), claiming that most people want to heard, but are not interested in taking the time to understand and read up on complex issues. Instead, they argue that a feasible approach to participation is to ask simple questions about issues where citizens can form an opinion without having to read hundreds of pages of documentation.

While stealth democracy is an idea situated in a different context from the European and Norwegian democratic tradition, it nonetheless provides a starting point for discussing the merits of polling-type systems as a bridge between traditional deliberation and involvement and the sarcastic comments found in social media and news.

The purpose of this reflection paper is thus to throw up some ideas regarding a third way/implicit/entry-level type of democratic participation, which could aid in providing a voice to the often silent majority of citizens who choose not to participate in traditional politics. We aim to develop these thoughts into a robust theoretical viewpoint on levels of participation and how different technological systems can act together to strengthen democracy in a time of fake news, post-truth, and polarization. We hope our reflection can contribute to some discussion at the conference and also provide feedback for further work.

2. Democracy and Participation

Signs are indicating that liberal democracy is struggling. The 2015 refugee crisis in Europe, populists, being elected for president or prime minister, yellow vests in France, and "illiberal democracy" in Eastern Europe. The Norwegian paper Morgenbladet, in collaboration with the "breaking bad" research project, has created a map of authoritarian changes in the legal systems of European nations, which shows that several countries, including Western European ones, are moving away from liberal ideals (Reinertsen, Jakobsen & Belgaux, 2019). This trend is aided by social media polarization, fake news, bots spreading propaganda, and an increasing number of activist web sites positioning themselves as alternatives to mainstream media (Sunstein, 2018). The so-called alt-right find each other on online platforms such as 4chan, Tumblr, and 8chan to coordinate campaigns against political opponents, and disinformation is an issue high on the EU's agenda (Comisión Europea, 2019).

In Norway, most of us still report high levels of trust in the political system and institutions, but a significant minority is less trusting, and choose not to vote in elections (Kleven, 2016). Voter turnout is lower among the young, and few are actively trying to influence policy. Those who do tend to be in the high income/higher education demographic, which typically would be labelled as elites (With, 2017). As trust is an essential determinant of intention to use eParticipation systems, a socio-technical approach to eParticipation is necessary (Naranjo Zolotov, Oliveira & Casteleyn, 2018). Earlier research has shown that eParticipation systems need a clear purpose and form

(Hurwitz, 2003), concretization of the outcomes of participation (Kolsaker & Kelly, 2008) and feedback mechanisms, so citizens see the impact of participation (Kolsaker, 2005).

2.1. Models of Participation and Democracy

Democracies should involve citizens through elections, political parties (Dewey, 1927; Oppenheim, 1971), and citizen/politician dialogue in various channels and media within the frames of representative democracy (Brooks & Manza, 2007). While the meaning of the term "citizen" has varied over time, with restrictions based on gender, land-ownership, age, and social class (Schreiner, 1992), modern definitions include every adult in the nation. Contrary to proponents of elitist democracy, Dewey (1927) argued that "only the public can decide what public interest is". Dewey and later Habermas emphasized the need for dialogue in order for "such a thing as public opinion to be formed (Habermas, 1991). For practical reasons, most democratic countries follow some representative model, where citizens elect representatives to look after their interests, accompanied by rights such as freedom of information, association and expression, and a universal right (for adults) to vote in elections (Urbinati, 2011).

Even within a representative democracy, there are several idealized models, with different normative criteria for participation. One example, from Ferree and colleagues (Ferree, Gamson, Gerhards & Rucht, 2002), describes four different models of democracy; Representative liberal, Participatory liberal, Discursive, and Constructionist. The models outline the amount of citizen participation, based on « who should speak, the content of the process (what), style of speech preferred (how), and the relationship between discourse and decision-making (outcomes) that is sought (or feared)." (s.290). While some countries focus mostly on the act of voting, others, such as Norway, see it as a democratic value that citizens engage in dialogue and are involved in decision-making between elections (participatory liberal model), and participation in the public debate is seen as a value in and of itself (Habermasian discursive model). The Norwegian constitution (§100, part 6) states, "government is required to facilitate open and rational public discourse". Even so, membership in political parties is in decline, with only 7 percent of the adult population being members of a political party, according to Statistics Norway. Thus, there is a need to find new ways of communicating between politicians and citizens.

3. eParticipation Complexity and Activity

eParticipation as a field is defined as a range of different activities with varying outcomes and effects, targeting different democratic ideal-types (Sæbø, Rose & Skiftenes Flak, 2008). This means that when discussing specific systems and applications, researchers should be clear about the type of democracy the system supports.

