Gustaf Juell-Skielse
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Service Automation in the Public Sector

Concepts, Empirical Examples and Challenges

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Editors

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Preface

With great satisfaction, we now present this book on service automation in public organizations. This book was written because we experience a strong interest from our partners in the public sector in issues about artificial intelligence (AI), robotic process automation (RPA), and how automation contributes to the digital transformation of their organizations. The first thoughts of a book came when we realized that we worked with the same types of questions and case studies about RPA in different municipalities. A book could be something to gather around and a way to form a community of researchers interested in the use of RPA in the public sector. Therefore, in connection with The Scandinavian Workshop on E-Government (SWEG 2020), researchers in digital government met to discuss the possibilities of collaborating on robotic processes automation issues in public organizations. However, we soon saw a need to expand the scope to deal with service automation in general rather than specifically RPA.

Our partners in the public sector had many questions about the development of new organizational skills, benefits, implementation, and challenges. As usual when an interest turns into a trend, there are great risks of excessive optimism. There is also a cause for concern when technologies that have first emerged in the private sector are uncritically imported into the public sector without considerations of possible differences between the sectors. Against this backdrop, we saw the need to describe, problematize, and analyze what an increase of automation in the public sector can entail. We furthermore wanted to address automation from different perspectives and acknowledge the particularities of the public sector.

The outbreak of COVID-19 unfortunately delayed the start somewhat, but a call for chapters was presented in the autumn of 2020 and a website[1] was set up for communication with interested researchers. The call attracted attention from an international crowd of researchers from multiple fields and contexts. During the winter and spring of 2021, a series of chapter development workshops were held to

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[1] https://publicserviceautomation.com

support authors in developing their chapter ideas. During the following summer and autumn, double-blind peer reviews of the submitted chapters were conducted. In total, twenty submissions were examined, which resulted in ten chapters. Additionally, two chapters were written at the invitation of the editors.

We have divided the selected chapters into three main parts: conceptualization, applications, and implementation challenges. Conceptualization aims to clarify the core concepts related to public service automation. Applications presents empirical examples of automation in public organizations. Implementation Challenges includes chapters identifying and discussing challenges that can arise from the implementation of automation technologies in the public sector service. The Editorial in first chapter briefly introduces the chapters in each of these three parts, and based on the lessons learned presents calls for further research on public service automation.

We thank Christian Rauscher at Springer Nature for encouraging and supporting the initial idea for this book, and Ramya Prakash and Jialin Yan for coordinating the work and supporting us during the production of the book. We also wish to thank the researchers who submitted chapters. Finally, we are grateful to our colleagues and friends who supported this book project by serving on its editorial board and who dedicated much of their time in reviewing and providing feedback on the submitted chapters.

We hope that you will enjoy reading the book and invite you to contact us for questions, feedback, and discussions.

Editors

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Part I
Editorial

Towards Service Automation in Public Organizations

Gustaf Juell-Skielse, Ida Lindgren, and Maria Åkesson

1 Introduction

Public sector organizations worldwide are under pressure to operate more efficiently, serve their citizens well, and provide a good working environment for their employees. With limited budgets, these goals are challenging and require new and innovative ways of organizing public sector operations. Inspired by successful implementations of automation technologies in the private sector, such as robotic process automation (RPA) and services based on artificial intelligence (AI), public sector organizations are currently exploring whether similar solutions can bring improvements also for public sector operations.

Automation of services and administrative processes has re-emerged as a popular theme also in the research discourse on digital government and public administration (Lindgren et al., 2019). Automation of structured and high-volume routine tasks is discussed as a means to shorten lead times and reduce costs for manual labor in public service delivery (Wirtz & Müller, 2019). If and to what extent automation of services and interconnected work practices and routines will lead to the expected gains for public organizations is still an open question. This question has served as a starting point and inspiration for this book.

