Digital Discretion Acceptance and Impact in Street-Level Bureaucracy

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Glossary

Street-level bureaucracy describes a public entity, occupying street-level bureaucrats, engaged in policy implementation on the street-level (Lipsky, 2010).

A *street-level bureaucrat* is a professional or semi-professional public service worker (e.g., a police officer or a teacher) who operates in the frontline of public service provision. S/he interacts closely with clients and makes decisions about them based on how s/he interprets policies relating to the situations at hand (Lipsky, 2010).

A *client* is the person for whom a public service is performed, for example, a police officer offers services to the public and not criminals (Lipsky, 2010).

Discretion is the freedom street-level bureaucrats have to make decisions concerning clients regarding the sort, quality, and quantity of sanctions and rewards during policy implementation, including the possibility of no sanction at all (K. C. Davis, 1969).

Digital discretion is the use of computerized routines and analyses to influence or replace human judgment (Busch & Henriksen, 2018).

A *public policy* is a course or principle of action proposed by a public entity and adopted by an organization, often in terms of a law, guideline, or rule (based on Hill & Hupe, 2014).

Policy implementation is the process of turning policy intentions in into actions that clients can experience (John, 1998).

E-government is the use of technology to design new or to redesign existing information processing and communication practices for the improvement of government activities (Meijer & Bekkers, 2015).

An *institution* is a typification of habitualized action by a specific group of people (Berger & Luckmann, 1967).

Typification is the process in which a social construction comes to represent something else, for example, habitualized action (Berger & Luckmann, 1967).

An *institutional logic* is a shared understanding of belief systems and organizing principles, by which a small group of people produces and reproduces to guide their daily activities (Battilana, Leca, & Boxenbaum, 2009; Thornton & Ocasio, 1999).

List of abbreviations

Abbreviation	Description
AI	Artificial Intelligence
CMS	Case Management System
DA	The Digital Agenda for Norway
DC	Digitalization Circular
DDAM	Digital Discretion Acceptance Model
MP	Member of Parliament
NTA	Norwegian Tax Administration
PLS	Partial Least Squares
SEM	Structural Equation Modeling
SL	System for Tax Assessment (Norwegian: *System for likning*)
UTAUT	Unified Theory of Acceptance and Use of Technology

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Abstract

Research context – Street-level bureaucracies are public organizations responsible for turning policy intentions into actions experienced by clients. They occupy street-level bureaucrats such as judges, social workers, and teachers who have extensive ability to exercise discretion. Whereas clients ideally should experience public policy implementation equally within a jurisdiction, policies are often found to be implemented differently in different contexts. Policy discrepancies have led to the criticism of discretionary practices, introducing technology as a remedy to reduce the street-level footprint in policy implementation.

Motivation and purpose – Whereas street-level bureaucrats may have become powerful actors, a technological impact on discretionary practices can disclose too much algorithmic imprint. This is potentially problematic since there is a fundamental difference between professional street-level work and digital work practices. Whereas street-level bureaucrats base their decisions on professional knowledge and skill sets, acquired through years of training and experience, digital tools are designed by non-professionals without any first-hand experience of street-level work. Thus, technology can lead to street-level bureaucrats that rely more on digital tools than their professional skills. Whereas the potential impact of technology on discretionary practices has far-reaching consequences for public service provision, my literature review revealed that this area is rarely investigated and that more research is required, especially concerning the conditions under which technology can influence street-level discretion. This neglect is surprising, given that street-level bureaucrats constitute a substantial amount of government personnel. In this study, I focus on the agentic behavior of street-level bureaucrats as a contextual explanation to when technology enables or constrains discretion. In particular, I investigate how the characteristics of street-level work can explain the acceptance and impact of digital discretion.

Research design – I have applied a sequential mixed methods approach to build and test theory. To build theory, I conducted a multiple case analysis of judges in a Norwegian district court, caseworkers in a Norwegian tax administration office, and high-level policy makers in the government and the Norwegian Parliament. Judges, caseworkers, and policy makers represent groups of actors with different constitutional responsibilities for policy implementation. To test the developed theory (a research model), I surveyed street-level bureaucrats (N = 125), representing several street-level

bureaucracies such as a food safety authority, public roads administration, directorate of fisheries, customs offices, and municipal kindergarten administration offices. The data were analyzed using structural equation modeling with the partial least squares estimation technique (PLS-SEM).

Findings – To make sense of the data, I applied institutional logics as the theoretical lens. Institutional logics help us understand the institutional tensions created by the use of technology in street-level work practices as well as the reactions to these tensions. Street-level bureaucrats respond by compliance, acquiescence, habitual compliance, appropriation, and defiance of digital discretionary practices. I found that professional motivations and the nature of public service provision make it difficult to fully automate discretionary practices. Street-level bureaucrats have a strong professional identity and their support depends on the professional outcome. According to them, information uncertainty, decision severity, and legislation complexity makes discretion necessary, especially within traditional street-level bureaucracies. Other factors such as the ability to utilize technology, societal considerations, the potential to routinize practices, e-legislation, and service entitlement can shift street-level bureaucrats in favor of digital discretion. Street-level bureaucrats within more hierarchical organizational structures are more likely to accept digital discretion. The analysis of the quantitative data introduced professional identity as the strongest explanation for the perceived importance of discretion, followed by decision complexity. These findings support the previous claims by street-level bureaucracy researchers who argued that the nature of public service provision makes discretion inevitable. Computer self-efficacy was strongly linked to a positive attitude toward digitizing discretionary practices. This is mainly because people with high computer self-efficacy are more likely to understand the opportunities and challenges that digital discretion offers.

Research implications and limitations – This study makes several contributions. First, I have developed a model of digital discretion acceptance (the digital discretion acceptance model). The model is developed based on the findings from the qualitative study, the literature, and an empirical test. Considering that street-level bureaucrats are often highly professionalized and strongly motivated by helping clients, my study implies that if public services, and discretionary practices in particular, are to be influenced by technologies, public management needs to address how professional aspects of street-level work can be supported by technology. Moreover, public

management should pay special attention to the opportunities that technological innovations, such as artificial intelligence, can create; it should also heed the potential inability of street-level bureaucrats to fully utilize the existing digital tools, due to limited training and old age. Second, I have described how technology influences street-level bureaucracies to the point that it no longer makes sense to talk merely about street-level bureaucracy, but also about infocracy, canocracy, and robocracy. In the infocracy, street-level bureaucrats are provided with more information through digital tools. Whereas technology can devise decision alternatives for them to consider, it does not make any decisions on its own. In the canocracy, much of the decision-making process is automated and the use of discretion is limited. Decision alternatives are analyzed and decisions are executed by a computer, although they may be overruled by a street-level bureaucrat. In the robocracy, technology has replaced the discretionary practices of street-level bureaucrats and decisions are made completely without human intervention. Third, I have elaborated on the role of material agency in institutional logics studies and developed a research framework for this purpose. My contributions are limited by cases recruited in Norway only, limited types of street-level work, the selection of informants, policy documents that may reflect biased views, and a relatively low number of respondents in the quantitative study.

Practical implications – I offer five recommendations for public management to avoid street-level resistance and the appropriation of digital discretion. Public management should pay special attention to the opportunities that technological innovations can create. Even though high-level policy makers are positive about innovations, such as artificial intelligence, big data, and automated services, they are seldom utilized or slowly adopted by street-level bureaucracies. Moreover, public management should be aware of the potential inability of street-level bureaucrats to fully utilize digital tools, mainly because of limited training and old age. Higher technology-proficiency is associated with more positive attitudes toward digital discretion. In addition, services that clients are entitled to should be completely handled by fully automated systems.

Originality/value – This research addresses a gap in the literature and explain how and why discretionary practices can be influenced by technology. This knowledge is particularly valuable for public management planning to introduce digital discretion in street-level bureaucracy and to avoid street-level resistance and the appropriation of technology.

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“If a robot could do your job quicker than you and better than you for no pay, would you still be employed? Today it's travel agents, data-analysts and paralegals whose jobs are under threat. Soon it will be doctors, taxi-drivers and, ironically, even computer programmers. Without a radical reassessment of our economic and political structures, we risk the implosion of the capitalist economy itself.”

— Martin Ford in ‘The Rise of the Robots’ (2016)

1 Introduction

Street-level bureaucracies are public organizations that until 20-30 years ago formed a somewhat homogenous group (Snellen, 2012). They occupy street-level bureaucrats, such as judges, social workers, and teachers who interact closely with clients and exercise extensive discretionary power during public policy implementation (Lipsky, 1980, 2010). Discretion, the granted privilege to bestow rights and impose obligations on clients based on their professional judgment (Lipsky, 2010; Snellen, 2012), has been considered a vital ingredient of policy implementation—and for several reasons. First, street-level bureaucrats are deliberately allowed to make professional considerations. They are granted discretionary power by policy makers through legal prescriptions (Hupe & Buffat, 2014). Second, legal terms (e.g., "satisfactory" or "reasonable") are often vague and require professional interpretation, since social complexity does not allow for schematic rules (Evans & Harris, 2004; Henriksen, 2018). Finally, applicable rules may be contradictory (Snellen, 2012). Therefore, considerations of higher rank rules ("lex superior") must be made.

The ideal implementation of a public policy is when street-level bureaucrats have considered all necessary circumstances for the best possible outcome of the client and the government (Dworkin, 1978; Henriksen, 2018). In reality, this rarely happens. Instead, policies are implemented differently in different contexts. Many are the public managers who have observed that their "followers" are no longer following (Kaufman, 1960). Policy discrepancies have led to criticism against the discretionary power of street-level bureaucrats arguing that they effectively become policy makers on the street-level (Evans, 2006; Prottas, 1978). Thus, there is a risk of removing the final stage of policy implementation from democratic control (Larsson & Jacobsson, 2013; Lipsky, 2010). To address this problem, digital discretion has been proposed to reduce the street-level footprint in policy implementation. Digital discretion is "the use of computerized routines and analyses to influence or replace human judgment" (Busch & Henriksen, 2018, p. 4). However, a technology-driven decision-making is not unproblematic, since it may disclose too much algorithmic imprint (Janssen & Kuk, 2016). Information and communications technologies (ICT) have been designed by system architects who have little or no experience of street-level work. Thus, they make choices that had previously been made by street-level bureaucrats (Bovens & Zouridis, 2002) by converting vague legal terms into algorithms and decision trees which can be decisive for policy implementation outcomes (Henriksen 2018). This is

problematic since ICT may be designed to apply rules too rigorously, apart from the real-life situations of clients, and therefore can shift policy implementation from a professional craft reflecting professional norms to more rationalized work reflecting private sector management principles (R. E. Meyer, Egger-Peitler, Höllerer, & Hammerschmid, 2014). Rather than helping clients, street-level bureaucrats may end up as mere ICT operators helping computers instead. Despite the massive diffusion of ICT in the public sector, its potential impact on the discretionary practices of street-level bureaucrats is scarcely researched in the information systems (IS), public administration, and e-government disciplines (Buffat, 2015; Snellen, 2012). This lack of knowledge is puzzling, considering that far-reaching changes are taking place in public organizations as a result of increased e-government diffusion, managerialization, and marketization (R. E. Meyer et al., 2014; Pollitt & Bouckaert, 2011; Snellen, 2012). The gap in the literature is even more worrisome considering that street-level bureaucrats constitute a substantial number of government personnel (Snellen, 2012).

Studies that directly assess the influence of ICT on street-level discretion are inconclusive. In general, extant research informs us that technology can both constrain and enable street-level bureaucrats' ability to exercise discretionary power (Buffat, 2015). However, less attention has been directed at the conditions under which digital impact on street-level discretion can be explained (Buffat, 2015). The extant research explains this through professional autonomy, the need for interaction with clients, social complexity, and features of the technological artifact in use. Street-level bureaucrats are professionals, and research shows that they often have human agency (Giest & Raaphorst, 2018). They are autonomous and reflexive and exert considerable influence on their work environment (Bandura, 2006; Giest & Raaphorst, 2018; Lawrence & Suddaby, 2006). Street-level bureaucrats expect to be trusted with their professional expertise (Hupe & Hill, 2007) and being hierarchically held accountable contradicts their sense of autonomy and can discourage them from using digital tools (Gofen, 2014). Standardized decision-making may even conflict with their professionalized knowledge. The literature has not yet concluded whether technology promotes professional norms or managerial goals.

Maintaining close interactions with clients is important, since it helps street-level bureaucrats to easily identify the unique characteristics of each case and clients to present their cases to them (Bruhn, 2015). Street-level bureaucrats prefer "rich"

information collected in face-to-face interactions with clients, to standardized text blocks, collected through forms (Raaphorst & Groeneveld, 2018). Due to social complexity, life situations are often better described through rich narratives rather than standardized texts (De Witte, Declercq, & Hermans, 2016). Technological tools amplify this influence and the more formalized the decision-making tools are, the stronger is the impact on discretionary practices (Høybye-Mortensen, 2013). However, more research is needed to understand how various technologies can reveal formal and informal aspects of street-level work (Buffat, 2015).

This dissertation aims at empirically showing and critically discussing the conditions under which technology enables or constrains the discretionary practices of street-level bureaucrats. Whereas other contextual explanations, such as personality type and cultural differences, can explain how and why technology can influence street-level discretion (Buffat, 2015), I pay attention to the beliefs and resulting behaviors of street-level bureaucrats when they are faced with technological influences on their discretionary practices. This perspective shows us (a) the ability of street-level bureaucrats to influence their own work situations and their underlying motivations to do so (see the first research question), and (b) how their behaviors combined with different types of technology, can influence discretionary practices on the street-level (see the second research question). To build an understanding of how street-level bureaucrats make their considerations about street-level work, I have applied institutional logics as the theoretical lens. Research has paid increasing attention to how the institutional environment influences changes in the public sector with institutional logics playing an essential role in these processes (e.g., Christensen & Lægreid, 2002; R. E. Meyer et al., 2014; Scott, Ruef, Mendel, & Caronna, 2000). An institutional logic is "a field's shared understanding of the goals to be pursued and how they are to be pursued" (Battilana et al., 2009, p. 69). The concept of institutional logics has received attention in studies within several disciplines including information systems (IS) and used to inform a wide variety of questions, such as adoption, implementation, and use of technology as well as the tensions arising from competing logics and coping mechanisms. Institutional logics can be applied to explain the specific motivational dispositions of street-level bureaucrats, public management, and policy makers concerned with policy implementation in public services. Whereas street-level bureaucrats base their professional judgment on unique knowledge and skill sets, acquired through years of training and experience, digital tools are designed by non-professionals without any firsthand experience of street-level work (Bovens &

Zouridis, 2002). The professional aspects and considerations about street-level work can be explained through a logic of state-professionalism. Managerial aspects and expectations are expressed through a logic of market-managerialism. These two logics are salient in digital public service provision, cause conflicting demands to occur and provoke an agentic behavior by street-level bureaucrats (Hupe, Hill, & Buffat, 2016; R. E. Meyer et al., 2014; Noordegraaf, 2016; Pollitt & Bouckaert, 2011). As professionals, street-level bureaucrats consider the potential consequences of digital discretionary practices and devise strategies accordingly. Thus, the beliefs and behaviors of street-level bureaucrats are given an institutional grounding by taking multiple competing institutional logics into account and investigating institutional antecedents for their reactions (R. E. Meyer et al., 2014).

As the basis for the empirical analysis, my research study used a sequential mixed methods approach to build and test theory (Eikebrokk & Busch, 2016; Mingers, 2001; Venkatesh, Brown, & Bala, 2013). Since research on digital discretion is relatively scarce, my research questions are exploratory in nature. In the qualitative study, I aimed at gaining a deeper understanding of how and why technology can enable or constrain the discretionary practices by identifying the cognitive, affective, and behavioral responses of street-level bureaucrats. In the quantitative study, I tested the identified factors and their relationships explaining digital discretion acceptance. The mixed methods design is chosen, mainly because the likelihood of divergent views is higher, stronger inferences can be made, and deduced hypotheses can be tested on a larger population (Venkatesh et al., 2013). To build theory, I conducted a multiple case study of judges in a Norwegian district court, caseworkers in a Norwegian Tax Administration (NTA) office, and high-level policy makers in the government and the Norwegian Parliament. Judges and caseworkers represent what Lipsky (2010) calls street-level bureaucrats. Traditionally, they have interacted closely with clients, exercised discretion, and controlled their work routines. Now, digitalization initiatives have resulted in a massive diffusion of digital tools, influencing their work practices (Giest & Raaphorst, 2018). Both the court and the NTA office have used case management systems (CMS), common in many public agencies, for several years. Whereas judges are independent law experts, handling all types of cases, NTA caseworkers are legal tax specialists and must report to higher authorities. To test the developed theory, I surveyed street-level bureaucrats (N = 125) and analyzed the data using structural equation modeling with the partial least squares estimation technique (PLS-SEM). The respondents represented several public organizations, such as a food

safety authority, public roads administration, directorate of fisheries, customs offices, and municipal kindergarten administration offices. Several of the respondents were accustomed to working alone and making decisions without conferring with colleagues. The purpose of the quantitative study was to empirically investigate whether findings from the court and NTA office could be generalized to a larger population of street-level bureaucrats. The qualitative and quantitative studies I conducted were the first steps of theory building and testing. This work suggested further theory refinement (Eikebrokk & Busch, 2016) and therefore encouraged me to re-examine the results of the quantitative analyses and the literature to develop the digital discretion acceptance model (DDAM) (see chapter 6.3.1). The initial problem statements that motivated this study are presented below.

1.1 Research questions

The first research question is:

RQ1: What are the enabling and hindering factors of digital discretionary practices?

The first research question is concerned with cognitive and affective responses to digital discretion; these include considerations by policy makers and street-level bureaucrats on the suitability of digital discretionary practices in public service provision, forming their attitudes toward digital discretion. Cognitive and affective responses are known in technology acceptance models (e.g., Venkatesh, Morris, Davis, & Davis, 2003). The considerations of policy makers are important, since they influence the national digital agendas to a considerable extent and define the boundaries of digital public service work. The decisions they make have implications for street-level bureaucrats implementing policies. Street-level bureaucrats are professionals and semi-professionals (Lipsky, 2010) and are therefore driven by professional norms, such as individualized service and care (Wihlborg, Larsson, & Hedström, 2016) rather than managerial objectives such as efficiency and cost reductions (Tummers, Bekkers, & Steijn, 2009). Their considerations are important, since they work in the frontline of public service provision and have first-hand experiences with the opportunities and challenges created by digital discretion. In technology acceptance models, cognitive and affective responses to technology lead to behavioral responses; these include the intentions and actual acceptance of technology.

I therefore asked the following question:

RQ2: How is street-level discretion influenced by technology?

The second research question is concerned with the actual influence of technology on discretionary practices. It inquired whether technology acts as an "action prescription" (limiting the room for maneuvering) or an "action resource" (enhancing the room for maneuvering). This research question focuses on human and material agency. Technology can enforce the scripts, which limit the freedom of street-level bureaucrats. Moreover, street-level bureaucrats can have a significant impact on changes in work practices, since they intentionally seek to influence their work environment (Bandura, 2006). As professionals and semi-professionals, they have agency (Bandura, 2006). Their agentic behavior is guided by how well they can anticipate future outcomes, the continuous nurturing of their self-interests, and their reflexivity (Suddaby, Viale, & Gendron, 2016). Thus, they do not act out of randomness but rather out of particular personal motivations (Bandura, 2006) to assess what is best for their work situation and for public service provision in general.

1.2 Summary of contributions

This dissertation is an integrative summary of my research project, comprising six research publications with each describing a part of the overall research study. The contributions of this research project have been published in international journals and conference proceedings. Each paper offers theoretical, empirical, and/or methodological insights into the research questions. The following research papers are included as part of this research project:

1. Busch, P. A., & Henriksen, H. Z. (2018). Digital Discretion: A Systematic Literature Review of ICT and Street-Level Discretion. *Information Polity, 23*(1), 3-28.
2. Busch, P. A. (2018). Technology and Institutional Logics. In *Proceedings of the 39th International Conference on Information Systems (ICIS)*. San Francisco, CA.
3. Busch, P. A. (2017). The Role of Contextual Factors in the Influence of ICT on Street-Level Discretion. In T. Bui & R. H. Sprague Jr. (Eds.), *Proceedings of the 50th Hawaii International Conference on System Sciences (HICSS)* (pp. 2963-2972). Big Island, HI.
4. Busch, P. A., Henriksen, H. Z., & Sæbø, Ø. (2018). Opportunities and Challenges of Digital Discretionary Practices: A Public Service Worker Perspective. *Government Information Quarterly, 35*(4), 546-555.
5. Busch, P. A. (2018). Conceptualizing Digital Discretion Acceptance in Public Service Provision: A Policy Maker Perspective. In *Proceedings of the 22nd Pacific Asia Conference on Information Systems (PACIS)*. Yokohama, Japan.
6. Busch, P. A., & Eikebrokk, T. R. (2019). Digitizing Discretionary Practices in Public Service Provision: An Empirical Study of Public Service Workers' Attitudes. In *Proceedings of the 52nd Hawaii International Conference on System Sciences (HICSS)*. Maui, HI.

Table 1 lists the contributions of this study indicating in which paper they are to be found.

Table 1. Summary of main contributions

Contr. to	Contribution	RQ(s)	Paper(s)	Purpose/importance
Research field.	Literature review.	1-2	1	To sum up what we have learned so far and identify where research efforts should be directed.
	Factors enabling or hindering digital discretion.	1	3-6	To identify whether technology can replace human judgment in street-level bureaucracy.
	Digital discretion acceptance model.	1-2	6 kappa	To identify the conditions for digital discretion acceptance by street-level bureaucrats.
The street-level bureaucracy perspective.	Technological impact on street-level bureaucracy.	2	1, 3-6	To assess whether the street-level bureaucracy perspective still describes realities of public service provision in the information age.
The institutional logics perspective.	The role of material agency in institutional logics studies.	2	2, 4	To show how technology can impact organizing and institutional stability and change.
	Research framework.	2	2	To compare the findings across different studies more easily.
Public management.	Recommendations.	1	4, 6	To understand attitudes and behaviors of street-level bureaucrats as explanations for digital discretion acceptance.

1.3 Structure of dissertation

The dissertation structure is presented in Figure 1.

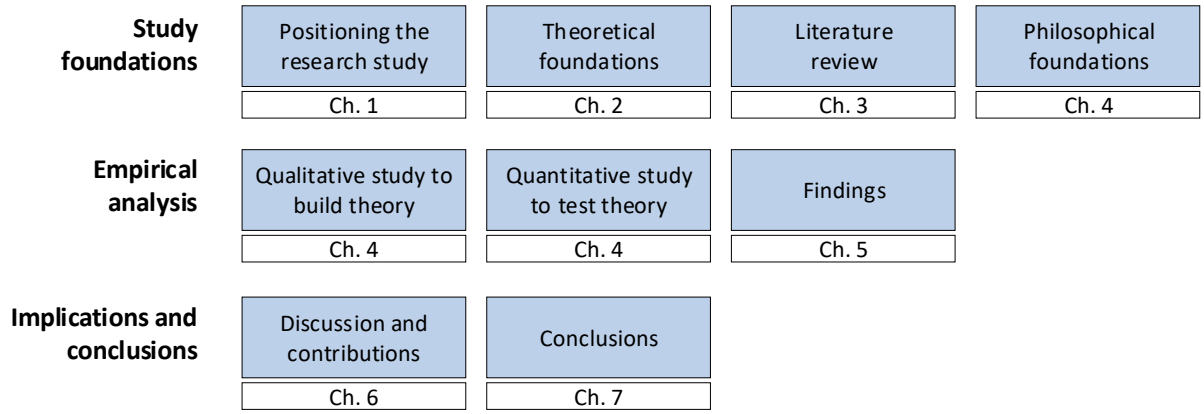

Figure 1. Dissertation structure

The dissertation is divided into seven chapters. Chapter 1 presents the problem area of the research project, explains the importance of new research in this area, elaborates on the main problem statements addressed in this study, briefly introduces the research design and context and suggests the potential theoretical and practical implications of my findings.

In chapter 2, I present the literature on street-level discretion and technological impact. I begin by describing public policy implementation and the importance of discretion as the broader context of this study. Thereafter, I elaborate on the main problem, which posits that street-level bureaucrats become policy makers outside democratic control. I continue with describing what digital discretion is. I continue by describing the procedures for my literature review (paper 1), presenting identified research on digital discretion, and critically discuss the weaknesses and contradictory results of the empirical studies. I end the chapter by delineating how my study contributes to the extant literature in terms of research questions (new knowledge), research design (choice of methods), and research context (choice of informants).

In chapter 3, institutional logics is thoroughly discussed as my theoretical lens. I review the IS literature on technology and institutional logics (paper 2), showing how researchers have produced knowledge within four different perspectives.

In chapter 4, I describe the ontological and epistemological underpinnings of this study and the research design rationale. This rationale is presented more thoroughly together with other research-political aspects in a paper that is not included in this dissertation (Eikebrokk & Busch, 2016). The chapter further presents the qualitative and quantitative research designs for this study. These chapters include descriptions of the choice of the informants and discussions about representativeness and generalizability, data collection processes, data analysis, and other related research activities.

In chapter 5, the main findings are presented and organized according to the six research publications that comprise this study. Chapter 6 summarizes and discusses the three research questions introduced in chapter 1.1. My own findings are reviewed critically and compared to the findings of other studies. The chapter continues by presenting theoretical and practical implications before it ends with suggestions for future research. Chapter 7 summarizes the research project providing brief answers to the research questions.

2 Theoretical foundations

My research questions focus on digital discretion acceptance in street-level bureaucracies. Applied in a street-level bureaucracy, institutional logics is a concept that describes how street-level bureaucrats share beliefs of important goals of public service provision and how to achieve them (Battilana et al., 2009). The increased use of technology challenges these shared beliefs. Whereas beliefs promoted by street-level bureaucrats are often motivated by professional norms associated with a state-professionalism logic, various technologies can promote goals and practices, associated with a market-managerialism logic. Thus, tensions occur when these logics compete which causes strategic behavior. My research questions focus on digital discretion acceptance, studying both motivations (cognitive and affective responses) and actual behavior (behavioral responses). Street-level bureaucracy, digital discretion, and institutional logics are presented in this chapter. Whereas the initial model of digital discretion acceptance tested the validity of several relevant constructs and their relationships, I suggest a new model that integrates my model with the unified theory of acceptance and use of technology (UTAUT). I have chosen UTAUT since I study how and why street-level bureaucrats react to technologies that can influence their discretionary practices and especially because UTAUT is the most commonly used and recognized technology acceptance model. UTAUT and its applicability is presented in section 6.3.1.

2.1 Why street-level bureaucracy?

Studies of public policy have often organized their analyses according to different policy stages in a policy cycle. Whereas stage models can be criticized for over-simplifying policy processes, they have benefited research on public policy by providing researchers with an analytical framework to order and accumulate knowledge (Hill & Hupe, 2014). Policy implementation is "the stage in the policy process concerned with turning policy intentions into action" (John, 1998, p. 204), where "policy as written" is transformed into "policy as performed" (Hupe & Buffat, 2014; Lipsky, 2010), and where "ideas manifest themselves in a world of behavior" (Pressman & Wildavsky, 1984, p. 163). It is in the implementation phase that street-level bureaucrats operate, and it is at this juncture where politics meets reality and where clients expect to experience the practical outcomes of political priorities. These priorities can be expressed in e-government strategy documents issued by a government or in the political debates of a legislature. Representatives for the

government and the Parliament as well as the official documents issued by them are therefore expected to elicit opinions in favor of the will of policy makers.

These expectations are expressed in what has been termed the top-down perspective in policy implementation research. Top-down research takes a rational-actor approach. Policy makers address a societal problem by setting goals for policies, and implementation research seeks to find out what makes the achievement of these goals difficult (Hill & Hupe, 2014). Here, policy implementation is hierarchically controlled. Whereas policy makers often expect top-down implementation, research has shown that policy discrepancies occur frequently. Another perspective, bottom-up research, focuses on the working conditions of public service workers and views them favorably (Brodkin, 2012). Faced with adverse circumstances, such as a heavy workload, a lack of resources, and policy uncertainties, they do their best to help their clients. In this view, discretion is a tool to achieve democratic goals.

My study looks at the technological impact on discretion through a bottom-up approach—the street-level bureaucracy perspective (Lipsky, 1980, 2010). In many ways, this perspective introduced researchers to bottom-up policy implementation (Hill & Hupe, 2014) and has been applied extensively in research. It was also the policy implementation perspective I became familiar with through the work of Buffat (2015). Street-level bureaucracy focuses on the crucial role of the street-level bureaucrat and his or her behavior during policy implementation—a role that makes the street-level bureaucrat powerful. While top-down research sees this as a problem, Lipsky (2010) does not. He argues that street-level bureaucrats do their best under adverse circumstances, and that hierarchical control will only lead to further disregard of client needs. In fact, they use their discretionary power to adapt policies to achieve the best possible outcomes for clients. Since I focus on the agency of street-level bureaucrats, street-level bureaucracy serves as a useful theoretical context for my study. This perspective can benefit my study, since street-level bureaucracy argues that discretion is for the best of the client, whereas digital discretion is introduced based on arguments contrary to this belief.

2.2 The street-level bureaucracy perspective

Street-level bureaucracy is a theoretical perspective introduced by Michael Lipsky in 1971 and later published as a book in 1980. His seminal work has influenced a wide

range of research on public policy, management, sociology, politics, and e-government (Buffat, 2015). Street-level bureaucracies are public organizations that form the operational core of the state, working at the intersection of politics and clients. Street-level bureaucrats are the public service workers who operate in the frontline of public service provision and interact closely with clients and make decisions about them. They are public servants such as teachers, social workers, judges, police officers, and doctors who, in the course of their work, interpret rules and situations and decide from among different decision alternatives.

Focusing particularly on the role of the street-level bureaucrat, Lipsky (2010) claims that public policy implementation eventually comes down to the people who implement it. The literature hints at four major influences on the street-level implementation of public policies (see M. K. Meyer & Vorsanger, 2003 for an overview). Political and administrative superiors constitute one major influence. They provide signals about the content and importance of a policy that aim at directing street-level behavior. The policy itself also uses a particular wording to set forth certain policy intentions, guiding implementation decisions. In addition, policies are often supported by guidelines and preparatory work that inform street-level bureaucrats about the background and goals of them. Street-level bureaucrats are important actors in this aspect; this is mainly because they choose how to interpret policy signals and can potentially challenge managerial directives due to their professional status (Noordegraaf, 2007). A second influence is associated with the organizational, managerial, and administrative imperatives which shape what happens at the operational level of public service provision (May & Winter, 2007). For street-level bureaucrats, this aspect often materializes in the extent to which public management delegates authority to make decisions on the street-level. While the judges I studied are constitutionally independent and therefore enjoy great autonomy in their work, the caseworkers in the tax administration are more dependent on public management authority. Third, the knowledge and attitudes of street-level bureaucrats concerning the tasks they conduct, their work situation, and clients can influence how policies are implemented (May & Winter, 2007), especially because they have strong opinions about their work. The final influence is related to specific characteristics concerning workloads, clients, and the type of technologies in use. As professionals, judges and caseworkers have agency. They are expected to have strong opinions about how street-level work ideally should be carried out and how technology may influence this. Very often, what brought them into public service work was their personal

motivation to help clients. In addition, to prepare for this work, they have also educated themselves, usually in a specific profession.

While work duties of street-level bureaucrats may vary, there are several structural similarities that make it worthwhile to compare the different work settings of street-level bureaucrats with each other. First, they often experience a heavy workload. They seldom have any spare time, and there are always new clients in need of their services. Second, they experience policy uncertainties. Policies need to be interpreted according to the local context, and policy maker intentions are not always readily available. Finally, street-level bureaucrats have great freedom to make decisions within the boundaries of the existing government policies (Lipsky, 2010). In fact, their influence on policy implementation is so enormous that they effectively become policy makers on the street level (Prottas, 1978); thus, their discretionary power is deemed inevitable since "the nature of service provision calls for human judgment that cannot be programmed and for which machines cannot substitute" (Lipsky, 2010, p. 161).

Discretion is understood as the freedom of street-level bureaucrats to make decisions concerning clients regarding the sort, quality, and quantity of sanctions and rewards during policy implementation including the possibility of no sanction at all (K. C. Davis, 1969; Lipsky, 2010). Discretion can also be described as "a restricted and protected space, where liberty to judge, decide, and act is provided" (Molander & Grimen, 2010, p. 169). Street-level bureaucrats who exercise discretion have the opportunity to decide on the choice of treatment, and the level of service, and the resources and benefits clients should have access to (Henriksen, 2018). Discretion is exercised in cases where established rules do not capture the complexity of a situation or where decisions need to be taken on the spot (e.g., police officers reacting to reckless driving or teachers grading students after oral exams). The motivation behind discretionary power is to make decisions that are the best possible outcomes for clients and the government. The ability to exercise discretion can be experienced differently by street-level bureaucrats when implementing the same policy since (a) their knowledge about loopholes in the rules may differ, (b) the public agency they belong to has operationalized the policy differently, (c) their relationship with the managers may provide them with more freedom for conditional adjustments, and (d) the personality of the street-level bureaucrat inclines toward a more rule-following or rebellious nature (Brehm & Hamilton, 1996; Henriksen, 2018). The potential influence

of technology on discretion is mainly a managerial concern, because digital discretion is implemented for increased policy control.

Whereas discretion can be exercised by several groups of people such as lawyers and service staff in the private sector, discretion in this study is associated with street-level bureaucracy. The latter part of the term ("bureaucracy") is related to juridical aspects of discretion that constrain street-level bureaucrats. For Max Weber, the need for discretion was reduced to a minimum. In the Weberian bureaucracy, functions were delimited and formalized in written rules: the organization operated like a machine and became an "iron cage" (Feldman, 1992; Mintzberg, 1983). However, research on bureaucracy has come to recognize discretion as inevitable (e.g., Lipsky, 1980; Lipsky, 2010). Since street-level bureaucrats are rule followers, the exercise of discretionary power is only possible in cases where rules grant street-level bureaucrats this power. Rules have several advantages, in that they legitimize decisions made by street-level bureaucrats and make decision-making more efficient. Since they are public, decision-making can be coordinated across several contexts and provide openness and transparency, because society has insights into their underlying criteria. Moreover, they serve to reduce illegitimate and personal considerations. The former part ("street-level") is associated with how rules are interpreted thus enhancing the influence of street-level bureaucrats in policy implementation. Discretion makes it possible to tailor a decision to particular circumstances of a case (Lipsky, 2010). These two interrelated aspects are the juridical and professional dimensions of street-level discretion. In my study, the influence of technology on discretionary practices relates to the professional dimension, since technology can enforce certain interpretations of rules, thus constraining professional judgment.

The juridical dimension: Legal rules are the basis for the exercise of discretion. Street-level bureaucrats are rule-followers. The decisions they make every day are characterized by matching recognized situations to rules (March, 2009). Discretion is granted upon street-level bureaucrats, mainly because legal rules are often vague, and social complexity does not allow fixed rules. It would be impossible for the policy maker to predict every possible situation that may occur, and fixed rules could lead to unreasonable outcomes. Hawkins (1992) describes law as "an interpretive enterprise" (p. 11), and this dimension of street-level discretion defines the scope of discretionary power (Hupe, 2013). The well-known metaphor of a doughnut by Dworkin (1978) is often used to define discretion. To him, discretion is the hole in the doughnut, whereas

the doughnut itself describes the limitations of discretion—the surrounding belt of regulation, practices, and norms. The extent to which legal rules require interpretation may vary. Dworkin (1978) distinguishes between "weak" and "strong' forms of discretion to illustrate differences in rule following. Weak discretion implies that street-level bureaucrats follow rules strictly (but these rules cannot or have not been automatically enforced by computers). Therefore, street-level bureaucrats can be associated with rigid rule following, paying limited attention to clients. In this perspective, they become symbols of authority, act as gatekeepers for the public services they provide, and hide behind policies and rules of the agency (Wenger & Wilkins, 2009). Strong discretion, on the other hand, describes situations where street-level bureaucrats are not bound by the authoritative standards (Dworkin, 1978; Feldman, 1992).

The professional dimension: Street-level bureaucrats are professionals who have gained unique knowledge about their practice domain through years of experience and specialized training. The purpose is to implement, as far as possible, the intentions of a policy, decided by democratically elected policy makers (Hupe, 2013) who signal the importance of the policy (May & Winter, 2007). They are motivated by helping clients and attending to their individual needs (Maynard-Moody, Musheno, & Musheno, 2003; Tummers & Rocco, 2015; Wenger & Wilkins, 2009). They make decisions in accordance with professional norms, set by a particular authority (e.g., a government agency or a professional association) (Dworkin, 1978). Violating these standards is considered an unacceptable abuse of the discretionary power they are bestowed on (Henriksen, 2018). The professional status of street-level bureaucrats has been criticized, mainly because they have autonomy and sometimes can act in ways that are considered arrogant (Evans, 2006) even challenging managerial directives (Noordegraaf, 2007). Prottas (1979), Lipsky's research assistant during their work on street-level bureaucracy, noted the following:

> "a general rule in the analysis of power is that an actor with low 'compliance observability' is relatively autonomous. If it is difficult or costly to determine how an actor behaves, and the actor knows this, then he is under less compulsion to comply" (p. 298).

In fact, the activities of street-level bureaucrats may be a result of a number of influences over which policy makers and public management may have limited or no

control (Hupe, 2013). While the actual amount of discretion exercised by street-level bureaucrats may be difficult to observe (Jorna & Wagenaar, 2007), discrepancies between "policy as written" and "policy as performed" can be easily spotted. From time to time, these discrepancies draw attention from media, pointing out the unfair treatment of clients.

Pressman and Wildavsky (1973) were among the first researchers to recognize policy discrepancies in the literature (Hill & Hupe, 2014). In the title of their influential book, they concluded that "great expectations in Washington are dashed in Oakland". The underlying motivations for making this statement can be traced back to the frustration many Americans felt about utter failures or at least limited successes of societal programs such as "the War on Poverty" in the late 1960s (Hill & Hupe, 2014). They did not experience the actual outcomes of the fine words spoken by politicians, and questions were raised about why well-intentioned and -funded political priorities did not materialize in practical outcomes (e.g., less poverty). Whereas policy discrepancies often occur, there are also studies showing evidence of equal implementation practices across different contexts. In another classical work, Kaufman (1960) investigated why and how lower-level US forest rangers actually made realities out of policy statements. The study revealed that US forest rangers, spread across the country and often working alone, implemented policies on the local level in very similar manners. He suggested that these similarities could mostly be attributed to the manipulation of the perceptions, thinking, and values of the rangers, and that formal organizational controls would not be as effective without this conscious "organizational indoctrination".