Figure 1: eParticipation Actors, Activities and Outcomes. Based on (Sæbø et al., 2008)

The activities identified can be set on a scale based on the potential democratic outcomes and the effort needed for participation. In the 1960s, Arnstein addressed this issue and created a "ladder of participation", showing the democratic outcomes of various activities (Arnstein, 1969). While we have yet to develop the full theoretical argument, section 2.1 is a beginning towards this end - finding a normative distinction between the outcomes of different eParticipation activities. Future work on our framework will extend this.

Deliberation or political discourse, as Sæbø (et al., 2008) defines it, is a time-consuming and demanding process, requiring us to understand the facts and arguments from all sides and them engaging in reasoned debate about the best possible outcome (Habermas, 1991). On the other hand, voting or rooting for a party or a politician requires less of the citizen. In voting campaigns, the work lies with the politicians who have to argue and campaign for the citizens to cast the votes in their direction (Hooghe & Dassonneville, 2018). Simplified, one can argue that eParticipation systems aimed at more demanding activities such as deliberation require more of the user in terms of handling complex arguments and spending more time, while activities such as choosing whom to vote for requires less from the citizen (table 1), as we have seen in section 1.

Table 10: Political Activity and System Complexity

	Political activity	
	Voting	Deliberation
System complexity	Low complexity/time	High complexity/time

4. Stealth/Lightweight/Implicit/In-Between Democracy?

Hibbing and Theiss-Morse (Hibbing & Theiss-Morse, 2002) found that many citizens were tired of politics and political debates as they play out in the media and do not wish to become too involved. At the same time, citizens want to be able to express their opinion and be heard. They are happy to participate in surveys or contribute in other ways, such as through FixMyStreet-type services related to their areas of interest (Berntzen, Johannessen, Böhm, Weber & Morales, 2018).

Over the past few years, we have participated in several studies examining how lightweight participation can contribute to democracy. Based on these, and the findings from evaluations of both more and less complicated and structured systems, we argue that systems for rapid feedback have the potential to be a missing link between the open and unstructured debate found in social media

and the more tailored and complex systems for participation. Lightweight, "stealth" participation in the form of surveys, data analysis through sensors or apps such as FixMyStreet and similar allow citizens to participate in a way that gives valuable insights to decision-makers, without having to spend too much time and effort.

In 2019, we evaluated a system built for this purpose. A mobile app designed as a tool for consultation, where politicians ask questions, and citizens answer. The outcome is both increased civic engagement and general democratic effects, depending on how the politicians decide to use the system. After a pilot study in five municipalities, we found that a vast majority of citizens were happy with how the system was applied, and they felt politicians were hearing them without them having to spend too much time or effort on politics.

The question is if this can facilitate a new form of participation, situated between voting and deliberation in terms of participatory outcomes, and low/high complexity and time on the system side. Also, future testing of the app will examine if and how this can lead citizens towards investing more time and effort in deliberative political activities.

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EGOV-CeDEM-ePart

Stakeholder Involvement in City Transformation: Towards a Smart Old Town

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Abstract: The ongoing digitalization of society is of increasing importance for city transformation and a driving force for cities to become smart. The aim of this study is to explore stakeholder challenges in becoming a "smart old town" and to contribute with innovative implications based on stakeholder involvement and governance. An interpretative single case study with qualitative interviews was conducted in an old town district in a Norwegian city. The results reveal that in order to transform a city with cultural heritage into a smart city requires efforts that go beyond smart ICT implementations. We argue for collaborative governance based on an open and coordinated involvement of stakeholders.

Keywords: Smart city, stakeholder involvement, governance, city transformation, cultural heritage

1. Introduction and Research Design

Contemporary cities are facing complex challenges to become smart. Governments and public sector organizations are gradually transforming due to networked digital technologies and the emerging open and "smart" innovation environment (Schaffers et al, 2011; Josefsson & Steinthorsson, 2020; Anthopoulos, 2015; Bernhard, 2014). The ongoing digitalization of society embraces dimensions of integration, equality, citizen needs, sustainability and quality of life that are of increasing importance for city transformation and governance. The smart city concept includes hence more than information and communication technology (ICT) since the involvement of stakeholders and bottom-up driven ideas are in focus (Anthopoulos, 2015; Aranguren et al, 2010). Smart cities are frequently about improvement and efficiency in public administration and in development of businesses, society and culture in the urban environment, focusing on creativity and sustainability while fostering human, social and relational capital (Caragliu et al, 2011; Axelsson & Granath, 2018; Josefsson & Steinthorsson, 2020). More and more emphasis is being put on developing innovative solutions to societal challenges through open and inclusive innovation processes, compared with the previously dominant focus on expert-driven innovation (Lindberg et al, 2015; Agbali et al, 2019).