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A current example of a digital technology used for automation of services and work processes in public organizations is RPA, referring to software that can be programmed to interact with user interfaces of information systems in a way that imitate human end-users. This type of software is designed to perform repetitive tasks quickly and is an example of the so-called lightweight information technology (Bygstad, 2012) that can be used to integrate information from various kinds of information systems. RPA was originally oriented towards business with fast and user-driven implementations and has in the private sector been found to increase customer satisfaction, financial performance, and process compliance (Lacity & Willcocks, 2021). Also, RPA has been found to free employees from repetitive and monotonous work so that they become available for more critical and value adding tasks in the organization (Suri et al., 2017; Bhatnagar, 2020). Based on these experiences from the business context, researchers and public sector officials alike see potential in using RPA also in public organizations. Hopes are that service automation using RPA will lead to lower costs, more efficient processes, fewer errors, time savings, and improved service quality of citizen services (Ranerup & Henriksen, 2019).

In the current discourse on the utility of RPA for public sector organizations, RPA is discussed as a silver bullet that can resolve the challenges faced by public sector organizations, e.g. challenges related to inefficiency in public administration, decreasing funds for public service delivery, working environment issues for public officials, and difficulties in attracting and recruiting personnel with the right competence. However, how well automation technologies such as RPA can perform in relation to public service delivery remains an empirical question; we still lack empirical evidence for the success and suitability of automation technologies, such as RPA, for public service delivery. There is yet limited research on service automation in the public sector, and there are only a few studies available that target automation technologies involving RPA or AI elements in public sector organizations (e.g., Wihlborg et al., 2016; Ranerup & Henriksen, 2019, 2020; Toll et al., 2021; Lindgren et al., 2021).

This title aims at presenting the latest advancements and findings from research on service automation in public sector organizations. Examples of service automation include, but are not limited to, Robotic Process Automation, Cognitive RPA, and various AI technologies. Spread across eleven chapters, this book brings forward conceptual- and empirical work from social- as well as technical perspectives. The targeted audience includes researchers interested in digital government and digital transformation; practitioners in public sector organizations working actively with automation; policy makers at local, regional, national, or international government levels; university students and professors from research disciplines concerned with people's and organizations' use of digital technologies; as well as ICT industry experts engaged in public sector information system, software design, and deployment projects related to automation. As such, this book is built on an ambition to aid and inspire researchers and practitioners to advance their knowledge on service automation in public organizations, as well as to provide a foundation for policy development and future research.

2 Understanding Public Sector Service Automation

The research presented in this book investigates public sector service automation from several perspectives. We have organized the content in three thematic sections that deal with the *conceptualization* of this phenomenon (Sect. 2.1), empirical examples of automation *applications* in public organizations (Sect. 2.2), and *implementation challenges* that can arise from public sector service automation (Sect. 2.3). Together, these three sections further our understanding of public sector service automation as a concept, as manifested in practice, and its associated opportunities and challenges.

2.1 Conceptualization of Public Sector Service Automation

Automation in public sector organizations is not a new phenomenon; however, lately software robots have emerged as a new way to automate larger portions of work processes. In light of this new wave of organizational development, Goldkuhl identifies a need for clarifying the concept of *process automation.* He performs a meta-study on several ongoing research projects and investigates basic concepts from a linguistic and ontological perspective. The results include a linguistic analysis of automation and a structure of key practices related to process automation. It provides a shared conceptual and linguistic ground for researchers in process automation in public sector organizations.

In the subsequent chapter, Roehl delves deeper into the case handling practices, illustrated by Goldkuhl, and takes a closer look at different decision situations where automation technology is used. Roehl presents a functional classification of six ideal types of decision situations with various degree of automation using algorithmic systems. The *typology* clarifies, for each of the six ideal decision situations, how decision authority is distributed between civil servants and algorithmic systems on the other. Through the typology, Roehl focuses on civil servants use of technology and sheds light on differences in organizational practices depending on different levels of human involvement and decision authority entrusted with technology. The typology informs practitioners and policy makers about actual work practices and how these are reflected in the design of IT systems.

In a similar vein, Juell-Skielse, Balasuriya, Güner, and Han identify a lack of conceptualization of cognitive robotic process automation and how it affects public organizations' dynamic IT capabilities. Juell-Skielse et al. offer a definition of cognitive RPA and depict it as an open system. Also, the authors offer a set of propositions for how an extended notion of RPA affects dynamic IT capabilities in public sector organizations. They provide testable hypotheses to researchers and inform practitioners of how RPA affects their organizational capabilities.

Together these three chapters provide solid foundations for defining practices related to process automation, distribution of decision authority between civil

servants and algorithmic systems as well as extending the notion of robotic process automation to include cognitive artificial intelligence.