Discussing the role of discretion in policy discrepancies, Lipsky (2010) argued that discretion is necessary and in fact a mechanism for strengthening the democratic footprint on policy implementation processes. Having to deal with a heavy workload, street-level bureaucrats develop coping mechanisms such as creating shortcuts and workarounds, which are often unsanctioned by agency managers. Evans (2006) explains Lipsky's position on this apparent paradox, seeing it as a result of "a picture of complex and confusing policies which, at street level, have to be interpreted, prioritised and made to work" (p. 14). Discretion can also be misused as a way for street-level bureaucrats to pursue their own goals rather than the policy objectives (Tummers & Bekkers, 2014). Street-level work can be shaped by street-level bureaucrats' personal beliefs and norms of what is considered to be fair and unfair; this

may lead to the violation of the democratic principle of impartiality and fairness potentially resulting in reduced trust in public agencies (Hupe & Buffat, 2014; Lipsky, 2010; Meyers & Nielsen, 2012).

Discrepancies between "policy as written" and "policy as performed" can be attributed to several reasons. Street-level bureaucrats, who implement public policies, experience policy uncertainties, increasing workload, and budget cuts, seldom have the time or the combination of resources required to fully assess each case (Hogwood & Gunn, 1984; Lipsky, 2010). As a result, they can be put under physical and mental pressure and make mistakes (e.g., Houston, 2015). Moreover, they may be corrupt, consciously tweaking decisions in favor of dishonest parties for personal gains (Matthew L Smith, 2011), or be personally biased (e.g., toward women), or be in a bad mood (e.g., after a quarrel with their spouse). Whereas certain biases can be explained by factors such as the differences in organizational rules, procedures, resources, and technical capacity (Rodríguez & Rossel, 2018), other biases discriminatorily favor certain clients above others due to factors such as gender and race (Bovens & Zouridis, 2002; Rodríguez & Rossel, 2018; Wenger & Wilkins, 2009). They may lack sufficient training and experience required for certain cases and can even challenge managerial directives as a result of their professional status (Noordegraaf, 2007).

These observations have created a dilemma for policy makers and public management, mainly because discretion can both serve and undermine policy intentions. Motivated by increased policy and managerial control (Henriksen, 2018; Rodríguez & Rossel, 2018; Wenger & Wilkins, 2009), digital discretion has been introduced as another form of "the massive mechanisms designed to control and direct" (Prottas, 1978, p. 288) the behavior of street-level bureaucrats, because technology can support more uniform decision-making.

2.3 The digital discretion concept

Digital discretion is "the use of computerized routines and analyses to influence or replace human judgment" (Busch & Henriksen, 2018, p. 4) indicating a gradual influence of technology on discretionary practices. The various technological influences on discretionary practices can be described through different scales. Bovens and Zouridis (2002) clustered these influences into three categories: (a) street-level, (b) screen-level, and (c) system-level bureaucracies. A street-level bureaucracy is a public

agency occupied with public service provision (see Lipsky, 2010). Here, street-level bureaucrats interact closely with clients and have a wide freedom to exercise discretion. In the second category, the screen-level bureaucracy, street-level bureaucrats are influenced by technology commonly used for information processing tasks. They gain access to more relevant information from clients and public databases. In the third category, the system-level bureaucracy, technology replaces discretionary practices and decisions are made completely without human intervention (Peeters & Widlak, 2018; Wihlborg et al., 2016). Characteristics of these categories are presented in Table 2 (adapted from Bovens & Zouridis, 2002; Reddick, Abdelsalam, & Elkadi, 2011).

Table 2. Street-level, screen-level, and system-level bureaucracies

Characteristics	Street-level bureaucracy	Screen-level bureaucracy	System-level bureaucracy
Organizational role of street-level bureaucrat	Autonomous professional	System operator	System facilitator
Human interaction	Full interaction	Partial interaction	No interaction
Role of technology	Information processing tool	Decision support	Autonomous decision-maker
Resource use	Less efficiency	More efficiency	High efficiency
Individual attention	Full attention to client concerns	Partial standardization of decision-making process	Standardized, non-reversible decisions

The work of Sheridan (1992) describes digital discretion in terms of a ten-point scale ranging from full discretion to full automation. As the degree of automation increases, the autonomy of street-level bureaucrats decreases (Høybye-Mortensen, 2013). The final point of his scale is where technology makes decisions, based on algorithms that ignore any human influence (Sheridan, 1992). When public services are automated, street-level bureaucrats become mere system facilitators contrary to autonomous professionals using their judgment acquired through professional training and years of experience (Høybye-Mortensen, 2013). Automation of decisions has been associated with standardized decision criteria and structured data. This way, decision-making is

based on collated data that fulfill certain criteria. For example, decisions about applications for Swedish student grants are made by computers based on data automatically collected from several third parties such as employers and financial institutions (Wihlborg et al., 2016). With increased automation of decisions within certain areas, street-level bureaucrats are sometimes left with more complex decisions, which are difficult to automate. Artificial intelligence (AI) systems have also been gaining momentum in the recent decade, challenging the limitations of rule-based systems by their ability to analyze vast amounts of data, and to learn and act as autonomous agents. For example, IBM's Watson is claimed to be able to identify symptoms of diseases faster and more precisely than experienced physicians (Steadman, 2013); or AI software is able to outperform teachers, when assessing English essays (Markoff, 2013).

2.4 Why institutional logics?

Whereas institutional concepts such as isomorphism, institutionalization, and institutional fields have been sufficiently researched within IS (Mignerat & Rivard, 2009), the institutional logics perspective has mainly been applied in the IS literature during the last decade. IS researchers mostly use case and field studies to study technology and institutional logics. A review of IS literature that apply institutional logics as theoretical lens shows that the extant research has focused on the relationship between human actors, technology, and institutional logics through four perspectives. Table 3 summarizes the central characteristics of these perspectives (see paper 2 for more details).

The first perspective focuses on how agentic behavior influences logic(s) (A). Researchers are interested in showing how actors with agency conduct institutional work to influence their institutional environment. Actors may struggle with belief systems and practices inherent in a dominant logic and seek to change their social reality by introducing a new logic that they advocate. In this view, IS researchers study how actors work and organize themselves in a technology-oriented organizational setting without looking at material aspects. Researchers interested in how logics influence the attitudes and behavior of people (B) represent the largest cluster of IS studies. Here, IS researchers investigate how macro-level structures can explain how actors use and appropriate technology within an organizational setting, which is most often influenced by multiple logics. Technology is often referred to in passing.

Table 3. Characteristics of research on technology and institutional logics

	A agentic behavior influencing logic(s)	**B logic(s) influencing actors' behavior**	**C technology influencing logic(s)**	**D technology influencing actors' behavior**
Core research question	How is the institutional environment influenced by human behavior?	How is human behavior influenced by institutional logics?	How is the institutional environment influenced by technology?	How is human behavior influenced by technology?
Core concept	Human agency	Structure	Material agency	Material agency
Dependent variable	Logic.	Human behavior.	Logic.	Human behavior.
Role of technology	Passive.	Passive.	Active.	Active.
Technology focus	Adoption, implementation, and use. Technology-oriented setting.	Adoption, implementation, and use. Technology-oriented setting.	Logic inscription, facilitator, and impediment.	Logic inscription, facilitator, and impediment.

The two perspectives that focus on material agency (C and D) are occupied with how technology represents the views and attitudes of designers, managers, and policy makers. The focus is on the technological artifact and explains how people can instill certain mindsets and values into it. Hardware and software thus become carriers of institutional logics. The third perspective represents papers that are interested in finding out how *technology can influence the institutional environment (C)*. Researchers in this camp seek to understand how characteristics inherent in technology can influence the dominance of particular institutional logics. This way, technology contributes to either institutional stability or change. Finally, studies also focus on how *technology can influence human behavior (D)*. When technology is ingrained with a logic, its use is expected to reflect the embedded logic (see Busch (2018b) for an in-depth discussion on these perspectives).

Taking stock of these studies, I noted that the perspectives that IS researchers have applied in studies using institutional logics resemble those of Orlikowski (1992) in her structurational model of technology. In this model, she describes technology as a product or medium of human action, institutional conditions, and consequences of interaction with technology. In the first perspective—technology as a product of human action—technology is considered an outcome of human action such as design, development, appropriation, and modification. In the second perspective—technology as a medium of human action—"technology facilitates and constrains human action through the provision of interpretive schemes, facilities, and norms" (p. 410). In the third perspective—institutional conditions of interaction with technology—various institutional properties such as professional norms, design standards, and intentions influence humans in their interaction with technology. Finally, in the fourth perspective—institutional consequences of interaction with technology—the institutional properties of an organization are influenced by technological artifacts, reinforcing or transforming structures (Orlikowski, 1992). IS research has discussed all these perspectives, leading me to conclude that IS research has mostly applied institutional logics to explain human behavior (*perspective B*) identifying how different actors begin to act according to the dominant institutional logic within a field (e.g., how they use and appropriate technology). Organizational settings that are institutionally complex and characterized by demands associated with multiple and often contradicting logics are prevalent. The frictions that occur because of the institutional complexity are sources of frustration, which actors need to make sense of. While the institutional literature pays increasing attention to human agency (Battilana et al., 2009; Lawrence & Suddaby, 2006), IS researchers who apply institutional theory have been slow to adopt an agentic lens. My review of the institutional logics literature within IS showed that agentic behavior played a vital part in the design and legitimization of new technological artifacts.

My initial thesis was that public organizations experience contradictory demands, which originate from the coexisting logics of state-professionalism and market-managerialism, salient in public service provision. The increased use of technology in public service provision has created institutional contradictions between professional norms supported by traditional discretionary practices on the one hand and managerial goals supported by public management on the other. Since street-level bureaucrats are professionals who are autonomous, reflect critically on their work, and seek to change

aspects that they are dissatisfied with (Bandura, 2006; Giest & Raaphorst, 2018; Lawrence & Suddaby, 2006), they are expected to reflect on and react to the tensions these conflicting logics cause. As professionals, they have been trusted with their professional expertise and are generally reluctant to be hierarchically held accountable (Gofen, 2014). Their attitudes and behavior are therefore one important condition of public service provision that can explain whether street-level bureaucrats' ability to exercise discretion is enabled or constrained, since they have the power and opportunity to obstruct and delay digital initiatives. My attention was directed toward a district court and a regional tax administration office, because of the differences in terms of societal mission and main work tasks, moreover, I was especially interested in studying street-level bureaucracies, where their professional practices seemed to be influenced by multiple institutional logics. My initial observations suggested that these case organizations were constantly under pressures to meet strict professional standards and be loyal to the will of the policy maker. At the same time, they face ever growing demands to achieve managerial operative goals.

The first objective of applying institutional logics is to explain human agency and behavior, that is, how street-level bureaucrats are influenced by and seek to influence their institutional environment (cf. perspectives A and B in Table 3). *The second objective* of applying the institutional logics perspective is to explain material agency, that is, how institutional logics, embedded in technological artifacts, compete with the predominant logic in the field and guide the behavior of street-level bureaucrats (cf. perspectives C and D in Table 3).

IS research has to a less extent looked at material agency, describing the capacity that a technological artifact has to act on its own apart from human intervention (Leonardi, 2011). From an institutional logics perspective, material agency is understood as the inscription of institutional logics into technological artifacts, which serve as carriers of these logics. It can be expressed through the inherent characteristics and features of a technological artifact, that is, the things it can or cannot do (Leonardi, 2011). IS researchers have most often used the theory of affordances and constraints to identify and describe technological capabilities (e.g., Tumbas, Schmiedel, & vom Brocke, 2015). Technologies can embody ideas, trigger cognitive and emotional responses, underpin the practices an organization employs, and render organizing durable (Czarniawska, 2008; Leonardi & Barley, 2008; Raaijmakers, Vermeulen, & Meeus, 2018). The final observation from the study of the IS literature pertains to the eclectic

and fragmented nature of the reviewed studies which requires a systematic approach to the study of technology and institutional logics. The relatively newfound IS interest in the institutional logics perspective may explain this eclecticism. Since fragmented findings make comparison and accumulation of knowledge across different studies difficult, I developed a research framework to systematically investigate the interplay between human behavior and technologies, based on the people using technologies, the maturity of technologies, and the institutional environment in which technologies are used (see Table 4 for the framework; see paper 2 for the development of the framework). In this study, the effects of different technologies (CMS and databases) in two case organizations were studied to identify which practices and goals they support.

Table 4. Framework for analyzing technology and institutional logics

Characteristic	Description
Empowerment	Organizational actor(s) gaining power through the institutional logic and the technological artifact (e.g., a government agency).
Goals and values	Underlying purposes, motivations, and desired results (often enduring) of an institutional logic and a technological artifact (e.g., adherence to bureaucratic rules).
Scope of practice	Types of tasks reflected in an institutional logic and restricted by a technological artifact (e.g., standards of a professional association).
Control of work processes	Organizing principles of an institutional logic and inherent in a technological artifact guiding activities, e.g., conformity to the methodology of a profession.
Level of analysis	Level that actor(s) conducting certain tasks belong(s) to (e.g., group level).
Technology phase (institutionalization)	The extent to which routines facilitated by a technological artifact are institutionalized (e.g., in use for more than 10 years).

2.5 The institutional logics perspective

What characterizes research within institutional theory is the study of institutions. Institutions are authoritative, well-established, and rule-like beliefs and practices

within an organizational field (Jepperson, 1991). They prescribe activities and actions taken by organizational actors depicting a repeated pattern (Kandathil, Wagner, & Newell, 2011). The reason for this reproduction of activities is that organizational actors have come to a shared understanding of their reality, or as Berger and Luckmann (1967) put it; "a reciprocal typification of habitualized action by types of actors" (p. 54). They take these beliefs and practices for granted, often "without any real reflection" (Tolbert & Zucker, 1999, p. 176), assuming that their existence and purpose has a historically justified and functional rationale, of which their validity should not be challenged (Avgerou, 2000). Historically, institutionalism is a response to the widespread use of rational-actor models to understand organizations. The old institutionalists claimed that an organization cannot be understood merely on the basis of rationality objectives, and that organizations can adopt structures and processes for their meaning rather than their productive value (Selznick, 1949, 1957; Suddaby, 2010). New institutionalism continued to oppose the view of the organization as a mere instrument to secure efficiency and rationalize decision-making; it encouraged taking political, cultural, and social factors into consideration (DiMaggio & Powell, 1983; J. W. Meyer & Rowan, 1977; Tolbert & Zucker, 1983; Zucker, 1977). The core questions that new institutionalists set out to answer were: (a) what explains organizational forms and practices? (J. W. Meyer & Rowan, 1977), and (b) why are organizations so similar? (DiMaggio & Powell, 1983). Whereas new institutionalists had a strong focus on how practices and related structures tend to become similar across different organizations, they largely ignored the increasing number of studies showing that organizations were in fact *not* alike, and that institutions were changing and not necessarily long-lasting (DiMaggio, 1988; Johansen & Waldorff, 2017).

Much of this change is attributed to the acknowledgment of micro-agency, which played an important role in changes taking place (Seo & Creed, 2002). It is not unlikely that DiMaggio (1988) was frustrated with the misinterpretation of his and Woody Powell's famous "iron cage" paper, arguing that researchers should pay more attention to agentic behavior (Suddaby, 2010). Whereas some institutionalists claimed that the concept of agency was difficult to align with the core ideas of institutional theory since autonomous actors influence institutions (instead of being merely influenced by them), other institutionalists found that the image of over-socialized actors (Powell, 1991) did not fit well with the view of reflexive actors pursuing interests that they highly value (DiMaggio, 1988; Suddaby et al., 2016). Institutional logics is one perspective that focuses on self-interest and its underlying motivations.

The concept of institutional logics has experienced an explosive rise of interest from scholars in various fields during the past decade, being increasingly referred to in journal articles (Johansen & Waldorff, 2017). Institutional logics refers to belief systems and organizing principles (institutionalized templates for organizing) that enable and constrain the behavioral repertoire of participants within an organizational field (Battilana et al., 2009; Friedland & Alford, 1991; Reay & Hinings, 2009; Suddaby & Greenwood, 2005). An institutional logic is "a field's shared understanding of the goals to be pursued and how they are to be pursued" (Battilana et al., 2009, p. 69). Thornton and Ocasio (1999) describe institutional logics as "socially constructed, historical patterns of cultural symbols and material practices, assumptions, values and beliefs by which individuals produce and reproduce their material subsistence, organize time and space and provide meaning to their daily activity" (p. 804). Since institutional logics define the meaning and content of institutions that are shared by a community of social actors, they are important to delineate and understand an organizational field.

Institutional change is often associated with a change of the dominant institutional logic for the field, which explains consistency in practices and order (Scott et al., 2000; Suddaby & Greenwood, 2005). Thornton (2004) points out how a single dominant logic is influencing the behavior in an organization:

> "Institutional logics, once they become dominant, affect the decision of organizations ... by focusing the attention of executives toward the set of issues and solutions that are consistent with the dominant logic and away from those issues and solutions that are not." (pp. 12-13).

The underlying idea is that logics compete with each other and that a dominant logic is able to influence organizational practices (Waldorff, Reay, & Goodrick, 2013). For example, Gozman and Currie (2013) examined how a dominant logic was questioned and new processes were introduced as a result. They looked specifically at how a technological artifact was used to facilitate the newly introduced logics.

While several authors have recognized that multiple logics can coexist, they have considered the coexistence of logics to be a temporary phenomenon. Powerful actors in favorable positions use their influence to support a logic that becomes the dominant logic in the field. The values and beliefs of these powerful actors are then reflected in

the dominant logic. When a new logic is introduced into an established field, a rivalry between the incumbent and challenger actors occur. In a period of time, a transition phase will prevail before the existing logic is replaced by a new and dominant logic. The new logic can be a hybrid of the two previously competing logics (Reay & Hinings, 2009). Mola and Carugati (2012) studied a manufacturing company that first adhered to an institutional logic of localism using software developed locally and in collaboration with a local firm. Subsequently, they had to choose another software package, and in a transition phase, they ran this process by adhering to two logics (the logic of localism and managerialism), aiming at a software solution that was familiar yet cost-effective. More recent studies have recognized that multiple logics can co-exist over a long period (Goodrick & Reay, 2011; Waldorff & Greenwood, 2011; Waldorff et al., 2013). For example, Hultin and Mähring (2014) were interested in the use of visualization boards in an emergency general surgery ward at a hospital. After a while, the staff found themselves enacting routines that supported the logic endorsed by the visualization boards. However, this enactment did not imply a shift from one dominant logic to another (from the professional logic to the lean logic) but rather the staff were guided by the two coexisting logics.

While most studies have focused on how field-level actors facilitate change, fewer studies have taken a micro-level perspective. Studies on a macro-level showed that new field-level actors challenged the existing logics by introducing new logics and thus driving forth change. Changes also occur when established field-level actors find new ways of organizing (Reay & Hinings, 2009). On a micro-level, studies show that fewer powerful actors overtly support the non-dominant logic. These individual actors use their knowledge of the context to devise activities that support their overall goals. These activities are not readily observable for the powerful actors, and over time, the institutional logic changes, because too many incremental changes have taken place and cannot be stopped (Battilana, 2006; Reay & Hinings, 2009). Other studies have shown that old logics are supported by micro-level actors even though they appear to accept the dominant logic (Khan, Munir, & Willmott, 2007; Townley, 2002). For example, Berente and Yoo (2012) found that the organizational actors in NASA loosely coupled elements of their practices from the new practices introduced by an enterprise system, thus satisfying the demands of the managerial rationalism that institutional logic supported by the newly implemented technology.

In addition, little attention has been paid to the relationship between different institutional logics, how stability is maintained, and how change is brought about (Thornton, Ocasio, & Lounsbury, 2012). Goodrick and Reay (2011) claimed that multiple logics could be either competitive or cooperative. When institutional logics are competitive, changes in organizational practices reflect one logic instead of another. Cooperative relations between institutional logics imply that changes in practices reflect the joint influence of multiple logics (Waldorff et al., 2013). Contrary to competitive logics, cooperative logics do not outplay each other by increases in strength in one logic leading to decreases in strength in another logic (Waldorff et al., 2013). Two different ways in which logics can be cooperative are suggested. First, logics may be facilitative. Goodrick and Reay (2011) suggest that changes in organizational practices consistent with one logic can assist the progress of changes consistent with another logic. For example, they found that customer knowledge of medications (because of widespread access to the Internet and pharmaceutical media advertisements) facilitated improved interaction with better educated consumers. Second, logics may be additive. Goodrick and Reay (2011) propose that a certain organizational practice could reflect more than one logic.

Digital street-level bureaucracies are characterized by conflicting demands from the market-managerialism and state-professionalism logics salient in public service provision (Hupe et al., 2016; R. E. Meyer et al., 2014; Noordegraaf, 2016; Pollitt & Bouckaert, 2011). This institutional reality of street-level bureaucrats is described in more detail in Busch, Henriksen, and Sæbø (2018).

3 Research on digital discretion

The literature search presents the research front at the beginning of my PhD project (i.e., literature published within 2014). To identify relevant literature, I undertook a systematic literature review. The purpose of the systematic literature review is to present and synthesize the current state of knowledge within a field, draw overall conclusions, and highlight issues that are left unresolved by research (Ritz, Brewer, & Neumann, 2016). Systematic literature reviews differ from narrative reviews and meta-analyses. They follow rigorous methodological approaches for identifying relevant studies and gathering information (Littell, Corcoran, & Pillai, 2008). Narrative reviews describe studies according to their thematic focuses and draw conclusions from the impressions of the trends. Meta-analyses use statistical methods to combine results from quantitative studies to analyze the overall trends. To my knowledge, there are no systematic literature reviews within the area of digital discretion. The casual and more narrow approach in the narrative review by Buffat (2015), online available in 2013, provided a useful overview of some of the literature but lacked a systematic approach. Since the extant research was scarce (Buffat, 2015), a broad and systematic search strategy was deemed appropriate to identify the relevant literature (Vom Brocke et al., 2009; Webster & Watson, 2002).

The strategy involved searching several databases, using several combinations of search words, and engaging in extensive backward and forward searches (Webster & Watson, 2002). No restrictions were applied to geographical area, publication date, research methodology, or sample size. Web of Science, Scopus, EBSCOhost, IEEE Xplore, and the E-Government Reference Library v. 12.0 were selected as databases since they cover a broad range of IS, e-government publications, and relevant studies within other fields, which may have studied street-level discretion and technology. The search terms were “street*level bureaucracy” and “discretion” in combination with “e-government”, “digital government”, “information technology”, and “ICT”. Searches using “digital government” did not provide any results. Since much research on street-level work has been conducted without using street-level bureaucracy as analytical lens (Hupe, 2013), the term “street*level bureaucracy” was excluded in some search combinations. I focused my attention specifically toward literature with the same interest in how technology can influence street-level discretion. The relevance of the literature was assessed based on whether studies discussed: (a) street-level work in public agencies and (b) technology and street-level discretion (must have), and

technology-induced managerial control of street-level discretion (could have). Studies that did not meet these criteria were excluded in the initial screening process since an explicit connection to digital discretion could not be identified. For example, several studies discussed how technology could be used as support for street-level bureaucrats but did not explicitly discuss how technology influenced discretionary practices. The strict inclusion criteria resulted in the dismissal of many studies but assured focus on studies specifically on the same phenomenon. In addition, several of the initially identified studies were excluded based on six exclusion criteria. Table 5 shows the exclusion criteria and their rationale.

Table 5. Exclusion criteria and their rationale

Exclusion criteria	Description and rationale
Recurrence of articles	Articles that had the same author(s), focused on the same problem(s), and used the same data set (e.g., a conference article developed into a journal article). Since these articles basically describe the same study, the oldest and less developed article was excluded.
Articles with anonymous author	Anonymous authorship makes it difficult to assess articles' level of quality and these articles were therefore excluded.
Articles written in a non-English language	Articles written in non-English languages are unavailable to the international research community and therefore excluded.
Non-research articles	The level of quality in non-research articles is difficult to assess since they have not undergone a peer review. In addition, they do not necessarily build upon the extant knowledge making it difficult to assess their contribution. Non-research articles were therefore excluded.
Research-in-progress articles	Findings and conclusions from research-in-progress articles are often incomplete, and they were therefore excluded.
Accessibility	Articles that were not accessible via Norwegian subscription access were excluded from the data set. On rare occasions, the university library was consulted for assistance if a study looked particularly relevant. No studies were added to the dataset as a result of this effort.

The first stage of the literature search process identified more than 200 articles from the database searches. After removing the articles based on the inclusion and exclusion criteria, I carefully read abstracts and full articles if necessary, to assess their suitability. Following recommendations by Webster and Watson (2002), a backward and forward search was conducted using the identified articles as a basis. The search identified 26 journal articles, five conference articles, and four book chapters. The fields of IS, e-government, and public administration are informed by a multitude of journal articles, conference articles, and books. Therefore, I do not claim this review to be exhaustive. However, I believe that the selected databases contain leading research within these fields, and that the review is representative of the scholarly research on digital discretion. Most of the articles I identified were from non-IS outlets, illustrating the lack of research within the IS community.

Following guidelines by Webster and Watson (2002), I applied a concept-centric approach to organize the literature. I applied the concept of public service values (Kernaghan, 2003) to categorize the findings according to the impact of digital discretion on ethical, democratic, professional, and people values as well as the possible reasons for this impact. The purpose was to synthesize the literature to find out if digital discretion causes a value shift in public service provision. In addition, the literature was analyzed to point out areas where more research is required. A bottom up approach was applied using techniques from grounded theory to study the reviewed articles. This approach has been recommended for rigorous literature reviews (Wolfswinkel, Furtmueller, & Wilderom, 2013). The first step was to read through the articles. The initial coding was done by applying open coding techniques resulting in codes that represented the aim, focus, and reported findings of each article (Strauss & Corbin, 1998). The codes were generated mainly from an analysis of the article abstract, introduction, findings section, and conclusion. Whenever necessary, the entire article was carefully read. In the next step, relationships between the initial codes were identified (axial coding). The codes were reduced to a set of 13 subcategories (Strauss & Corbin, 1998). When categorizing the number of codes into subcategories, simplicity was sought while at the same time ensuring diversity in the initial codes were represented. In the third and final step, the objective was to identify how the articles aligned with the overall public service values (Kernaghan, 2003). Public service values reflect an ideal type of public administration, which generates trust and confidence in public sector decisions (MacCarthaigh, 2008). My literature review served as a reference to discuss how various aspects of public service provision are

influenced by digital discretion. Reliability was increased through regular meetings between a fellow researcher and myself in which coding questions were answered and disagreements were discussed and resolved, thus improving inter-rater reliability (Littell et al., 2008). Busch and Henriksen (2018) is an updated version of the literature review which includes the literature published within January 2017 (paper 1).

Of 35 articles, 16 studies were conceptual. These studies build their arguments on first-hand experiences, technological trends, extant literature, and example data. Nineteen studies were empirical. Four articles using secondary data were left out (paper 1 includes studies using secondary data). The remaining set of 15 studies is listed in Table 6, which includes information about their sample, methodology, findings, and relevance to my research questions. The empirical studies are discussed in more detail in the next section.

Table 6. Identified empirical studies (published within 2014)

Article	Sample and origin	Type of work	Methodology
Henman and Adler (2003).	Expert informants in computerized social security in 13 OECD countries. National agency.	Social security.	Survey.
Marston (2006).	Clients and case managers of Australian employment services. National agency.	Social work.	Case study.
Jorna and Wagenaar (2007).	Operators in two Dutch public programs: subventions to farmers and the granting of housing benefits. National agency.	Multiple.	Case study.
Le Dantec and Edwards (2008).	Staff at two centers for the homeless in a US metropolitan area. Local agency.	Social work.	Ethnography.
Peckover, White, and Hall (2008).	Child welfare practitioners in one local authority area in the UK. Local agency.	Social work.	Ethnography.

Table 6. Continued.

Article	Sample and origin	Type of work	Methodology
Shaw, Morris, and Edwards (2009).	Team leaders, social workers, and others using children's services systems as well as clients (children and families) in the UK. Case records. Local agency.	Social work.	Multiple case study.
Tummers et al. (2009).	Dutch insurance doctors and labor experts. National agency.	Multiple.	Case study.
Wastell, White, Broadhurst, Peckover, and Pithouse (2010).	Practitioners and managers in UK children's services directorates. Case records. Local agency.	Social work.	Ethnography.
Keymolen and Broeders (2011).	Practitioners of the Dutch National Reference Index. Local agency.	Social work.	Case study.
Pithouse et al. (2011).	Practitioners and managers in UK children's services directorates. Case records. Local agency.	Social work.	Ethnography.
Reddick et al. (2011).	Top management of Egyptian governorates. National agency.		Survey.
Matthew L Smith (2011).	Prominent stakeholders (government officials, administrators, NGO activists) of two Chilean e-services. Public and private sector users. National agency.	Tax administration.	Multiple case study.
Larsson and Jacobsson (2013).	Management and staff from the Swedish Enforcement Authority handling debt relief. Documents related to debt relief. National agency.	Social work.	Case study.

Table 6. Continued.

Article	Sample and origin	Type of work	Methodology
Paulin (2013).	Staff at different Slovenian public legal entities. Staff at an administrative proceeding in Austria handling residence permits. Local agency.	Legal matters.	Multiple case study.
Jansson and Erlingsson (2014).	Senior officials and local politicians in a Swedish municipality. Local agency.	Multiple.	Case study.

I intentionally designed my literature review with a narrow focus on three aspects: (a) frontline work of public service provision, (b) technological impact on discretion, and/or (c) managerial control of discretion. This narrow focus may have excluded the literature that could have informed my study, especially in other sub-stages of policy implementation (Busch, Under review). Moreover, the literature in IS and e-government outlets is scarce which perhaps could have justified a broader approach. Nonetheless, the literature was selected based on my intention to identify studies, dealing particularly with the technological impact on street-level discretion. The 15 empirical studies I identified through my literature search represented the research in the beginning of my PhD project (literature published within 2014). These studies are critically discussed below.

Samples. The generalizability of empirical research relies heavily on how a sample is selected. Generalizability may be seriously hampered if most studies base their findings on samples from the same region, sector, or similar informants (Ritz et al., 2016). The empirical studies were investigated according to their geographic origin of their data collection. Two of the studies used samples comprising multiple countries and were therefore coded with two or more codes for each study. Research was conducted with UK and Dutch samples in five and four studies respectively. Swedish samples were used in three studies. Of the remaining studies, three studies relied on data from North America whereas Europe and Australia were represented by two studies each. Data from South America (Chile) and Africa (Egypt) were used in one study each. Africa and South America are regions normally underrepresented in public

administration research (Ritz et al., 2016). This underrepresentation may be because only English language publications were included in the review. None of the empirical studies used data from Asia. Since I only searched for studies discussing discretion in public policy implementation, all the studies used data exclusively from public sector settings, focusing on street-level bureaucrats. Based on the small sample of empirical studies, I found an imbalance in the levels of government studied: national (7, 46.7 percent), local (8, 53.3 percent), and state/regional (none of the studies investigated public agencies at this level).

Methods used. The review showed that most studies relied on qualitative research methods such as case studies (six) and ethnographies (four). Three studies were multiple case studies and only two studies used a survey. Whereas most studies relied on individual interviews, other data were also utilized such as documents, non-survey-related archival data, data from focus groups, and field data.

Measurement scales. Two studies used a survey methodology. Whereas Reddick et al. (2011) included the measurement instrument in their paper, the other study provided few details about the scales they used. By excluding the scales, other researchers are left with limited information about how the study was conducted. More important, an opportunity to follow up other researchers' work and reuse validated scales is lost (Eikebrokk & Busch, 2016).

Findings. The challenges with policy implementation, such as the unequal treatment of clients, biases, and slow and costly discretionary practices are the main underlying motivations behind digital discretion. Many of the changes that technology is sought to introduce have their origins in market-managerial thoughts or professional norms. While studies focusing on market-managerial goals investigate how technology can make discretionary practices more efficient, reduce costs, and increase managerial control (Larsson & Jacobsson, 2013; Wenger & Wilkins, 2009), studies emphasizing professional aspects of street-level work focus on how technology can help street-level bureaucrats make better decisions (Hupe & Buffat, 2014; Tummers et al., 2009). Street-level bureaucrats are professionals and semi-professionals (Lipsky, 2010) which means that they have specialized knowledge acquired through years of training and experience (Freidson, 2001). The work they conduct requires professional knowledge, enabling them to make decisions about clients. Having a profession is considered a privilege since those who hold this profession can control their own work to a

considerable extent. The more critical and monopolized the tasks they conduct are, the more power is available to certain groups of street-level bureaucrats. Thus, having professionalized knowledge is regarded a power base (Snellen, 2002) to the point where street-level bureaucrats even challenge managerial directives (Noordegraaf, 2007). The empirical studies revolve around four broad topics: (a) managerial control of formal aspects, (b) standardization of practices, and technological impact on (c) discretionary practices and (d) public service quality.

The reviewed studies illustrate that managers consider technology a mode of control to repair the information deficit they have regarding street-level work. By comparing how various street-level bureaucrats conduct their work, managers are better able to standardize decision-making and offer guidelines for street-level work. Pithouse et al. (2011) found that technological monitoring of street-level bureaucrats made it possible to hold them accountable for uncompleted tasks. Jorna and Wagenaar (2007) showed in their study that technology helps managers monitor formal aspects of street-level work more closely. Since a gap between street-level bureaucrats' informal use of discretion and what they register occurs (Jorna & Wagenaar, 2007; Wastell et al., 2010), the management is only aware of the information they can see. Hence, technology implementations may appear as successful for managers while actual practices by street-level bureaucrats may deviate substantially. Whereas technology was used to reduce discretion, algorithms were unable to capture the social complexity of street-level work. This led to a decrease in the individual client reviews and an increase in the number of complaints (contrary to the intentions of the implemented technology). Many of the initial computerized decisions were later changed in favor of the client. Instead of controlling discretion, technology resulted in facilitating more discretion. Similarly, Pithouse et al. (2011) found that technology could not grasp the diversity of activities by street-level bureaucrats, often faced with the uncertain and the unforeseen. Henman and Adler (2003) concluded in their study that the extent to which technology could be used to control street-level bureaucrats tended to reflect the strength of union power within a country.

Some of the studies focused on how technologies aiming at standardizing decision-making could conflict with street-level bureaucrats' professional knowledge and goals. Wastell et al. (2010) found that professional child welfare work was increasingly regulated and structured into formal processes, embedded in technology. Technological scripts led to formally conformable behavior, reducing discretion and

reflecting a shift to a managerial model of control. They also found that actions were conducted without genuine commitment. They concluded that excessive managerial power is dysfunctional for the organization and that street-level bureaucrats should be governed based on professional values. Traditionally, street-level work has been characterized by close interactions between street-level bureaucrats and clients where the specifics of cases are outlined as narratives. Standardization will necessarily reduce clients' stories from narratives to selective data, required by multiple text boxes, which makes individualized treatment of clients more challenging (Pithouse et al., 2011; Wastell et al., 2010). As a response, practices promoted by technologies may be appropriated to be able to complete tasks. Shaw et al. (2009) observed that street-level bureaucrats appropriated technology-enforced scripts, since they found the requirement to evidence many of their practices time-consuming. Similarly, Pithouse et al. (2011) found that, although technology seeks transparency, it may lead to disguised actions, lying behind the more apparent accountability of systems, thereby making practice less rather than more visible. On other occasions, street-level bureaucrats followed system protocols routinely since they experienced the persuasive appeal of the computer screen as immense and became fearful or reluctant to act against technology-prescribed actions (Keymolen & Broeders, 2011). Tummers et al. (2009) investigated how new practices were implemented as a result of extensive performance management. These practices substantially changed the discretion available to the street-level bureaucrats they studied (i.e., doctors and labor experts).

Several studies looked into how technology directly affected discretion. The results are inconclusive, though. Larsson and Jacobsson (2013) found that discretion is narrowed only in some respects and that there is still space for case officers in selecting and interpreting the information and assessing the conditions of the subject matter. Reddick et al. (2011) conducted a survey and found that the demands for e-government effectiveness influenced discretionary practices since face-to-face contact was reduced. Moreover, technology can lead to reduced moral dilemmas about street-level actions. E-government essentially takes the bureaucrat out of the day-to-day process and relieves some of the discretion associated with face-to-face contact (Reddick et al., 2011). Similarly, another study reported that street-level bureaucrats found that technology reduced discretion and moral dilemmas about whether involvement with a particular child justified this action (Peckover et al., 2008). Keymolen and Broeders (2011) concluded that professional autonomy is reduced when semi-automatic system decisions could not be easily reversed. In general, several of

the studies concluded that technology does not involve the same kind of flexibility and discretion as the personal meeting (Jansson & Erlingsson, 2014; Le Dantec & Edwards, 2008; Peckover et al., 2008; Tummers et al., 2009; Wastell et al., 2010).

These studies have shown how the management wishes to use technology to both monitor and control street-level practices. Observing these changes, other studies investigated how technology could affect public service quality. Tummers et al. (2009) examined how more information could support professional aspects of street-level work since a better foundation for decisions was expected. A less automating and more informating new system aimed at increasing the discretion of the labor experts. However, the opposite occurred. Matthew L Smith (2011) found that managers were observant of how the quality of the street-level bureaucrat transaction is highly dependent on personal factors such as the personal and recent life experiences. Computerization was viewed favorably since computers are not subject to the same whims. Whereas Le Dantec and Edwards (2008) concluded that the scripts enforced by technology reduced discretion and thus service quality, Pithouse et al. (2011) expressed frustration over the lack of investigation to actually check if technology caused increased trust as intended. Marston (2006), investigating the attitudes of street-level bureaucrats, found that technology was welcome unless it was experienced as contradictory to delivering a personalized and respectful service. Paulin (2013) is pessimistic about the opportunities of digital discretion and concludes that e-government tools, automating existing processes, cannot sustainably improve bureaucracies, as they introduce novel forms of corruption, break core legal principles, and require high maintenance costs as soon as the law changes.

Several studies have also focused on how technology can lead to the deprofessionalization of street-level bureaucrats. Whereas Matthew L Smith (2011) found that new technologies could tip the power balance in favor of government institutions, Le Dantec and Edwards (2008) suggested that technology may shift power in favor of system designers. Another interesting aspect of deprofessionalization was investigated through the use of unqualified staff in social work facilitated by the removal of discretion from tasks. These changes created tensions within the organization (Pithouse et al., 2011). Marston (2006) on the other hand, studied citizen participation and found that technology is only an enabling tool for those citizens who have the capacity to participate in decision-making.