One important and unique resource in city transformation is the local cultural heritage (Al-hagla, 2010). When cultural heritage meets innovation processes and ICT several complex issues evolve and the need for transparent innovation processes are required combined with stakeholder involvement (cf. Axelsson & Granath, 2018; Angelidou et al, 2017; Koukopoulos et al, 2017).

The aim of this paper is to explore stakeholder challenges in becoming a smart old town and to contribute with innovative implications based on stakeholder involvement. The following research questions are addressed: What are the stakeholder challenges in transformation of an old town district? How can the transformation into a smart old town be governed in order to enhance stakeholder involvement? An interpretative single case study approach with qualitative interviews was applied (Walsham, 2006). The case was an old town district in a Norwegian city ("Old Town"), originated from the 17th century with 100,000 vistors a year and it is also a living area for 340 local citizens. The data includes 18 one-hour semi-structured on-site interviews with a total of 21 respondents (a mix of tradesmen, citizens, property owners, craftsmen, nonprofit associations, educational institutions, local government and municipal organizations, as well as local elected officials). The interviews were recorded and transcribed and analyzed according to the themes of the interview guide.

2. Findings and Conclusions - Towards a Smart Old Town

The study is positioned as unique in terms of its complex nature of transforming an old town to become a smart old town based on an open and coordinated involvement of stakeholders. Local citizens emphazised that the Old Town should not merely be seen as a picturesque scenery backdrop but as a real living city. Other respondents representing businesses expressed a wish to preserve the past, the cultural heritage, by using it in the present time. A particular challenge concerned the unclear governance of the city transformation as it was not fully discussed, communicated, negotiated or anchored among stakeholders nor related to the municipality. Respondents clearly state that there is lack of governance and communication and they wish to be included and suggest doing this step-by-step to build community involvement and trust. Communication and collaboration was fragmented among those who produce, use and intermediate the Old Town due to the fact that the information rarely reaches beyond its own grouping. There is no common communication channel covering all stakeholders. There was an obvious need for an inclusive innovation process, as a holistic local community design process that develops visions, strategies and action plans related to the specific city. It was necessary to clarify and formalize the process of decision-making as well as to follow the contemporary digital development of society by upgrading skills of digital communication and use of open data in order to become a smart city.

The study brings forward the opportunities that lies in the dynamics of interaction between the spirit of cultural heritage and the body of governance that go beyond ICT implementations. The city transformation process needs to take point of departure from the uniqueness of the city's resources and the elements of place, citizens, technologies, businesses and visitors need to be balanced since they are mutually dependent. An organizing body including a communication platform that coordinates and governs activities and flows of information is needed. Given that smart city is not only about advanced ICT implementation the findings contribute with vital challenges that need to

be considered in order to become a smart old town. Smart city implementations have wide-ranging societal implications that require further studies.

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EGOV-CeDEM-ePart

Borderlines for Smart Police Work

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Abstract: Smart objects, cyber-physical systems and applications based on artificial intelligence open new possibilities for police forces. The Internet of Things, the Internet of Services and the Tactile Internet will substantially change police work and have disruptive effects. This may enrich and improve the work of the police and other law enforcement agencies. But smart policing could massively interfere with the previously respected privacy of citizens through smart surveillance. This raises today essential questions about borderlines for smart police work.

Keywords: Smart Police, Smart Policing, Smart Surveillance, Smart Government, IoT

1. Smart Objects and Cyber-Physical Systems change the Police Work

Digital transformation poses great changes and challenges for the state, for society and for police authorities. With the Internet of Things, the Internet of Services and the Tactile Internet, the police work is facing more disruptive changes. Smart objects and cyber-physical systems (CPS) continuously generate smart data and feed smart data platforms in the background. Applications based on artificial intelligence (AI) are also suitable for the analysis of this smart data, e.g. to be able to act almost in real time. Security policy makers expect that the police may use these modern technologies to do their police work in an efficient way. The first sketches, experiences and implementations of smart policing and smart surveillance are already available. The United Arab Emirates, Singapore and the People's Republic of China are all expecting a greatly improved national security from a smart police force. This is causing a great deal of irritation. Therefore, it is necessary to reflect on how smart police work may really become and where are the borderlines.