2.2 Applications of Public Sector Service Automation

Automation of work has re-emerged as a popular theme in public administration, where suppliers of automation technologies and AI-based services promise fast and bias-free handling of citizen data. In parallel, policy makers promote increased digitalization and automation as a way of increasing efficiency in administrative routines. Two policy areas in which RPA and other automation techniques have gained attention are *human resource management* (HRM) and *social work*, both of which are associated with large volumes of paperwork and rule-based decision-making. However, they also include social interactions with employees/clients, professional work, and discretionary practices. Three chapters of this book provide insights into the use of RPA in HRM and social work.

First, based on a literature review, Persson and Wallo provide an overview of RPA use within the field of HRM and relate this to public service values. Their review indicates that automating IT systems can be an effective way to creating efficiency in administrative and information-based services provided by HRM. But when it comes to more innovation-oriented services, RPA seems to have few if any benefits. Many organizations seem to utilize e-HRM more for an automating approach that focuses primarily on increasing administrative efficiency rather than supporting strategic human capital management processes.

As a complement, Gustafsson illustrates how algorithms-supported decision-making in social work requires new and cross-jurisdictional governance and coordination mechanisms, as well as new institutional arrangements. As such, RPA implementation in social work creates tensions, ambiguities, and conflicts that call for public organizations to re-examine current practices and core services in relation to democratic goals.

On a similar note, Ranerup and Svensson provide a qualitative study of how RPA is discussed and implemented in social work in Sweden. Their results call for future studies on the discretion of caseworkers in view of the greater experiences of RPA, as well as the influence of new laws that might, or might not, increase the potential of utilizing RPA in local government contexts like social work.

Last, Neu, Benke, Müller, and Fettke illuminate automation from a slightly different perspective by highlighting the use of RPA for cross-border business processes. Their study shows that public organizations can engender citizen trust in AI service agents by enhancing their sense of security and data protection, as well as the perceived quality of advice.

All four chapters give important insights on how automation of work and services can be manifested in practice and show how different values can be created using automation technologies, as well as highlighting challenges that can arise from the use of automation.

2.3 *Implementation Challenges of Public Sector Service Automation*

The last section of chapters provides additional examples of automation applications in public organizations but focus on what challenges public organizations can face during the phase in which they implement automation technologies.

The study by Güner, Han, and Juell-Skielse shows that only a few early adopters have implemented RPA in the public sector, and that RPA development and use in public organizations generates new routine capability in advancing human and machine practices.

Similarly, the chapter by Lindgren, Åkesson, Thomsen, and Toll illustrates how two Swedish municipalities have organized for automation and RPA initiatives. The study shows how politically driven policies on process automation become a driving force that challenge traditional ways of organizing work and IT in Swedish local governments.

Similarly, Bygstad, Övrelid, and Williams address the challenges of managing lightweight and heavyweight IT innovation. They propose a governance framework for two-speed innovation which is illustrated in three empirical cases. The study illustrates that RPA clearly offers new opportunities for public sector organizations, but that these opportunities are accompanied by a set of challenges that, according to the authors, can be balanced with the framework of two-speed innovation.

Lastly, and as mentioned in the introduction, RPA was developed for business purposes and has been deployed in the private sector for some time. Drawing on his research on RPA use in the private sector, Asatiani offers advice to public sector organizations embarking in automation and RPA initiatives.

Together, these last four chapters provide important insights on the need for public organizations to understand that automation technologies can result in more substantial organizational changes than first anticipated. An important lesson learned is that seemingly simple applications such as RPA requires that the organization invests in new skillsets and competencies, as well as new organizational structures.

3 Future of Public Service Automation

When combining the research efforts presented in the chapters, we see that service automation is in fashion for public organizations. Using the words of Wang (2010), RPA has been presented as the "hottest IT" for public organizations, resulting in an array of initiatives to automate parts of public service delivery. So far, research on this topic is limited and there is great potential for enhancing the understanding of the topic of public service automation.