Practical implications. In general, the studies provide little guidance for practitioners. In wording, they seldom state that they aim to do so or hint at contributions to practice. From the studies, it is difficult to come up with reasons for the neglect of practical implications. It may be attributed to the scope and policy journals and requirements for scientific rigor. My review identified three studies that provided recommendations to practice. Two studies are concerned with how technologies are purposely designed to achieve certain goals (Barth & Arnold, 1999; Matthew L Smith, 2011). They assert that technology is value-laden and is therefore the carrier of intended viewpoints. I summarize these considerations through the following short and idiomatically "translated" take-aways:

• *Technologies should be designed according to the professional needs of their users.*

• *Technology implementations must take into consideration that various technological artifacts are not value-free, apolitical tools.*

The final study was concerned with bureaucratic controls of street-level practices and advocated self-monitoring (Wastell et al., 2010). The following practical take-away is idiomatically formulated from their study:

• *To improve policy implementation, street-level bureaucrats should self-monitor their street-level work instead of being exposed to bureaucratic controls through technology.*

Updated literature search. The literature was continuously searched and consulted throughout the study. The published literature review (paper 1) contains conceptual and empirical articles published until January 31st, 2017. This literature review identified six studies (excluding a study that is a part of this PhD) in addition to those listed in Table 6 (Ben & Schuppan, 2016; Bruhn, 2015; De Witte et al., 2016; Devlieghere, Bradt, & Roose, 2017; Tummers & Rocco, 2015; Wihlborg et al., 2016). Using the same search criteria, I conducted an updated literature review to identify new literature. The new review is restricted to articles published after the end date of the previous review. In this review, I used the latest version (v. 14.0) of the Digital Government Reference Library (DGRL) – previously known as the E-Government Reference Library (EGRL). My search ended October 19th, 2018. The review process resulted in 45 hits. After removing duplicates, the pool was reduced to 22 articles. I

applied the exclusion criteria, as described in Table 5 resulting in the exclusion of six articles based on language (1), non-academic contributions (2), research-in-progress (1), and being non-accessible (2). In the final step, I read the abstracts, and the full articles, if necessary, to assess the relevance of the remaining 16 articles. In this process, 11 articles were excluded, resulting in an addition of five articles to my literature base, one of which is included in this research project (Avgar, Tambe, & Hitt, 2018; Busch et al., 2018; Lemmens, Lungo, Georgiadou, & Verplanke, 2017; Nganyanyuka, Martinez, Lungo, Verplanke, & Georgiadou, 2017; Nowacki & Willits, 2018). After having performed in backward and forward searches of the identified studies, two more studies were added to the literature base (Maskaly, Donner, Jennings, Ariel, & Sutherland, 2017; Piza, In Press). Appendix C shows the search process. Combining my previous literature review (paper 1) with the updated literature search, I identified 51 studies on digital discretion in total. Although I have noticed the lack of research on digital discretion in IS outlets, interestingly, one of the newly identified articles is published in the field's top journal *MIS Quarterly* (Avgar et al., 2018). The authors have mainly concentrated on employee discretion in the private sector, although they investigate nursing homes in their study.

4 Research design

I have chosen a mixed methods design for my research inquiry. A mixed methods approach can serve several potential purposes: complementarity, completeness, knowledge development, expansion, corroboration/confirmation, compensation, and diversity (Venkatesh et al., 2013). A mixed methods approach has been beneficial since the quantitative study allowed me to assess and expand upon the inferences obtained in the qualitative study. By combining research methods, the probability of divergent views are higher and stronger inferences can be made (Venkatesh et al., 2013). My mixed methods approach follows the recognized guidelines by Venkatesh et al. (2013) often applied in IS studies. The philosophical foundations underpinning my research design is presented in section 4.1. My qualitative and quantitative research designs are presented in sections 4.2-4.3.

4.1 Philosophical foundations and design rationale

Any research design is based on a set of philosophical assumptions that guide the researcher. In science, ontology and epistemology are used to describe how researchers view and study this world. Ontology is concerned with how we view the existence ("the being") of various empirical phenomena; whether they are created and reproduced without human interference, or merely existing as social constructions (Berger & Luckmann, 1967; Leonardi & Barley, 2010; Orlikowski & Baroudi, 1991). Epistemology is concerned with questions about how we can acquire certain knowledge, that is, how we as researchers can design and conduct our research studies to make valid claims (Kuhn, 2012; Orlikowski & Baroudi, 1991; Popper, 1959; Wallace, 1971). Ontological and epistemological issues as well as ethical considerations are fundamental to all scientific inquiry since a research design that is not carefully planned can produce flawed knowledge.

Research paradigms can often be placed along a continuum. Historically, IS research has been dominated by interpretive and positivist studies (Hirschheim & Klein, 2012; Orlikowski & Baroudi, 1991), which are placed on either end of this continuum. Interpretivism holds that reality is socially constructed and that there is no objective reality to be studied. Thus, reality is understood through social interactions; humans give meaning to what they observe and communicate via the medium of language (Easterby-Smith, Thorpe, & Jackson, 2015). Positivism describes reality as existing externally to humans and can be observed from the "outside". Reality is then studied

through objective methods rather than through human sensation or reflection (Easterby-Smith et al., 2015). The debate on the supremacy of either one of these philosophies has been a source of contention among IS researchers, especially since it developed into a discussion about qualitative vs. quantitative research methods (Hirschheim & Klein, 2012). In recent years, an increasing number of IS researchers seems to draw upon other philosophical paradigms that seek to reconcile interpretivism and positivism such as pragmatism (Goldkuhl, 2004, 2012) and critical realism (Dobson, 2001; Mingers, Mutch, & Willcocks, 2013). Whereas critical realism has a clear and elaborate ontology, pragmatism has a more agnostic approach to it (Mingers, 2004).

I believe that an objective reality exists that may not be observed directly. Thus, our understanding of the social world is a product of the complex social interactions shaping and being shaped by ideational and material artifacts. Theoretical constructs are socially constructed and "represented by a set of intellectually-derived measures that are not self-evident or inherently 'true' measures" (Straub, Boudreau, & Gefen, 2004, p. 383). This research study is based on the philosophy of pragmatism which is a method that focuses on the "practical difference" of an idea or concept:

> "[T]he tangible fact at the root of all our thought-distinctions, however subtle, is that there is no one of them so fine as to consist in anything but a possible difference of practice. To attain perfect clearness in our thoughts of an object, then, we need only consider what conceivable effects of a practical kind the object may involve—what sensations we are to expect from it, and what reactions we must prepare". (James, 1907, p. 29)

Pragmatism has problem-solving as the core purpose of conducting research where the unit of analysis is practical problems, which need attention. Guided by purpose and human knowledge, actions function as intermediaries used to change our existence (Goldkuhl, 2012). The outcome of research is practical theories: "no theory is absolutely a transcript of reality, but any one of them may from some point of view be useful"[1] (James, 1907, p. 33). Thus, pragmatists have a lower level of ambition relating to finding facts and making truth claims compared to critical realists. Even

[1] This quote by James (1907) resembles Lewin's famous dictum about good theory: "nothing is as practical as a good theory". However, I do not know if Lewin was inspired by the pragmatists.

though pragmatists are skeptical of formal theories developed to understand broad conceptual areas, they believe that social patterns can be identified. I believe I can arrive at such patterns for digital discretion acceptance, because street-level bureaucrats share several characteristics and tend to experience similar work conditions (Lipsky, 2010).

I view research as a cyclical process of induction and deduction. Wallace (1971) developed a model of research, which describes this process. He argued that scientific claims became better justified by alternating between theory-building (or theory-refining) and theory-testing (Eikebrokk & Busch, 2016). Figure 2 depicts his "wheel of science" describing how theory is continuously developed, tested, and refined (Eikebrokk & Busch, 2016; Wallace, 1971).

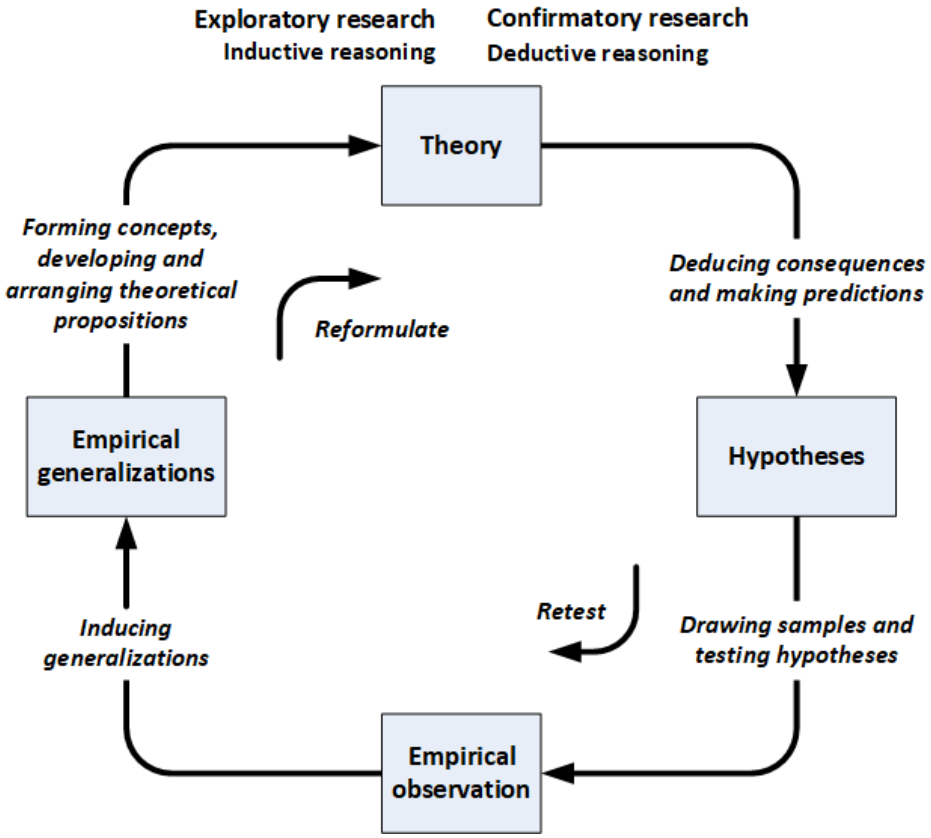

Figure 2. The wheel of science

Pragmatists seek to reconcile dualisms. *First*, pragmatism rely on abductive reasoning (Fann, 1970) alternating between induction and deduction, where theories are derived from empirical observations and then evaluated. Through a cyclical process, theory becomes increasingly "useful", which is highly appreciated from a pragmatist (e.g.,

Morgan, 2007) and practitioner perspective (e.g., Perry, 2012). Contrary to critical realists, pragmatists welcome both qualitative and quantitative research methods (Mingers, 2004; Morgan, 2007). *Second*, pragmatism refuses the subjectivity vs. objectivity dualism. Pragmatism aims at intersubjectivity and holds that any researcher has to work back and forth between subjective stances and the pursuit of mutual understandings with research participants and fellow peers (Morgan, 2007). *Third*, the final dualism that pragmatism offers a solution for is the distinction between context-dependent or universal knowledge. A pragmatist seeks to expand the usability of a theory—to make the most out of knowledge learned with specific methodologies in specific contexts. There is no point, nor is it possible, to generate knowledge so narrowly focused that it only applies for a particular context. Similarly, social scientists should not hope for knowledge "so generalized that they apply in every possible historical and cultural setting" (Morgan, 2007, p. 72). Instead, pragmatism aims at transferring knowledge from one context to other contexts. However, this cannot simply be assumed; it must rather be empirically tested and justified (Lincoln & Guba, 1985; Morgan, 2007).

I have addressed a research area where little research has been conducted. My research questions are exploratory and formulated to gain an in-depth understanding of how and why technology can enable or constrain the discretionary practices of street-level bureaucrats. The first task at hand was to identify and gain an understanding of the enabling and hindering factors of digital discretionary practices (addressing RQ1). Moreover, I sought to identify how these factors relate to each other and to digital discretion acceptance (addressing RQ2). To explore this phenomenon in more detail, I conducted a multiple-case study. A qualitative research design was found the best suitable method of gaining an understanding of these factors and about digital discretion acceptance, mainly because this research area has been underdeveloped. Thus, the "what" and "how" in my research questions reflected exploratory aims where the goals were involved making empirical observations from which generalizations could be induced, concepts formed, and theoretical propositions developed (Yin, 2014). From this work, I developed a research model to test the relationships between the identified constructs. A cross-sectional quantitative survey was conducted to find out how the research model performed. Thus, the "what" of RQ1 also reflected an inquiry of identifying how many of these factors and relationships remained valid, when tested on a larger and more diverse group of street-level bureaucrats.

The two phases of my research project are described in the following two subsequent sections. Phase I describes the context and procedures (pilot testing, data collection, and analysis) of the qualitative study. Phase II describes the sample, model and survey instrument development, and data analysis.

4.2 Phase I: qualitative research design

The inductive, theory building work is based on an exploratory multiple-case analysis. A case study is suitable when studying the circumstances (the context) under which some social phenomenon (the "case") occurs and where an in-depth inquiry is necessary (Yin, 2014). The exploratory case study is suitable when investigating a phenomenon which is poorly researched and where data required for formulating hypotheses are not yet obtained (Eisenhardt, 1989; Yin, 2014). A multiple-case study investigates the same phenomenon within several contexts and is particularly suitable for generating more robust theory and to prepare for theory-testing studies (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Yin, 2014). Since the goal is to replicate findings across case organizations, they must be carefully selected for the researcher to be able to predict similar or contrasting results (Baxter & Jack, 2008). Related to theory building, this research method is considered especially useful when "research and theory are at their early, formative stages" (Benbasat, Goldstein, & Mead, 1987, p. 369). The phenomenon of interest in this study is digital discretion. There exists little research in this area and results are inconclusive (Buffat, 2015; Busch & Henriksen, 2018). To answer the research questions and to be able to build robust theory, a thorough examination and understanding of multiple contexts is necessary.

4.2.1 Case overview

Three cases were selected based on theoretical replication (Yin, 2014) to elicit the opinions of actors with different responsibilities, relating to public policy implementation. They represent the three independent powers, *trias politica*, in most nations: the legislature, an executive entity, and a judiciary entity (Bovens & Zouridis, 2002). When cases are selected based on theoretical replication, contrasting results are expected, albeit for predictable reasons (Baxter & Jack, 2008; Yin, 2014). When I selected case organizations for this study, I considered their societal role, main work tasks and professional practices, and their institutional environment.

Two of the case organizations—a district court and a regional tax administration office—occupy street-level bureaucrats experiencing that digital tools gain momentum in public service provision (Giest & Raaphorst, 2018). The court has a special role in society, which makes it worthy of study. Judges are expected to use their professional and independent judgment to assure that various actors (e.g., clients) are treated fairly. The NTA office is characterized by inter-agency dependency and legitimation strategies, which makes it responsive to managerial demands. Initial observations suggested that these informants face multiple institutional demands, which can be conflicting: they must be loyal to policy maker intentions, adhere to strict professional norms, and achieve managerial objectives (e.g., efficiency). The third case focuses on high-level policy-making. The government is responsible for national ICT politics which is governed through the issuance of directives and white papers. The Norwegian Parliament is the supreme legislature in Norway responsible for issuing policies, exercising control with the government, and ensuring finances for the safe operation of the state. Their opinions are important, because they exert considerable influence on national ICT strategies and represent politicians who expect their policies to be implemented according to their intentions.

Norway was found an interesting context for this study since the country is ranked among the leading countries in the world in terms of e-government maturity and readiness (United Nations 2016). Norway has initiated many ICT efforts, which have substantially changed how public services are provided. For example, the Norwegian State Educational Loan Fund has automated the processing of applications leading to a 50 % reduction in case processing time for clients, reduced sick leave, and significant cost reductions. Other initiatives look at how building permits for specific application areas can be automated. Like many other countries, Norway has also utilized technology in many public services without removing the discretionary power of street-level bureaucrats (Ministry of Local Government and Modernisation, 2016).

The court

The district court has judges who are constitutionally independent of other public organizations. As a district court, it handles all incoming cases into the court system in its region. This court employs 20-30 judges, including judges in qualifying positions. The process of appointing judges is rigorous, and major efforts are made to ensure that the judges are competent to conduct the tasks required of the profession. Appointed

judges are expected to be efficient, conduct high quality work, be able to show respect for people in the court, and behave properly and conscientiously. Chief judges are expected to be oriented toward users of the court and its employees to assure trust, competency, and transparency. Judges have intentionally various professional backgrounds, such as work experience in the Ministry of Justice and Public Security, county governor offices, lawyer firms, the police, non-profit organizations, and unions. Once hired, judges seldom leave their office until retirement. The average age of a judge was approximately 50 years in the studied district court. Judges in qualifying positions are employed for 2-3 years and perform many of the same tasks as judges normally undertake after a probationary period. However, the law sets some boundaries for their authority. For example, they cannot judge in criminal cases that lead to imprisonment for more than 6 years. On average, they have five years of professional experience after the law study.

The court handles several thousand cases every year. Most civil cases are handled by conciliation boards which have certain decision-making powers delegated to them. If the parties do not agree, the case will be brought before the district court. Other types of civil cases such as child custody and cases against public authorities begin directly in a district court. Only in special cases may a court reject a case. All criminal cases begin in the district court and involve cases such as theft, drunk driving, and murder. Besides civil and criminal cases, the courts also consider cases on enforcement, bankruptcy, debt settlement (composition), division of joint property, and decedent estates. The district court is also responsible for issuing official certifications. Some of the cases show signs of routinization (e.g., forced sales of residences). Trials are often held with two lay judges who are randomly called in for duty, selected from a database that is renewed every four years. Other cases go directly to judges and are not solved in the courtroom. A judge is independent and no one, including the chief judge, is entitled to instruct a judge on the decision he or she makes.

The main rule is that cases are randomly assigned to judges. Thus, they cannot choose which cases to handle. This rule is enforced to assure trust in the legal system. The rule implies that judges become all-rounders, handling cases of sexual assaults one day and large enterprise contracts the other day. The random assignment also means that judges may apply literally every legal rule in cases they handle. In general, a judge may learn that the same legal rule may not occur throughout his or her tenure in decades. The exception is when cases require special competency, such as child

custody cases. A limited number of judges handles these cases. In cases of enormous magnitude, a judge may be responsible for and handle the same case for a long period (e.g., two years). However, such cases are rare. Cases that are appealed are sent to the appeal court in the region and ultimately to the supreme court in the capital. Approximately 4% of the cases handled in the district court were appealed placing this court among the courts in the country with the lowest share of appeals. Whereas Norwegian judges are highly trusted, and most judges have few unpleasant experiences from the decisions they make, there is an increasing number of criminal acts toward judges.

The court uses a case management system named *Lovisa* which won the Global Awards for Excellence in Adaptive Case Management and has drawn attention from other European countries. The CMS was implemented in 2003, and its use patterns are well established. The purpose is to provide decision support in all criminal and civil cases. The solution was developed by a Norwegian IT consultant company in cooperation with the national courts administration for decision support in court work. It is used across all the Norwegian district and appeal courts. The courts handle claims in many cases with detailed procedural rules. It provides judges with necessary information in complex subject areas, ensures that deadlines are met, and guides judges through procedures according to procedural legislation. In particular, its strength is claimed to be the support of complex procedures in courts. Lovisa contributes to the quality of the court system by ensuring that trials are settled without errors and unnecessary delays. The national court administration plans to further improve the procedural support in the system for interaction between the actors in the court. The CMS is also used to inform the media about forthcoming cases in the courts. In addition, the court uses *Law Data* and *Court Data.* These are online databases that provide access to various legal resources such as legislation, previous verdicts and decisions, and academic literature. These tools are listed in Table 7.

The tax administration office

The second case organization is a regional NTA office employing 20-30 caseworkers. The caseworkers have similar educational and professional backgrounds. Whereas caseworkers could previously be hired without any education, they are now seeking candidates who are most often educated in economy and law. Many of the caseworkers have gone through an agency-specific education, which no longer exists. The office has low throughput.

Table 7. Decision-making tools

	Lovisa	SL	Law Data and Court Data
Technology.	Adaptive case management system.	Case management system.	Databases.
Technology aim(s).	Support procedural rules, handle workflow, and prevent unnecessary delays and errors.	Provide computerized controls, comprehensive information collection, and inter-agency collaboration.	Provide access to online legal resources such as legislation, decisions, and academic literature.
Role in decision-making.	Procedural support. Decision-support.	Procedural support. Decision-support. Decision control.	Decision-support.
Policy area.	Used in district courts and appeal courts.	Used in tax administration offices.	Used in a wide variety of public agencies conducting legal assessments.
Policy aim(s).	Ensure independent and fair assessments of clients' cases.	Ensure safe and simple procedures for tax reporting and assessment.	Ensure high-quality foundations for decision-making.
Meta-level questions to answer.	How should clients be judged based upon identified sequences of events, law, and previous practices?	How should tax matters of clients be assessed based on financial arrangements?	What does the law and academics say about legal matters, and how have other clients in similar situations been assessed?

Most of the caseworkers had worked in the NTA for more than 20 years and some for more than 40 years. Contrary to the judges, most of the caseworkers have little work experience other than from their current work. The average age of a caseworker was around 50 years in the studied tax administration office.

The main mission of the NTA is to ensure that various clients pay taxes to finance the welfare society and exercise daily operational authority for taxes and fees to be settled and paid in the correct way. It consists of 6,500 employees employed in the central agency functions and regional offices throughout the country. The NTA is subordinated to the Ministry of Finance. Contrary to judges, caseworkers are not independent, and they are both obligated to and motivated by the achievement of NTA goals. If the NTA fails to legitimize its existence, resources may be withdrawn from the agency. The vision of the NTA is a society where everyone would like to pay their taxes contrary to a society where sanctions and controls are required to collect tax money. To achieve their vision, they seek to be innovative in the way they accomplish their tasks. The NTA has created several technical solutions that make it easier for clients to report taxes. Due to their innovative solutions, the NTA has been considered the "flagship" within the public sector, relating to the development and utilization of technological solutions. For example, the tax report is now handled completely without human interaction resulting in reduced administrative costs and improved service quality. Contrary to many other public agencies, the NTA has managed to implement complex ICT projects without major financial overspending.

Incoming cases to the office are assigned to teams of caseworkers. Each team then agrees on how cases should be assigned to each team member. The issues that caseworkers deal with vary from simple assessments of how much a car has been used privately to identifying financial transactions and establishing ownership of various entities. The complexity of the cases varies to a large extent. Whereas some cases are solved in minutes, other cases may require several months of work to complete. These latter cases are more comprehensive, since it is difficult for the caseworker to establish the actual circumstances surrounding the taxpayers' individual situations. Often, multiple actors such as other individuals and companies are involved. To decide on a case, caseworkers are in contact with clients, financial organizations, and employers. However, they may experience times when clients do not respond to or wish to inform the NTA office. In such cases, the caseworker can decide independently how to tackle the case despite limited information.

Decisions by caseworkers may be overruled via managerial control or peer review. Managers do not have the time to control each decision made by caseworkers nor do they believe that such controls are a good solution. Instead, they can perform random checks. If they encounter cases om which they disagree with caseworkers, they have

the privilege to reverse decisions. Peer review is organized in the NTA office where the caseworkers can control one another's' work locally. The standard procedure is that a caseworker decides on a case and sends it for approval to a lawyer or an experienced caseworker. Through these controls, caseworkers seek to assess how discretion is exercised. Sometimes, even mundane mistakes are revealed in these controls. Caseworkers can also control other cases outside the office. Using the CMS, they can control cases from anywhere in the country. The system also facilitates the control of minor aspects of a case. This way, several caseworkers from all over the country can be involved in the control of a case, without knowing of each other and even the client.

The NTA office uses a CMS, known as *SL* (a Norwegian abbreviation for 'system for tax assessment'). The development of SL began in 1996. From 2002-2004, SL was gradually implemented across all the NTA regional offices. The system was a considerable modernizing and streamlining undertaking and provided new opportunities for the governance and reporting of tax assessment work. The SL system provides caseworkers with information in tax specific subject areas and assists caseworkers by supporting mandatory routines. In addition, the NTA office also uses *Law Data* and *Court Data.* The tools that are used in the NTA office are listed in Table 7.

The Government and the Parliament

The third case consists of high-level policy making in the government and in the Norwegian Parliament. Norway is a monarchy. Even though the constitution assigns the executive power to the ruling king or queen, the real power is with the government—the executive authority responsible for implementing decisions made by the Parliament. Since Norway has a parliamentary system, the party or parties that have the most support in the Parliament are given the privilege to form the government. It has considerable political clout since it proposes most of the cases in the Parliament. The government is headed by the prime minister and consists of ministers in charge of specific political areas. The documents I studied concern the Solberg government (incumbent since 2013), which is a minority government, dependent on support from other parties outside the government. The Parliament is the supreme legislature in Norway. It is the most important arena for political debate, where the will of people, as expressed through the election results, is put into concrete political intentions. This is carried out by deciding on laws, ensuring the financial

basis for the operation of the state, and controlling the government. It consists of 169 members (MPs), elected from 19 election districts and distributed among 12 standing committees.

Data are collected from the digitalization strategy documents and MPs. The government expresses its ICT political views in various strategy documents of different authority. One group of authoritative documents includes white papers, which are prepared by the Norwegian government for debate in the Parliament. This type of white paper is used by the government to either inform or raise discussion about certain matters in the Parliament. Whereas the white paper does not contain any proposed resolutions, it often provides the basis for other and more formal propositions such as new laws and suggested decisions to be made. This type of white papers is often the result of work conducted by various appointed committees. The government can also issue documents such as directives, circulars, and regulations, which have implications for the utilization of e-government in Norway. These white papers do not need approval from the Parliament and have less authority than those decided on by the Parliament.

In this study, I interviewed MPs in the Standing Committee on Local Government and Public Administration which consists of 15 members from seven political parties: The Socialist Left Party, The Norwegian Labour Party (often called 'left-wing' parties), The Centre Party, The Christian Democratic Party, The Liberal Party (often called 'centrist' parties), The Conservative Party, and The Progress Party (often called 'right-wing' parties). This committee is responsible for matters regarding local government, regional and rural policy, and the organization and operation of state and government administration. The views of MPs can be very useful, since they exert considerable influence on national ICT politics.

4.2.2 Interview guide development and pilot testing

Guided by theory and the research questions, two semi-structured interview guides were developed (see Appendices A and B). Questions were designed to elucidate the institutional demands in street-level bureaucracies increasingly using technology (RQ1), policy makers' considerations on such demands (RQ1), and actual technological impact on discretionary practices (RQ2). In the interview guide for the street-level bureaucrats (Appendix A), the institutional demands are explored through

the questions in sections 1-3 and 5, the role of technology in section 4, and the potential influence of technology on street-level work in section 6. In the interview guide for policy makers (Appendix B), institutional demands are sought understood through the questions in sections 1-3 and the potential influence of technology on street-level work in section 4. I completed three interviews prior to the collection of the main data. These interviews involved the managers of a building permit office and the chief judge. Based on the informants' feedback and the initial experience of conducting the interviews, the interview guide for the street-level bureaucrats was modified influencing the subsequent data collection. The interview guide was continuously adjusted, albeit to a limited extent. The interview guide for the MPs were designed by drawing on previous collated data, the literature, and discussions with a peer. This interview guide was not pilot tested.

4.2.3 Data collection

Data from the individual interviews were utilized in addition to field notes from the participant observations and the e-government strategy documents. The findings presented are a synthesis of the interviews, field notes, and documentary analysis. Table 8 provides an overview of the data collection.

Table 8. Overview of data collection

	Court	**Tax administration**	**Parliament and government**
Interviews.	Chief judge, judges, judges in qualifying positions (seven interviews).	Manager, lawyers, caseworkers (nine interviews).	Parliament committee chairman, committee members (four interviews).
Observations and documents.	Field notes from participant observations in four one-day trials in situ.		White papers: The Digital Agenda for Norway (2016), The Digitalization Circular (2017).

Sampling. The guidelines for purposeful sampling provided by Lincoln and Guba (1985) were followed when selecting the informants. My research questions were the

starting point. Informants were selected based on who I believed were best able to inform me about the impact of technology on the discretionary practices of the street-level bureaucrats. I started the sampling with the managers, since, in several studies, they have been identified as key informants responsible for achieving organizational objectives; they have also been identified as informants who have important insights about the case organization and its organizational structures as well as about the strategies relating to the information systems in use; they can also suggest or command other informants who can inform my study about how they are positioned in the organization (Kumar, Stern, & Anderson, 1993). Moreover, the views of the managers were of particular interest, since they were required to respond to both societal and political expectations. The data collection involved an iterative process where data were constantly compared. The data relevant to the research questions were pursued by seeking new informants who could give new insights and by making continuous adjustments to the interview guide. Through this process, the sample of informants evolved, and the data became increasingly focused until theoretical saturation was reached (Eisenhardt, 1989).

Case 1: Court. The first case was conducted in one of the largest district courts in Norway. I gained access to this case by contacting the chief judge in the court through e-mail with information about my PhD project. My first interaction thereafter was an informal talk with the chief judge on the telephone prior to the interviews. He was informed about the objectives of the study, how data collected would be treated, and where and how the results would be published. An interview was first conducted with the chief judge in his office. The interview was recorded and later transcribed. The chief judge was considered an important informant to provide a management perspective on the phenomenon. Only one judge held the position as chief judge.

The chief judge presented a list of judges in regular and qualifying positions to the researcher for purposeful sampling. Within these groups, informants were selected randomly. Two judges were assistant judges in qualifying positions whose opinions were deemed important, especially because they were less experienced and were expected to rely more heavily on ICT to locate the necessary information. In total, seven judges were interviewed. All the interviews were semi-structured and had open-ended questions to allow the informants to speak freely (Myers & Newman, 2007). The interviews were conducted face-to-face and recorded. On average the interviews lasted approximately 45 minutes, varying between 35 to 55 minutes. The interviews

were conducted in a period of eight months. After transcribing them, the informants were given the opportunity to correct any errors in the transcribed text. The interviews covered key areas, such as expectations of the court, management and control, formulation and implementation of public policies, legal principles and processes, decision-making processes, current use of information systems, and specific conditions influencing this use. Table 9 provides an overview of the conducted interviews in the court.

Table 9. Interviews in the court

Informants	#	Length	Form	Documentation
Chief judge.	1	35 min.	Face-to-face in court office (one at the university). Semi-structured questions.	Audio file. Interview transcript.
Judges.	4	40-55 min.		
Assistant judges.	2	45-50 min.		

To gain more in-depth knowledge of the phenomenon, I also engaged in four participant observations *in situ* in the court observing the actions of the judges, how information about the cases was collected, the routines the judges followed when using the information systems, and how a verdict was decided. The observations were made within a period of two years and based on the opportunity to participate as a lay judge. The chief judge was consulted regarding the participant observations. I observed what the judges did before, during, and after a trial. Key observation events included pre-trial meetings, trials, meetings during the trials, and post-trial meetings. Each trial was held with a judge and two lay judges. The trials dealt with cases of violence, misconduct, and drunk driving. In pre-trial meetings, the case was briefly discussed between the judges and questions were asked, if necessary. All these meetings were short and held without any assistance from technology. During the trial, I observed how the judge collected information about the case from the documents, testimonies, and procedures of the state attorney and the attorney of the accused. Field notes were written down after each trial ended. The field notes did not contain any verbatim utterances but rather the essence of the communication was captured. After the trial, post-trial meetings were held (on a day other than the day of the trial) to discuss the case more thoroughly and decide on a verdict. Technological tools were used to assist

the juridical judge in the process of writing a verdict. Table 10 provides an overview of the participant observations conducted in the court.

Table 10. Observations in the court

Judge	Trial	Time	Documentation
Assistant judge.	Young woman charged for misconduct.	Mar. 2015	Field notes.
Judge.	Man charged for violence against random passerby.	Fall 2015	
Assistant judge.	Young woman charged for misconduct and violence against police officer.	May 2016	
Assistant judge.	Woman charged for drunk driving.	Sep. 2016	

Case 2: NTA office. The second case was conducted in a regional NTA office. I gained access to this case by contacting the central research and development department of the NTA. An inquiry was made through an official form on their website and processed by the NTA officials. After some time, I was referred to the regional NTA office and its manager. The first interaction was an informal talk with the manager on the telephone prior to the interviews. The purpose with this talk was to clarify the aspects of the PhD project and help the manager understand what type of informants I sought.

The manager assisted me in selecting the informants based on their position (manager, lawyers, and caseworkers), so that they could provide various perspectives on the research questions. None of the NTA workers were in qualifying positions. In total, nine interviews were made in the NTA office. Most of the informants worked in an open concept office and interviews were therefore conducted in a shared office space. All the interviews were semi-structured. The interviews were conducted face-to-face and recorded. On average the interviews lasted approximately 45 minutes, varying between 20 to 100 minutes. The interviews were conducted during two full days at the NTA office. After transcribing the interviews, the informants were given the opportunity to correct any errors in the transcribed text. Table 11 provides an overview of the conducted interviews in the NTA office.

Table 11. Interviews in the NTA office

Informants	#	Length	Form	Documentation
Manager.	1	100 min.	Face-to-face in NTA office. Semi-structured questions.	Audio file. Interview transcript.
Lawyers.	3	20-50 min.		
Caseworkers.	5	35-55 min.		

Case 3: Parliament and government. The third case was related to the work of the government and members in the Norwegian Parliament (MPs). I collected the contact information of the MPs through the website of the Parliament and contacted them through e-mail. MPs representing each political party in the committee in the electoral period 2013-17 were approached. My goal was to interview one MP from each political party represented in the committee. Since they were very busy, I had to contact them several times and ended up with interviewing MPs representing The Norwegian Labour Party (MP #1), The Centre Party (MP #2), The Progress Party (MP #3), and The Socialist Left Party (MP #4). One of the MPs I interviewed was the committee chairman (MP #3). MPs from The Conservative Party, The Christian Democratic Party, and The Liberal Party of Norway, also represented in the committee, were not able to participate in the study. Neither the Parliament committee chairman nor other committee members had any first-hand experience of e-government initiatives.

Four interviews were conducted in total. Based on the availability of the MPs, the interviews were conducted face-to-face, and through the telephone or e-mail. The interviews had structured and/or semi-structured questions. Face-to-face interviews with semi-structured questions were preferred, as they allow informants to speak more freely (Myers & Newman, 2007). Three of the interviews were recorded. On average, the interviews lasted approximately 30 minutes. The MPs were given the opportunity to correct any errors in the transcribed text. Key areas of inquiry were: (a) intentions of the legislator manifested in new legislation, (b) policy implementation issues, (c) potential areas and prerequisites for digital discretion, and (d) societal, organizational, and professional opportunities and limitations of digital discretion. Table 12 provides an overview of the conducted interviews in the Norwegian Parliament.

Table 12. Interviews in the Norwegian Parliament

Informants	#	Length	Form	Documentation
Committee chairman.	1	20 min.	Face-to-face in Parliament office.	Audio file. Interview transcript. Written communication.
Parliamentary members.	3	25-30 min.	Face-to-face in Parliament office. Telephone. E-mail. Semi-structured and structured questions.	

To further investigate the views of the policy makers, I selected the two most central e-government strategy documents each representing current political views on ICT in Norway:

- The Digital Agenda for Norway (Ministry of Local Government and Modernisation, 2016).
- The Digitalization Circular (Ministry of Local Government and Modernisation, 2017).

The Digital Agenda for Norway (DA) is the main document used to express the government's political views on e-government. Its main purpose is to present the Norwegian government's overall policy for how ICT can be utilized in the public sector and in society at large. It details measures to achieve a more user-oriented and efficient public administration. The DA belongs to a group of authoritative white papers that are prepared by the Norwegian government for further treatment in the Parliament. The second document I selected was the annually issued Digitalization Circular (DC). This document consists of prescriptions and advice, influencing how e-government is implemented; it is issued by the government without requiring parliamentary approval. These documents were deemed appropriate for two reasons. First, the DA contains the exact details about the government's long-term political ICT views, and it offers a broad coverage including an historical account of ICT politics in Norway as well as its future outlook. The DC provides detailed recommendations, reflecting the political views of the incumbent government, which are useful when investigating the persistent and changing considerations by the policy maker. Second,

interviewing policy makers in prominent positions in the Norwegian government is challenging, since they are often unavailable for research-related interviews.

4.2.4 Data analysis

The data were analyzed in several steps as the research project progressed reflecting the focus of each paper. Three of the papers (papers 3-5) are based on the qualitative study. For all the cases, the first step was to conduct a within-case analysis (Eisenhardt, 1989). Paper 4, which is based on a multiple-case analysis, reports a cross-case analysis, whereas papers 3 and 5 report within-case analyses for the judges and policy makers, respectively. The analyses followed the Gioia methodology engaging in first-order and second-order analyses (Gioia, Corley, & Hamilton, 2013), similar to the open coding and axial coding techniques in grounded theory (Strauss & Corbin, 1998). The coding resulted in data structures, illustrating the findings from the analyses. The within-case and cross-case analyses are described below.

Within-case analysis

The main purpose of a within-case analysis is to gain a thorough understanding of each case capturing their particularities (Eisenhardt, 1989). The analysis was based on interview transcriptions, personal notes, field notes, and e-government strategy documents. The analysis aimed to integrate data from these sources regarding issues raised in the interview guide as well as those emerging from the data. A qualitative analysis software (NVivo) was used to aid in coding and analyzing the data as well as searching through the entire data material, when needed. In addition to coding and visualizing data, representative quotes were translated to support the findings.

For the within-case analysis of the policy makers, I cycled among data, findings, and relevant literature. As the initial step, a first-order analysis was conducted involving a detailed coding of the interviews and e-government strategy documents. The coding was based on standard grounded theory techniques and guided by the research questions. Relevant concepts in the data were identified and grouped into categories (open coding). I used simple descriptive phrases to label the concepts. The context was further consulted in cases where I had difficulties with associating a concept with a specific category. To increase the rigor of my coding, an outside researcher was provided with definitions of the first-order concepts and asked to match a sample of the interview quotes and document text passages with the concepts. Disagreements were discussed until they were resolved. In the final step of the coding process I

immersed myself in axial coding (Strauss & Corbin, 1998) looking for relationships between the categories to consolidate them into second-order themes. Concepts continued to emerge from my analysis until I had a clear understanding of the relationships between the categories and the related themes, and until the analysis failed to reveal any new relationships. NVivo was used to keep track of the coding process allowing for a quick reference to similar concepts with representative quotes and text passages from our data, which could be collapsed into fewer categories and themes. The final data structure is illustrated in Figure 3 ordered from specific, first-order categories—derived from the empirical data—to more general, researcher-induced second-order themes.