2. Smart Police Work

The understanding of smart police works varies in research and practice. Fritz (2020, pp.34-35) understands "smart police work" as those processes in connection with police work and the handling of tasks that can be managed with the help of intelligently networked information and communication technologies and the analysis of big amounts of data. Smart watches, police smartphones, body cams and other wearables for police officers can help with location services, tracking and internal communication in the field. The development of smart police glasses or smart police helmets would further improve the situation awareness for the operational forces. They show the police officers visually understandable additional information about the risk situation and

operations on the integrated display. This can be supplemented by sensor-supported decision analyses. But these smart objects and CPS will not only support police officers in providing information and analysis. They will also be able to automate and control police tasks and take people out of decision-making processes. Police reports could be enhanced by the automated analysis of smart data sets. Security cockpits benefit from the ongoing generation of smart data by sensors and cameras in the respective area of operation, which they process promptly and automatically for mission overview and planning. A team led by Enrico di Bella (2014, p. 212) has put together the components and requirements for smart security systems of the future. The elements of a "smart security system" would include access to relevant administrative databases and registers (crime records, socio demographic statistics, economic data, urban data, maps and geo-information systems), sensor networks, crowdsourcing apps and websites to integrate the population via social media, crime maps, trend visualization, a security dashboard and further modules for data integration and data analysis to improve "security intelligence". But with the installation of such an infrastructure, the path to a smart surveillance of the population would already be largely mastered.

3. Borderlines for Smart Police Work

The variety and quality of sensors and smart surveillance camera systems have increased significantly in recent years. Faces can now clearly be recognized and people can be identified even over long distances. AI-based video recognition systems are already available which can be used by the police to recognize deposited faces in a large crowd, to analyze people's behavior and to provide people with attributes such as age, sex, hair length and clothing. These services are suitable for quickly finding confused seniors, runaway children or criminals and capable of learning. Police authorities worldwide are interested in such systems. It makes sense to discuss them in order to understand them, determine their intended use, assess their quality and ethically reflect on application scenarios before an introduction. If this results in the full surveillance of all the citizens, existing borderlines for the police forces within the society are crossed. Unfortunately, the public's trust in the work of the police authorities can easily be lost through over-smart technologies.

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Workshops

EGOV-CeDEM-ePart

SPIDER: open SPatial data Infrastructure eDucation nEtwoRk

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Abstract: In this 2 hour workshop the experiences of the geographic data domain will be shared with the open data research & education community to promote and strengthen active innovative learning and teaching in both worlds. The domain of geographic data can be considered as one of the front running in open data. Over the past two decades, many geographic datasets in Europe became available as open data through the open [spatial] data infrastructure. Several of the high value dataset categories in the EU Directive on Open data and reuse of Public Sector Information have a geographic component. Teachers in this domain are struggling with the concepts of data ecosystems and data infrastructures presented in the academic literature. A very current discussion is on the exact scope of 'open' spatial data infrastructures (SDIs) (see Vancauwenberghe et al. 2018), in which also nongovernment data and nongovernment actors should be considered as key to the performance of the infrastructure and/or ecosystem. Moreover, teaching methods are still limited to traditional teaching in the classroom. As a consequence, there is barely an international exchange of educational material and approaches on open SDI among universities. In this workshop an overview and detailed analysis of the concepts of open data ecosystems and infrastructures are presented and discussed and existing open data education highlighting good practices of learning, teaching and training in open [spatial] data infrastructures or ecosystems explored.

Keywords: Open data education, learning and teaching methods

Acknowledgement: This workshop is related to the Erasmusplus H2020 SPIDER- open SPatial data Infrastructure eDucation nEtwoRk project (Erasmus+2019-1-DE01-KA203-005042).

1. Topic and Objectives of the Workshop

The topic of this workshop concerns open data learning, teaching and training in higher education. First, it aims at refining concepts of open data ecosystems (see for different views: Pollock 2011; Harrison et al. 2012; Ubaldi 2013; Zuiderwijk 2015; Jetzek 2017) and open data infrastructures (see

for different views: Zuiderwijk 2015; Janssen et al. 2012; Borgman 2000; Coleman and McLaughlin 1997) and the relation between the two (see Coleman and McLaughlin 1997; O'Reilly 2010; Davies 2010; European Commission 2013). Secondly, it will share and discuss good practices of learning, teaching and training methods on open data (ecosystems) currently employed by universities and other higher education organisations.

The insights in the concept of open data ecosystems and in new innovative learning teaching and training methodologies will be inspirational to teachers in open data to develop and implement their own active teaching practices and achieve excellence in open data education.