The chapters focus mainly on public organizations' use of RPA. However, our ambition is to understand service automation in a wider sense and to consider RPA as a useful empirical example of service automation in public organizations. At

present, RPA is in fashion but will most likely be considered as a commonplace or outdated technology in a foreseeable future (like other hyped technologies before). In contrast, automation of work and services, as a more general concept, is likely to remain a relevant and evergreen topic for public organizations. With upcoming advancements in AI-based applications and services, we furthermore anticipate an increase in automation of work and service delivery in the public sector. The lessons learned from these initial applications of RPA are, therefore, important for understanding the future implications and challenges of public service automation, and call for further research:

- Practitioners and suppliers of service automation have high hopes that automation will lead to lower costs, more efficient processes, fewer errors, time savings, improved service quality of citizen services, and higher work quality for civil servants. But so far, there is still little evidence of these effects of automation of public service; future research has an important task to evaluate these effects over time.
- There is a need for more research on how specific automation technologies and solutions are developed and on what grounds specific work practices are chosen and re-designed for automation. Furthermore, we see a need for more studies on the co-creation of new automated work practices. Considering that automation is co-created by a large set of actors, design thinking can be a fruitful perspective for creating a deeper understanding of how automation solutions are negotiated and created, based on both technical- and social dimensions of work.
- The social consequences of increased public service automation are not well understood. Increased automation will change the work situation for many professionals in the public sector and affect interaction and communication patterns in and between public organizations, and in relation to citizens. Similarly, the citizen perspective as well as the policy perspective is still under-researched. So far, little is known about how service automation is perceived by citizens and how automation affects policy making. For example, future research could shed light on how citizens' trust in authorities is affected by increasingly automatic decisions.
- There are several policy areas within the public sector yet to study. The applications covered in the book are taken from social work and human resource management. Therefore, we expect to see future research about cases of service automation in other policy areas, as well as on how to scale automation within and between policy areas.
- It can be highly valuable to draw lessons from private organizations' use of automation and transfer these lessons to the public sector. At the same time, it is also important to recognize that there are significant differences between the sectors. How the specifics of public sector organizations affect their opportunities to automate work and service delivery must be investigated further. It is also important to investigate the influence of commercial actors on the design of public organizations and processes, e.g. the role played of technology suppliers and consultants in reshaping the public sector.

- Last, but not least, there is a need for a critical perspective on automation in the public sector; what is possible versus desirable? What are the risks of the digitally automated society? There are, for example, issues of transparency and traceability in automated processes and algorithm-based decision-making that require further research.

In this book, we contribute to the understanding of service automation in the public sector with studies from three perspectives: conceptualization, applications, and implementation challenges. The results reveal several questions for future research, as outlined above. We hope that this book will inspire to new and exciting research initiatives, perhaps with the aim of answering some of these questions.

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Part II
Conceptualization of Public Sector Service Automation

The Subject Matter of Process Automation Practices: Through the Lenses of Research Questions

Göran Goldkuhl

1 Introduction

In its inception, the computer was considered and used as an automatic machine. This means that it was self-operating by control of software in transforming input data to output data. The computer was used for numeric and later administrative applications (Mahoney, 2005). The roles of humans were to feed the machine with data and after computing interpret and use its produced results. Later in history, a radical change occurred through the introduction of the micro-computer and its graphical user interface (ibid.). The computer was transformed from previously the main role of an automaton to the role of an interactive tool (Ehn & Kyng, 1984). This tool view has later been emphasized through the development and integration of communication technologies including the Internet revolution. Interactivity has not taken away automatic functionality of computers, but only made this less visible and obvious. Computers operate, as controlled by software, and transform input to output. These computing steps are just smaller in an interactive mode than in large-scale computing where the automatic functions are more obvious.

Already at the outset, automation was closely associated with computers and information technology. It has been used as a buzzword on several occasions during history, as in automation and robotics in industrial engineering (Mahoney, 2005) but also in office automation (Olson & Lucas, 1982). It would be possible to talk about different automation waves during the history of computing. A recent wave is that of robotic process automation (RPA); e.g., Lacity and Willcocks (2016). The main idea is to reduce the human involvement in administrative processes; to have longer chains of automatic computing without any humans maneuvering the IT artifact. The

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role of the IT artifact returns to that of an automaton instead of being an interactive tool. In this new type of technology, the RPA-based software will be the interactor with other IT artifacts' user interfaces (Lacity & Willcocks, 2016). This and other types of technology have found their ways to the public sector where they are used for automating back-office processes such as case handling and routine decision-making (Wihlborg et al., 2016; Ranerup & Henriksen, 2019; Houy et al., 2019). Process automation in the public sector can be conducted with the aid of specific RPA software (Lacity & Willcocks, 2016) or other types of software (Houy et al., 2019).