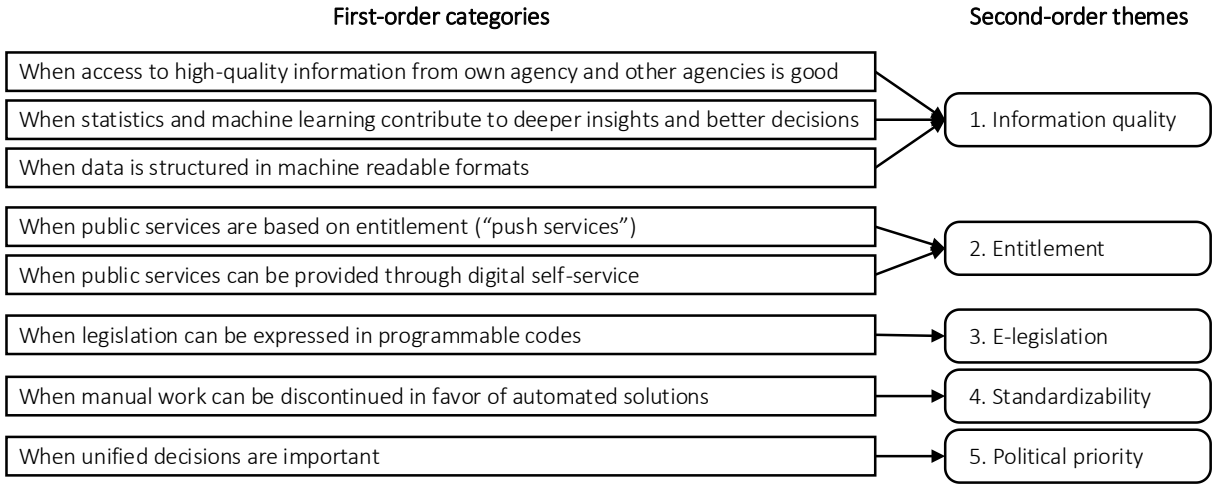

Figure 3. Data structure of within-case analysis (policy makers)

Representative quotes from the interviews and text passages from the e-government strategy documents that substantiate the identified second-order themes are provided in paper 5.

The within-case analyses of the judges and caseworkers are described together, since the processes are similar for both cases. These analyses sought to identify the different strategies that street-level bureaucrats adopted as well as the opportunities and challenges of digital discretionary practices, which could explain these strategies. The public administration and institutional logics literature were consulted to help me learn how individuals cope with multiple demands from institutional logics. With this theoretical framework serving as a reference, I engaged in a first-order analysis, which involved a detailed coding of the interviews and field notes where I cycled between data, emerging theory, and relevant literature as codes emerged. Codes were then consolidated into concepts and labelled by the language of the informants whenever

possible. Whenever in-vivo codes were not available, simple descriptive phrases were used. Related concepts were then identified and grouped into categories (open coding) before engaging in axial coding (Strauss & Corbin, 1998), searching for possible relationships between the categories. Figure 4 shows the combined data structures of the analyses. The data structures are ordered from specific, first-order categories—derived from the empirical data—to more general, researcher-induced second-order themes, which describe the underlying motivations street-level bureaucrats have for particular strategic responses to the institutional complexity they face. Representative quotes from the empirical data that substantiate the identified second-order themes are found in papers 3 and 4.

I used my self-developed framework (see Table 4) to analyze the role of the CMS and the databases used in the court and the NTA office. To identify the role of these technologies, I specifically consulted the data to understand how the technologies (a) could empower certain actors, (b) promote certain goals and values, (c) restrict and allow certain types of work practices, and (d) promote certain organizing principles.

Cross-case analysis

In the cross-case analysis, data from all the three cases are treated together[2]. The purpose is to identify and generalize the patterns in the data (Eisenhardt, 1989), which can explain the influence of technology on discretionary practices from the perspectives of actors with different responsibilities for policy implementation. The analysis focused on the underlying motivations of street-level bureaucrats and policy makers, which can explain the technological impact on discretionary practices. To search for similarities and differences in the data material, I used the second-order themes from the within-case analysis as a starting point. Following the recommendations from Eisenhardt (1989), the literature was consulted to group second-order themes into dimensions. The search was guided by the following dimensions: authority, strength of discretion, service complexity, computer literacy, and material agency. Street-level bureaucrats in hierarchical relationships are dependent on the management and thus used to following managerial directives (Hupe, 2013). Dworkin (1978) distinguishes between “weak” and “strong” forms of discretion to illustrate the differences in rule-following.

[2] Paper 4 reports findings from a cross-case analysis of data from judges and caseworkers. None of the papers have reported a cross-case analysis based on all three cases.

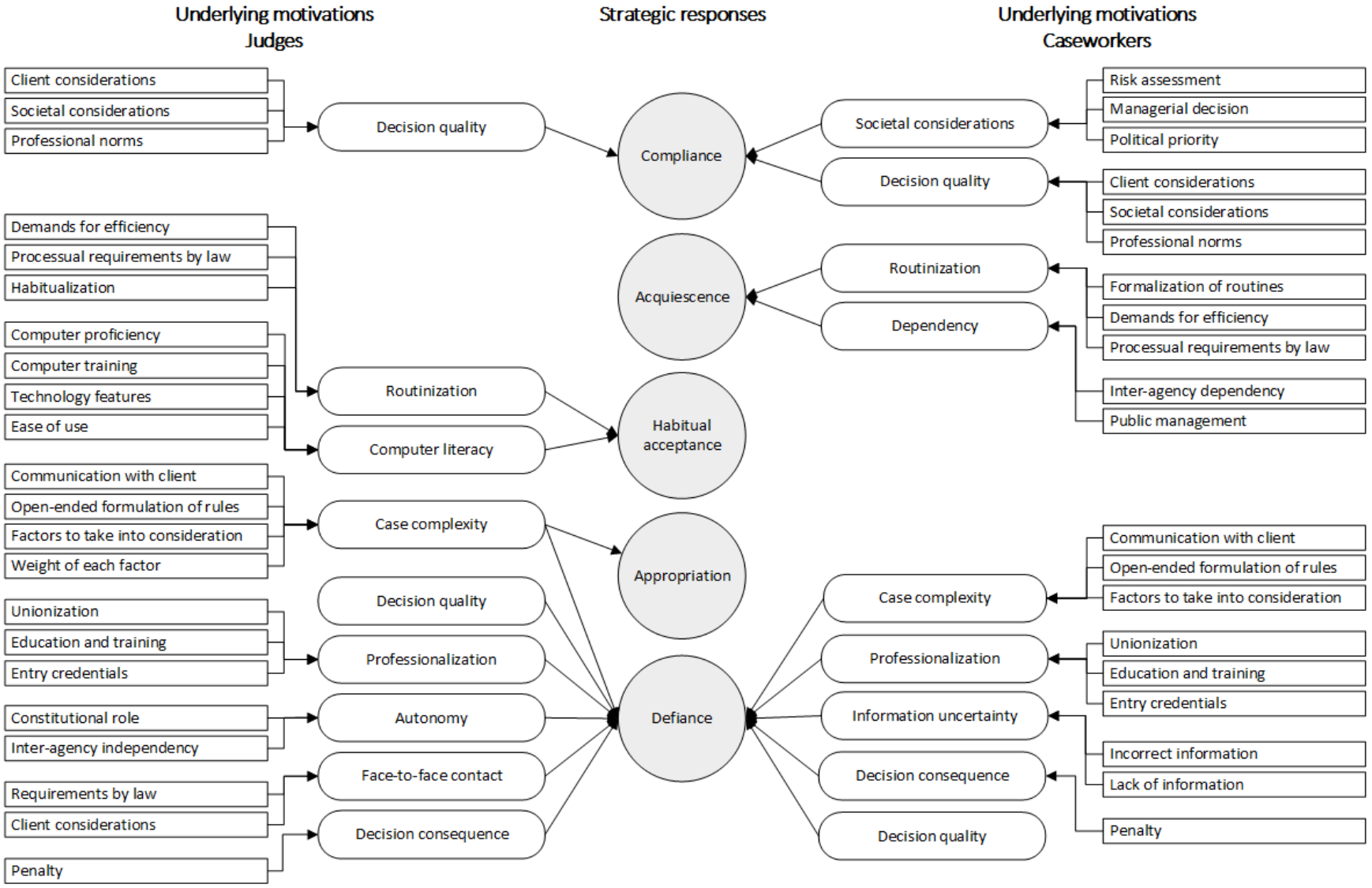

Figure 4. Data structures of within-case analysis (street-level bureaucrats)

Whereas street-level bureaucrats with weak discretion exhibit greater tendency to follow rules, those with strong discretion have more opportunity for maneuvering. Service complexity describes the extent to which matters raised by clients can be complex, requiring the consideration of various factors (Bovens & Zouridis, 2002; Buffat, 2015). Computer-literate street-level bureaucrats adapt more quickly to novel technological routines and thus view the use of technology in discretionary practices more favorably (Giest & Raaphorst, 2018). Material objects are instantiations of institutional logics and technologies can signal and support different aspects of organizational work such as professional norms and market-oriented goals (Czarniawska, 2008; Raaijmakers et al., 2018).

The search for patterns was guided by (a) the similarities and differences between the cases, and by (b) categorizing the case organizations according to the identified dimensions. I then compared the views of the different actors in the three cases based on the potential impact of digital discretion on the achievement of central professional norms (care, neutrality, fairness, rule of law, and decision quality) and managerial goals (accountability, efficiency, cost efficiency, work rearrangement, market orientation) for street-level work.

4.2.5 Validity of findings

This section discusses the validity issues and limitations of my qualitative study to justify my findings and conclusions. To assess the quality of the multiple-case study, I consider two interrelated yet separate aspects of research validity, namely internal and external validity. Internal validity is concerned with rigor (Guba, 1981); that is, how well I have conducted the research study to ensure that my findings are true representations of the phenomena and contexts that I have investigated. External validity is concerned with relevance (Guba, 1981); that is, how relevant my findings are to other contexts and other units of analysis.

Internal validity

In this study, internal validity is assessed by applying the criteria for rigorous assessment of positivist case study research developed by Dubé and Paré (2003). Their criteria focus on research design, data collection, and data analysis. In addition, they provide recommendations for further advancement of the case study methodology within IS. I have only included the criteria relevant to exploratory multiple-case, studies since my study is exploratory. To make my research as transparent as possible,

I tried to document the details about the research process. The evaluation of the internal validity of my study is shown in Table 13.

Table 13. Evaluation of internal validity in the case study

Criteria	Evaluation
Research design	
Clear research questions.	The aim of and the research questions for the study are clearly stated. I pose what, how, and why questions typical for case study research (Yin, 2014). Whereas the first question addresses all the cases, the second question addresses the street-level bureaucrats only.
A priori specification of constructs and clean theoretical slate (exploratory case studies).	I conducted a literature review identifying constructs a priori. By doing so, I built on the work of others and ensured that important issues were taken into consideration in the study. However, as Eisenhardt (1989) stresses, research aiming at theory-building should begin as closely as possible to no a priori theoretical assumptions under consideration, since they may bias findings (Dubé & Paré, 2003).
Multiple-case design.	This research is based on a multiple-case study of a phenomenon, enabling comparisons among contexts.
Replication logic in multiple-case design.	The selection of case organizations has followed a theoretical replication logic (Yin, 2014) to elicit the opinions of actors with different interests in and responsibilities for policy implementation (I expected that their different contexts could lead to contrasting results). However, since RQ2 and the subsequent quantitative study focus on street-level bureaucrat context, perhaps it would have been beneficial to recruit cases within the street-level context only.
Unit of analysis.	My study has specified discretionary practices as the unit of analysis.
Pilot case.	I did not conduct a pilot study, but I completed three interviews before the main data collection began. These interviews were with the managers of a building permit office and the chief judge (of which the latter is used in the formal study). The information provided in these interviews formed the subsequent data collection. A pilot study could have provided information about which could have better guided the development, testing, and refinement of the research questions.

Table 13. Continued.

Criteria	Evaluation
Context of the study.	I have provided detailed descriptions of the study context. The context is limited to Norway only.
Team-based research and different roles for multiple investigators.	Whereas I agree that a team of researchers can increase the reliability of the findings (Benbasat et al., 1987; Eisenhardt, 1989), this study is an individual PhD project where I, as a PhD candidate, should demonstrate my capabilities of carrying out a research project on my own. Therefore, the research design considerations are framed by me. However, other researchers have been the co-authors of some of the publications and therefore involved in the interpretation and presentation of study details.
Data collection	
Elucidation of the data collection process.	I have provided a thorough description of the data collection process and the data sources in this study including elements such as sampling, interview guide, number of interviews, and documentation.
Multiple data collection methods and mix of qualitative and quantitative data.	The multiple-case study has made use of different data collection methods. Interviews were the primary data source, but data have also been collected through participant observations and the analysis of e-government strategy documents.
Data triangulation.	Multiple data sources are combined to support the findings.
Case study protocol and case study database.	An interview guide was developed prior to the interviews. The guide was further developed and used throughout the interviews. The guide contained interview questions grouped according to the research topics of interest. The data were maintained through a case study database where interview audio files, transcripts, and notes were saved. It further contained files with coded data, field notes, and e-government strategy documents.
Data analysis	
Elucidation of the data analysis process.	I have described the data analysis process meticulously to show the link between the data and the findings.

Table 13. Continued.

Criteria	Evaluation
Field notes, coding, data display, and flexible process.	Field notes were used to include additional relevant information during the interviews. They could, however, have been used more effectively. The data were analyzed using a systematic coding approach. The first case led to subsequent changes in the data collection.
Logical chain of evidence.	All publications that comprise this research project have been subject to peer review processes. Thus, the connection between data and findings should be sufficiently demonstrated.
Modes of analysis.	The data analysis is driven by explanation-building analysis strategy (Yin, 2014).
Cross-case patterns.	Similarities and differences are identified between the cases, elaborated in the different papers. Cross-case patterns were identified according to the particular phenomenon under study. The cross-case analysis was challenging since the cases consist of both street-level bureaucrats and policy makers. Since all the cases shed light on the considerations about digital discretion acceptance, the cross-case analysis is focused on these considerations and not on the actual acceptance. The subsequent model of digital discretion acceptance is therefore developed based on the considerations derived from all the cases and associated actions derived from two of the cases.
Quotes.	Data have been extensively displayed in the form of quotes to support the findings from the study. The field notes are not quoted. However, they are difficult to quote, since they do not contain verbatim utterances.
Project reviews.	I did not consult the informants after the data analysis, mainly because their availability was limited. Nonetheless, more effort could have been made to ensure that my findings were accessible to my informants.
Comparison with extant literature (exploratory case studies).	I have to a large extensively compared the research findings with extant literature and theoretical frameworks. Whereas this can be considered a strength since I build on the work of others, it may also be a weakness because previous findings may bias the analysis of my data (Eisenhardt, 1989).

External validity

Since I have conducted a multiple case study, I do not claim any statistical generalization (Yin, 2014). The cases I have investigated are not representative units and too few to be able to make such generalizations. Instead, I have focused my study on digital discretion acceptance and impact in street-level bureaucracy, which is a perspective that provides a coherent theoretical view of a large group of public service workers (street-level bureaucrats). They are characterized by heavy workload, lack of resources, and close interaction with clients, exercising a substantial amount of discretion. In my study, data are collected from judges, caseworkers, and high-level policy makers to shed light on digital discretion acceptance. My approach has involved developing theory that can be statistically tested in a subsequent study as well as contributing to the existing theory through analytical generalization (Yin, 2014). I have made several efforts to assure external validity.

First, I assessed the extent to which my research context was suitable for studying digital discretion acceptance and influence in street-level bureaucracy. Whereas judges are explicitly mentioned as examples of street-level bureaucrats, the NTA caseworkers are not (Lipsky, 2010). However, their work is characterized by the same working conditions to those of street-level bureaucrats. Although the viewpoints of policy makers were insightful, mainly because they are important stakeholders in the national ICT politics, they are not normally considered street-level bureaucrats. Hence, the characteristics of public service provision, which enable or hinder digital discretion that they came up with, are marked by future opportunities and challenges.

Second, regardless of whether street-level bureaucrats are judges, teachers, police officers, or caseworkers - Lipsky (2010) believes that the nature of their work is so complex that their professional judgment is vital for achieving good results. The similarities that he identified between them suggest that my findings are transferable to other groups of street-level bureaucrats given that they reside in a country like Norway, which has somewhat homogeneous demographics and where services are organized uniformly, policies are applied consistently, and decision-making is supported by similar technologies. Third, the policy makers' views identified in this study are likely to reflect those of others in the industrialized countries, dealing with the same challenges. Finally, my study has intentionally been designed for a broader relevance. The qualitative study facilitates further testing of the identified concepts on a larger population (Eikebrokk & Busch, 2016).

Despite the similarities among the street-level bureaucracies, there are also several differences. For example, they may use technologies other than CMS (e.g., handheld devices). Moreover, some street-level bureaucrats (e.g., police officers) make decisions on the spot. Therefore, my findings may deviate from the experiences of these groups.

4.2.6 Limitations of the qualitative research design

Four potential limitations are highlighted. First, the appropriate number of cases in a multiple-case study is a debatable point. Conducting case study research in a positivist tradition, Eisenhardt (1991) argues that the appropriate number of cases is dependent on the existing knowledge, the researched topic, and the extent to which new information can be obtained from additional cases. Analyzing her multiple case studies, she most often uses eight cases and, to my best knowledge, few studies have less than six cases. My initial goal was to recruit six cases to be able to draw inferences based on different cases. Unfortunately, I was able to recruit three cases only, since the processes of recruiting them became lengthy and challenging in several ways. It takes large public organizations weeks and even months to reply to written inquiries. Other entities were too busy to participate in the project or were able to participate at a time when the qualitative data collection would have been completed. More empirical data from street-level bureaucrats in schools, the police, social work, and low-level policy makers would have been beneficial to this study, since their work and viewpoints may differ from those I studied.

Second, my selection of interviews may also represent some limitations. I was only able to interview two assistant judges and their views on technology seemed to differ from those of the experienced judges. Moreover, the manager in the tax administration selected the informants could have introduced bias in views. As for policy makers, I was only able to recruit four MPs for interviews after spending much efforts to recruit more (I contacted the other MPs several times as well as the various political advisors for the parliamentary committee). Since three political parties were not represented among the policy makers (The Liberal Party, The Conservative Party, The Christian Democratic Party), the collated data may be biased. Third, since my findings stem originate from Norway, I cannot rule out potential differences in conclusions based on geography and culture.

Fourth, the selected policy documents are not specifically produced for research purposes but for communicating current digital agendas to society at large, public agencies, and the Parliament. Thus, they do not discuss digital discretion in-depth (Bowen, 2009). To mitigate this problem, I interviewed the MPs to gain a more complete understanding. The third potential limitation is a biased view of the ICT politics, since the selected documents reflect the considerations of the incumbent government and thus are more likely to present positive and visionary views of the e-government initiatives rather than discussing their challenges (Bowen, 2009).

4.3 Phase II: quantitative research design

I conducted a cross-sectional quantitative study of 125 street-level bureaucrats within several types of public service provision (Busch & Eikebrokk, 2019). The quantitative study is exploratory and represents an early phase of theorizing within an area where little research has been conducted. This study builds upon the findings from my qualitative study (including the propositions put forward in papers 4 and 5) and an updated literature review (see chapter 3). The purpose was to test my inferences from the qualitative study. Therefore, several relevant constructs and relationships were intentionally included to test their validity relating to RQ1. The initial model did not include any UTAUT constructs, since UTAUT is used in the next step to enable the further development of the research model.

4.3.1 Hypotheses and conceptual model

Figure 5 shows the conceptual model, with the hypotheses underlying the quantitative study. In the model, attitudes toward digital discretion are considered through how important discretion is perceived to be and the perception of decision quality.

Decision complexity

The exercise of discretion is related to the prevailing statutory provisions of law (Lipsky, 2010). The legislation that street-level bureaucrats use as the basis for their decisions may contain terms that invite street-level bureaucrats to determine the meaning of them (Henman & Adler, 2003; Hupe, 2013; Jansson & Erlingsson, 2014). The process of interpreting legal terms can be lengthy and complicated, albeit necessary. Both the judges and NTA caseworkers pointed out that legal terms could vary to a large extent and that certain rules did not leave much room for discretion.

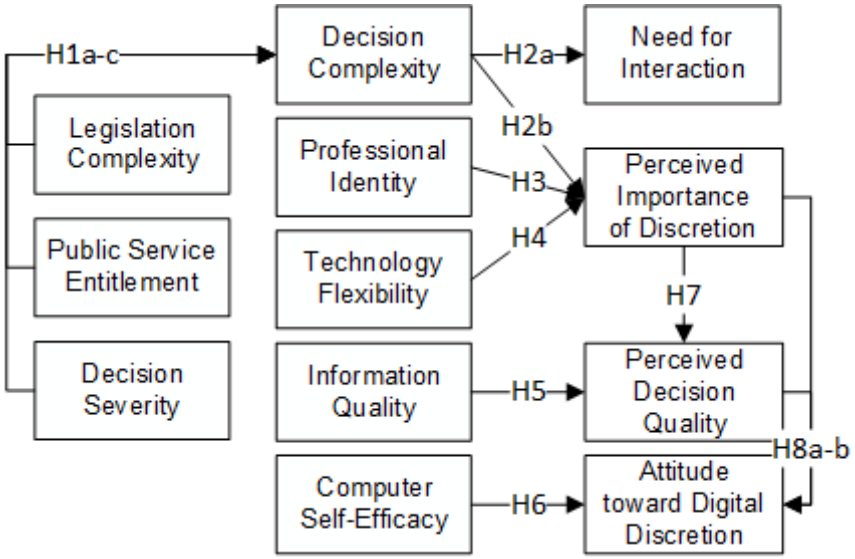

Figure 5. Research model

Since "life comes in so many facets" (Busch, 2017, p. 2967), it will be impossible for policy makers to foresee every situation that may occur. Open-ended rules can ensure fair decision outcomes. Therefore, the policy makers consider digital discretion favorably when the legislation could be expressed in programmable codes, hence the following hypothesis:

Hypothesis 1a: Legislation complexity will positively influence decision complexity.

Whereas public services often require considerations by street-level bureaucrats, there are other services to which groups of clients are entitled (Paulin, 2013). Decisions about these services are often based on objective criteria such as age (e.g., whether a child is entitled to a place in the kindergarten) and income (e.g., whether a student is entitled to study grants). My findings suggested that policy makers were more likely to accept digital discretion in cases where clients were entitled to public services; they also expressed positive views about digital self-service solutions, where clients can help themselves whenever possible. Whereas the street-level bureaucrats did not explicitly express these views, I argue that they are likely to reflect the opinions of the policy makers, since they exercise little or no discretion in these cases. Therefore, I hypothesized thus:

Hypothesis 1b: Public service entitlement will negatively influence decision complexity.

Clients can be different in terms of maturity, their need for support, economic status, and life experiences. The situations they represent can vary from simple matters such as over-speeding to serious cases such as murder. My findings strongly suggest that street-level bureaucrats consider the severity of a decision outcome to be related to how important discretion is. For example, judges can sentence clients to several years in prison or make decisions about child custody matters which obviously create strong emotions among the clients involved. The potential decision severity usually means that clients have a strong desire for street-level bureaucrats to make professional assessments of their cases. Therefore, they did not favor digital discretion in severe cases arguing that these cases were too complex for digital tools. I therefore hypothesized thus:

Hypothesis 1c: Decision severity will positively influence decision complexity.

Public service characteristics, discretion importance, and decision quality

The complexity of decision-making influences the need clients have to interact with street-level bureaucrats (Reddick et al., 2011). My findings suggest that clients often prefer to talk to street-level bureaucrats arguing that their case is unique and requires a certain outcome. The judges emphasized that clients often wanted to "tell their story" to them so that they could understand how things went wrong in life. My findings further strongly suggested that clients tend to be increasingly satisfied with decisions if they have the opportunity to present their case and explain their actions directly to a street-level bureaucrat even if the street-level bureaucrat decides on a decision that is not in their favor. A judge pointed this out by describing a client who was satisfied with the court because the judge had listened to him. Moreover, the judges pointed out that certain face-to-face contacts are even required by law, for example, when it is necessary to explain to children the decisions that have been taken about them. I then hypothesized thus:

Hypothesis 2a: Decision complexity will positively influence need for interaction.

Decision complexity was emphasized by the street-level bureaucrats and the policy makers as an important reason for having discretionary power. The clients that street-level bureaucrats make decisions about represent circumstances that can be unique and require special attention (Bruhn, 2015; Henman & Adler, 2003; Jansson & Erlingsson, 2014). For example, a criminal may have experienced a traumatic upbringing through

which the actions of this client should be understood. Therefore, each case needs to be sufficiently elaborated, and cases that are seemingly similar may be different to some extent, which makes it difficult to standardize decision outcomes. The street-level bureaucrats specified how cases concerning the same policy area could be quite different. This is the reason why street-level bureaucrats have discretionary power; they must have the opportunity to think creatively and devise appropriate actions adapted to each client if necessary (Lipsky, 2010). The policy makers recognized the complexity of service provision and were only in favor of digital discretion, if it aided the standardization of manual work processes, hence the following hypothesis:

Hypothesis 2b: Decision complexity will positively influence the perceived importance of discretion.

Professional identity is another dimension that influences the perceived importance of discretion. It refers to whether a street-level bureaucrat identifies himself or herself with the conduct, aims, or qualities that a profession is recognized by. The literature supports the notion that increased identification with a profession favors professional judgment (e.g., Giest & Raaphorst, 2018). Street-level bureaucrats who have great autonomy (e.g., Aas, 2004) and well-established standards for their occupation (e.g., Hill & Hupe, 2014) are more likely to resist digital discretion. A strong professional identity suggests that the decisions street-level bureaucrats make cannot be made by untrained people (Marston, 2006). My findings strongly suggest that the street-level bureaucrats see their unique expertise as necessary to guarantee reasonable decision outcomes. In particular, judges were highly protective of their profession. I therefore hypothesized thus:

Hypothesis 3: Professional identity will positively influence the perceived importance of discretion.

Governments increasingly rely on the use of ICT for implementing policies (Meijer, 2009). Technologies often play a key role in the tasks of street-level bureaucrats since they devise actions to be taken and provide street-level bureaucrats with information (Hupe & Buffat, 2014; Meijer, 2009; Snellen, 2012; Wihlborg et al., 2016). The literature has identified the flexibility of a technological tool to be of importance for how much discretion street-level bureaucrats can exercise (Jorna & Wagenaar, 2007). In some cases, technology is found to reduce the room for maneuvering that street-

level bureaucrats have (Buffat, 2015). Technology creates decision paths that need to be followed based on previous choices, and the more choices street-level bureaucrats make, the more limited will subsequent choices be. Technology can also enhance the room for maneuvering. By being flexible, supporting existing work practices, and providing more information, the perceived importance of discretion increases. I therefore hypothesized thus:

Hypothesis 4: Technology flexibility will positively influence the perceived importance of discretion.

Information quality is identified as being important for decision quality. My findings showed that the street-level bureaucrats, through the use of digital tools, have now access to vast amounts of information, which can help them make better decisions. Information quality is often associated with the term "fit for use" which denotes how information is in need of characteristics to allow it to be applied and used in a specific context and in an understandable format for its users. Information may be erroneous for several reasons such as when public agencies store and handle client data multiple times, disseminate wrong data inputs from external organizations (e.g, financial institutions), and when clients deliberately provide incorrect information (Henriksen, 2018). The policy makers also commented that they favored digital discretion only when information could be structured and as accurate as possible. I then hypothesized thus:

Hypothesis 5: Information quality will positively influence the perceived decision quality.

Attitude toward digital discretion

Computer self-efficacy refers to an individual's perception of his or her own ability to use technology to accomplish as task (Brown, Dennis, & Venkatesh, 2010; Compeau & Higgins, 1995b). This term implies that a computer is used to accomplish specific tasks. Since the time Compeau and Higgins (1995b) first developed their measure of computer self-efficacy in 1995, ICT has changed considerably. In the mid-90s, ICT was purchased and installed at workplaces. Today, ICT refers to a variety of technologies such as smart phones, smart watches, tablets, cloud applications etc. Therefore, when I refer to the use of technology, I mean it in its broad sense, which includes a variety of technologies. My findings suggest that, although computer self-

efficacy is not specific to the use of discretion, street-level bureaucrats with greater computer self-efficacy will perceive discretion in decision-making processes to be less relevant. Like Compeau and Higgins (1995a) who demonstrated that task performance increases in tandem with increased computer self-efficacy, I argue that street-level bureaucrats mastering technology also rely more on the choices and decisions technology makes (Reddick et al., 2011). Thus, I hypothesized the following:

Hypothesis 6: Computer self-efficacy will positively influence attitude toward digital discretion.

Research shows that digital discretion is difficult to utilize in traditional public service work such as in courts and schools (Bovens & Zouridis, 2002; Buffat, 2015). Mass transactional public services such as loan assessments and police controlling over-speeding seem to be more suitable for digital discretion (Bovens & Zouridis, 2002). Street-level bureaucrats argue that public policies need to be interpreted and adapted to real-life situations (Buffat, 2015; De Witte et al., 2016; Jansson & Erlingsson, 2014; Lipsky, 2010). By doing so, the quality of their decisions increases since they can produce outcomes that are fairer and more reasonable when taking individual circumstances into consideration (Bruhn, 2015). My findings strongly suggest that the more important street-level bureaucrats consider discretion to be for their work, the less positive they are toward digital discretion. I therefore hypothesized thus:

Hypothesis 7: Perceived importance of discretion will positively influence perceived decision quality.

Hypothesis 8a: Perceived importance of discretion will negatively influence attitude toward digital discretion.

My findings support that the perceived decision quality is important to explain whether street-level bureaucrats accept digital discretion or not. Whereas street-level bureaucrats in general are skeptical about digital discretion, they are more likely to accept it in cases where they can see that it improves public services. They further prioritize professional norms over managerial goals, if they are required to do so (Tummers & Rocco, 2015). A positive attitude reflects the belief that computers, under certain circumstances, can make better decisions than street-level bureaucrats (Bovens & Zouridis, 2002; Wenger & Wilkins, 2009). The appropriacy of a decision is judged

in terms of whether street-level bureaucrats believe that computerized decisions follow the norms of their profession (Tummers & Rocco, 2015), hence the following hypothesis:

Hypothesis 8b: Perceived decision quality will positively influence attitude toward digital discretion.

4.3.2 Sampling and data collection

The sampling frame involved street-level bureaucracies, as defined by (Lipsky, 2010). Since there are many public agencies that can be termed street-level bureaucracies, a random sample of public agencies in Norway was drawn from agencies, providing several types of public services. I intentionally sought to recruit diverse agencies in terms of service provision to test the model. I also aimed at—and succeeded in—recruiting the respondents from different parts of the country to avoid inter-organizational biases, which are likely to occur among the municipal offices because they may cooperate, align their practices, or exchange employees in a common job market. Potential agencies were contacted via the telephone and e-mail. The executives were informed about the research project and subsequently invited to participate. The executives then distributed the survey link to the respondents. Some of the respondents chose to participate in the survey whereas other respondents were instructed to do so by their managers. I offered gift certificates to increase participation (they were given to two of the respondents after a draw). In total, 125 street-level bureaucrats completed the survey, of whom 90 (72 %) used the gift certificate option. Several attempts at recruiting the respondents were made. However, in many cases, it was impossible to track how many of the respondents had actually responded, and I had to rely on the managers to redistribute the survey. In the end, I was able to recruit at least four respondents from one agency and up to 26 respondents from the most highly represented agency. The respondents from several types of public service provision participated: food safety authority (FSA), public roads administration (PRA), directorate of fisheries (DF), customs offices (CO), county governor office (CGO), courts (CRT), municipal building planning and permit offices (BPO), and municipal kindergarten administration offices (KAO). While some of the street-level bureaucrats conduct field inspections (FSA, PRA, DF, CO), often alone, other street-level bureaucrats deal with case handling (CGO, CRT, BPO, KAO).

4.3.3 Operationalization of constructs

The operationalization of constructs combined previously validated indicators with new indicators developed to fit the context. I developed several items, using the extant literature and 16 interviews with the street-level bureaucrats, conducted prior to the survey. The candidate indicators were pretested on three IS researchers and four street-level bureaucrats. A list of questions was presented to the subjects who assessed them according to the constructs. Based on the results of the pretest, questions were rephrased or deleted from the candidate list. In addition to the multi-item measures, questions about type of work and work experience (in years) were collected. Table 14 provides the operational definitions of the variables used in the theoretical model.

The original measurement instrument had between four and five items for each construct. To avoid survey fatigue, all the constructs were adapted to and measured by using 7-point semantic-differentials scales (Chin, Johnson, & Schwarz, 2008). During the analysis, several indicators were dropped due to insufficient loadings. The complete measurement instrument marking the retained indicators is provided in Appendix C. For the convenience of the respondents, the questionnaire was presented to them in Norwegian.

4.3.4 Data analysis, validation, and results

Data analysis and hypotheses testing were conducted using structural equation modeling (SEM) with the partial least squares (PLS) estimation technique. SEM combines the instrument and the model into the same analysis. SmartPLS was used as the supporting software. I adopted best practices for reporting PLS-SEM results from Hair, Hollingsworth, Randolph, and Chong (2017). All the survey data were downloaded from the survey site in CSV format for direct import into SmartPLS. The variables were converted for analysis, using a label name and numerical indicators. The accuracy of the data entry was assessed manually.

Instrument validation

The *first* part of my analyses included instrument validation through four steps starting with indicator reliability. Initially, my constructs had four or five indicators and my analysis revealed too low indicator loadings for some constructs. The model was subsequently modified by removing the indicators that had unsatisfactory loadings.

Table 14. List of variables

Variable	Operational definition	Source
Computer self-efficacy (CSE).	An individual's perception of his or her own ability to use technology to accomplish a task.	Adapted from Sasidharan, Santhanam, Brass, and Sambamurthy (2012).
Information quality (IQ).	The degree to which an individual perceives the usefulness of information.	Adapted from Au, Ngai, and Cheng (2008).
Decision complexity (DC).	An individual's perception of the number of factors to take into consideration and their individual weight.	Adapted from Barki, Rivard, and Talbot (1993).
Perceived decision quality (PDQ).	The extent to which how correct a decision is based on the circumstances in a case.	Adapted from Paul, Samarah, Seetharaman, and Mykytyn Jr. (2004).
Attitude toward digital discretion (ADD).	The degree to which an individual expects digital discretion to be useful in street-level work.	Adapted from Venkatesh et al. (2003).
Decision severity (DS).	The degree to which a decision will influence a client.	New scale developed.
Technology flexibility (TF).	The degree to which a technological artifact provides its user with freedom to make choices about its use.	New scale developed.
Professional identity (PI).	The extent to which specialized knowledge and work experience are crucial for decision-making.	New scale developed.
Need for interaction (NI).	The extent to which a street-level bureaucrat perceives a client's need for interaction with a street-level bureaucrat.	New scale developed.
Legislation complexity (LC).	The extent to which a legal rule requires interpretation before it is applied to real-life scenarios.	New scale developed.
Perceived importance of discretion (PID).	The extent to which a street-level bureaucrat perceives professional judgment to be vital for decision-making.	New scale developed.
Public service entitlement (PSE).	The extent to which clients are entitled to certain public services.	New scale developed.

After the modification, I found that all the outer loadings (OL) were above the recommended level of .70 except for CSE3 (.689), which is acceptable in exploratory research (Hair et al., 2014). *Second*, the internal consistency reliability of the constructs was evaluated by their composite reliability (CR). All the CR values were above the recommended value of .70 (Hair et al., 2017). Cronbach's Alpha was omitted, because it assumes that all the indicators of a construct are equally reliable (Hair, Sarstedt, Ringle, & Mena, 2012). *Third*, I assessed the convergent validity by using the constructs' average variance extracted (AVE). All AVE values were above the recommended threshold of .50 (Hair et al., 2017). These tests showed satisfactory values, and the variance caused by random errors did not challenge the validity of the model. The *fourth* step assessed the discriminant validity (DV) of the constructs through the Fornell-Larcker criterion (Hair, Hult, Ringle, & Sarstedt, 2014) and revealed that all the indicators loaded higher on their respective the constructs. The square root of each construct's AVE was higher than the correlations between constructs. Appendix D presents results from the DV assessment. Reliability and validity metrics are summarized in Busch and Eikebrokk (2019).

Model validation

Figure 6 shows the research model with path coefficients (β), hypotheses, and explained variance of endogenous variables (R2).

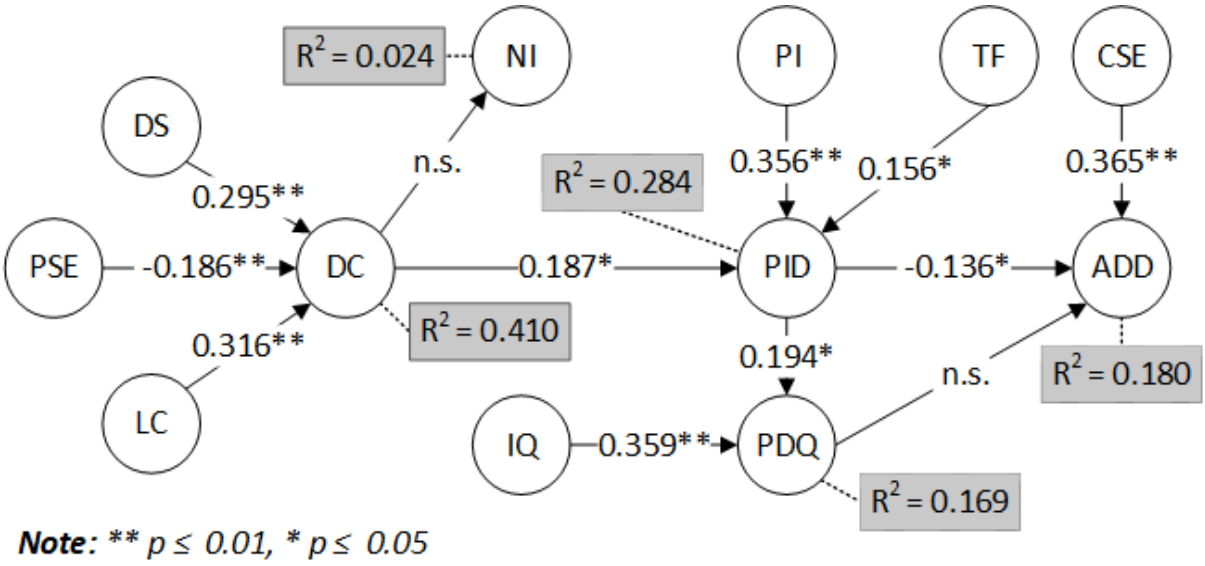

Figure 6. Results of hypotheses tests

As depicted in Figure 6, ten of the 12 hypotheses were empirically supported. Table 15 sums up the results from the hypotheses testing.