2. Format of the Workshop

0. Introductory video:

1. Introduction SPIDER: Bastiaan van Loenen (10 minutes)

2. Open data experts view on the concept of open data infrastructure & open data ecosystems (40 minutes): interactive session

4. Outlook into Innovative education on open data infrastructure (10 minutes)

2.1. Presentations (20 minutes)

The following presentations will inspire a constructive dialogue:

- The concept of open [spatial] data ecosystems. Ali Mansourian and Frederika Welle Donker present the different views on open [spatial] data infrastructures.
- Good methods on open data infrastructures. Frederika Welle Donker and Bastiaan van Loenen will present the outcomes of their research on good practices in the domain of open [spatial] data infrastructure education.

2.2. Brainstorming (60 minutes): Refining the Concept of Open Data Ecosystems

The second part of the workshop is dedicated to group discussions. In groups of three to five persons, participants are asked to develop their view on open data ecosystems and infrastructures. Subsequently, we will discuss the group views plenary resulting in a refined holistic open data ecosystems/ infrastructure concept(s).

2.3. Discussion of Innovative Education (40 minutes)

The remainder of the workshop is dedicated to identifying novel innovative and excellent teaching practices on open data (infrastructure/ecosystems) and related topics. In small groups, participants will discuss their teaching practices and experiences. The findings of the group discussions will be discussed plenary. This discussion provides participants with insight in the innovations others have implemented in their open data (infrastructure/ecosystems) education and what is needed to implement such innovations. The results of this discussion will be used to develop and further specify the direction of the SPIDER project.

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EGOV-CeDEM-ePart

Assessment of the Use of Artificial Intelligence to Support Public Services: Methodology and Roadmap

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Abstract: To assess the social and economic impacts of Artificial Intelligence on public services, a methodology using a public value perspective was developed. This workshop aims to validate this methodology as well as to develop a roadmap for implementation of this methodology, including the identification of opportunities, threats, enablers and barriers.

Keywords: Artificial Intelligence, Public Services, Public Value, Impact Assessment, Roadmap.

Acknowledgement: European Commission Joint Research Centers Seville & Ispra study entitled "Scientific support to the development of a methodology to assess social and economic impacts of the use of Artificial Intelligence to support public services".

1. Introduction

Several recent studies have mapped the use of Artificial Intelligence (AI) in public service delivery (e.g. Misuraca, Noordt & Boukli, 2020; Veenstra, Grommé & Djafari, forthcoming). However, little is known yet what the impact, both social and economic, is of the use of AI on public services. Therefore, an impact assessment methodology is currently being developed to assess such impacts. It proposes a number of clusters of impact factors based on a public value approach, including effectiveness, efficiency, openness, outcomes and social value, ethical behaviour and professionalism, and trust (Faulkner & Kaufman, 2018; Twizeyimana & Andersson, 2019).

The assessment methodology is accompanied by the development of a roadmap for implementation including opportunities, threats, enablers, and barriers. The methodology and the roadmap need validation by experts from the field of Digital Government to ensure that the approach combines scientific grounding and practical applicability. Furthermore, the topic of the

impact of AI on public services is still emerging and requires a broad discussion with experts on how this emerging technology will create impact and value for the public sector.

2. Objectives of the Workshop

The objectives of the workshop are to engage the audience in a discussion on the social and economic impact of AI on public services, to validate the proposed impact assessment methodology, and to identify opportunities, threats, enablers and barriers to develop a roadmap for the implementation of this methodology.

3. Workshop Structure

The online workshop will last for 90 minutes. After an introduction to the study, the concept methodology to assess the impact of AI to support public services will be presented (15 mins). The remainder of the first part of the workshop will be dedicated to discussing and validating the proposed assessment methodology along the main impact factor clusters that were identified (30 mins). Depending on the number of participants, parallel groups are formed to discuss the various clusters, supported by an online whiteboard application.

After a short break, the second part of the workshop (45 mins) consists of a co-creation session to provide input for the development of a roadmap for implementation of the assessment methodology. The workshop will identify and rank opportunities, threats, key enablers and barriers. Again, depending on the number of participants, parallel groups are formed to allow for more in-depth discussion and ranking. The workshop, thereby, proposes an interactive session, discussing the impact and value of AI on public services.

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Posters

EGOV-CeDEM-ePart

What is this 'RPA' they are selling?

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Abstract: Robotic Process Automation (RPA) is being adapted by public sector organizations as a means to solve challenges yet new problems and challenges arise. One reason for this may be a mismatch between how RPA is portrayed and what it turns out to be. This paper covers the first analysis in a study that compares the portrayal of RPA by vendors by that of public sector.