As indicated above, process automation in the public sector is both an old and new phenomenon. There is an obvious need for a conceptually clear view of this phenomenon in research (Wihlborg et al., 2016; Ranerup & Henriksen, 2019, 2020; Houy et al., 2019). This chapter is based on an ongoing meta-study of several research projects on process automation in the public sector. The main purpose is to elaborate on the subject matter of process automation (PA). To clarify ontologically, the phenomenon of process automation can be made in different ways. The route taken in this chapter is an indirect one. The subject matter of process automation is studied mainly through the eyes of other researchers that conduct PA research. The research interest in this chapter translates into different inquiry questions: How is process automation framed and conceptualized in the research questions of different research projects? What kinds of phenomena appear as salient in the problem formulations that guide the research? The chapter contributes to an enhanced understanding of how to conceptualize process automation in the public sector.

2 Research Approach

As stated, the basic inquiry idea delineated for the chapter is how to view and conceptualize the research subject matter of process automation; see Fig. 1 for an overview. The focus is on pre-conceptualizations made in research questions (RQs). Through the study of five research projects on process automation, a comprehensive view of its subject matter appears. This emergent view should have greater coverage than each singular view from the research projects, respectively.

The source material for the meta-study consists of:

- Research project descriptions and other related material
- Interviews with researchers

The chapter presents a review of such pre-conceptualizations on process automation. The main purpose is not a comparative review of studied research projects. I use RQs of five research projects to obtain a richer view of the subject matter of process automation. This analysis of five research projects produces inevitably a material that makes a comparison of those projects possible.

Fig. 1 Research overview
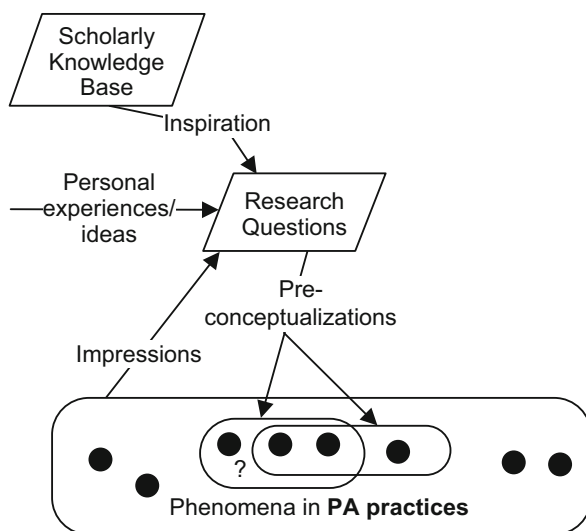
The review of pre-conceptualizations is made through linguistic and ontological analyses of basic concepts. This conceptual analysis is based on the "linguistic turn" (e.g., Alvesson & Kärreman, 2000; Goldkuhl, 2002), the "practice turn" (e.g., Schatzki, 2001; Reckwitz, 2002; Goldkuhl & Röstlinger, 2006; Nicolini, 2012) and processual and relational thinking (Abbott, 1992; Emirbayer, 1997; Goldkuhl, 2005).

Initially, I investigate the concept of process automation from a linguistic perspective as a basis for further analysis. Then, research questions (from the studied research projects) are investigated in a two-step procedure. First, the types of practices that are presumed in the RQs are articulated. Second, different phenomena mentioned and presumed in the RQs are identified and ontologically determined following the ontology of socio-instrumental practice theory (Goldkuhl, 2002, 2019; Goldkuhl & Röstlinger, 2006).

The outcome of this meta-inquiry of different research projects is a suggested and synthesized description of process automation practices. This is made in the last step of this inquiry: Different practice reconstructions and the conceptual analysis of phenomena from RQs are synthesized in an ontological map of process automation practices as a conclusion of this chapter.

3   A Linguistic Analysis: What Does "Automation" Mean?

As a preparatory step, before I embark on a review of the studied research projects, I look into possible meanings of the main concept "process automation." I follow the lines of the linguistic turn, which means a turn to an enhanced focus and