Table 15. Summary of hypotheses tests

Hypotheses	Independent variables	Dependent variables	Support
H1a	LC	DC	Yes
H1b	PSE	DC	Yes
H1c	DS	DC	Yes
H2a	DC	NI	*Non-significant*
H2b	DC	PID	Yes
H3	PI	PID	Yes
H4	TF	PID	Yes
H5	IQ	PDQ	Yes
H6	CSE	ADD	Yes
H7	PID	PDQ	Yes
H8a	PID	ADD	Yes
H8b	PDQ	ADD	*Non-significant*

The validation of the structural model included an assessment of the model's overall approximate fit through standardized root mean square residual (SRMR), showing satisfactory fit for the model (Henseler et al., 2014). The model was also evaluated by looking at the effect size for paths (f2), the predictive relevance of exogenous constructs (Q2), and the effect size of predictive relevance (q2). These metrics and procedures showed that the model is relevant (see paper 6). Table 16 presents a summary of the model validation.

Table 16. Summary of model validation

SRMR	Number of hypotheses	Supported hypotheses	Dependent variable	R2 of dependent variable	Q2 of dependent variable
.08	12	10	Attitude toward digital discretion	18 %	.12

4.3.5 Limitations of the quantitative research design

Despite the contributions, I recognize that my quantitative study has some limitations. First, the sample consists of street-level bureaucrats exclusively residing in Norway with shared understandings of public service provision. Acknowledging this shortcoming, I have already noted that Norway represents street-level bureaucrats in a highly industrialized country, comparable to other top-ranking e-government countries in the world. Second, whereas some public services are underrepresented (and others not represented) in the sample, I have tested a possible conceptualization of digital discretion acceptance with the respondents who represent a wider variety of public service provision than most other studies within this stream. Third, the validation of the model shows low values on some metrics. However, I argue that the quantitative study represents relevant additions to the early theory development of digital discretion acceptance. Lower values are common and acceptable in exploratory studies (Hair et al., 2017). Finally, the number of respondents (N = 125) is relatively low. Future studies should seek to increase the sample size.

5 Findings

Six publications comprise this research project by laying the foundation for the project and addressing the research questions presented in chapter 1.1. Table 17 lists these publications (included in full text at the end of the dissertation). Papers are ordered sequentially to illustrate how they are related to the research project by presenting a coherent story rather than ordering them by their publication dates.

Table 17. Research articles constituting the PhD project

#	Authorship	Title	Publication outlet
1	Busch and Henriksen (2018).	Digital Discretion: A Systematic Literature Review of ICT and Street-Level Discretion.	Information Polity, 23(1).
2	Busch (2018b).	Technology and Institutional Logics.	Proceedings of the 39th International Conference on Information Systems (ICIS), San Francisco, CA.
3	Busch (2017).	The Role of Contextual Factors in the Influence of ICT on Street-Level Discretion.	Proceedings of the 50th Hawaii International Conference on System Sciences (HICSS), Big Island, HI.
4	Busch et al. (2018).	Opportunities and Challenges of Digital Discretionary Practices: A Public Service Worker Perspective.	Government Information Quarterly, 35(4).
5	Busch (2018a).	Conceptualizing Digital Discretion Acceptance in Public Service Provision: A Policy Maker Perspective[a].	Proceedings of the 22nd Pacific Asia Conference on Information Systems (PACIS), Yokohama, Japan.
6	Busch and Eikebrokk (2019).	Digitizing Discretionary Practices in Public Service Provision: An Empirical Study of Public Service Workers' Attitudes.	Proceedings of the 52nd Hawaii International Conference on System Sciences (HICSS), Maui, HI.

a) Nominated for Best Paper Award

5.1 Paper 1 - Empirical foundation

Busch, P. A., & Henriksen, H. Z. (2018). Digital Discretion: A Systematic Literature Review of ICT and Street-Level Discretion. *Information Polity, 23*(1), 3-28.

Focus: The first publication is a literature review conducted to identify the gaps in the literature, set the stage for the study, and sum up the existing knowledge relating to my research questions. The paper reviewed 44 papers on digital discretion prior to January 2017. The review was intentionally focused on a public policy implementation setting and was conducted according to the guidelines provided by Webster and Watson (2002). Five databases were searched to identify the relevant literature. The relevancy was assessed based on whether the studies focused on street-level work in public agencies according to Lipsky's understanding of street-level bureaucracy (Lipsky, 2010), discussed technology and street-level discretion, and, preferably, also included research on technology-induced managerial control of street-level discretion. Findings were organized according to the influence on four categories of public service values (Kernaghan, 2003): ethical, democratic, professional, and people values.

Contributions: The literature review contributes by synthesizing the extant knowledge on digital discretion and by identifying gaps in the literature, which require further investigation. Motivated by a previous literature review (Brodkin, 2012; Buffat, 2015; Meyers & Nielsen, 2012), this review specifically assessed the current state of research according to two guiding questions: (a) is digital discretion causing a value shift in street-level bureaucracy?, and (b) under what conditions can digital discretion cause a value shift in street-level bureaucracy?

Findings: The review shows that the context in which technology is implemented and used is vital for understanding the impact of digital discretion. The contextual explanations can be attributed to factors such as the degree of professionalization, formulation of rules, computer literacy, and the level of information richness required. For street-level work characterized by mass transactional tasks, technology has reduced or even eliminated the use of human judgment. In other types of street-level work (e.g., social work), the discretionary practices of street-level bureaucrats are less influenced. Digital discretion in public services between these extremes and novel technologies (e.g., AI) are less researched. Studying how street-level bureaucracies

change, digital discretion was found to strengthen ethical and democratic values while weakening professional and relational public service values. The street-level bureaucrats mainly reacted negatively to these changes. The changes seem to imply that the scope of street-level bureaucracy is decreasing and that it is increasingly characterized by digital bureaucrats who operate computers instead of interacting face-to-face with their clients.

5.2 Paper 2 - Theoretical foundation

Busch, P. A. (2018). Technology and Institutional Logics. In *Proceedings of the 39th International Conference on Information Systems (ICIS)*. San Francisco, CA.

Focus: The second publication is a combined literature review and position paper presenting research on technology and institutional logics in the IS field. The main premise for this paper is that the role of technology is under-explored and unclear in research on institutional stability and change (Kandathil et al., 2011). Since technologies are instantiations of institutional logics, they can signal and support different aspects of organizational work such as innovation, professionalism, and market-oriented goals. The paper investigates the extant research focusing particularly on how technology can act as an institutional carrier and how "technological norms" can function as "norms for human behavior" and thus regulate and order social life (Czarniawska, 2008). In addition, the ways in which human behavior can be guided deliberately or unwittingly by designers of technological artifacts through algorithms, programmable codes, and design considerations are also explored.

Contributions: This paper has two main contributions. First, it provides an overview of IS research that draws upon institutional logics. I show that this research stream is clustered into four perspectives focusing on (a) how agentic behavior influences logics, (b) how logics influence human behavior, (c) how technology can influence logics, and (d) how technology can influence human behavior. The second contribution is an analytical framework to systematically investigate how technological artifacts relate to institutional logics and how they can change organizing. The intention of the framework is to provide researchers with a tool to systematically investigate the interplay between human behavior and technologies

based on the people using the technologies, the maturity of the technologies, and the institutional environment in which the technologies are used.

Findings: Several conclusions can be drawn from the study. Whereas several studies expected the technology to create a new institutional order, the review suggests inconclusive results. Longitudinal studies indicate that, contrary to the dominant logic, technology use is resisted in an early phase of implementation and that elements of this use are later accepted (e.g., Hultin & Mähring, 2014). Other studies found it challenging for technology to cause radical institutional change (e.g., Baroody & Hansen, 2012). More research is necessary to understand how and why technology can influence its institutional environment. Second, human agency needs attention from IS researchers. Actors with agency are often autonomous (sometimes to the point where they reject managerial directives), they reflect on their institutional environment, and seek to change the aspects they are dissatisfied with. The review showed that agentic behavior played a vital part in the design and legitimization of new technological artifacts. Third, the theory of technology affordances and constraints (Pozzi, Pigni, & Vitari, 2014) has been applied in institutional logics studies and seems to be a promising theoretical framework for exploring the reciprocal influence between technology and institutional logics. In particular, IS researchers should pay attention to algorithms, mainly because their important role in the design and use of novel technologies (Janssen & Kuk, 2016). The final argument pertains to the eclectic and fragmented nature of the reviewed studies which requires a systematic approach to the study of technology and institutional logics. The eclecticism can be explained by the relatively newfound IS interest in the institutional logics perspective. Fragmented findings make it difficult to compare them and cumulate knowledge across different studies.

5.3 Paper 3 - Judges' considerations on digital discretion

Busch, P. A. (2017). The Role of Contextual Factors in the Influence of ICT on Street-Level Discretion. In *Proceedings of the 50th Hawaii International Conference on System Sciences (HICSS)* (pp. 2963-2972). Big Island, HI.

Focus: The third publication focuses on the contextual factors that can explain how technology influences discretionary practices. The paper builds on a case study with

interviews of judges in the court and participant observations. The study draws upon institutional theory to identify the pressures judges are faced with as a result of the increased use of technology.

Contributions: Whereas the literature has identified that technology can have both enabling and constraining effects on street-level bureaucrats, this paper contributes to the literature by identifying moderating effects on this influence, that is, the conditions under which this influence can take place. It further contributes by considering how functions and capabilities of technology and the street-level bureaucrats' ability to utilize technology may influence the phenomenon.

Findings: The findings show that technology has no unilateral effect on street-level discretion and is moderated by contextual factors. The following factors were identified: (a) social complexity, (b) the societal role of a public agency, (c) degree of professionalization, (d) computer literacy, (e) the degree to which face-to-face contact is required or desired, and (f) the potential consequences of decisions. The judges considered social complexity as a factor since it is impossible to make policies that can account for all kinds of scenarios, and that discretion is necessary to adapt them to real-life situations. Moreover, judges are highly professionalized. They belong to a profession that requires special training and entry credentials for service. They are protective of their profession and their societal role being independent of other public entities. The study also showed that a judge's ability to make use of technological features determines how discretion is influenced. Finally, face-to-face contact is sometimes required by law and most often desired by clients. These factors were considered by judges to be important obstacles for digital discretionary practices.

5.4 Paper 4 - Street-level considerations on digital discretion and behavior

Busch, P. A., Henriksen, H. Z., & Sæbø, Ø. (2018). Opportunities and Challenges of Digital Discretionary Practices: A Public Service Worker Perspective. *Government Information Quarterly*, *35*(4), 546-555.

Focus: This paper explores how and why street-level bureaucrats react to digital discretionary practices. I draw upon institutional logics to show the underlying considerations of public service workers, when they are faced with the multiple

conflicting demands from the market-oriented goals of e-government and their professional norms. The following research questions are addressed: (a) which strategies do street-level bureaucrats adopt to cope with institutional complexity in digital street-level bureaucracies?, and (b) which characteristics of public service provision can explain their preferences for a particular strategy? To identify their reactions and underlying considerations, I conducted a multiple case analysis of two Norwegian public organizations; a district court and a tax administration office. The data came from interviews and participant observations. Representative quotes are provided to illustrate the attitudes and behavior of street-level bureaucrats.

Contributions: The first contribution follows up on the previous case study by investigating how and why technology can impact on street-level discretion. The paper does this by showing how street-level bureaucrats react to the increased use of technology and their underlying motivations for such reactions. Furthermore, the paper shows how the ability to utilize technological features may determine how discretion is influenced. The second contribution relates to institutional stability and change. Even though organizational and individual responses to institutional complexity have become central to our knowledge about institutional change (Smets & Jarzabkowski, 2013), the extant research has mostly focused on the role of field-level actors (Johansen & Waldorff, 2017). This study adds to the research to how and why micro-level actors can explain institutional stability and change.

Findings: I found that street-level bureaucrats react to a potential impact on their discretionary practices through five strategic responses: compliance, acquiescence, habitual acceptance, appropriation, and defiance. These responses are explained by several characteristics of public service provision such as case complexity, information uncertainty, professional autonomy, and societal considerations.

5.5 Paper 5 - Policy maker considerations on digital discretion

Busch, P. A. (2018). Conceptualizing Digital Discretion Acceptance in Public Service Provision: A Policy Maker Perspective. In *Proceedings of the 22nd Pacific Asia Conference on Information Systems (PACIS)*. Yokohama, Japan.

Focus: The paper focuses on the conditions under which policy makers consider digital discretion suitable for public service provision. Given that the often-negative

attitude of street-level bureaucrats toward any impingement on their discretionary power is acknowledged, this paper studies policy makers who considerably influence the national digital agendas and define the boundaries of digital public service work. The study focused on policy makers on the national level. The specific research question addressed in this study is as follows: under which conditions do policy makers accept digital discretion? To answer the question, the study was carried out by interviewing four members of the Norwegian Parliament and by examining two central e-government strategy documents. The MPs resided in *The Standing Committee on Local Government and Public Administration*, which is responsible for matters regarding local government, regional and rural policy, and the organization and operation of the state and government administration. The examined e-government strategy documents are most central to the current ICT politics: (a) The Digital Agenda for Norway, and (b) The Digitalization Circular.

Contributions: The study addresses a gap in the e-government literature by seeking a policy maker's perspective, illustrating under which conditions policy makers consider technology suitable for digitizing the discretionary practices of street-level bureaucrats. It further offers theoretical contributions by providing propositions and a model that demonstrate how the various considerations made by policy makers are interrelated to the acceptance of digital discretion.

Findings: I found that policy makers view digital discretion favorably when (a) structured data and correct information are available, (b) clients are entitled to a public service, (c) legislation can be expressed in programmable codes, (d) services can lead to reorganizing how public service work is done, and (e) politicians choose to prioritize harmonized practices in favor of individualized considerations. Studying their interrelationships, the findings suggest that public services that clients are entitled to can more easily be presented in machine-readable formats and expressed using schematically formulated rules which are prerequisites for standardizing services.

5.6 Paper 6 - Cross-sectional study

Busch, P. A., & Eikebrokk, T. R. (2019). Digitizing Discretionary Practices in Public Service Provision: An Empirical Study of Public Service Workers' Attitudes. In *Proceedings of the 52nd Hawaii International Conference on System Sciences (HICSS)*. Maui, HI.

Focus: This paper describes a quantitative study to test the inferences made in the qualitative study. Based on the assumption that street-level bureaucrats are motivated by helping individual clients (Tummers & Rocco, 2015), this paper focuses on the characteristics of public service provision, which can explain their acceptance of digital discretion. I surveyed street-level bureaucrats (n=125) within eight types of public service provision: food safety authority, public roads administration, directorate of fisheries, customs offices, county governor office, courts, municipal building planning and permit offices, and municipal kindergarten administration offices. Some of the street-level bureaucrats conducted field inspections (often alone), whereas others dealt with case handling. Data analysis and hypotheses testing were conducted using PLS-SEM. SmartPLS was used as the analysis software.

Contributions: This study makes two important contributions. The relationship between public service characteristics and street-level bureaucrats' attitudes toward digital discretion have received little attention in previous research. This study contributes to this literature gap by empirically testing the theoretical assumptions from other studies. Moreover, I also identify the opportunities for digitizing discretionary practices from a street-level bureaucrat perspective, which is less researched in the extant literature. The second contribution is the presentation of measurement scales, which, although it is in an early stage of validation, can be useful for further research within e-government.

Findings: The study concludes that professional motivations and the nature of public service provision make it difficult to completely automate discretionary practices. Professional identity is the strongest explanation for the perceived importance of discretion. Considering that street-level bureaucrats are often highly professionalized, these findings imply that if public services, and discretionary practices in particular, are to be influenced by digital tools, government agencies need to address how

professional norms can be achieved. They are strongly motivated by helping clients, and their support of digital services depends on the professional outcome of digital tools. Another important explanation is decision complexity. There is something about the complexity of life, which makes discretion inevitable, and digital discretion research seems to confirm that it is difficult to remove or influence the discretionary practices within the traditional street-level bureaucracies (Buffat, 2015; Busch & Henriksen, 2018). Computer self-efficacy is strongly linked to a positive attitude toward digitizing discretionary practices. This is mainly because people with high computer self-efficacy are more likely to understand the opportunities and challenges that digital discretion offers. Since they can see the benefit of it, they are also more likely to accept the influence (Busch, 2017; Busch et al., 2018). The findings suggest that policy makers and public management should pay special attention to the opportunities that technological innovations can create; they should also heed the potential inability of street-level bureaucrats to fully utilize digital tools, due to limited training and old age.

5.7 The role of technology

The role of technology is analyzed in paper 4. However, the framework I developed (see Table 4) is not used, and hence, I herein present the findings from the analysis of material agency in the court and NTA office.

Empowerment. While CMS provides management with more informal controls, the SL system in the NTA office facilitates more formal control. By introducing these technologies, management was empowered. The formal controls in the NTA office influenced the ability of the caseworkers to exercise discretion. Since management is empowered, the technologies supported the market-managerialism logic.

Goals and values. The CMS in both street-level bureaucracies were initiated to support work practices according to the procedural law and control certain aspects of street-level work. The databases were used to provide access to legislation, previous decisions, and academic literature. Both judges and caseworkers stated that the technologies assisted them in doing their job better and more efficiently thus supporting both the institutional logics of state-professionalism and market-managerialism.

Scope of practice. The purpose of the technology was not to change the type of work that the judges conducted in the court, but rather change how these work tasks were conducted. As a result, the identity of the judges and their scope of practice were not changed, still reflecting a logic of state-professionalism. On the contrary, the CMS in the NTA office was introduced to change certain aspects of their practice scope, mainly because much of the manual routines and controls they conducted previously had been replaced by computers. Therefore, the identity of the caseworkers and their scope of practice have been considerably changed over the years, now focusing more on businesses rather than on individuals. The technology therefore reflected a logic of market-managerialism.

Control of work processes. For the judges, there were no significant technological influences on how they conducted their tasks. The CMS and the databases supported the legal methodology devised by the state-professionalism logic. However, they were provided with templates in certain types of cases, which created a habitual effect. Compared to the previous practices, the technologies in the NTA office greatly control how they work, for example, by involving multiple caseworkers nationwide in the controls of a single client.

Level of analysis. The study focused on how judges and caseworkers used the CMS and databases in their work. Both groups of street-level bureaucrats reflected homogeneous patterns of technology use.

Institutionalization. My study looked at street-level bureaucracies, where the implementation of the CMS and databases had started over ten years ago. Thus, both the judges and the caseworkers were familiar with the technologies and used them on a daily basis without too much reflection. The street-level bureaucrats found themselves following routines that reflected both the state-professionalism and the market-managerial logics.

5.8 Overall story of the dissertation

The six papers presented above constitute the overall research storyline of my dissertation. The contributions of each paper are depicted in Figure 7 presenting how my study is related to the research gap, focus, and theory.

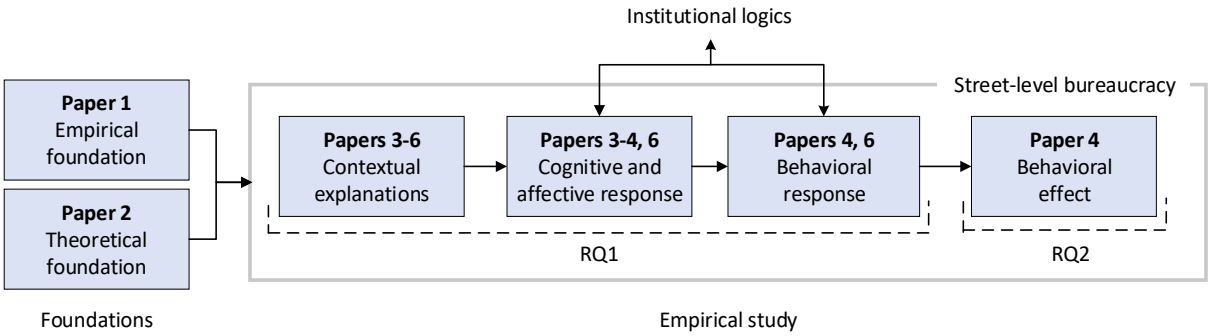

Figure 7. Each paper's contribution to the research storyline

Paper 1 is a study that reviewed the literature on digital discretion. It looked specifically for studies that discussed the technological impact of technology in street-level work. From the review, I was able to make an inventory of the extant research and identify the research gaps. It thus provided me with the empirical foundation for the study focus and strengthened the arguments presented in the introduction (chapter 1). *The second paper* presented the theoretical foundation of the dissertation. It is a combined review and position paper describing and discussing studies on technology and institutional logics. In addition to showing how institutional logics can influence and provoke human behavior, I made an argument for why material agency should not be ignored in IS studies and developed a framework for studying the role of technology in institutional logics studies. Findings and arguments from this paper are discussed in detail in relation to my study in chapter 2. *Paper 3* is an empirical analysis of the judges. It provided me with the knowledge about how street-level bureaucrats perceive the usefulness of technology in discretionary practices. Thus, it focuses on cognitive and affective responses, based on the characteristics of street-level work. It further presents the moderating effects on their behavior, even though I did not look specifically for these effects. Institutional theory is used to show which institutional pressures judges experienced in their work.

The fourth paper reports from an empirical analysis of both judges and caseworkers, reporting on their agentic behavior, explained by their considerations about digital discretion in street-level work. It uses institutional logics as theoretical lens, describing how the old institutional logic of state-professionalism coexists with and is challenged by the logic of market-managerialism as a result of technology use. Thus, street-level bureaucrats try to interpret the institutional tensions that are created. Thus, it specifically looks at the role of the street-level bureaucrats with agency (like

institutional entrepreneurs) and their influence on how influential digital discretion becomes. *Paper 5* describes the empirical findings of policy makers' considerations about digital discretionary practices. Since they are not street-level bureaucrats, their opinions do not contribute directly to my understanding of digital discretion acceptance behavior. However, as policy makers, they have expectations about how policies are implemented and about the substantial influence on the diffusion of e-government in public agencies. *The final paper* tests the inferences from the qualitative study (a developed research model) through a cross-sectional, quantitative study. The model intentionally tested the relationships between several constructs, since I was in an early stage of theorizing. A survey was conducted, which involved 125 street-level bureaucrats in eight different types of street-level work. The findings showed that decision complexity and the perceived importance of discretion had the strongest explanatory power of the endogenous constructs. Decision complexity was explained by decision severity and legislation complexity, whereas service entitlement led to less complexity. The perceived importance of discretion was explained by professional identity, technology flexibility, and decision complexity. The perceived decision quality was also tested but showed insignificant results. The policy implications drawn from the study included paying special attention to the opportunities created by the technological innovations as well as the potential inability of the street-level bureaucrats to fully utilize the digital tools due limited training and old age. The main findings from my papers are summarized according to the perspectives illustrated in Figure 7.

Contextual explanations

I have studied characteristics of street-level work as contextual explanations for why digital discretion is accepted or defied by street-level bureaucrats. These contextual explanations are presented in Table 18 substantiated by representative quotes and text passages.

Table 18. Contextual explanations for digital discretion acceptance

Contextual explanation	Description	Representative quotes and text passages
Decision quality	The extent to which professional norms can be adhered to in the decision-making process.	"Through IT, we now have access to more legal sources than we had before [..]. So, IT influences us by providing a better basis for making decisions." (Judge #1)
Societal considerations	The extent to which societal goals can be taken into consideration.	"I think that IT systems lead to more equal treatment." (Caseworker #4)
Routinization	The extent to which work processes can be transformed into routines.	"We see things pass that are wrong. However, they will not be checked since we must prioritize other areas. And this is not a good feeling [..]. So, there have been discussions about what is the smartest thing to do. If only what the computer systems have picked out is the best selection." (Caseworker #9)
Technology utilization	The extent to which specific features of technology can be utilized.	"I should have liked to see how older judges go forth when they search 'Law Data' [..]. There are dozens of useful features, but you must be aware of them." (Judge #6)
Case complexity	The extent to which many factors and their individual weight can be considered.	"[..] life comes in so many facets [..]. If you can exercise discretion, then a rule may be adapted, and the result will be correct." (Judge #1)
Information uncertainty	The extent to which information is unavailable or less trustworthy.	"We must get hold of the facts in a case [..]. We contact the taxpayer and get the facts. And sometimes, taxpayers do not respond, and we have to make an assessment." (Caseworker #1)

Table 18. Continued.

Contextual explanation	**Description**	**Representative quotes and text passages**
Professionalization	The extent to which street-level work relate to or has the characteristics of a profession.	"This has simply to do with the rule of law […]. An individual assessment should be made by a judge. A decision will not be independent and personal if automation is used." (Judge #4)
Autonomy	The degree of dependency on public management or another public agency.	"Because we want to retain our ability to exercise discretion as granted by law. And we would not accept reduced discretionary power since we are loyal to the law and the legislator. And that is the aim of and our job. ICT shall not put anything of this aside." (Judge #1)
Decision consequence	The extent to which a decision may influence a client positively or negatively.	"From a psychological perspective, one has stressed that children should meet whoever made the decision that they should stay with mom or dad and explain why [..]. This is no easy task for a computer." (Judge #5)
Entitlement	Whether a client is entitled to a service.	"When you know you're entitled to [..] if you apply for parental leave after a child is born, it is not a question of whether you will receive it. It is not about exercising discretion." (MP #2)
E-legislation	The extent to which the legislation can be prepared for (semi-) automation.	"Rules must be technology-neutral. No new regulatory barriers should be made, and existing, unintended obstacles must be removed." (DC, 2017, §1.2)

Digital discretion acceptance (cognitive, affective, and behavioral response)

Digitalized street-level work is guided by the coexisting institutional logics of state-professionalism and market-managerialism. These logics create institutional tensions with multiple, and sometimes opposing, demands that street-level bureaucrats need to make sense of to consider the impact of digital discretion. Street-level bureaucrats react to digital discretion through five strategic responses: compliance, acquiescence, habitual compliance, appropriation, and defiance.

Street-level bureaucrats are positive about digital discretion when professional aspects of their work are supported, and societal considerations suggest increased technological impact. I was not able to support this finding in the quantitative study, since the relationship between the perceived decision quality and attitude toward digital discretion was insignificant. Street-level bureaucrats acquiesce in digital discretion when routines can be formalized and made more efficient: they still prefer to retain their discretionary power, but they consider the benefits of digital discretion to be too substantial to ignore. In these situations, they adhere to a market-managerialism logic. Routinization can also lead to habitual acceptance, together with the ability of street-level bureaucrats to utilize technology. They accept computerized routines by habit, since these routines tend to become institutionalized. The extent to which street-level bureaucrats can utilize technology is based on a variety of factors such as computer proficiency, computer training, the features that technologies afford, and their ease of use. Habits may be established based on the convenience that technology offers in streamlining work processes and can be the practical outcome of technology use, even if it is not intended. Habitual behavior can occur as a result of both conscious and unconscious acts and reflect both logics.

Yet another strategy that street-level bureaucrats can adopt is appropriation which is a mild form of resistance to technology use. Appropriation refers to how street-level bureaucrats "may choose not to use the technology or use it in ways that undermine its 'normal' operation" (Orlikowski & Robey, 1991, p. 153), contrary to the intentions of its designers and adopters. Since even similar cases can be treated differently, it is difficult to create computerized routines that capture the complexity of cases. By initiating an unintended use of technology, unreasonable outcomes can be avoided and procedures adapted to individual situations. An appropriation strategy reflects a state-professionalism logic, mainly because street-level bureaucrats seek discretionary practices according to professional norms.

When street-level bureaucrats choose defiance as strategy, they actively refuse computerized routines, which can influence their discretionary practices and challenge their application area, arguing that the characteristics of public service provision call for "human judgment that cannot be programmed and for which machines cannot substitute" (Lipsky, 2010, p. 161). A negative attitude toward digital discretion was the most common response by street-level bureaucrats and is strongly supported by a state-professionalism logic. Several underlying motivations explain their defiance strategy. First, the more professionalized street-level bureaucrats are, the more likely they are to be negative to any influence on their ability to exercise discretion. The judges were more professionalized than the caseworkers reflecting their long history as a profession. Judges were very reluctant to any influence on their discretionary practices. Second, whereas judges enjoyed a high degree of autonomy, the caseworkers did not. The more autonomous the street-level bureaucrats are, the more negative they are about digital discretion. Third, street-level bureaucrats may struggle with uncertain information, calling for discretion to identify the most likely factual basis for their decision. The caseworkers were particularly concerned with this aspect. Fourth, both judges and caseworkers emphasized case complexity where various factors need to be considered to make a good decision for clients. This finding was strongly supported by the quantitative study. Finally, decisions can affect clients in several ways. This aspect was particularly salient in the court, where the outcomes of decisions can be severe.

Technological impact on discretion (behavioral effect)

In my study, I have investigated the potential impact of digital discretion (the behavioral effect) through the cognitive, affective, and behavioral responses of street-level bureaucrats (see Figure 7). The analysis of three actors with different responsibilities for policy implementation suggests that discretionary practices are more likely to be influenced by technology in hierarchical street-level bureaucracies (e.g., the NTA office), where street-level bureaucrats are used to weak discretion, low service complexity, and/or mass-transactional services. On the contrary, digital discretion is less likely in street-level bureaucracies with less hierarchical structures (e.g., the court) where street-level bureaucrats are used to strong discretion, high complexity in cases, and/or unique situations. Table 19 summarizes the potential impact of digital discretion according to authority, strength of discretion, service complexity, computer literacy, and material agency.

Table 19. Potential impact of digital discretion

Court	NTA office	Government and Parliament
Authority		
Judges have a strong professional identity and do not accept digital discretion unless it supports professional aspects of street-level work.	Caseworkers were used to a hierarchical structure. Whereas they spoke highly of professional practices, they were more susceptible to managerial incentives and control.	Policy makers expect street-level bureaucrats to safeguard professional aspects of street-level work as well as adhering to managerial goals whenever possible—especially when increased efficiency, reduced costs and work practices can be changed.
Strength of discretion		
Judges are used to exercising strong discretion and protecting their discretionary power.	Caseworkers see similarities in many cases that do not require much discretion. However, they want to protect their ability to exercise discretion according to their professional identity.	Policy makers consider services that require weak discretion to be more suitable for digital discretion.
Service complexity		
Judges believe that almost every case has a different content and complexity thus requiring individual and professional assessment.	Caseworkers can have cases that can be both simple and very complex. The latter cases require professional judgment.	Policy makers believe that street-level bureaucrats need discretion to adapt policies to local contexts.

Table 19. Continued.

Court	NTA office	Government and Parliament
Computer literacy		
Younger judges believe that older judges make less use of the inherent features of the technology, since they are not aware of them. Thus, computer-literate judges more seldom miss out on professional benefits of technology use.	The caseworkers stated that the SL system was complex to use, and that training was necessary.	N/A.
Material agency		
Technologies favored both professional norms and market-managerial goals.	Technologies favored both professional norms and market-managerial goals. The support of market-managerial goals and values was stronger in the NTA office.	Policy makers consider technology suitable for supporting objectivity and the rule of law according to professional norms.

6 Discussion

This study is guided by two broad research questions. They are answered and discussed in sections 6.1-6.2. My contributions to theory are presented in section 6.3 and suggestions for future research are presented in section 6.4. I end this chapter with recommendations for practice in section 6.5.

6.1 Research question 1: considerations about digital discretion

The first research question was:

RQ1: What are the enabling and hindering factors of digital discretionary practices?

Street-level bureaucrats have a strong professional identity and their support depends on the professional outcome. According to them, information uncertainty, decision severity, and legislation complexity makes discretion necessary, especially within traditional street-level bureaucracies. Other factors such as the ability to utilize technology, societal considerations, the potential to routinize practices, e-legislation, and service entitlement can shift street-level bureaucrats in favor of digital discretion. The analysis of the quantitative data showed that professional identity was the strongest explanation for the perceived importance of discretion, followed by decision complexity. Computer self-efficacy was strongly linked to a positive attitude toward digitizing discretionary practices. The potential to reorganize public agencies was vital for policy makers. They recognized that, even though the choice of technology is important, digitization is not merely about "electrifying" the public sector. They consider digital discretion favorably when the legislation could be made technology-friendly and reassuring of information quality. Furthermore, they considered public services that clients were entitled to as more suitable. On certain occasions, a harmonization of discretionary practices could be a result of political priorities.

Judges and caseworkers are professionals and semi-professionals. Since they are motivated by and concerned with the professional aspects of street-level work, they mainly, but not entirely, consider opportunities and challenges of digital discretion related to these aspects. In general, they are reluctant to any influence on their ability to exercise discretion which they perceive as an important prerequisite for making quality decisions about clients. Policy makers have additional considerations about

digital discretion. They are concerned with both managerial goals such as increased efficiency and cost reductions as well as the professional aspects of public service provision. Whereas high-level policy makers have a strong focus on opportunities, street-level bureaucrats, for the most part, focus on the challenges of digital discretionary practices.

Policy makers largely consider opportunities to standardize manual work practices and reorganize public agencies. They recognize that even though choice of technology is important, the use of technology is not merely about "electrifying" the public sector. They further reckon that work processes must be changed to realize e-government benefits. While possibilities for reorganizing structures and work processes are incentives for accepting digital discretion, it seems to be a significant difference between written e-government visions and realized benefits acknowledged by policy makers who emphasize that greater commitment and courage is needed to realize the benefits of digitalization. Whereas the public sector often has been slow in utilizing opportunities offered by innovative technology, they point out the importance of identifying opportunities for standardizing manual work tasks including exploiting emerging technologies such as big data and AI. AI is not common in public agencies, but they are committing their efforts to being better able to fulfill their societal mission. The automation of case processing may have an impact on how public services are organized and designed in the future. When work practices change, the need for competence changes accordingly. Routinized jobs disappear, being replaced by more specialized and knowledge-intensive jobs, creating a growing need for adapting the workforce to innovative technologies.

Street-level bureaucrats are more positive to technology, when it could enable them to do a better job. Services that clients are entitled to were frequently mentioned to illustrate the suitability of digital discretion. If the outcome of the decision they made were predetermined based on policies, there was simply no need to exercise discretion. For example, if a child is eligible for a place in the kindergarten, there is no need for a street-level bureaucrat to assess the case. Street-level bureaucrats also saw the opportunities related to routinized tasks. Both judges and caseworkers discussed how certain practices of theirs were strongly based on routines and therefore should be considered for digital discretion. In the tax administration, several of these tasks had already been automated leaving the caseworkers with tasks requiring their analytical skills. In general, they were happy about this development, even though the number of

caseworkers had been considerably reduced over the years. The number of routine tasks was far less in the court, but they did have tasks, such as forced sales of residences, which they had to decide on. These tasks were often routine requiring no professional judgment from their side.

Policy makers emphasize two important prerequisites for digital discretion: the quality of public information must be improved in terms of its correctness and its ability to be machine-processable. Whereas information can be utilized as a solid foundation for better decisions, if intended for digital discretion, it presupposes certain vital attributes. First, the information must be correct. To ensure intrinsic information quality, reliable sources must be used, and users should provide their information only once. To be able to use pre-filled information for automated services, the public administration must reuse the information it already has. Second, the increased use of technology in society generates substantial amounts of data that can be utilized in different contexts, if they fit the task at hand; examples of such data include those generated in businesses, public data like maps and traffic data, and real-time information collected from sensors in public spaces. The purpose is to identify patterns irretrievable through traditional data analysis methods. The combination of structured, unstructured, and real-time data can uncover relationships public service providers never would have looked for and be used in areas such as in combating crime. Third, data must be presented in a way that facilitates ease of use. This can be done by making data available in machine-readable formats for internal and external use. New information systems are required to make data from various services available in machine-readable formats and with description of its content (metadata). In addition, policy makers consider information security as a prerequisite for confidence in digital solutions. Information should be handled using a risk-based approach, assessing current threats and vulnerabilities and followed up through internal controls (Busch, 2018a).

For street-level bureaucrats, the monitoring and control of work practices entail that they be held accountable hierarchically which resonate poorly with their sense of autonomy (Giest & Raaphorst, 2018; Hupe & Hill, 2007). Depending on their professional status in the organization, street-level bureaucrats may therefore be somewhat reluctant to use technology in street-level work. What stood out from my study was that the judges, representing highly professionalized street-level bureaucrats, were reluctant of any influence on their discretionary practices. The caseworkers in the tax administration were also frustrated by some of the controls

imposed upon them. However, they were more used to working with "weak discretion" and interpreting rules within a more narrow framework than judges having "strong discretion" (Dworkin, 1978; Giest & Raaphorst, 2018). Judges strongly expected to be entrusted with discretionary power. They were also reluctant to draw on digital discretionary practices, mainly because of the complexity associated with decision-making. They refer to uncertainty about facts, complex processes to find out how policies should be interpreted, and the potential consequences of decisions. Both judges and caseworkers assessed it as necessary to have discretionary power to be able to overcome these shortcomings. In addition, they also prefer face-to-face interactions on many occasions (Giest & Raaphorst, 2018).

6.2 Research question 2: changes in public service provision

The second research question was:

RQ2: How is street-level discretion influenced by technology?

My findings suggest that the behavior of street-level bureaucrats is strongly associated with five characteristics of street-level work: (a) authority, (b) strength of discretion, (c) service complexity, (d) computer literacy, and (e) material agency. There was a significant difference between the judges in the court and the caseworkers in the tax administration, relating to these characteristics. In the following section, I organize my discussion according to the four main topical areas identified in digital discretion research: (a) managerial control of formal aspects, (b) standardization of practices, and technological impact on (c) discretionary practices and (d) public service quality.

Technological impact on street-level work is strongly associated with the monitoring and control of work practices. Street-level bureaucrats comment that technology is used to monitor formal aspects of their work, that is, how many cases they handle each day, how fast they handle cases, and the information they provide about each case. Formal monitoring can be stressful. The judges remarked that a case could be removed from an assigned judge and reallocated to another judge, if a deadline was not met. In addition, they were concerned with the efficiency of the court, which was measured regularly and compared to other district courts in the country. The caseworkers did not express any particular concerns about formal monitoring. Whereas formal aspects of discretionary practices are easily supervised through technology, informal aspects can

become hidden from the management (cf. Jorna & Wagenaar, 2007). Judges, in particular, said that the amount of discretion exercised in a specific case was difficult to monitor through technology. The management has also sought to control work practices of street-level bureaucrats, through scripts embedded in various technologies. These scripts separate the practices that are deemed "appropriate" by public management from those which are not. While the literature has identified situations where street-level work is deprofessionalized in terms of allowing unqualified staff to conduct work tasks or even involving clients themselves (Pithouse et al., 2011; Reddick, 2005), my empirical work showed that changes were related to automating or semi-automating routine tasks, leaving caseworkers with analytical tasks requiring their professional judgment. Thus, the caseworkers did not express any concerns about deprofessionalization, but rather viewed the development as favorable for them. In the court, the chief judge was positive about the developments aimed at reducing judges' involvement in routine tasks. From my study on judges and caseworkers, managerial control was less salient in the court, since they are constitutionally independent, enjoy strong discretion, and often deal with cases of high complexity, which require analytical skills.