Keywords: Robotic Process Automation, RPA, Service Automation, Digitalization, Digital Transformation, Public Sector ICT

1. Introduction

Robotic Process Automation (RPA) is software automation of repetitive tasks. RPA has received significant interest due to its potential to solve some of the current challenges of public sector organizations. The vendors have grand visions and high hopes that RPA solutions will have an almost instant positive effect on clients' operations by eliminating repetitive tasks currently done by humans. However, there are challenges ahead and new problems arising when adopting and implementing RPA. One potential reason may be due to how RPA is portrayed and what it is received to be. We are looking into the differences of how RPA is portrayed and received by the vendors and the public sector. So far we have performed an analysis of the vendor portrayal of RPA, which we present in this paper.

2. Method

We have conducted a content analysis (Krippendorf, 2004) inspired by grounded theory (Glaser and Strauss, 1967). The study is qualitative and interpretative (Walsham, 1995; 1993). The data used is content from websites of the five largest RPA vendors (Gartner, 2019); a ranking based on estimated market share in 2018. These websites describe what RPA is. Prior to analysis the text from these websites were extracted. The steps performed during analysis were: (1) Open coding, where each sentence were coded with its messasge(message) and type of message (category) as shown in the example in Table 1, (2) Cleaning of categories, where categories were consolidated or removed, groups were also formed to categorize categories, (3) Clustering of messages, similar messages were clustered together, and (4) Filtering, where only clusters based on messages from at least three of the five vendors were kept for rigor.

Table 11: Example of Open Coding.

"Robotic Process Automation is the technology that allows anyone today to configure computer software, or a "robot" to emulate and integrate the actions of a human interacting within digital systems to execute a business process."	
What is the message? (Message)	**What type of message is it? (Category)**
RPA is a technology	Description of RPA (describing statement)
RPA can be used by anyone	Feature (a trait of the technology)
Configure a software robot	Operation (information about how it works)
Emulate the actions of a human	Capability (what the technology is capable of)
Execute business processes	Purpose (the purpose of the technology)

3. Results

We present the results in Figure 1 and Figure 2. Figure 1 shows the relative distribution of clusters within their categories and groups. Figure 2 shows the groups, categories and clusters. In total, the results are based on 428 coded rows. In Figure 1, the inner circle represents the groups and the outer circle the categories. The size of the categories is determined by the number of clusters for the respective category. A group contains categories, a category contains clusters, and a cluster is a collection of similar messages.

Figure 1: The Groups and Categories. Size of categories relative to number of clusters.

Figure 2: The Groups, Categories, and Clusters.

Definition	**Description**	**Capability**	
	Intelligent	Working with any system	
	A technology or software	Use AI and machine learning	
		Learn and adapt	
		Emulate cognitive abilities	
		Emulate human interaction with systems	
		Handle various types of data and information	
Usage	**Application area**	**Suitability**	**Purpose**
	Back-office administration	Repetitive tasks	Extract data
	Contact-centre and customer service	High-volume tasks	Enter data
		Strenuous tasks	Copying and pasting data
			Interpretation and analysis
			Administrative tasks
			Move data and files
			Transform data
			Calculations
			Reporting
Arguments	**Features**	**Reasons**	**Outcome**
	Fast and efficient	Easy to implement and use	Business growth and success
	Flexible	Is needed to survive and remain competitive	Frees up human workers
	Scalable	Cheap	Time for more valuable work
	Easy to use	Fewer or no mistakes	Efficiency
	Usable by anyone	Leads to business success	Improved customer experience
		Reliable	Happy employees
		Fast ROI	Transformation and change
		Free from human fallacies	
		Fast	

4. Conclusions So Far

We can thus far conclude that the vendors' portrayals of RPA:

- Emphasizes arguments of acquiring RPA, followed by RPA usage and to a lesser degree the definition of RPA. The overall portrayal is positive but, in some parts, vague. The highly optimistic perception of RPA may cause the requirements and efforts needed to be underestimated.
- Is not fully comprehensive, as there are areas of relevance that are covered minimally or not at all. This is unsurprising since the data could be considered marketing material. The absence of certain dimensions may however lead to underestimating requirements and efforts needed for successful RPA implementation and usage.
- Is associated or related to AI, which in turn could risk RPA being interpreted as a smarter concept than it is. This can lead to confusion as to what is what and for which purposes the respective technologies can be used.

5. Continuation

We plan to continue this study by including empirical data from the public sector, to cover both of these perspectives. This is something we already have some data for. We will then compare the two portrayals to spot differences, problematize about the reasons for these differences and discuss possible implications.