There have been many discussions and visions about how various technologies could automate tasks and ultimately steal jobs. Matthew L Smith (2011), although writing in 2011, is pessimistic about the potential of technologies for extensive changes, claiming that they have structural limitations, which delimit how far they can go. On the other hand, AI (e.g., IBM's Watson) has shown that even tasks traditionally associated with specialized knowledge and analytical thinking, such as patient diagnosis, are now more prone to replacement. Global companies such as Gartner and PwC have previously forecast that close to half of all American jobs would be automated and thus leave many people unemployed (Ford, 2016; Frey & Osborne, 2013). One of these technology prophecies was quoted at the beginning of my thesis:

> If a robot could do your job quicker than you and better than you for no pay, would you still be employed? Today it's travel agents, data-analysts and paralegals whose jobs are under threat. Soon it will be doctors, taxi-drivers and, ironically, even computer programmers. Without a radical reassessment of our economic and political structures, we risk the implosion of the capitalist economy itself (Ford, 2016).

Based on my findings, I am not able to draw such dramatic conclusions. My findings, similar to those of other researchers, suggest that different digital tools impose different affordances and constraints on street-level discretion (Høybye-Mortensen, 2013). Moreover, the ability of street-level bureaucrats to utilize various technologies has a significant impact on the digital footprint on discretionary practices. Rather than posing imminent threats against jobs, technology seems to create a shift in the types of tasks that street-level bureaucrats conduct, and new jobs are still being created—similar to the observations made in the wake of the industrial revolution. There may be shorter periods of unemployment as a result of a transition from an informating street-level bureaucracy to a more technocratic governance. My findings further suggest that jobs that previously required no education are now being replaced by high-competency jobs. The caseworkers shared the experience that, while they could once become hired and trained on the job, the NTA now almost exclusively hires professionals and semi-professionals. From my findings, I cannot discern that a massive automatization of public services should be expected, but rather incremental changes in hierarchical public agencies dealing with routine tasks and cases of lower complexity. Street-level bureaucrats working in the area between routinized, mass-transactional tasks on the one hand and complex tasks on the other, seem to be increasingly exposed to and influenced by various technologies. The diffusion of technology into public agencies has caused structural changes in some street-level bureaucracies, leading to computerized interaction with clients instead of face-to-face contact.

The most pessimistic visions about novel technologies, such as AI, are already about to change. Instead of predicting the demise of the industrialized countries, the visions are now far more positive (e.g., Rao & Verweij, 2017). However, there are considerable differences in terms of automatability (i.e., low level of routine jobs) in different countries. Whereas Norway has the lowest level of automatability, the Slovak Republic has the highest according to a recent report by the OECD (Nedelkoska & Quintini, 2018). As long as technology replaces routine tasks, it both supports professional and managerial aspects of street-level work. Whereas Lipsky (2010) claimed that society is not prepared "to abandon decisions about people and discretionary intervention to machines and programmed formats" (p. xix) and that "street-level bureaucrats have discretion because the nature of service provision calls for human judgment that cannot be programmed and for which machines cannot substitute" (p. 161), my findings suggest that society *does* leave certain decisions to computers and that public service provision is changing to a certain degree. While

policy implementation can be viewed as a succession of several sub-stages that outline how decision needs occur, how information is collected and assessed, as well as what discretionary practices, internal controls of decisions, and implementation of actions required by the decision (Busch, Under review), I observe that technology is increasingly used in several of these sub-stages, especially in the early stages. The actual exercise of professional judgment seems to be less influenced. The influence happens gradually and is characterized by moving street-level bureaucrats from the streets to the front of the computer screens in office buildings.

This shift suggests that professional aspects of discretionary practices are partly undermined. Digital solutions have experienced radical changes in supply and capacity and have the potential to shift the bases of legitimacy from street-level work, driven by professional norms, to goals associated with a market-managerial orientation. However, this influence should not be exaggerated. Whereas the government was most eager for the opportunities of digital discretion, the MPs—regardless of political affiliation—spoke highly of the necessity of discretion. Where discretion could be reduced, the MPs mainly talked about routine tasks and public services, which clients were entitled to. The recognition of novel technologies (e.g., AI) could be identified among policy makers, but not to the extent that they would be ready to replace complex tasks with computerized practices. Street-level bureaucrats expressed similar views regarding routine tasks and service entitlement. But they also emphasized that technology can help them in making better decisions in the preparatory stages. However, they added that discretionary practices should remain as they are, since they are considered a prerequisite for making quality decisions about clients. In other words, current developments seem to replace tasks for the completion of which professional expertise is not so important, compared with tasks for which professional judgment is highly appreciated—a development mainly welcomed by street-level bureaucrats.

6.3 Theoretical contributions

To describe how theory relates to a study, three Es can be used as a rule of thumb (Figueiredo, Gopaldas, & Fischer, 2017). The first E (*enabling*) describes how a theory can be used as an analytical lens to analyze data. Whereas theory enables us to understand phenomena through the work of others, this is generally not considered a theoretical contribution. However, it may be if the theoretical lens is applied in a new

context increasing the understanding of the lens' utility. In my study, I do not make such claims. I have used institutional logics to understand the institutional complexity of street-level bureaucracies influenced by digital tools, micro-level agency, and the role of technology in institutional stability and change (see section 2.4 and papers 2 and 4). The second E (*emergent*) describes how a study can build theory, for example, through case studies (Eikebrokk & Busch, 2016; Eisenhardt, 1989). An updated research model is developed, combining constructs developed in my own work (early model development is described in paper 6) with the existing UTAUT (see section 6.3.1). This model is not tested. The last E (*enriching*) describes how empirical work can contribute to the existing theories and thus enrich them. Sections 6.3.2 and 6.3.3 describe how my empirical work contributes to the street-level bureaucracy and institutional logics perspectives, respectively.

6.3.1 An updated model of digital discretion acceptance

The purpose of my quantitative study was to test the inferences of my exploratory study and prepare for further theory refinement (Eikebrokk & Busch, 2016). The qualitative data analysis and further examination of the literature led to the propositions presented in papers 4 and 5. These propositions were used to develop the hypotheses and the research model (see Figure 5). I intentionally included several relevant constructs and relationships to test their validity since my work represented an early phase of theorizing. Thus, the initial model tested in paper 6 did not build on a preexisting theoretical framework. The next step in the process is to assess the results from the quantitative study and rearrange the constructs and relationships wherever necessary. The purpose is to develop a modified model that can be tested in a subsequent study (Eikebrokk & Busch, 2016).

Since my study focuses on the acceptance of various technologies based on their influence on street-level discretion, I chose to combine my digital discretion acceptance model (DDAM) with a technology acceptance model (see Figure 9). Technology acceptance behavior has been studied extensively in IS and other disciplines, especially through the technology acceptance model (TAM) and UTAUT (F. D. Davis, 1989; Venkatesh et al., 2003; Venkatesh, Thong, & Xu, 2012). UTAUT was developed after reviewing, mapping, and integrating eight theories focusing on the individual acceptance of technologies: the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model (MM), the Theory of

Planned Behaviour (TPB), a combined Theory of Planned Behaviour and Technology Acceptance Model (C-TPB-TAM), the Model of PC Utilization (MPCU), the Innovation Diffusion Theory (IDT), and the Social Cognitive Theory (SCT). The rationale behind UTAUT was to create a unified theoretical basis for technology acceptance behavior instead of using several theories. The theory has been applied in numerous contexts, such as in e-government and consumer research (e.g., Escobar-Rodríguez & Carvajal-Trujillo, 2014; Gupta, Dasgupta, & Gupta, 2008). I have chosen to build upon elements of UTAUT2 (Venkatesh et al., 2012), since it has shown higher explanatory power than any other model of technology acceptance behavior (Bandyopadhyay & Fraccastoro, 2007). The UTAUT model consists of three core determinants of behavioral intention (BI) and use behavior (UB): performance expectancy (PE), effort expectancy (EE), and social influence (SI). A fourth construct, facilitating conditions (FC), determines UB directly, but is not used to predict BI. Habit (H) has later been added in the extended UTAUT2 (Venkatesh et al., 2012) since there is an increasing recognition that BI is not the sole predictor of UB. In fact, Ajzen and Fishbein (2005) noted that what best could predict future technology use behavior was past behavior. Four moderating variables are included in UTAUT: gender, age, experience, and voluntariness of use. The UTAUT model is shown in Figure 8.

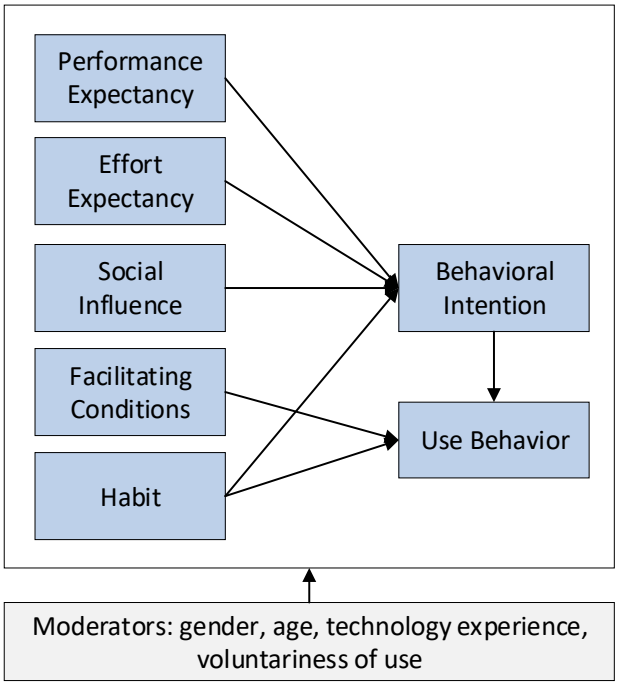

Figure 8. Unified theory of acceptance and use of technology (UTAUT)

UTAUT was used in combination with the constructs I identified for digital discretion acceptance. I have suggested extensions to the UTAUT model in terms of endogenous variables explaining performance expectancy and exogenous variables. Variables added to the UTAUT model is shown in yellow. In addition, I have added technology flexibility as a moderating effect. The updated DDAM is shown in Figure 9.

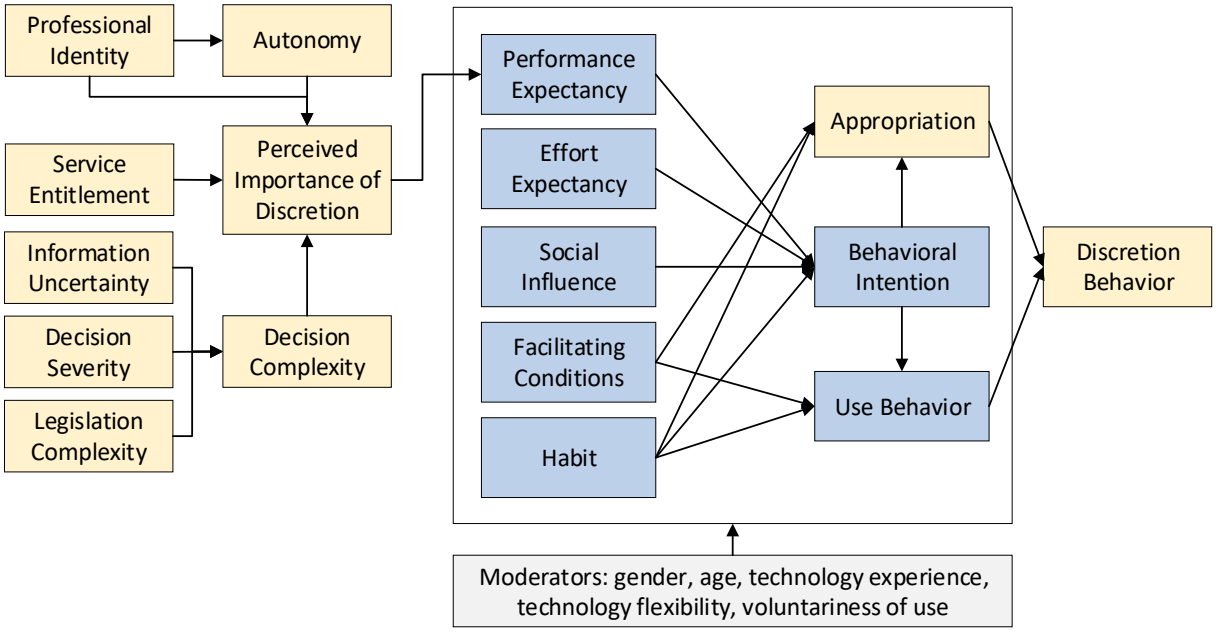

Figure 9. Digital discretion acceptance model (DDAM)

The rationale for combining the elements of UTAUT with the identified, and previously tested, constructs for digital discretion acceptance is explained in the following. First, I describe how the UTAUT elements fit my study of digital discretion acceptance. PE is "the degree to which the user expects that using the system will help him or her to attain gains in job performance" (Venkatesh et al., 2003, p. 447). In my study, PE is understood as the degree to which a street-level bureaucrat perceives digital discretion to be more useful in street-level work than exercising discretion. The perceived importance of discretion (PID) is expected to influence PE negatively. Both my study and the literature strongly suggest that the willingness of street-level bureaucrats to use technologies that can potentially constrain their discretionary power is dependent on the usefulness of the technologies, that is, to what extent they enhance the professional aspects of their work (Busch & Eikebrokk, 2019; Busch et al., 2018; Giest & Raaphorst, 2018). The more discretion is perceived as important, the less street-level bureaucrats will deem technology appropriate for street-level work, replacing the previously perceived decision quality construct. The literature has shown

that PE is the strongest predictor of BI in both voluntary and mandatory settings (Venkatesh et al., 2003). The relationship between PE and BI is moderated by gender and age, where the effect of PE on BI is stronger on younger people and men. My findings did not suggest any moderation for gender and age relating to the effect of PE on BI.

EE describes the degree of efforts expected in order to use a technological artifact (Venkatesh et al., 2003). Some technologies may be complex and require more effort, before a user can master them. A street-level bureaucrat may consider the ease of use of technologies enforcing digital discretion. My findings suggested that technologies that could ease the burden of street-level work would be used by street-level bureaucrats if they were available (Busch, 2017). The relationship between EE and BI is moderated by gender, age, and experience. Studies show that the effect of EE on BI is more significant for women, older people, and less experienced workers (Venkatesh et al., 2003). My study further suggests that street-level bureaucrats with a higher computer self-efficacy were more likely to use technology and use it more, thus becoming more prone to be influenced by it (Busch, 2017). My study also seems to support that older people were more reluctant to use technology or at least to fully utilize it, mainly because of the learning curve (Busch, 2017).

SI refers to the extent a user believes that significant others expect them to use a certain technology (Venkatesh et al., 2003). Street-level bureaucrats may be expected by public management to use certain digital tools even though use is not mandatory. Street-level bureaucrats are often subordinated to public management, which can both expect and encourage them to use certain technologies. Therefore, SI is expected to influence behavioral intention. Even judges who enjoy great autonomy are expected to use technology in their work. My study does not provide any hints on the moderating effects for this relationship. Whereas SI has a direct effect in mandatory settings, being particularly important in the early stages of the individual experience of the technology, SI seems to influence the perceptions about technology in voluntary settings (Venkatesh et al., 2003). My findings did not suggest such an influence since the use of the CMS and databases were mandatory for judges and NTA caseworkers. The impact of SI on BI tends to be more important among women, older people, and less experienced users. My study did not identify any of these moderating effects.

FC refer to the extent to which a user believes that organizational and technical infrastructures exist to support the use of technology (Venkatesh et al., 2003). Older people and people with more experience expected a stronger presence of FC for their BI (Venkatesh et al., 2003). A street-level bureaucrat may be more positive toward digital discretion if he believes that the system is controlled by him. My study further suggests that street-level bureaucrats expected FC in terms of training and computer support of technology use, in particular among older workers (Busch, 2017; Busch & Eikebrokk, 2019).

H is defined as "the extent to which people tend to perform behaviors automatically because of learning" (Venkatesh et al., 2012, p. 161). In my study, habit describes how street-level bureaucrats can learn and repeat practices which can reduce discretion. My study strongly suggests that street-level bureaucrats' use of technology and its impact on discretion are affected by habitual behavior (Busch, 2017; Busch et al., 2018). Technologies that could ease the burden of street-level work were used frequently in busy working environments (Busch, 2017). Venkatesh et al. (2012) hypothesize that the effect of H on UB is moderated by experience, gender, and age, showing a stronger effect for older men with high levels of experience with technology. H also affects BI, suggesting a stronger effect for older men with high levels of experience with technology. My findings suggest that older and more experienced street-level bureaucrats were more inclined to exhibit habitual behavior. For in-depth descriptions and definitions of UTAUT constructs, readers are referred to the UTAUT literature (e.g., Bandyopadhyay & Fraccastoro, 2007; Venkatesh et al., 2003; Venkatesh et al., 2012).

After explaining how the elements of the UTAUT model can be used to explain digital discretion acceptance, I now continue by explaining how the identified, and previously tested, constructs from my empirical study qualify as extensions to the UTAUT model. The endogenous variables mainly come from my exploratory quantitative study supported by data from my qualitative study. Their relationships are modified, based on the empirical study as well as further examination of the literature. When considering DDAM, I looked specifically at the Stone-Geisser's predictive relevance (Q^2) value for endogenous variables (Busch & Eikebrokk, 2019; Hair et al., 2014). This measure showed that my model has predictive relevance for several constructs. The model showed the highest predictive relevance for DC and PID. Compared to my previous model, I have included autonomy as an explanation for PID. This is because

highly professionalized street-level bureaucrats are autonomous and expect professional freedom. Thus, those who enjoy great autonomy are more likely to perceive discretion to be important in their work. SE is changed to influence PID directly instead of DC, since services that clients are entitled to should require no discretion. Not surprisingly, the relationship between SE and DC was validated in the previous model, since SE necessarily decreases DC. Since the correlation was not particularly strong and decisions in these cases are characterized by routinization, I suggest a direct link to PID instead. Information uncertainty (IU) is included in place of information quality (IQ). Based on my study, IQ can be viewed as a performance expectancy of technology rather than a prerequisite for improved performance. IU on the other hand is suggested to influence DC, mainly because IU requires the attention of street-level bureaucrats (Raaphorst, 2018).

I have included appropriation in addition to actual use behavior since my study suggests that technology is sometimes appropriated when it does not fit street-level expectations (Busch et al., 2018). Appropriation here refers to how street-level bureaucrats may choose to use technology "in ways that undermine its 'normal' operation" (Orlikowski & Robey, 1991, p. 153), contrary to the intentions of its designers and adopters. Whereas technology is purposely designed to encourage certain use patterns, its use may be adjusted according to needs and goals that street-level bureaucrats consider important (Busch et al., 2018). Appropriation can be done overtly by openly adapting the use of technology, or covertly by decoupling elements of their practices from expected routines (Berente & Yoo, 2012; Jorna & Wagenaar, 2007; Keymolen & Broeders, 2011). Finally, discretion behavior is included in the model to measure the actual influence of technology on the discretionary power of street-level bureaucrats. This construct was not included in the initial model.

Discussing theory in the IS discipline, Gregor (2006) describes theory in terms of five theory types: theories for analysis, explanation, prediction, explanation and prediction, and design and action. I have developed a model that explains digital discretion acceptance. Rather than claiming causality, I have shown how different constructs are interrelated (cf. Gregor, 2006). My model can *predict* acceptance by street-level bureaucrats and *explain* how they consider the suitability of digital discretionary practices in street-level work. The model consists of the four essential building blocks that Whetten (1989) argues a theoretical contribution should contain: factors (variables, constructs, concepts), their interrelationships, explanations for

interrelationships, and contextual limitations. Using Gregor (2006), I describe the structural components of my theory in Table 20.

Table 20. Structural components of DDAM

Theory component	Representation(s) in DDAM
Means of representation.	The theory is represented graphically in terms of a model.
Main constructs.	Decision complexity, perceived importance of discretion, professional identity, autonomy, appropriation, discretion behavior.
Statements of relationship.	Associative.
Scope.	Street-level bureaucracies; may be applied in other settings.
Causal explanations.	Not present.
Testable propositions (hypotheses).	The model consists of constructs whose relationships between them can be tested empirically.
Prescriptive statements.	Not present.

The model is a novel theory still in development. I adopt dimensions identified by Corley and Gioia (2011) to evaluate my theoretical contribution[3]. They evaluate theory based on its originality (incremental and revelatory insight) and utility (scientific and practical usefulness). Corley and Gioia (2011) understand *incremental insight* as a question of how significant an advance in knowledge is needed to constitute a theoretical contribution. *Revelatory insight* is achieved when a new theory "allows us to see profoundly, imaginatively, unconventionally into phenomena we thought we understood .... theory is of no use unless it initially surprises—that is, changes perceptions" (Mintzberg, 2005, p. 361)—similar to revolutionary cumulation (Eikebrokk & Busch, 2016; Kuhn, 2012). A theory is *scientifically useful,* when it has the potential to improve research practices (Corley & Gioia, 2011). Finally, a theory is practically useful, if it has the potential to improve managerial or organizational practices (Corley & Gioia, 2011). Table 21 lists these dimensions and the evaluation criteria as well as my evaluation of DDAM.

[3] Several frameworks for evaluating theory exist. For example, Weber (2012) whose framework evaluates a theory according to its parts and the theory as a whole. However, I consider this evaluation framework more suitable for theories that have been applied and tested in several studies.

Table 21. Framework for evaluating the theoretical contribution of DDAM

Dimensions	Evaluation criteria	Evaluation of DDAM
Originality (what is new?)		
Revelatory.	• Interesting. • Surprising. • Novel and unique.	The theory provides novel knowledge, which should be interesting. It does not, however, represent any paradigm shift.
Incremental.	• Knowledge advancement. • Theoretical advancement. • Best possible explanation.	The theory is new and builds on gaps in our understanding of how technology influences discretion (e.g., Buffat, 2015). Whereas the most parsimonious explanation is sought, the theory needs to be tested (and refined).
Utility (so what?)		
Practically useful.	• Applicable to practical real-life problems.	The theory helps practitioners understand attitudes toward digital discretion and associated behavior on the street-level. It can further aid in avoiding street-level resistance and appropriation of technology.
Scientifically useful.	• Improve conceptual rigor. • Outline specificities. • Can be operationalized. • Can be tested empirically.	The theory represents the early steps to conceptualize and empirically test digital discretion acceptance.

Overall, in evaluating DDAM based on Corley and Gioia (2011), my findings suggest that it represents early steps of theory-building, which can result in high-quality theory. The theory adds to UTAUT and focuses on the important phenomenon of why street-level bureaucrats accept and use technologies that can constrain their discretionary practices, introduces moderation effects that can explain digital discretion acceptance, and are subject to rigorous empirical validation. Since DDAM is still in an early stage of development, it has relatively low parsimony and further empirical tests are needed to validate its constructs and relationships. Whereas DDAM represents emergent theory from my study, the massive use of technology in public service provision illustrates that the street-level bureaucracy perspective needs reconsideration.

6.3.2 Contributions to the street-level bureaucracy perspective

Governments worldwide will face great challenges in the future. The population of the elderly increases in many places, more people require public services, some countries struggle intensively with matters of corruption and cultural biases, and ever-increasing number of clients expects better services, mainly because of the opportunities that digitalization has brought about. Recognizing these challenges, Lipsky has added a new chapter in the anniversary edition of his book, in which he addresses government improvement. He explains why this "improvement project" is necessary:

> Recognizing that the twenty-first century is characterized by a deep skepticism about government, efforts to improve government performance take on new meaning. Improving schools or the welfare system or policing are not just matters of achieving more effective public services at the appropriate cost. They may also be understood as contributing to a more substantial agenda in which government, by improving its public services, across all the divides of race, ethnicity, and class, is perceived as fair and trustworthy.
> Lipsky (2010, p. 221)

This way, Lipsky (2010) links government improvement with street-level improvement, since government capacity and confidence in the government are closely related (Brodkin, 2012). Since street-level organizations occupy a substantial amount of government personnel (Snellen, 2012) and form the operational core of the state, "their practices assume deep political importance, potentially building or undermining support for government as a vehicle for advancing social welfare, equity, and justice" (Brodkin, 2012, p. 7). It is against this backdrop that the interest in and the promotion of digital discretion among policy makers and public management must be interpreted. Its potential lies in the opportunity to achieve efficient, low-cost, and fair services, and yet achieve what clients perceive as improved service quality. Lipsky (2010) is surprisingly vague about the potential of digital discretion for his "improvement project". That he, in 1980, claimed that "the nature of service provision calls for human judgment that cannot be programmed and for which machines cannot substitute" (p. 164) is no wonder; the personal computer had yet to see its glorious entry into public offices. However, in 2010, the story is an entirely different one. There is "no" public office (almost literally!) that does not have some kind of technological artifact for work-related purposes. Lipsky (2010), recognizing the challenges that street-level work faces, continues explicating his bottom-up views on policy

implementation, and seems to ignore how technology can influence or replace street-level discretion on some occasions. Instead of discussing when and how technology can do a better job, he holds on to the belief that clients are always better served when street-level bureaucrats exercise discretion. Both the literature and my empirical study suggest that this belief is a misbelief in the information age.

The way technology is implemented in street-level bureaucracies has made them more fragmented and less uniform. Since an increasing number of street-level bureaucracies is characterized by digital bureaucrats, operating computers instead of interacting face-to-face with their clients, it makes less and less sense to talk about street-level bureaucracy. A street-level bureaucracy can instead be characterized as what I have termed an infocracy (originally termed by Zuurmond, 1998), a canocracy (the term is derived from the Greek word κανόνας meaning rule, and κράτος, meaning power – indicating a rule-based system), or a robocracy. Table 22 describes the four types of street-level bureaucracies in the information age. The descriptions are based on my empirical work and the work of Bovens and Zouridis (2002), Sheridan (1992), and M. L. Smith, Noorman, and Martin (2010).

Table 22. Street-level bureaucracies in the information age

Type of public agency	Degree of automation	Degree of automation (Sheridan, 1992)	Description and example
Street-level bureaucracy	1. No automation (full discretion)	1. Technology offers no assistance, humans must do it all.	A human considers various decision alternatives and makes a decision. *Example:* A teacher decides on measures for improved learning.
Infocracy	2. Limited automation	2. Technology offers a complete set of action alternatives, and 3. narrows the selection down to a few, or 4. suggest one, and 5. executes that suggestion if the human approves	Decision alternatives are devised by the computer, but a human makes the decision. *Example:* A judge is provided with a template for routine decisions but can at any time deviate from it (Busch, 2017).

Table 22. Continued.

Type of public agency	Degree of automation	Degree of automation (Sheridan, 1992)	Description and example
Canocracy	3. Considerable automation	6. Technology allows the human a restricted time to veto before automatic execution, or 7. executes automatically, then necessarily informs the human, or 8. informs him after execution only if he asks, or 9. informs him after execution if it, the computer, decides to.	Decision alternatives are analyzed and executed by a computer; may be overruled by a human. *Examples:* Librarians use systems that automatically close accounts of users. Restrictions can be reversed by librarians[4]. Tax reports are generated automatically based on data from different actors (e.g., employers and financial institutions). If not changed by the human, a decision is automatically made by the computer.
Robocracy	4. Full automation (no discretion)	10. Technology decides everything and acts autonomously, ignoring the human.	Decision alternatives are analyzed by a computer and a decision is made. *Example:* A student applies for a student loan. Information about income and other relevant information is gathered and analyzed. A decision is then made by the computer (Wihlborg et al., 2016).

The street-level bureaucracy perspective is described in detail in chapter 2. In the *infocracy*, information provided by computers are used in public service provision. Technology is most commonly utilized for information processing, where street-level bureaucrats gain access to more relevant information from clients and public

[4] This happened to me when I forgot to return an overdue book to the university library. Luckily, librarians are still in power and I was granted the privilege to loan books again!

databases. Street-level bureaucrats can be assisted by technology, which devise decision alternatives for them to consider. However, the computer will not make any decisions on its own. In the *canocracy*, computers have gained considerable influence on decision-making. In this perspective, much of the decision-making process is automated and the use of discretion is limited. In the *robocracy*, technology has led to the replacement of discretionary practices and decisions are made completely without human intervention (Peeters & Widlak, 2018; Wihlborg et al., 2016), most prominently perhaps through the automated routines where decisions are made completely without human intervention. Routinized mass transactions are more prone to automatization, and street-level discretion is eliminated in these cases (Bovens & Zouridis, 2002). Summing up, humans have the upper hand in the two first degrees of digital discretion (street-level bureaucracy and infocracy), whereas technology has the upper hand in the two latter degrees (canocracy and robocracy).

The changes in street-level bureaucracies are systemic. The descriptions of street-level bureaucracies are not random observations of changes in particular types of public services but derive from my literature review and empirical work. Rather, street-level bureaucracies are to a large extent transformed into infocracies. In that sense, they have moved "one step up the ladder" toward becoming robocracies. The article by Bovens and Zouridis (2002) is more characterized by illustrating the changes in public service provision for certain types of public services—a shortcoming they also acknowledge. However, their arguments are still valid claiming that mass-transactional services are more prone to automatization whereas traditional street-level work (e.g., teaching and nursing) are less likely to be influenced. My findings suggest a similar development. My cross-case analysis indicates that street-level bureaucrats within hierarchical structures who have weak discretion, deal with services of low complexity, and handle routine work are more likely to be influenced by digital discretion. Complex street-level work, conducted by professionals with strong discretion, requires analytical skills, which computers have difficulties with. Even though street-level bureaucracies greatly resemble infocracies, developments into canocracies and robocracies are further into the future, circumstances permitting. In addition to contributing to the street-level bureaucracy perspective, I also seek to enrich the institutional logics perspective.

6.3.3 Contributions to the institutional logics perspective

By investigating street-level bureaucrats' strategic responses to institutional complexity, my attention was drawn to understanding the dynamics between technology and institutional logics (Busch, 2018b). Only a few e-government and information systems studies have investigated how technology can influence the strength and dominance of institutional logics (e.g., Janssen & Kuk, 2016). I contribute to a better understanding of institutional stability and change by theorizing about how technology can have material agency, and either facilitate or impede institutional logics. Technology has inherent characteristics, which can either favor a logic in terms of support for certain work processes or constrain a logic in terms of the number of potential actions that street-level bureaucrats can take. These affordances and constraints can be purposefully ingrained into technologies by its designers (becoming institutional carriers). By examining the work practices of street-level bureaucrats influenced by digital tools, I was able to study how technology could enforce practices reflecting one or two logics (state-professionalism or market-managerial logics). Through this process, I found that technology could be facilitative by strengthening a logic, obstructive by weakening a logic, and subversive by supporting a non-intended logic.

In my study, I found that technology can be implemented according to an institutional logic and facilitate it. The CMS in both case organizations was implemented to support a state-professionalism logic. I observed that the system facilitated this logic by handling workflows and providing support for work processes, ensuring that they are in accordance with the legal requirements. Street-level bureaucrats are equipped with tools that lead to increasing decision quality. By theorizing the role of technology in institutional complexity, I provide an additional model for recognizing the potential of material agency. Thus, this model can serve as a theoretical foundation in studies seeking to understand how technology can be used by actors to support a particular logic gaining or defending its dominance in a field (e.g., Berente & Yoo, 2012).

The second pattern I identified showed how technology can obstruct the institutional logic it was intended to facilitate. The technology can obstruct the logic while it simultaneously facilitates the same logic. Whereas the CMS facilitated high-quality decisions by providing a better factual foundation for judges, the system provided this basis through algorithms with built-in search criteria, of which judges have limited knowledge. They trust the information that the computer provides them without any

further investigation. Thus, technology led to the creation of habitual effects, similar to the findings in other studies, where street-level bureaucrats have been found to be intimidated by the computer screen, even when their professional judgment indicates that the information cannot be trusted (Keymolen & Broeders, 2011; Wihlborg et al., 2016).

In the third type of pattern that I identified, technology supported an institutional logic other than the intended logic. This pattern illustrates the second example of technology, supporting unintentional values and norms. Here, technology turns into an unfaithful servant, strengthening another logic. By using templates that standardize decisions, judicial judgment will be directed toward a particular decision track, although, in principle, they may deviate from this track at any time. The decision-making process becomes faster, making it more convenient for street-level bureaucrats to use technology.

As described in section 3.1, my review of the literature on technology and institutional logics showed that the reviewed studies were, in essence, eclectic and fragmented. I have developed a research framework for researchers to systematically investigate the interplay between human behavior and technologies, based on the people who use technologies, the maturity of the technologies, and the institutional environment in which technologies are used. The framework is presented in Table 4 and its development is elaborated in paper 2.

6.4 Limitations and future research

Limitations of the qualitative and quantitative research designs are presented in sections 4.2.6 and 4.3.5 respectively. The contributions of this study and its limitations offer opportunities for future research. In the following, I will elaborate on the specific issues pertinent to the enabling and hindering factors of digital discretion requiring the attention of other researchers. In addition, I will elaborate on human and material agency as areas requiring increased attention by IS researchers applying the institutional lens.

Policy implementation can be viewed as a process where different tasks are conducted in different sub-stages (Busch, Under review). Whereas my literature review focused particularly on the impact of technology on street-level discretion (which is a part of

the policy implementation process), a broader review could have benefited my study. This is particularly true considering the relatively low number of identified studies, especially in the IS and e-government literature (Buffat, 2015; Busch & Henriksen, 2018). Knowledge about the conditions under which technology influences discretionary practices is scarce. However, updated literature searches show a growing body of literature. The literature on employee discretion (e.g., Avgar, Pandey, & Kwon, 2012) can provide valuable insights, and future research efforts should consider this stream of literature. Methodologically, several studies on digital discretion are conceptual, calling for more empirical studies. Many of the empirical studies apply qualitative research methods such as case studies and ethnographies. Future researchers should consider other methods such as Delphi studies, experiments, and surveys.

Digital discretion acceptance

DDAM needs further testing and development. Even though I have put great effort into identifying the constructs relating to digital discretion acceptance and explaining their interrelationships, other explanations may be included in the model. Identifying enabling and hindering factors are challenging, mainly because public service provision is very diverse and complex, spanning different cultures and jurisdictions. The utility of UTAUT also needs consideration. Reducing model complexity should also be on the agenda for future research. Whereas UTAUT constructs are operationalized into measurement items, additional constructs are not operationalized. Future research should seek to operationalize these constructs, based on the extant literature and the retained and validated items in the previous instrument (Busch & Eikebrokk, 2019).

Whereas both my qualitative and quantitative studies have focused on street-level bureaucracy as the context for informants and respondents, I believe DDAM may have implications for organizations that are not street-level bureaucracies. For example, there are several private organizations, such as asylum centers and health service providers, that provide services on behalf of public entities. Furthermore, my model can also be applied in the private sector, where discretion has been researched quite extensively (see Avgar et al., 2012). To illustrate my latter claim, I will take a service employee in an airline as an example. Whereas this employee must adhere to company policies, he or she has a certain amount of work discretion. The employee could disregard rebooking policies and reschedule a passenger, even though a low-fare ticket

normally cannot be rebooked. This choice can be justified by rational reasons such as expected bad weather (the airline prefers as few stranded passengers as possible) or oversold flights (to prevent passengers from waiting one day before their travel). This choice can also be explained by irrational reasons, such as when the employee feel sorry for the misplaced passengers and decides to help them. Whatever the reason, it is highly likely that the employee wants to retain this discretionary power and avoid having technology constraining his or her behavior. A booking system could easily be developed, so that the rebooking of low-fare tickets would not be possible without additional cost. However, that would also harm the airline itself for the rational reasons stated above. Jan Carlzon, the former chief executive officer (1981-1994) of Scandinavian Airlines System (SAS), was loved by the SAS employees for his "tear down the pyramids" policy shifting decision power from the top management to the service frontline (Carlzon, 1989). He believed that customers were better attended to through the direct involvement of service personnel at airports and city offices rather than through the top-down management models of organizing.

Obviously, the model requires a slight reinterpretation. However, autonomy, entitlement, decision complexity, and perceived importance of discretion are constructs that should be recognized in private settings too. Professional identity could be translated into work role identity. Information uncertainty and decision severity seem to be directly relevant. Legislation complexity may be translated into company policy complexity. The moderators (gender, age, experience, technology flexibility, and voluntariness of use) seem to be relevant in a private service industry context as well. The suitability of DDAM for this setting, and its relationship to the existing theories such as the theory of workarounds (Alter, 2014), merit further research.

Digital discretion impact

Even though enabling and hindering factors of digital discretionary practices have been discovered, a more overarching framework is still missing. My cross-case analysis is an attempt to achieve this where I suggest that the impact of digital discretion can be evaluated based on the hierarchical structure, the strength of discretion, service complexity, computer literacy, and material agency. Whereas these dimensions are supported by my findings and the literature, more research should be conducted to investigate other potential dimensions, for example, culture, type of policies, and ways of organizing public services.

Important unanswered questions relate to the technologies in use in street-level bureaucracy. I have only been able to study CMS and databases in the court and NTA office, and a range of other technologies exist. Whereas the literature has pointed out obvious limitations of certain digital tools (e.g., Matthew L Smith, 2011), other studies, research and advisory companies, and popular media show how emerging technologies such as AI and the internet of things create new opportunities for street-level bureaucracies. Researchers should also investigate the effects of technologies (e.g., handheld devices), especially in situations where street-level bureaucrats make decisions on the spot (e.g., police officers). Another opportunity for researchers relates to applying the theory of technology affordances and constraints (Pozzi et al., 2014) to discover how technology can contribute to improved services. The theory could also be combined with the institutional logics perspective (Busch, 2018b). Whereas other disciplines such as management and organization theory show interest in human and material agency in institutional studies (e.g., Jones, Boxenbaum, & Anthony, 2013; Suddaby, 2010), IS researchers applying institutional theory have been slow to adopt agentic lenses. Human agency seems to be ignored in studies. Material agency is also less researched, perhaps because of the field's desire to distance itself from technological determinism (Busch, 2018b; Leonardi & Barley, 2010). Both human and material agency can teach us interesting lessons (cf., Busch, 2018b). Yet, another avenue for future research is to find out how technological training of street-level bureaucrats influences their use of technology and attitudes toward digital discretion. DDAM may also be applied to illuminate this issue.