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EGOV-CeDEM-ePart

ENDA: Insights into Building a Chatbot for Open Government Data

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Abstract: The frictionless access to Open Data via portals and traditional search paradigms currently lacks usability. In order to tackle this problem, we developed a prototype of a chatbot for Open Government Data called ENDA, which is based on the ChatScript framework and the Linked Data specification for public sector datasets DCAT-AP. User requests are mapped to corresponding SPARQL queries using pattern-matching techniques. The initial requirements were derived via a Wizard-of-Oz study involving potential users. During evaluation against the European Data Portal it was revealed that existing limitations hinder the development of a production-grade chatbot.

Keywords: Chatbot, Linked Open Data, DCAT-AP

1. Introduction

Today Open Data is prevalent in many different domains, published by nonprofit organizations, companies, and authorities from the public sectors alike. Open Data portals in the European Union are encouraged to publish their data using the DCAT-Application profile for data portals in Europe (DCAT-AP)[1], a linked data ontology specifically designed for "describing public sector datasets in Europe". However, (Janssen, Charalabidis, Zuiderwijk, 2012) conclude, that (meta) data not being found is one of the "impediments that influence the open data process from the perspective of open data users". The hypothesis of our work is that this problem could be approached by employing chatbots as a means of interaction. That creates the illusion that users are communicating with a human, when in fact they are not. Instead, algorithms interpret the input of the users and consequently try to reply in a meaningful way. The foundation of our work is a Wizard-Of-Oz (WOO) study, which has been conducted to get a better understanding of the way users will interact with the chatbot. In a WOO experiment, users are asked to interact with a given system. However, instead of the system a human produces the output.

[1] https://joinup.ec.europa.eu/solution/dcat-application-profile-data-portals-europe/

2. Design and Implementation

Based on the insights gained from the WOO experiment a dialogue flow and system was designed. The service offered by ENDA is split into the following three tasks: (1) user interaction, (2) dialog management (NLP), and (3) construction and handling of SPARQL queries. The first two tasks were implemented using ChatScript[2], a pattern-matching based framework for developing chatbots. Once a user's intent and correspondig entities have been detected the SPARQL middleware maps the extracted keywords to the applicable fields specified by DCAT-AP. The retrieved datasets are then passed back in a human readable way. The system is accessible via a web frontend.

3. Findings & Outlook

A chatbot depicts a very user-centric application, since the interaction scheme is much more in line with human conversational patterns than traditional user interfaces. Therefore, a complete evaluation of any chatbot should include a structured usability test with real users. Some research was conducted in this field (Kuligowska, 2015). However, our experiences from the practical implementation in comparision to the user-driven requirement elicitation did not justify such an evaluation. Several surrounding conditions impeded (for now) an implementation of an applicable Open Government Data chatbot. We have derived three major recommendations from our findings, which can act as guidelines for the development of production-grade Linked Open Data chatbot applications:

1) The quality, integrity and completeness of the metadata correlates with the potential abilities of the chatbot.
2) The interface for the retrieval of metadata has to offer sufficient performance and rich query features.
3) The design and implementation of a meaningful and communicative dialog flow requires substantial resources and domain knowledge.

Our work has shown that the popular DCAP-AP standard and mature frameworks like ChatScript are a solid foundation for developing novel approaches to access Open Government Data. However, adoption demands an in-depth examination of data quality and correct application of standards. Future work will focus on covering more input phrases and extending the dialog flow. Hardening the bot against low quality metadata and providing suggestions for users on limiting the result set could also be considered valuable improvements. Finally, user studies will have to be conducted.

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EGOV-CeDEM-ePart

Where Does the Value of Open Data Lie? A Framework to Assess Open Data Impacts

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Abstract: Literature concerning the impacts of OGD is still limited to anecdotal evidence. The object of this work is a framework for the measurement, hence assessment, of the overall impacts, in terms of value creation and efficiency bol- stering, of OGD owned and published by Public Agencies. The framework to construct shall combine the display of impact evaluation tools with a requirement for sustainability of the publication process. The poster shows the process for the definition of the framework and a preliminary categorisation of impacts that shall lead to the identification of measurement indicators.