6.5 Contributions to practice

This study has addressed the opportunities and challenges of a technological impact on discretionary practices. The extant literature has not prioritized contributions to practice. I intend to provide recommendations to public management dealing with the "wicked" situation of achieving managerial goals, such as increased policy control on the one hand and professional norms such as individualized care, rule-following, and neutrality on the other. These, often opposing, demands are not easy to deal with for street-level bureaucrats who experience increased use of technology in street-level work. I hope that the contributions I have made (i.e., the DDAM and taxonomy of street-level bureaucracies), are useful for practitioners too. In addition, I offer five recommendations to policy makers and public management, which can mitigate street-level resistance toward digital discretionary decision-making.

Recommendation 1: Technology should be designed according to professional aspects of street-level work.

The design of technological tools is often somewhat separated from those who use these tools. For example, case management systems and office tools are often standardized packages, which are distributed to a variety of users within both public and private sectors. Street-level bureaucrats are strongly motivated by helping clients (Tummers & Rocco, 2015). They are professionals who have power and autonomy, reflect on their work, and actively seek to influence it. Technologies are carriers of meanings, beliefs, and values. Since they are not apolitical tools to improve the rationality of decision-making and the efficiency of organizational operations as Herbert Simon declared (Barth & Arnold, 1999; Janssen & Kuk, 2016; Matthew L Smith, 2011), too strict technologies should be avoided. Technological tools that address the specific use by street-level bureaucrats will be assessed as more suitable for street-level work and therefore less likely to be appropriated. Both Lovisa and SL—the CMS used by the judges and caseworkers—were designed specifically for their work practices. Both the judges and caseworkers clearly expected the CMS to be professional aids; they can handle recommendations from a computer, but not orders. To avoid resistance from street-level bureaucrats, assertions on how technology can improve public service provision should be stated clearly.

Recommendation 2: Services that clients are entitled to should be automated.

Both policy makers and street-level bureaucrats mentioned services that clients are entitled to as candidates for automation. Since clients have the right to claim a specific service, there is usually no need for the street-level bureaucrat to exercise any professional judgment. There are examples of public services that are “electrified” meaning that technology is used in parts of the decision-making chain but not as an incentive for organizational change. For example, kindergarten applications in some Norwegian municipalities have their application process done entirely through web-based interfaces except for the actual decision-making. Then, applications are printed out and handled in the traditional way. In such cases, the whole decision-making chain should be automated.

Recommendation 3: Design systems that can handle exceptions to main rules.

Following up on the previous recommendation, services should be fully automated whenever possible and not semi-automated. There are services that are automated based on the most commonly applied rule in specific cases, which cannot handle exceptions, though. An example provided by policy makers are parents' entitlement to maternal and paternal leave given certain predefined conditions. When applied for, the systems will check if these conditions are met and grant or reject the application. However, if a parent needs to split up the leave, the system cannot handle the application and a street-level bureaucrat is assigned to handle the case, instead. This change is unnecessary and creates frustrations among clients who expect the application process to be a formality.

Recommendation 4: Provide financial incentives for technological innovations.

Even though high-level policy makers were positive about technological innovations (e.g., AI, big data, and automation), they are seldom utilized or slowly adopted by public organizations. The reasons for these observations may be attributed to tight budgets, heavy workload, and limited time to assess how novel technologies can contribute to street-level work. These constraints create uncertainty which public management seeks to mitigate. Therefore, if public organizations are to use technological innovations, financial incentives should be provided to reduce risk and encourage the use of new technologies in public service provision. The tax administration is an exception, though; it has been proactive in the use of big data and automated systems.

Recommendation 5: Pay attention to the ability of street-level bureaucrats to utilize various technological tools.

Giest and Raaphorst (2018), studying barriers to digital public service provision, recommended that policy makers and public management should pay attention to the ability of street-level bureaucrats to utilize various technologies. My findings are similar and suggest that there are considerable differences in how street-level bureaucrats utilize technologies based on their training and age. This aspect also influences the habits of street-level bureaucrats who, in a busy workday, are more inclined to follow habitual behavior. Both judges and caseworkers are more familiar with technology, and the younger ones seem to be more trustful of novel technologies.

Therefore, I recommend that e-government efforts, having the potential to change street-level work and influence discretionary practices, should be accommodated through the training of street-level bureaucrats.

7 Conclusions

Using a mixed methods approach, this study has investigated the conditions under which technology can influence discretionary practices on the street-level. The findings from this study can help resolve inconsistent findings of the extant literature, stating that technology can both enable and constrain the ability of street-level bureaucrats to exercise discretion. The study has been guided by two research questions: (1) what are the enabling and hindering factors of digital discretionary practices? and (2) how is street-level discretion influenced by technology? I found that street-level bureaucrats react to a potential impact on their discretionary practices through five strategic responses: compliance, acquiescence, habitual acceptance, appropriation, and defiance. These responses are explained by several characteristics of public service provision such as case complexity, information uncertainty, professional autonomy, and societal considerations. In general, they support the use of digital tools if the professional aspects of street-level work are improved. Policy makers viewed digital discretionary practices favorably in cases where client information can be reduced to structured data and the legislation can be expressed in programmable codes.

By investigating enabling and hindering factors as well as street-level behavior, I have developed a model of digital discretion acceptance by street-level bureaucrats. To build an understanding of factors that can explain acceptance or defiance of digital discretion, I conducted a multiple case analysis, approaching street-level bureaucrats and policy makers with different constitutional responsibilities related to policy implementation. Since street-level bureaucrats have professionalized knowledge and has extensive ability to exercise discretion in their work, I focused on how they reacted to digital discretionary practices and the underlying reasons for their reactions. Policy makers have both coinciding and opposing interests of street-level bureaucrats. Whereas they are committed to strengthening the professional aspects of street-level work, they also aim at making decision-making on the street-level fairer, more efficient, and less costly; to do so, they pointed out digital remedies among other measures.

The influence of technology on discretionary practices can create tensions in street-level bureaucracies, which street-level bureaucrats must cope with. I was able to show

that street-level bureaucrats react strategically to this influence. I observed that they were positive about digital discretionary practices when professional aspects of street-level work are enhanced and when societal considerations recommend that practices be changed. I also observed that technology can create habits that influence discretionary practices and become taken for granted over time. Furthermore, street-level bureaucrats can create new ways of using technology, when the intended use does not fulfill their needs. Whereas they could see the benefits of digital discretionary practices, they were mostly concerned with the negative aspects of reduced discretion. Their sense of professional identity and autonomy made them believe that clients were best attended to when they could assess each case individually. The nature of street-level work suggested that many situations were characterized by uncertainty and that the consequences of the decisions they made were too grave to be made by computers. Policy makers argued for digital discretionary practices in routine work provided that the quality of public information could be safeguarded and that the legislation could be prepared for computerized handling. Services that clients were entitled to were particularly favored. Based on the findings from my multiple case analysis and the literature, I developed a model of digital discretion acceptance, which I tested empirically by surveying 125 street-level bureaucrats. The PLS-SEM analysis revealed that the model had predictive relevance to digital discretion acceptance. Based on the analysis, I made a revised version of the model: DDAM is combined with UTAUT. Future research efforts are needed to test the validity of this model.

The study has also considered if public service provision changes as a result of the radical changes in the supply and capacity of various technologies. I conclude that certain aspects of street-level work are changing. Technology has led to a change from traditional discretionary intervention on the streets to information processing tasks in discretionary practices; street-level bureaucracies have turned into infocracies. However, the actual influence on discretionary practices seem to be less. Discretionary practices, characterized by hierarchical management structures, routine tasks, low complexity, and the exercise of weak discretion, are more likely to be impacted by technology.

Finally, my findings are highly relevant to public management and policy makers. They should pay attention to how different digital tools, including novel innovations, can provide different results; they should also heed the ability of street-level bureaucrats to make use of the various features that different technologies offer. This

study shows that resistance against digital discretionary practices is far less likely, when technology supports the professional aspects of street-level work. If technologies are designed for street-level needs, any technological aid that can assist in a busy work situation is appreciated. Technology is particularly suitable for services that clients are entitled to. It is hoped that these findings will encourage public management and policy makers to involve street-level bureaucrats more in change processes and ensure their proper training in digital tools.

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Appendices

Appendix A. Interview guide (street-level bureaucrats)

Introduction of the research

a. Theme of the interview: brief background of researcher
b. Notes on participation: confidentiality, anonymity, and use of notes and recordings.
c. Questions from the informant: participants are encouraged to ask questions.
d. Initial questions about the informant: name, educational background, current position in organization, number of years in current position, and field experience.

Section 1: Discretion

a. How do you define discretion?
b. Does your group of coworkers have the opportunity to exercise discretion?
c. Has your education shaped your understanding of discretion and the work role you have today?

Section 2: Policies

a. Which rules, laws, and policies are relevant for your work?
b. How clear and detailed are these rules and policies?
c. Can you provide an example?

Section 3: Management

a. What does your manager expect of you?
b. How does these expectations affect your work?
c. Can your manager control how discretion is exercised? E.g., using ICT.

Section 4: Technologies in use

a. Which ICT systems are used in your organization?
b. How do your ICT systems function? How do you use them?
c. Do you use ICT systems for decision support?
d. Do you use systems for automated decision-making?
e. Do you experience that the ICT systems limit your freedom to make decisions? If yes; in what way? Would such a limitation be negative to you?

f. What impact do you believe ICT has on ...
   - Legal methodology?
   - Legal argumentation?
   - Correct decision-making?
g. Have there been introduced ICT systems in your work that intend to reduce the exercised discretion? Are you aware of any such initiatives being planned?
h. Is it possible to use ICT for automation in your work? Why/why not?

Section 5: External pressures

a. Does your profession experience an influence (or attempts of influence) from other government entities, society, case stakeholders?
b. Are there discussions between colleagues (locally or nationally) regarding the use of ICT in your organization and its potential influence on your work? E.g., in unions.

Section 6: Professional norms and values

a. Which norms and values are important for your work?
b. Can discretion promote certain norms and values above others?
c. Can an ICT system promote other values than those important to you?
d. In your view: what does clients perceive as «fair» decisions?

Summary

a. Brief recap: find out if the informant is understood correctly.
b. Additional information: the informant is encouraged to add aspects that are not asked for in the questions.
c. Thank participant.

Appendix B. Interview guide (policy makers)

Introduction of the research

a. Theme of the interview: brief background of researcher
b. Notes on participation: confidentiality, anonymity, and use of notes and recordings.
c. Questions from the informant: participants are encouraged to ask questions.
d. Initial questions about the informant: name, educational background, current position in party, number of years in current position, and professional experience.

Section 1: Discretion

a. How do you define discretion?
b. To what extent do you consider discretion important for public service provision?

Section 2: Policy development and control

a. To what extent is the will of the legislature in focus when new legislation is prepared?
b. Are you aware of any cases where a law has been practiced differently than what you believe was intended?
c. If yes; why does it happen?
d. To what extent do you believe that laws should be formulated so that they provide increased opportunity for objective case processing in public service provision?

Section 3: Automation

a. To what extent do you believe that more objective case processing and automation of decisions should be introduced?
b. To what extent do you believe that ICT can replace professional judgment in case processing?
c. Are there specific areas where you find objective case processing especially suitable?
d. What opportunities and challenges do you see with increased use of ICT and automation in case processing?

e. Do you see any societal challenges related to an increased use of ICT and automation in case processing?
f. Do you see any organizational challenges related to an increased use of ICT and automation in case processing?

Section 4: Professional norms and values

a. Which norms and values do you deem as important when clients receive public services?
b. Can discretion promote certain norms and values above others?
c. Can an ICT system promote other values than those you deem as important?

Summary

a. Brief recap: find out if the informant is understood correctly.
b. Additional information: the informant is encouraged to add aspects that are not asked for in the questions.
c. Thank participant.

Appendix C. Updated literature review

Note: The table only includes search phrases that identified literature published between January 2017 and October 2018.

Literature database	Search query	Search results
Web of Science	TOPIC: (discretion) AND TOPIC: (e-government)	1
	TOPIC: (discretion) AND TOPIC: (“information technology”)	5
	TOPIC: (discretion) AND TOPIC: (ICT)	4
Scopus	(TITLE-ABS-KEY(discretion) AND TITLE-ABS-KEY (e-government))	1
	(TITLE-ABS-KEY(discretion) AND TITLE-ABS-KEY (“digital government”))	1
	(TITLE-ABS-KEY(discretion) AND TITLE-ABS-KEY (“information technology”))	4
	(TITLE-ABS-KEY(discretion) AND TITLE-ABS-KEY (ict))	6
	(TITLE-ABS-KEY(“street-level bureaucracy”) AND TITLE-ABS-KEY (e-government))	1
	(TITLE-ABS-KEY(“street-level bureaucracy”) AND TITLE-ABS-KEY (ict))	2
EBSCO*host*	AB discretion AND AB e-government	1
	AB discretion AND AB “information technology”	5
	AB discretion AND AB ICT	2
	AB street-level bureaucracy AND AB ICT	1
IEEE Xplore	*No hits for any of the search phrases*	0
Digital government reference library v. 14.0	discretion AND e-government [abstract]	1
	discretion AND information technology [abstract]	8
	discretion AND ICT [abstract]	1
	street-level bureaucracy AND ICT [abstract]	1

Identified articles	45
- Duplicates	23
- Excluded articles	6
- Irrelevant articles	11
+ Articles identified in forward searches	2
Articles added to literature base	*7*

Appendix D. Complete measurement scales

Technology Flexibility (TF)	*self-developed items*

1. I often experience that technology makes my room for decision-making
   ... smaller (1) – (7) larger
2. When using technology, decisions are often
   ... taken by the system (1) - (7) taken by me (v)
3. When I make decisions, I often feel that the technology is
   ... very rigid (1) – (7) very flexible
4. When I make decisions, my overall impression is that technology
   ... decides everything (1) – (7) offers no help
5. In general, I experience that technology has led to
   ... reduced use of discretion (1) - (7) increased use of discretion (v)

Information Quality (IQ)	*adapted items*

1. I often experience that the software provides information that is
   ... completely wrong (1) - (7) completely correct (v)
2. I often experience that the software provides information that is
   ... totally irrelevant (1) - (7) very relevant (v)
3. I often experience that the software provides information that is
   ... completely outdated (1) - (7) completely updated (v)
4. I often experience that the software provides information that is
   ... badly presented (1) – (7) well presented

Decision Severity (DS)	*self-developed items*

1. My clients often perceive my decisions as
   ... completely unimportant (1) - (7) crucial (v)
2. My decisions often lead the clients to
   ... continue their behavior (1) – (7) change their behavior
3. My decisions affect the lives of my clients
   ... to a small extent (1) - (7) to a considerable extent (v)
4. To my clients, my decision outcomes are often
   ... uninteresting (1) - (7) interesting (v)
5. If my decisions become known to my clients' surroundings, my clients will
   ... strengthen their reputation (1) – (7) weakened their reputation

Appendix D. Continued.

Decision Complexity (DC)	*adapted items*

1. When I make decisions, I must often take
   ... identical factors into account (1) - (7) a range of factors into account (v)
2. When I make decisions, I must often take
   ... a few factors into account (1) - (7) many factors into account (v)
3. In cases where I make decisions, I often find the assessment of each factor
   ... completely unimportant (1) – (7) decisive
4. The decisions I make are
   ... always routine (1) - (7) always new (v)
5. In my work, I often must pay attention to
   ... very few goals (1) – (7) many goals

Need for Interaction (NI)	*self-developed items*

1. My clients prefer personal contact
   ... as rare as possible (1) – (7) as often as possible
2. When I make decisions, clients often consider personal interaction with me as
   ... completely unimportant (1) - (7) crucial (v)
3. In cases where the client can talk with me, s/he often thinks that the use of technology is
   ... useless (1) – (7) useful
4. Often, my clients consider the ability to present their case personally to me as
   ... completely unimportant (1) - (7) crucial (v)
5. My clients consider personal contact with me often as
   ... unrewarding (1) – (7) rewarding

Legislation Complexity (LC)	*self-developed items*

1. Often, the legislation has
   ... definitive terms (1) - (7) discretionary terms (v)
2. Usually, an interpretation of the legislation is
   ... completely unnecessary (1) - (7) completely necessary (v)
3. The context, in which a legal rule is applied, is often
   ... completely insignificant (1) - (7) crucial (v)
4. For my clients, the legislation is often
   ... easy to understand (1) – (7) difficult to understand

Appendix D. Continued.

Public Service Entitlement (PSE)	*self-developed items*

1. When I make decisions regarding my clients, the outcome is most often
   ... influenced by me (1) – (7) predetermined based on policies
2. Often, I experience the outcomes of my decisions to be
   ... my judgments (1) - (7) predetermined (v)
3. My clients often evaluate the outcome of my decisions to be
   ... surprising (1) – (7) as expected
4. When I make decisions, I exercise discretion
   ... to a less extent (1) - (7) to a large extent (R) (v)

Computer Self-Efficacy (CSE)	*adapted items*

1. If I should complete my work with a specific technology, help along the way
   ... completely necessary (1) – (7) completely unnecessary
2. Without the experience of using a specific technology, completing my work will be
   ... difficult (1) – (7) easy
3. If there is little time to complete my work tasks, to complete them with an unfamiliar technology would be
   ... difficult (1) - (7) easy (v)
4. If I am shown how to do my work tasks using a technology, to complete them would be
   ... difficult (1) - (7) easy (v)

Professional Identity (PI)	*self-developed items*

1. The decisions I make
   ... can be taken by most people (1) - (7) must be taken by professionals (v)
2. Usually, the decisions I make require
   ... no formal education (1) - (7) formal education (v)
3. For my decisions, professional experience is often
   ... completely unnecessary (1) – (7) completely necessary
4. To make decisions, my professional training is often
   ... completely unnecessary (1) - (7) completely necessary (v)
5. Often, I experience that the decisions I make require
   ... general skills (1) - (7) specialized skills (v)

Appendix D. Continued.

Perceived Importance of Discretion (PID)	*self-developed items*

1. Often, when I make decisions about clients, discretion is
   ... completely unnecessary (1) - (7) completely necessary (v)
2. Often, discretion makes my work tasks
   … non-feasible (1) – (7) feasible
3. I often experience that my decisions
   ... can be easily standardized (1) - (7) cannot be standardized (v)
4. Discretion do that my decisions
   ... never gets quite right (1) - (7) always get right
5. To be able to tailor my decisions according to clients' life situations, discretion is
   ... completely unnecessary (1) - (7) completely necessary

Perceived Decision Quality (PDQ)	*adapted items*

1. I often experience that my decisions are
   ... unfair (1) - (7) fair (v)
2. I often experience that my decisions have
   ... unfavorable outcomes (1) - (7) favorable outcomes (v)
3. Once I have made a decision, I often have
   ... a bad conscience (1) - (7) a clear conscience (v)
4. Often, I experience that my decisions are based on
   ... a poor foundation (1) - (7) a solid foundation (v)
5. After making a decision, I often experience that all necessary aspects of a case
   ... are not well illuminated (1) - (7) are well illuminated

Attitude Toward Digital Discretion (ADD)	*adapted items*

1. Using technology to influence my decision-making is
   ... a bad idea (1) - (7) a good idea (v)
2. If a technology can influence my decisions, I will
   ... not use it (1) - (7) prefer to use it (v)
3. Compared to humans, technology takes decisions that are
   ... less fair (1) – (7) fairer
4. I consider the use of technology in decision-making as
   ... unfavorable (1) - (7) favorable (v)
5. I consider the use of technology in decision-making as
   ... damaging (1) - (7) beneficial (v)

v = validated measurement item

Appendix E. Discriminant validity matrix

	ADD	CSE	DC	DS	IQ	LC	NI	PDQ	PI	PID	PSE	TF
ADD	.838											
CSE	.384	.790										
DC	.043	-.026	.796									
DS	.104	.056	.520	.839								
IQ	.212	-.012	.219	.358	.830							
LC	-.093	-.010	.539	.447	.053	.781						
NI	-.016	-.063	.151	.184	-.084	.048	.918					
PDQ	.078	.158	.119	.393	.362	.070	-.018	.803				
PI	-.040	-.157	.328	.474	.126	.489	.116	.299	.764			
PID	-.196	-.131	.342	.394	.002	.496	.200	.190	.437	.774		
PSE	.205	.110	-.466	-.441	-.078	-.476	-.080	-.166	-.353	-.645	.865	
TF	-.042	-.137	.334	.287	.227	.232	-.070	.138	.326	.258	-.495	.845

Thesis publications

The following research publications are included as part of this research project:

1. Busch, P. A., & Henriksen, H. Z. (2018). Digital Discretion: A Systematic Literature Review of ICT and Street-Level Discretion. *Information Polity, 23*(1), 3-28.
2. Busch, P. A. (2018). Technology and Institutional Logics. In *Proceedings of the 39th International Conference on Information Systems (ICIS)*. San Francisco, CA.
3. Busch, P. A. (2017). The Role of Contextual Factors in the Influence of ICT on Street-Level Discretion. In T. Bui & R. H. Sprague Jr. (Eds.), *Proceedings of the 50th Hawaii International Conference on System Sciences (HICSS)* (pp. 2963-2972). Big Island, HI.
4. Busch, P. A., Henriksen, H. Z., & Sæbø, Ø. (2018). Opportunities and Challenges of Digital Discretionary Practices: A Public Service Worker Perspective. *Government Information Quarterly, 35*(4), 546-555.
5. Busch, P. A. (2018). Conceptualizing Digital Discretion Acceptance in Public Service Provision: A Policy Maker Perspective. In *Proceedings of the 22nd Pacific Asia Conference on Information Systems (PACIS)*. Yokohama, Japan.
6. Busch, P. A., & Eikebrokk, T. R. (2019). Digitizing Discretionary Practices in Public Service Provision: An Empirical Study of Public Service Workers' Attitudes. In *Proceedings of the 52nd Hawaii International Conference on System Sciences (HICSS)*. Maui, HI.

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Digital discretion: A systematic literature review of ICT and street-level discretion

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Abstract. This study reviews 44 peer-reviewed articles on digital discretion published in the period from 1998 to January 2017. Street-level bureaucrats have traditionally had a wide ability to exercise discretion stirring debate since they can add their personal footprint to public policies. Digital discretion is suggested to reduce this footprint by influencing or replacing their discretionary practices using ICT. What is less researched is whether digital discretion can cause changes in public policy outcomes, and under what conditions such changes can occur. Using the concept of public service values, we suggest that digital discretion can strengthen ethical and democratic values but weaken professional and relational values. Furthermore, we conclude that contextual factors such as considerations made by policy makers on the macro-level and the degree of professionalization of street-level bureaucrats on the micro-level are important for understanding the diffusion and impact of digital discretion. In addition, inherent features of technology can be discussed at all levels in relation to their aims and tasks. We conclude that the scope of street-level bureaucracy is decreasing, and more and more street-level bureaucracies are turned into digital bureaucracies characterized by digital bureaucrats operating computers instead of interacting face-to-face with clients.

Keywords: ICT, e-government, discretion, street-level bureaucracy, literature review

1. Introduction

While policy makers expect policy making to be a top-down process where the intentions of the policy maker are pushed downward a hierarchy and materialize in actual outcomes, a different picture emerges through the implementation practices of street-level bureaucrats. Street-level bureaucrats refer to public service workers on the street-level who interact closely with clients and can exercise a substantial amount of discretionary power [1]. Discretion is the freedom street-level bureaucrats have to make decisions concerning individuals regarding the sort, quality and quantity of sanctions, and rewards during policy implementation including the possibility of no sanction at all [1,2]. Public service provision is complex and policy implementation has traditionally required the unique expertise and skill sets of street-level bureaucrats acquired through years of experience. This competence is so exceptional that Lipsky [1] claims that "the nature of service provision calls for human judgment that cannot be programmed and for which machines cannot substitute" (p. 161). Given the diffusion of information and communications technology (ICT) in the public sector [3,4], and the rapid technological development during the last two decades, this claim can be questioned. By ICT in this article, we refer to technologies that are used to register, store, edit, and handle client data as a basis for making case assessments or executing

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decisions [5]. The most frequently referred to technologies are variations of databases, case management systems, and automated systems.

In their seminal article, Bovens and Zouridis [5] observed that the structures of many traditional public agencies are changing due to ICT, and that this development can be traced as a change from the 'street-level', via 'screen-level', to a 'system-level' bureaucracy. They argued that street-level bureaucrats gradually disappear from the streets where face-to-face contacts are replaced by computers, and where computerized routines influence their discretionary practices (screen-level bureaucracy). Ultimately, street-level bureaucrats become replaced by fully automated technologies that make decisions about clients based on collected data and predefined algorithms (system-level bureaucracy). Although Bovens and Zouridis [5] claimed that street-level bureaucracies were changing, they acknowledged that the discretionary practices of traditional street-level bureaucrats such as teachers and nurses were more unlikely to be influenced by ICT. Inspired by their article, the purpose of this literature review is to take stock of research that has studied how ICT impinges on the discretionary practices of street-level bureaucrats. We are interested in studying how ICT has influenced street-level discretion in the past two decades given the rapid development of ICT and the wide variety of tasks that street-level bureaucrats conduct.

The role of street-level bureaucrats, their practices and particularly the discretionary power that they exercise, has been subject of much attention among academics and practitioners [6]. To ensure decisions according to intentions of the policy maker and to avoid a too strong street-level footprint, digital discretion has been introduced understood as the use of computerized routines and analyses to influence or replace human judgment. From this perspective, all use of discretion can in principle be mapped out by using algorithms [7]. The concept of digital discretion emphasizes the shift from viewing discretion as the street-level bureaucrats' intellectual process to a situation where ICT replaces parts of, or the full intellectual discretionary process [5]. Digital discretion therefore describes how ICT has the potential to influence discretion by e.g., devising decision alternatives, or replacing discretion by fully automating decision-making. There are two main reasons for why digital discretion is desired. First, an administrative ideal is to treat clients equally and avoid that factors such as personal mood, bias, and coincidences influence decision-making [1]. Legal boundaries and principles of sound administration have successfully been implemented to curtail some of their leeway [5]. Whereas decisions made by street-level bureaucrats most often go unnoticed to the public, there are frequent examples of news articles stirring the debate about street-level discretion since examples of corruption [8], errors [9], and bias [10] continue to occur. ICT can be used to control the actions of street-level bureaucrats to close the gap between 'policy as written' and 'policy as performed' [1]. Research has shown that automation can strongly increase the quality of legal decisions in comparable executive agencies [11], and can thus be seen as "the zenith of legal rational authority" [5, p. 181].

Second, digital discretion can make decision-making more efficient. The discretionary practices of street-level bureaucrats are time consuming since each case needs some degree of attention. By automating parts of or the whole decision-making process, street-level bureaucracies may save considerable amounts of time and money, or spend their resources in a more beneficial way. For example, a public tax agency may allocate their resources to control tax embezzlements instead of handling individual tax reports manually.

Researchers adopting a bottom-up perspective will argue that digital discretion is not desired and that human judgment is necessary to adjust policies to real-life situations [12]. Without this adjustment, outcomes would be considered unreasonable by clients. Thus, discretion is a tool that strengthens a policy by ensuring that policy objectives are fulfilled. The role of ICT is merely to provide access to

resources street-level bureaucrats can use in the decision-making process, e.g., by making more relevant information easily available [13].

In this literature review focusing on street-level bureaucracy through the lens of digitization, we use the concept of public values to categorize the overall goals embedded in the included articles. Digitization is the process of converting analog information such as text, pictures, and sound into a digital format [14]. In a public-sector context, digitization typically implies increased use of technologies that can assist street-level bureaucrats in handling cases by providing easy access to information about clients through channels such as online forms, and automating parts of or whole work processes. From the popular media and research literature, we observe that digitization has become particularly important in the public sector with the purpose of improving public services and yield cost savings. Based on this observation, we expect that digital discretion has increased its influence since Bovens and Zouridis [5] made their observations, and will continue to do so. Generally, a value is considered something good without further justification and something that is worth pursuing and of importance for an entity [15–17]. The concept of public value has received much attention in public administration and has been conceptualized as the successor of the New Public Management (NPM) paradigm [18,19]. Public values have been subject to a number of classifications [20] and the concept has been highlighted as core pillar of public administration [21]. It is not the objective of this review to contribute further to classifications or taxonomies of public values but instead to categorize research contributions related to street-level bureaucracy within this core pillar of public administration. A broad and traditional categorization of public values is chosen for this review: ethics, democratic, professional, and people values [22]. Given its significant role in public administration [23], the categorization of the contributions along four generic parameters provides a measure for determining if digital discretion potentially leads to a value shift in street-level bureaucracy and highlight what the characteristics are. The first research question that this literature review addresses is:

1.1. Is digital discretion causing a value shift in street-level bureaucracy?

Furthermore, reviews of the street-level bureaucracy literature highlight that context matters [13,24–27]. In the continuation of research question 1, we investigate under what conditions digital discretion is causing a value shift in street-level bureaucracy. Thus, the following research question is sought answered in this literature review.

1.2. Under what conditions can digital discretion cause a value shift in street-level bureaucracy?

The remainder of this article is organized in the following manner. In the next section, we lay out the concept of public values. Then we describe the search methodology and outline the characteristics of the 44 reviewed articles on digital discretion. This leads to a qualitative analysis of the articles guided by four categories of public service values: ethics, professionalism, democracy, and people. This section is followed by a discussion of the findings before the conclusion ends the literature review by summarizing main findings and discussion points.

2. Public values

One of the central and widely cited conceptualizations of public value was introduced by Moore [19] more than two decades ago in his book titled “Creating public value: Strategic management in government”. The book has received much attention but also critique for its pragmatic approach and non-empirical foundation [18,20]. The work of Moore [19] along with the discussion of the work [18,20]

has led to an emphasis on public values in administration in general [22,28], within the domain of ICT in public sector [21], and more specifically in relation to e-government [15]. Research contributions point to the ambiguity and comprehensiveness of the conceptualization of public values (see for example MacCarthaigh [28] and Bryson et al. [23]. Jørgensen and Bozeman [20] identify as many as 72 values and Bannister and Connolly [21] identify a number of classifications, taxonomies and subcategories of values which they synthesize to three orientations which are impacted by ICT: duty, service and social. Common for the classifications is the inclusion of core aspects of public administration, i.e. accountability, responsibility, equity, and democracy. As stated in the introduction the aim of this literature review is not to identify new classifications or taxonomies of public values but to present how the reviewed articles reflect digital discretion related to public service values recognizing that the term represents core aspects which generally are followed independently of specific context [23]. The more generic classification of Kernaghan [22] is used which serve as a common denominator for those more comprehensive classifications mentioned above [20,21]. Following the classification of Kernaghan [22] the sources from the literature review are grouped along the four general parameters; ethics, democratic, professional, and people values. Each of the four parameters is briefly introduced in the following.

2.1. Ethics

The ethics perspective attends to public service values that guide desired "right" and "good" actions as opposed to undesired "wrong" and "bad" actions [22]. The challenge is that the boundaries of ethical conduct are not static, they are contextually defined, and often involve dilemmas which are enhanced with the introduction of IT in public administration [29]. It is beyond the scope of this article to discuss the concept of ethical dilemmas. For the sake of simplicity, we refer to Kakabadse et al. [30] who emphasize that the right versus wrong and good versus bad dichotomies not always exist and furthermore that ethics when exercised is concerned with the commitment to do what is right or what is good. The ethical dimension in the workplace is often articulated as a 'code of conduct' [22,28] which serve as a guidance but public employees may be subject to conflicting 'codes of conducts' i.e. professional, organizational, and national norms [22] which can lead to constant dilemmas. Literature points to key ethical values such as integrity, fairness, loyalty, and honesty [22]. In this context, the ethical perspective focuses on street-level bureaucrats who willingly and knowingly act contrary to policy objectives when faced with ethical dilemmas.

2.2. Democratic values

Public service values focusing on democratic values emphasize how the opinions of the people are reflected in public administration [28]. MacCarthiagh [28] outlines four families of public and democratic values; honest and impartial advice including all information relevant to decision-making, loyal implementation decisions, lawfully taken; support of individual and collective accountability; and information on results achieved by public servants provided regularly to relevant stakeholders. Key representative values for this perspective are rule of law, accountability, and representativeness [22]. This perspective points our attention towards street-level bureaucrats as trusted government representatives that take actions solely aiming at implementing the intentions of the policy maker [1], as well as including citizens in decision-making.

2.3. Professional values

Professionalism is "the conduct, aims, or qualities that characterize or mark a profession or a profes-

sional person" [31]. While professional values may vary based on profession, some values are shared among professions and go largely unchallenged [32]. The professional values relate to effectiveness, efficiency, service, leadership, excellence, innovation, and quality [28].

2.4. People values

People values are concerned with how the public sector should attend to individuals in various contexts and with diverse needs. It involves respect for human dignity and the value of every person [28]. The decisions that street-level bureaucrats make have a big impact on individuals' lives [1], and their different backgrounds and unique situations may cause different emotional reactions. Key people values are caring, fairness, tolerance, decency, compassion, courage, benevolence, and humanity [28]. Studies in this theme are concerned with how digital discretion affects individualized concerns.

3. Methodology

A systematic literature review of scholarly research was conducted to get a comprehensive understanding of digital discretion, and more specifically to find out if digital discretion is causing a value shift in public service provision and if so; under what conditions this value shift occurs. The review was guided by recommendations outlined by Webster and Watson [33]. Apart from answering the initial research questions, the literature review also analyzed the attributes of the research community.

The review targeted articles on digital discretion published on or before January 31st, 2017. Five databases were searched to gain access to leading publications within social sciences: Web of Science, Scopus, EBSCOhost, IEEE Xplore, and the E-Government Reference Library (EGRL v. 12.0). The search was limited to article title, abstract, keywords, or topic, and conducted in two rounds. In round 1, the search term was 'street*level bureaucracy'. Using this term only was considered an incomplete search since much research on street-level work has been conducted without using street-level bureaucracy as the analytical lens [34]. In round 2, the search terms were 'e-government', 'digital government', 'information technology', and 'ICT' combined with 'discretion'. Combining 'discretion' with 'digital government' did not provide any results in the selected databases. All combinations of search terms and their respective results are listed in Appendix A.

Manuscripts were excluded based on the following criteria:

- Recurring articles
- Articles with anonymous author
- Written in a non-English language
- Non-research manuscripts
- Research-in-progress articles

From the initial set, we excluded 251 manuscripts for the following reasons: 193 manuscripts were duplicates; 12 manuscripts had anonymous authors; 15 manuscripts were written in a non-English language; 31 manuscripts were non-academic; and one manuscript was a PhD dissertation. After this process, we ended up with 111 articles.

All abstracts were read, and articles were included if they discussed:

- Street-level work in public agencies, and
- The relationship between technology and street-level discretion, and/or
- Managerial control of street-level discretion using technology.

After reading the abstracts, 70 more articles were removed because they did not meet the above criteria. Reading through the 41 remaining articles resulted in 21 more articles being removed because they were not relevant or accessible. As a result, 20 articles remained in the dataset.

Following recommendations by Webster and Watson [33], a backward and forward search was conducted using the identified articles as a basis. The forward search added 20 articles to the existing dataset. The backward search added four more articles to the final pool resulting in a total of 44 articles for our review. The fields of e-government and public administration are informed by a multitude of journal and conference articles as well as books, and we do not claim this review to be exhaustive. However, we believe that the selected databases contain leading e-government and public administration research, and that the review is representative of scholarly research on digital discretion.

We used a bottom up approach applying techniques from grounded theory to study the reviewed articles. This approach has been recommended for rigorous literature reviews [35]. The first step was to read through the articles. The initial coding was done by applying open coding techniques resulting in codes that represented the aim, focus, and reported findings of each article [36]. The codes were generated mainly from an analysis of the article abstract, introduction, findings section, and conclusion. Whenever necessary, the entire article was carefully read.

In the next step, we identified relationships between the initial codes (axial coding). The codes were reduced into a set of 13 subcategories [36]. When categorizing the number of codes into subcategories, simplicity was sought while at the same time making sure that the diversity represented in the initial codes were represented. In the third and last step, our objective was to identify how the articles aligned with overall public service values [22]. Public service values reflect an ideal type of public administration which generates trust and confidence in public sector decisions [28]. In this context, it serves as a reference to discuss how various aspects of public service provision are influenced by digital discretion.

The reviewed articles cover a diversity of street-level bureaucracies ranging from child care services to automated handling of student grants. Due to the diversity, it is not possible to dive into the details of all 44 articles. However, the purpose of this article is to provide researchers in fields such as public administration and e-government with an overview of the academic contributions within the area of what is here labelled as digital discretion.

4. Research on digital discretion

In this section, we outline the research area of digital discretion. First, we provide an overview of conducted research with information about publication authors, timeframe, and outlets. Furthermore, we provide an overview of theoretical foundations and research methods. The conceptual articles build their arguments on firsthand experiences, technological trends, extant literature, and example data. The empirical articles build their arguments on collected data. Second, article reflections about digital discretion are laid out using the concept of public service values [22]. The articles are categorized according to four public service values each representing the focus in the articles: ethics, democracy, professionalism, and people.

4.1. Descriptives

Of the 44 articles reviewed, there are 31 journal articles, nine conference articles, and four book chapters. A complete list of identified articles is provided in Appendix B. The earliest study identified is from 1998. A citation analysis shows that the Bovens and Zouridis [5] article is the most cited article in this stream of research. The number of published articles varies from year to year with an increased interest in the phenomenon during the last decade.

Table 1
Implications of ICT for ethical public service values

Societal problem	Leads to ...	Purpose of ICT	Desired effect(s)	Article(s)
Unethical actions and corruption	Trust in street-level bureaucrats decline	Reveal reasoning behind decisions Reveal actions made by street-level bureaucrats	To avoid unethical actions and corruption	[8,38,81–83]
Wrong decisions due bias	Trust in street-level bureaucrats decline	Enforce adherence to rules and procedures	Fair and uniform decision-making	[10]
Wrong decisions due different interpretation of rules, and personal factors	Unfair and random decision-making	Enforce adherence to rules and procedures	Fair and uniform decision-making	Interpretation: [62,84–86] Personal factors: [38]

Researchers from UK, Netherlands, USA, and Sweden are most active in this stream of research. Their affiliation was used to associate them with a research discipline showing that researchers within sociology, public administration, information systems, and computer science dominate the research stream. Other and less represented disciplines are political science, law, e-government, education, and cultural science. Social work is the most frequently studied empirical context.