Keywords: Open Data, impact measurement, Public Administration

1. Purpose of the Framework

The object of this work is a framework for the assessment of the overall impacts of Open Data (OD) owned and published by Public Administrations (PA). The GIO- COnDa framework[1] combines the display of impact evaluation tools with a requirement for economic sustainability of the publication process. The value of the framework rests in a contribution to both research and practice. In fact, it builds upon theories and con- structs for OD impact measurement while starting their actualisation, to pave the path for a larger debate on the definition of indicators and their application. In this sense, the result of the work will be twofold. On the one hand, the goal of GIOCOnDa is to pro- duce a useful tool for PAs for self-assessing the impacts of data they open up and pub- lish, as well as their

[1] GIOCOnDa is the acronym of the Interreg Italy-Switzerland project it is developed within. GIOCOnDa is funded by the European Regional Development Fund and by April 2021 it will provide cross-border territo- ries with a reusable crosswise applicable platform for open data and linked open data publication.

publication process and dedicated portals. This means that the framework shall combine scientific robustness with simplicity of adoption and flexibil- ity with regard to PAs' specificities. However, this can lead to a second product targeted at scientific debate, allowing a higher level of abstraction to achieve a more holistic and generalisable outlook. In order to do achieve these products and based on the synergies that GIOCOnDa creates, the poster unfolds a possible design for the framework, in order to open further debate about: 1. how different types of impacts should be grouped and categorised; 2. what literature stream is best adequate to substantiate impacts; 3. how sustainability is best conceptualized.

2. Literature Review

Literature concerning the specific impact of OD and even more generally of OD still mostly relies on anecdotal evidence (Zuiderwijk & Janssen, 2014). Research focuses on theoretical aspects, descriptions of empirical uses, and/or design of technical solutions. Little attention is payed to the way OD can enhance policy design, also due to the costs and time required for policy evaluation (Harrison et. al., 2012). Thus, PAs (policy makers and officials) are left without the needed evidence to assess, improve and modify policies. The framework aims at ful- filling this need by providing a process and method to create a knowledge base for PAs to assess what existing sets of data they shall be given priority in publication, and even- tually what data they shall engage to collect. In order to do this, a second research step shall consist of displaying a categorisation of impacts based on existing literature (Attard et. al., 2016), upon which a comprehensive yet flexible dashboard of measurement indicators shall be produced.

3. Methodology

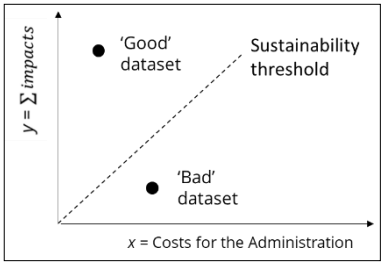
To design the framework we adopt mixed methods, a choice determined by the op- portunity to benefit from the overall project results. In particular: (i) a pre-study about data demand by PAs based on interviews and surveys was performed by project part- ners; (ii) a scientific and grey literature review is being carried out, to adopt a consoli- dated categorization of impacts, and a review of use cases will be carried out to identify a set of indicators; (iii) in Autumn 2020, the framework will be applied by PAs participating in the piloting of the GIOCOnDa platform for publication. Depending on the capability of the project consortium, the framework will be also submitted to a network of stakeholders (academics, practitioners and officials). Thanks to the pilots, we will be able to provide a first evaluation, hence a starting point for what is supposed to be a recursive process of measurement and ongoing assessment of impacts.

4. The Design

The figure represents the overall design of the framework. Impacts are organised in macrocategories (eg. economic, environmental, social, ..) identified through the study of literature and submitted to stakeholders for validation. The categorisation must be pragmatic, i.e. it should mirror the needs and political preferences of the PA. Impacts ate then in turn sub-categorised un- der

internal and external ones, respectively concerning the PA (eg. financial savings, buildings carbon footprint, …) or the adminis- tered territories (eg. economic growth, air quality, social mobility, …).

Figure 1: Overall Framework Design



For every sub- category of impacts, measurement indicators are to be identified, in order to create a dashboard that can be enriched over time. The y coordinate is obtained weighting all impacts according the preferences and priority that PAs independently set by political decision. The x coordinate is estimated based on data production and publication costs thus ensuring the process sustainability. The estimation of x also considers the precon- ditions for the restraint of costs such as the level of automation of publication, the ease of collection (also depending on data intrinsic qualities), the general administration ca- pacity in terms of information management. Thanks to the piloting phase of the GIO- COnDa project, we will be able to position selected datasets and, in so doing, providing administration with a "first round" of impacts evaluation. The application of the frame- work is then a recursive process that PAs shall perform when results in terms of impacts are expected and isolating the effects of data sharing from other policies and/or contex- tual factors. For this reason we recommend departments and offices to be in charge of setting the frequency of data analysis for the group of dataset of interest for their sector.

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