The reviewed articles make use of various theories, concepts, and research methods implying that research on digital discretion is eclectic with no general agreement on appropriate theories and research methods. Street-level bureaucracy (SLB) is the most often appearing theoretical conceptualization in the included sample of articles giving much credit to the early work of Lipsky [1,37]. This SLB focus is obvious given the applied search criteria. A number of articles combine SLB with theoretical perspectives from public administration, and in particular Weberian bureaucracy and institutional theory. But the overall picture is diverse with respect to theoretical frameworks applied in the sample. While the classification of research methods shows that there is no single methodology of choice, most of the empirical articles have used qualitative research methods. The use of research methods is characterized by some variation in use of well-known methodologies. Most common is the use of single and multiple case study designs followed by ethnographic studies. Several studies refer to firsthand experiences or other cases as examples to support their arguments and leave detailed and explicit descriptions of their research methods out.

4.2. Digital discretion and public service values

Reflecting research question 1, the first aim of this literature review is to study if digital discretion is causing a value shift in street-level bureaucracy. To find out, the articles are related to four categories of traditional public service values; ethics, democracy, professionalism, and people [22,28]. In each category, digital discretion is studied with regards to whether it results in strengthening or weakening public service values.

4.2.1. Ethical values

Table 1 provides an overview of societal problems that ICT can solve which have implications for ethical public service values. Only three out of nine articles in this category were empirical whereas six articles were conceptual. Findings from the empirical studies are inconclusive. While two of the studies show that digital discretion is supporting traditional ethical values in public administration, one of the studies claim that digital discretion is creating novel forms of unethical actions.

Table 2
Implications of ICT for democratic public service values

Societal problem	Leads to ...	Purpose of ICT	Desired effect(s)	Article(s)
Reduced acceptance of authority	Reduced political legitimacy	Reveal reasoning and actions made by government (open government)	Increased political legitimacy	[39,81]
Wrong assessment of cases	Wrong decisions	Allow citizens to participate in decision-making processes	Empower citizens	[40,41,59]
Reduced adherence to rules and procedures	Reduced impartiality	Enforce adherence to rules and procedures	Increased accountability	[42–44,87]
Street-level bureaucrats are policy makers	Policy outcomes may differ from intentions of policy makers	Embed intentions of policy makers in decisions	Increased rule of law	[5]

Wenger and Wilkins [10] found that women were discriminated when filing claims to employment services. Introducing digital discretion increased the number of women receiving benefits while having no effect on men. The second study focused on how personal factors such as the mood and recent life events of street-level bureaucrats could influence their decision-making. Increased computerization was viewed favorably as computers are not subject to the same whims [38]. Contrary to these studies, the third study concluded that digital discretion could not sustainably improve bureaucracies through the automation of processes since they introduce novel forms of corruption [8].

4.2.2. Democratic values

Table 2 provides an overview of how ICT is intended to solve societal problems with implications for democratic public service values. Ten articles were categorized to discuss democratic implications of ICT. Five of these articles were empirical whereas five articles were conceptual. Findings from the empirical articles are inconclusive. Some of the studies conclude that ICT enhances democratic public values whereas other studies claim that ICT weakens values in this category.

One democratic problem that ICT is proposed to solve is the reduced acceptance of the authority of public agencies. Jansson and Erlingsson [39] claimed that legitimacy is closely interlinked with how citizens experience public services, and were less optimistic on behalf of ICT's possibilities to enhance legitimacy. They viewed discretion as a prerequisite for legitimacy which ICT cannot support since the use of technology is not as flexible as a personal meeting.

A trend in research is the phenomenon of citizens taking a more active role in governmental tasks [40]. Marston [41] views ICT as enabling tool for citizens that have the actual capacity needed to participate in decision-making. Snellen [40] found that citizens, being situated in society, can contribute to intelligence functions.

Another important venue for public agencies to utilize ICT is to increase accountability. The purpose is to make street-level bureaucrats accountable for their actions (or lack of actions). While Reddick [42] argues that bureaucratic accountability is enhanced as a result of reducing the discretionary power of street-level bureaucrats, Pithouse et al. [43] found that this view was only expressed by people in managerial roles, as one informant states it: "I know exactly what members of the team are doing and then they can be answerable to why they haven't completed things when they're suppose to have completed them..." (p. 169). Whereas managers were positive, Pithouse et al. [43] found that transparency promoted by ICT in fact could lead to disguised actions lying behind the more apparent accountability of ICT. Similar to these findings, Smith et al. [44] concluded that when ICT takes over tasks previously done by humans it actually obscures the lines of responsibility.

Table 3
Implications of ICT for professional public service values

Societal problem	Leads to ...	Purpose of ICT	Desired effect(s)	Article(s)
Insufficient or incorrect information	Inadequate decisions	Information processing	Increased quality of decisions	[12,45–50,88–90]
Erroneous assessments by street-level bureaucrats	Wrong decisions	Reveal reasoning behind decisions Reveal actions made by street-level bureaucrats Enforce adherence to rules and procedures	Prevent errors	[8,9,75,85,91]
Reduced adherence to rules and procedures	Reduced quality of decisions	Enforce adherence to rules and procedures	Increased quality of decisions	[5,7,51–54,87]
Discretion is costly and inefficient	High public expenditures and reduced efficiency	Empower unqualified street-level bureaucrats	Reduced costs	[42,43,92]
Discretion is costly and inefficient	High public expenditures and reduced efficiency	Faster decision-making	Increased efficiency	[9,47,55]
Erroneous and inefficient decision-making	Reorganization of public agencies	Change work processes	Increased efficiency and quality of decision-making	[49,50,56]
Consequences of erroneous decisions are too big	Trust in street-level bureaucrats decline	Management monitoring of employees	Increased quality of decisions	[5,10,43,57,58]
Consequences of erroneous decisions are too big	Trust in street-level bureaucrats decline	Peer-to-peer monitoring of employees	Increased quality of decisions	[51]

4.2.3. Professional values

Articles that view ICT as an instrument to enhance professionalism within street-level bureaucracy are listed in Table 3. Articles discussing the professional implications of ICT were by far the largest group consisting of 30 articles. Nineteen of these articles were empirical whereas 11 articles were conceptual. Our review shows that ICT somewhat struggles to enhance professional values. The reduction of discretion in street-level work is claimed to reduce service quality, demoralize street-level bureaucrats, and fail to achieve goals such as preventing errors to occur. However, the picture is not all black and white, and ICT is looked at with positive eyes when used as an enabling tool for street-level bureaucrats.

Street-level bureaucrats are expected to make decisions that are based on law and their professional judgment since their education and experience uniquely qualify them to make such decisions. However, a large portion of the articles focus on how decision-making can be improved in terms of quality. Various causes have motivated this research: Insufficient or incorrect information, errors made by street-level bureaucrats, and reduced adherence to rules and procedures leading to wrong decisions. In addition, the profound consequences of wrong decisions are reasons for why ICT is considered a valuable tool for increased quality in decision-making. Articles looking at how ICT can be used as an information processing tool conclude that sufficient and high-quality information lead to better decisions since street-level bureaucrats are provided with a better foundation for their decision-making than earlier. In addition, decision-making can be improved by utilizing intelligent algorithms, and collect and combine information from several sources [45]. This was found to be the case for judges [12], social workers [46], clerks and case officers [45,47], and police officers [48]. However, Wastell et al. [49] found that ICT intended to reduce discretion instead provided erroneous information leading to reduced decision-making quality, and Bruhn [50] concluded that data intensive cases enlarged the scope for discretion since ICT was not

Table 4
Implications of ICT for relational public service values

Societal problem	Leads to ...	Purpose of ICT	Desired effect(s)	Article(s)
Wrong decisions due to lack of understanding of individualized concerns	Unfair and random decision-making	Reveal reasoning behind decisions Reveal actions made by street-level bureaucrats Enforce adherence to rules and procedures	Fair and uniform decision-making	[12,41–43,46, 47,50,59–62]

able to handle the data complexity. Larsson and Jacobsson [45] concluded that case officers still had some discretionary power in selecting and interpreting information. Furthermore, research suggests that street-level bureaucrats trust the information provided by databases and do not search any further for more information [12,47,51].

Paulin [8] was the only empirical study reporting from ICT used to prevent errors. He concluded that ICT could not assist since, in this case, core legal principles were broken. Other studies investigated how ICT can enforce adherence to rules and procedures. Shaw et al. [52] found that social workers returned to their discretionary practices after finding that strict adherence to rules did not work. In other studies, officials were found to suffer from decreased discretion and increasing routinization [51,53]. They became fearful of opposing system protocols and information on computer screens, being left with the opportunity to make only minor changes in cases [51]. In addition, routines have been enforced because of external or internal inspections [54]. The result of reducing their discretionary power was a further demoralization of the street-level bureaucrats [43], and the erosion of service quality [50,53].

Yet other studies focused on how ICT could achieve cost reductions by empowering unqualified street-level bureaucrats and thus cheaper labor in street-level work. Pithouse et al. [43] suggested that a combination of unqualified staff in social work and ICT led to a lack of professional judgement, analysis, and interpretation leading to tensions within the organization. Handing over discretionary power to untrained staff is seen as a formula for chaos [42]. Also being motivated by high public expenditures, Wihlborg et al. [47] and Tummers et al. [55] found that the roles of street-level bureaucrats were characterized by rearranged relationships, competences, and action spaces. Other studies investigated how ICT led to changed work processes and as a result an increased efficiency and quality in decision-making [49,50,56].

In the final batch of articles, ICT is used to monitor street-level work. While the purpose of such monitoring is to control the discretion exercised by employees, several studies show that discretion is disguised, and managers must participate directly in street-level work to understand how discretion is used. When discretion is obscured, the result may be less openness contrary to initial objectives of managerial control [43,57]. Henman and Adler [58] suggest that the amount of managerial control reflects union strength since unions do not accept managerial control of exercised discretion. On the other hand, Wenger and Wilkins [10] provide a more positive view where managerial monitoring identified "rogue" agents resulting in better decisions to the advantage of female claimants. While managerial monitoring is most discussed, Keymolen and Broeders [51] refer to social workers who monitored each other's decisions for openness and transparency purposes.

4.2.4. People

Relational implications of ICT for public service values are discussed in this section. Table 4 provides an overview of ICT is intended to support people values. Eleven articles were categorized to discuss how ICT can influence the relational aspects of street-level bureaucracy. Nine out of these 11 articles were

empirical whereas two articles were conceptual. Authors of the empirical studies do unanimously agree that ICT is not supporting relational public service values. On the contrary, they find that ICT is reducing the action space needed to take individualized concerns into account.

Researchers argue that citizens actively seek human judgment due to their need for individualized treatment. Their individual cases have specialized circumstances that rigorous rule-following technology cannot handle. A reduction in the discretionary power of street-level bureaucrats may make it difficult or impossible to pay attention to these individual needs resulting in what citizens believe are unreasonable outcomes [12,42,50,59]. Moreover, human dialogue is claimed to improve public service provision since needs arise through this dialogue [41,43]. Citizens are also more prone to accept decisions in their disfavor if they have discussed their case with a street-level bureaucrat [12].

Arguments by street-level bureaucrats are client oriented where attention to the particular over the standardized and the individual over the general are emphasized. Street-level bureaucrats are motivated by helping others and by taking individualized considerations [46,60,61]. They are demoralized by a lack of human contact [43]. What is more, when street-level bureaucrats need to prioritize, they identify work-arounds in the system so that clients are benefited [46,47] since ICT is not providing the level of flexibility that is needed in street-level work [62]. De Witte et al. [46] show how social workers are motivated by helping others and that ICT is not supporting them in their daily work routines. Furthermore, they report that social workers get more concerned with processing and monitoring information than with focusing on the relational aspects of their job [46].

4.3. Digital discretion and context

While the first research question of this literature review addresses whether digital discretion is causing a shift in public service values in street-level bureaucracy, the second question focuses on gaining an understanding about the conditions under which digital discretion can cause this shift. It relates to context, or specifically why change is happening [63–65]. Pettigrew emphasizes the need for applying a holistic view when uncovering events leading to an outcome. He distinguishes between the inner contexts, i.e. questions about the role of history, structure, cultures, power, and politics in enabling and constraining change and the outer context, i.e. the social, economic, political and competitive environment [63–65]. In other words, when can and when can ICT not influence human judgment? By studying these conditions, we address an identified gap in the literature [13] and gain an understanding of why digital discretion can strengthen or weaken public service values.

In accordance with Buffat [13], we conclude from the reviewed studies that ICT has both constraining and enabling effects on street-level bureaucrats. Factors that explain whether ICT can influence or replace human judgment are seldom addressed directly in the literature, but rather discussed in relation to other research puzzles. Ten contextual factors were identified from the empirical studies which can explain the prevalence of digital discretion in street-level bureaucracies. These factors are categorized into four levels of analysis and presented in Table 5. Each category describes a different level of analysis. First, the macro-level concerns contextual factors related to the process of formulating and making policies. The meso-level deals with how street-level bureaucracies experience their working conditions and organize their work tasks. The micro-level involves issues related to how street-level bureaucrats adapt policies to real-life situations. The final category is technology discussing the capabilities of ICT of which actors on the macro, meso, and micro levels must take into consideration.

The factors shed light on considerations during policy making, how street-level bureaucracies organize their work and are influenced by ICT, and how diverse types of street-level work are conducted. Many

of the reviewed articles discuss how street-level bureaucrats resist a reduction in their discretionary power. The resistance is often, but not always, justified by these contextual factors. Other factors such as demoralization [43] and change in work status [47] can also explain why street-level bureaucrats object to changes in street-level discretion. The ten conditions causing the shift are presented next.

4.3.1. Contextual factors at the macro-level

Formulation of rules

The complexity of society is reflected in the complexity of cases that street-level bureaucrats must deal with. Policy makers decide on policies that use both open-ended and fixed formulations determining the level of discretion in the regulatory foundation. The open-ended policies are formulated with terms such as 'reasonable' which must be interpreted in relation to previous interpretations. The reason for rules to be formulated open-ended is because it is impossible for the policy maker to account for every situation that can occur in society, and therefore rules must be formulated so that street-level bureaucrats can adapt them to specific situations. Fixed rules can be used when certain criteria are clear such as to identify the correct fine for speeding. ICT is found to be far more suitable for use with regulations that are schematically formulated.

4.3.2. Contextual factors at the meso-level

Formulation of organizational goals

If organizational goals are not clearly defined it may be difficult to accommodate them in an ICT system. The goal of fair decision-making serves to illustrate this. While a street-level bureaucracy may aim at fair decisions, the meaning associated to the term 'fair' may be disputed in an organization. If goals are not clearly defined it is difficult to operationalize measures to achieve these goals.

Formulation of routines

How routines are formulated depend to a considerable extent on what kind of tasks they are supposed to solve. A street-level bureaucracy may receive a wide variety of inquiries which are difficult to solve with fixed routines. Instead, street-level bureaucrats are expected to select a procedure that is suitable for the specific situation. ICT is identified to be associated with routines that follow a fixed set of procedures.

Inter-agency dependency

The degree to which a street-level bureaucracy is dependent on other agencies is a factor that can explain why digital discretion is prevalent or not. Certain street-level bureaucracies such as courts are independent on other public entities through the constitution and cannot be instructed to make certain decisions. Other street-level bureaucracies are heavily dependent on other public agencies and must follow prescriptions enforced upon them. Street-level bureaucracies that are independent of other agencies are more prone to resist pressures to utilize ICT to reduce discretion.

4.3.3. Contextual factors at the micro-level

Professionalization

The level of professionalization indicates how a street-level bureaucrat views his job and role in society. For example, judges and nurses are specialized professions that require a certain type of education, are protected by unions, and have standards for how to conduct their work. The strength of the unions indicates how prone a profession is to let its discretionary practices be influenced by ICT.

Table 5
Contextual factors as indicators of the diffusion of digital discretion

Level of analysis	Contextual factor	Description	Challenge(s)	Example	Article(s)
Macro-level Policy maker	Formulation of rules	Policies may use indefinite terms that need interpretation, or definite terms.	Social complexity can make it difficult or impossible to formulate policies with schematic rules.	Terms such as "reasonable" and "satisfactory" are difficult to interpret by ICT.	[12,38,39, 42,44,45,47, 49,52,58]
Meso-level Street-level bureaucracy	Formulation of organizational goals	Whether organizational goals are clearly defined.	To initiate ICT measures to achieve goals is difficult if goals are not clearly defined.	The content of and measures to achieve fairness may be disputed.	[86]
	Formalization of routines	The degree to which routines are fixed or flexible.	Case complexity makes it difficult or impossible to create fixed routines.	A call center may receive very different inquiries.	[39,44,45, 49–51,56,58]
	Inter-agency dependency	Street-level bureaucracies differ in terms of how the constitution defines their dependency on other public entities.	It is difficult to enforce ICT, routines, and practices on independent public entities.	A court has an independent role in society, and can thus more easily reject rationality pressures.	[12]
Micro-level Street-level bureaucrat	Professionalization	The degree to which street-level bureaucrats are autonomous, have quality standards for their specific occupation, and are unionized.	Strongly professionalized street-level bureaucrats tend to adhere strictly to established practices for their occupation and reject new practices.	Judges are heavily professionalized, and protect their profession eagerly.	[12]
	Computer literacy	The ability to utilize computers for various tasks.	High computer literacy influences how street-level bureaucrats use ICT.	Street-level bureaucrats may utilize skills to abandon practices encouraged by computers.	[8,12,46]
	Decision consequences	The consequences of decisions may vary to a considerable extent with a potentially significant impact on clients.	Society expects decisions with profound consequences to be made by humans.	A judge can sentence a client to many years in prison.	[12]
	Information richness	Information of various richness is collected from several sources such as a client, public databases, and employers.	Direct contact with a client is often preferred since a narrative provides the best understanding of a case and its implications.	Selective data required by a form tend to lose information provided in a narrative.	[10,12,41,43, 46,48,54,57]
	Relational negotiations	The degree to which people are in need to negotiate with other people.	Just and fair outcomes of complex cases is dependent on constant negotiations between different stakeholders.	Needs are revealed through human relations which ICT hardly can grasp.	[43,46,54]
Technology	Features	Capabilities and characteristics of ICT; what ICT can do.	Technology lacking capabilities to conduct certain tasks or model rules correctly constrains opportunities.	If ICT cannot enforce certain routines, they may easily be subject to work arounds.	[8,12,43,46, 53]

Computer literacy

While computers may be used to enforce certain practices upon street-level bureaucrats, they can nevertheless be ignored or manipulated so that street-level bureaucrats can choose their preferred approach instead. In other occasions, a high computer literacy is found to strengthen digital discretion since street-level bureaucrats trust computers and the information that is provided by them.

Decision consequences

Street-level bureaucrats may make several decisions every day dependent on their type of work. For example, a police officer may handle several incidents a day whereas a judge may use several days on one trial ending in a verdict. The consequences of these decisions vary to a substantial extent. While a police officer may issue a speeding ticket for a minor amount of money, a judge may sentence a person to jail for several years. The inclination to use ICT for decision-making with dire consequences is low.

Information richness

Street-level bureaucrats use information from various sources to solve cases. This information may stem from for example a client, other public agencies, or employers. When ICT is used, information tends to be stored in structured data formats ruling out rich information that can shed light on a specific case. Structured data formats are also better suited for automated decisions since they can be assessed through programmed algorithms. However, the narrative that is presented by a client to a street-level bureaucrat, often over time, provides a better basis for making an individual assessment of a case strengthening relational public service values.

Relational negotiations

Related to information richness are the ongoing negotiations that take place between clients and street-level bureaucrats. In this process, a client can discuss her case with a street-level bureaucrat face-to-face instead of entering information in a computer system. In many cases this is sufficient for a client. For example, a defendant may be satisfied with being able to discuss his case with the judge even though the verdict is opposite to his wishes [12]. In other cases, face-to-face contact is required. For example, where a judge is expected to inform a child of a certain decision regarding where the child should live in the future – a task that obviously is difficult for a computer [12].

4.3.4. Technology features

Often when technology in organizations is studied, ICT is under-theorized and invoked "in name only, but not in fact" [66, p. 128]. In this article, ICT is recognized as "a composite made up of some combination of software, hardware, database and network components with an information processing capability aimed at enabling individual, group and organizational tasks" [67, p. 224]. ICT is thus characterized by certain capabilities that determine what street-level bureaucrats can use it for. However, while ICT has certain inherent capabilities affording certain actions, street-level bureaucrats do not necessarily make use of them. Various technologies are adopted in street-level bureaucracies influencing discretionary practices differently. The various technologies include case management systems, web sites, databases, and automated systems. Table 6 provides a list of ICTs discussed in the empirical studies. The list provides descriptions of the technology, the street-level context in which the technology is applied, and its use. Seven of the empirical studies are not represented in the list as they did not discuss any technology explicitly referring to it in passing only.

The most common technologies in use are databases, automated systems, and case management systems. The automated systems were often used to automate sub processes and more seldom for decision-making. In the latter case, discretion is obviously influenced. But for other technologies, the influence on

Table 6
Technologies discussed in empirical studies

Technology	Description	Context	Use	Article(s)
Telephone	Communication channel used to interact with clients.	Social work.	Receive claims.	[10]
Multifunctional computer	Multifunctional computer available remotely.	Policing.	Enable remote access and transmission of relevant documents, videos, and other information for police operations.	[48]
Database	Organized repository of data.	Court, financial services, social work.	Register client information. Provide access to various resources.	[12,43,46,51, 52,54,57,61]
Web site	Set of web pages made available through the Internet under a single domain name.	Generalist, financial services, health care.	Receive various inquiries. Make decisions based on collected data.	[39,42,50,60]
Case management system	System that handles workflow and support for organizational processes.	Court, social work, financial services.	Administer work tasks. Provide overview of client information. Register client information. Exchange information. Provide templates for decisions. Exercise control activities.	[12,38,43,52, 58,61]
Automated system	System that conducts tasks without human intervention.	Financial services, social work.	Generate new data based on collected data. Make decisions based on collected data.	[38,41,44,47, 50,51,57]

discretionary practices seem to vary to a considerable extent based on their use. For example, the search algorithms embedded in a database determine what information a street-level bureaucrat is provided. If algorithms are poorly designed, results will be equally poor. Given that street-level bureaucrats are reluctant to question the information provided by a computer screen, even if their professional judgment indicates otherwise, the democratic control of public policy implementation can in these cases be handed over to software developers [5,51]. Another example is the use of simple telephone technology to interact with clients. Wenger and Wilkins [10] found that by making claims through the telephone rather than showing up in person, more women received social benefits. The reason for this change was that rogue street-level bureaucrats no longer could make decisions based on their own biases. Yet another example is provided by Busch [12] where the ability of judges to utilize the features that the technologies offered actually affected their discretionary practices. These examples serve to illustrate how differently technologies can influence street-level discretion.

5. Implications for street-level bureaucracy and research on digital discretion

The key problem that Lipsky [1] addresses is the potential loss of democratic control of the public policy making process since street-level bureaucrats influence the outcomes that clients experience, and the actions they take can actually become public policy. This observation is made despite the many procedures that have been implemented to control their behavior. ICT has been introduced to ensure

implementation of public policies according to the intentions of the policy maker. The diffusion of ICT into public agencies has caused structural changes in some street-level bureaucracies leading to computerized interaction with clients instead of face-to-face contact. While these observations can be made, Lipsky [1] holds that "the nature of service provision calls for human judgment that cannot be programmed and for which machines cannot substitute" (p. 161). In the digital era, we believe that this claim can be questioned. Digital discretion, understood as the use of computerized routines and analyses to influence or replace human judgment, can change what street-level bureaucracy fundamentally is. Guided by the literature, this review addresses two research puzzles: (1) whether digital discretion can cause a value shift in street-level bureaucracy, and (2) under what conditions digital discretion can cause such a value shift.

Addressing the first research puzzle, the review indicates increased diffusion of digital discretion which has implications for public values guiding street-level bureaucrats. The scarce number of empirical studies in this area makes it difficult to draw generalizable conclusions but the findings can rather serve as an indication of a general development. While digital discretion seems to be more suitable for strengthening ethical and democratic values, it generally fails in its attempts to strengthen professional and relational values. Street-level bureaucrats who willingly and knowingly act unethically are at the center of societal attention on a regular basis. The reviewed studies show that digital discretion can support ethical values by removing personal biases from decision-making [10,38]. Traditionally when interacting closely with their clients, street-level bureaucrats became acquainted with them gaining knowledge about who appeared to deserve a better treatment thus leading to favoritism. Technology does not make individual considerations but focuses merely on objective predefined criteria. However, one study found that automation could lead to novel forms of corruption since system administrators had excessive control of system outputs [8]. Thus, the threat is not emerging from the use of ICT which in fact seems to prevent street-level bureaucrats from unlawful actions as intended, but rather from the design of algorithms and system control [5].

Democracy is founded on the principle that certain agencies or people are appointed to conduct tasks on behalf of the community. They are expected to do so according to policies decided by democratically elected representatives. Thus, the people controls the state. The responsibility given to others than those elected presupposes that those who implement policies such as street-level bureaucrats can be held liable for their actions. Democratic values are values that support this principle. A common characteristic derived from the studies is that ICT seems to be well suited for control functions. By limiting the scope of actions that street-level bureaucrats can take, democratic values such as the rule of law and accountability are enhanced [42]. However, other studies clearly indicate that ICT can actually obscure who is responsible for actions taken simply by referring to what the computer said [43,44].

Concerning professional values, digital discretion seems to enhance efficiency but on behalf of the quality of decisions [12]. ICT, embedded with certain public values, seems to promote different goals, and thus often influence public service values [21]. While the attempt to make decision-making more time and cost efficient is legitimate, its conflicting consequence of reducing the quality of decisions is not. The reduction of discretion in street-level work is claimed to reduce service quality, demoralize street-level bureaucrats, and fail to achieve goals such as preventing errors to occur. However, the picture is not all black and white, and ICT is looked at with positive eyes when used as an enabling tool for street-level bureaucrats. In general, several of the studies conclude that ICT can be of considerable help to street-level bureaucrats by providing access to a vast amount of resources which enhances the quality of the decisions that street-level bureaucrats make. In addition, an increased diffusion of digital discretion is likely to influence the role of the street-level bureaucrat. While most street-level bureaucrats have gained

a considerable competence within their work area through education and experience, ICT may turn them into mere ICT operators that simply follow computerized routines. Discretion is considered an award by street-level bureaucrats, and reducing or eliminating their discretionary power may result in reduced job meaningfulness [2] and ultimately in less attractive jobs which has consequences for recruitment [68].

In the last category of values, the classic tension in street-level work between concerns for individual treatment on the one hand, and commitments to efficiency and standardization on the other is salient. Street-level bureaucrats have traditionally considered how to balance these concerns. Insights from the review suggest that ICT has not changed this practice considerably. In fact, ICT is found to contradict people values by reducing the options street-level bureaucrats have to look at the specifics in each case and adapt policies to real-life situations. These concerns are important for street-level bureaucrats who are found to unequivocally prioritize clients in situations where they are confronted with this dilemma [60]. Furthermore, researchers argue that citizens actively seek human judgment due to their need for individualized treatment.

From the discussion above, we suggest that as long as the goals promoted by various types of ICT are known, the value shift caused by digital discretion is a matter of prioritization. In those cases where ICT seems to have emergent effects and promote public values that were non-intended, digital discretion is causing a value shift outside the control of public managers and public policy makers. However, the effects of ICT are most often a result of both IT strategic decisions as well as emerging from the use of ICT. Thus, it is difficult to unequivocally make conclusions about a value shift based on our review. We suggest that digital discretion more easily supports ethical and democratic values than professional values whereas digital discretion seems to contradict people values. Findings indicate that we may witness the beginning of a value shift towards values favoring standardization and equal treatment of clients on behalf of values emphasizing individualized concerns. We hold that ultimately it must be the outcome of decisions that is important and not the logic behind them [32]. If ICT can enhance public values that result in fair and robust decisions, clients will be satisfied with public service provision and the underlying logic will be of less importance. Furthermore, findings show clearly that the influence is dependent on the context within which ICT is implemented. This conclusion leads us to the second research puzzle; namely to explain the conditions under which digital discretion can cause changes in public values.

The review of academic contributions illustrates that researchers studying digital discretion agree on context as vital for understanding the implications of digital discretion. Beyond this shared understanding, there is a significant difference in what researchers perceive to be the effects of digital discretion and which contextual factors that facilitate these effects. While street-level bureaucrats share commonalities such as the ability to exercise discretionary power, close interaction with clients, and scarce resources at their disposal, they are nevertheless very different. Diverse types of public services differ in terms of clients involved, the seriousness and consequences of each case, type of policies and the formulation of rules, and the expertise of street-level bureaucrats. To explain how computers could take over tasks conducted by humans, Sheridan [69] developed a 10-point scale to demonstrate nuances in degrees of automation. The scale can be divided into two main categories: (1) Low-level automation where the computer leaves discretionary practices and decisions to humans, and (2) high-level automation where the computer is increasingly able to execute decisions by itself [44]. Whereas the computer will offer no assistance to a human at the lowest level in Sheridan's scale of automation, the computer will act autonomously at the highest level. Cases of child abuse and neglect illustrate situations where computers can offer limited assistance to humans. In these cases, street-level bureaucrats are confronted with tragic situations that involve vulnerable children being neglected or even seriously harmed. Under extreme circumstances, the children die and sometimes due to professional errors among social workers [9,51].

These cases are so complex and span over many years making it very difficult to utilize ICT tools, and certainly to influence discretionary practices which is associated with higher levels of automation. Tax reporting can serve as an example of public services that can be exposed to high-level automation. The reporting is based on schematic rules and numerical data which makes such cases ideal for automation. The criteria that decide the outcomes of a tax report are clear being merely dependent on collecting data from required sources such as the client employer and bank. While Bovens and Zouridis [5] claimed that street-level bureaucracies were turned into system-level bureaucracies which are driven by the logic of the information system rather than the individual judgement of the street-level bureaucrat, they made some important caveats as well. They argued that mass transactions were most prone for automation, and believed that the suitability of ICT to influence the discretionary practices of traditional street-level bureaucrats such as teachers and nurses seemed to be more limited. A tendency we observe is that the number of empirical studies is increasing whereas the number of conceptual articles is decreasing. Furthermore, the view of digital discretion becomes more nuanced as more empirical studies are published.

From the review, three main reasons emerge for why digital discretion is diffusing more rapidly in some cases whereas more slowly in other cases. First, the automation of mass transactions has been very successful in terms of rationality objectives, and politicians and government officials constantly experience pressures to find more efficient solutions for public service delivery [70]. The imperative for public managers to prioritize efficiency is illustrated through a study of Rose et al. [4] who found that municipal managers were under considerable pressure to prioritize efficiency, and that they often did go by rationality objectives.

Second, while work routines have been a focus of researchers in this area, powerful actors are in general more interested in how the established power relations in the organization can be either changed or maintained dependent on the agenda of these actors [71]. This means that a change in work routines is not a problem as long as street-level bureaucrats can adapt their practices to any constraints enforced by ICT. The reviewed articles are most frequently occupied with how digital discretion affects the street-level bureaucrat. What we observe from the articles is that street-level bureaucrats exclusively relate digital discretion to the traditional public administration paradigm and do not see digital discretion as an opportunity to transform government. For example, transparency is emphasized to reveal how governments work since the logic behind decisions is expected to reflect the way decisions are made today. The public administration literature has shown that public agencies are reluctant to change their practices. Existing structures are reinforced, and street-level bureaucrats continue to work as before [72–74].

Third, the technology in use has obvious limitations. The reviewed articles have studied several types of ICT but most often databases and case management systems. While several of the recent empirical studies have used student grant loans, electronic tax reporting, and social e-services as examples of public service provision that is automated [44,47], we argue that new technology has begun to show evidence on its capability to perform tasks of traditional street-level bureaucrats. There is an increasing potential of ICT to transform non-routine street-level work such as teaching, nursing, and policing [32]. Artificial intelligence (AI) is a technology that has developed rapidly during recent decades describing computers that can act as autonomous agents and approximate the human brain. By time, they will have improved their own capacity to make accurate decisions [75] that overcome the many constraints of rule-based systems [76]. For example, IBM's Watson can now better identify symptoms of diseases than experienced physicians [76], and AI has proved to conduct better assessments of English essays than teachers [77].

The findings and conclusions from this literature review point to a number of implications for street-level bureaucracy. While we observe that digital discretion is increasingly diffusing, that ICT is influencing the practices of street-level bureaucrats, and that digital discretion in some cases is substituting

human judgment, can we still talk about street-level bureaucracy? Is it not turning into something else such as a screen-level or system-level bureaucracy [5], an infocracy [7], an e-bureaucracy [70], or a digital bureaucracy? From the research and policy literature it is observed that digitization is increasingly on the agenda of public policy makers, and from this we can conclude that digital discretion is likely to continue to increase its impact on street-level bureaucracies. The main characteristics of a street-level bureaucrat, as Lipsky [1] defined him or her, are (1) close interaction with clients during work hours, and (2) the ability to exercise a substantial amount of discretion. If digital discretion causes significant changes in how clients and street-level bureaucrats interact as well as limit the ability that they have to exercise human judgment, the two main characteristics of the street-level bureaucrat are changing due to digital discretion. While this development can be observed, it is acknowledged that certain types of street-level work seem to be unaffected by ICT which advocate for still talking about a street-level bureaucracy, for example in nursing and social work. However, the scope of street-level bureaucracy is decreasing, and opening space for a theory of digital bureaucracy where ICT is the core ingredient characterized by digital bureaucrats working in front of computers, who do not interact face-to-face with their clients, and who are limited to operating computers all with the intentions of improving public service provision in terms of enhancing ethical, democratic, professional, and relational values.

The most promising research avenue for digital discretion appears to be for public services where certain aspects of discretionary practices can be taken over by a computer. These are services that cover situations that are neither very complex nor straightforward. In between these situations, one will find that discretion is not "an 'all-or-nothing' phenomenon", but rather a result of "gradations of power that exist in the relationship between managers and professional workers" [78, p. 881]. In this mid-position, many questions are unresolved such as how ICT can obscure the discretionary practices of street-level bureaucrats contrary to intended objectives [57], how street-level bureaucrats may create work arounds for computerized routines, and how discretion can be influenced by ICT without street-level bureaucrats being fully aware of it [12]. In some cases, street-level bureaucrats experienced to be empowered by technology having more information about citizens and being able to control information flows. What is more, technology-induced change is caused by street-level behavior emerging "from a dynamic interaction of external circumstances and internal motives or interest" [79, p. 585], thus making it hard to predict effects of ICT implementations. Like socio-technical arguments claiming that technology cannot be viewed isolated but rather related to a social context shaping its use [80], digital discretion researchers increasingly view ICT as one of many factors that influence the outcomes of the use of ICT.

6. Conclusion

In this study, we report from 44 scholarly articles on ICT and street-level discretion. Societal problems such as increasing and more complex demands on public service provision, and errors and corruption are creating pressures on politicians and government officials to provide services of higher quality and in a more efficient manner. The review shows that the environment in which ICT is implemented and used is vital for understanding why digital discretion diffuses and how the impacts of it are. For certain types of street-level work such as mass transactional tasks, ICT has reduced or even eliminated the use of human judgment. Examples of mass transactional tasks are the handling of student grant loans and tax reports where the data is numerical and readily available for government agencies, and where decisions are made based on schematic rule sets. In other types of street-level work such as social work, the discretionary practices of street-level bureaucrats are influenced by ICT to a lesser degree or not

influenced at all. Contextual explanations for the prevalence of digital discretion can be attributed to factors such as the degree of professionalization, formulation of rules, computer literacy, and the level of information richness required. The impact of digital discretion is less explored in types of street-level work in between these extremes which opens avenues for future research. Another promising area for future research seems to be the increasing use of advanced technology such as artificial intelligence. This technology is now to a considerable extent able to deal with tasks of high complexity, and can thus address many of the shortcomings that the critics of digital discretion put forward.

The review further reveals that digital discretion has the potential to change the nature of public service provision. By using the concept of public service values, we found that digital discretion is strengthening ethical and democratic values but weakening professional and relational values for traditional street-level bureaucracies. Thus, digital discretion impacts the role of street-level bureaucrats and the work practices they perform in public service provision. Researchers in this area are mainly negative to digital discretion and conclude that street-level discretion is necessary to ensure values that are vital for public service provision such as making well-founded and fair decisions.

We conclude the literature review with claiming that the scope of street-level bureaucracy is decreasing. While certain types of street-level work seem to avoid extensive changes due ICT, it makes more and more sense to talk about digital bureaucracy and digital discretion since an increasing number of street-level bureaucracies are characterized by digital bureaucrats who operate computers instead of interacting face-to-face with their clients.

This literature review calls for more research. One third of the reviewed articles were conceptual, and the task now at hand is to evaluate the effects of digital discretion empirically, to explain under which circumstances ICT is influencing street-level discretion, and to explain how several types of technologies play a role in this influence. These are all under-investigated areas which provide good opportunities for future research. Other researchers are encouraged to join in exploring these questions and continue the research in this emergent area of significant practical importance.

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Appendix A. Literature search words

Literature database	Search query	Search results
Web of Science	TOPIC: (discretion) AND TOPIC: (e-government)	6
	TOPIC: (discretion) AND TOPIC: (“information technology”)	21
	TOPIC: (discretion) AND TOPIC: (ICT)	10
	TOPIC: (“street*level bureaucracy”) AND TOPIC: (e-government)	3
	TOPIC: (“street*level bureaucracy”) AND TOPIC: (“information technology”)	4
	TOPIC: (“street*level bureaucracy”) AND TOPIC: (“ICT”)	4
Scopus	(TITLE-ABS-KEY(discretion) AND TITLE-ABS-KEY (e-government))	14
	(TITLE-ABS-KEY(discretion) AND TITLE-ABS-KEY (“information technology”))	65
	(TITLE-ABS-KEY(discretion) AND TITLE-ABS-KEY (ict))	23
	(TITLE-ABS-KEY(“street-level bureaucracy”) AND TITLE-ABS-KEY (e-government))	9
	(TITLE-ABS-KEY(“street-level bureaucracy”) AND TITLE-ABS-KEY (“information technology”))	3
	(TITLE-ABS-KEY(“street-level bureaucracy”) AND TITLE-ABS-KEY (ict))	4
EBSCO*host*	AB discretion AND AB e-government	7
	AB discretion AND AB “information technology”	51
	AB discretion AND AB ICT	31
	AB street-level bureaucracy AND AB e-government	3
	AB street-level bureaucracy AND AB “information technology”	4
	AB street-level bureaucracy AND AB ICT	1
IEEE Xplore	((“Abstract”:discretion) AND “Abstract”:e-government)	2
	((“Abstract”:discretion) AND “Abstract”:“information technology”)	3
	((“Abstract”:discretion) AND “Abstract”:ICT)	1
	((“Abstract”:“street-level bureaucracy”) AND “Abstract”:“information technology”)	2
E-government reference library (EGRL) v. 12.0	discretion AND e-government [abstract]	5
	discretion AND information technology [abstract]	60
	discretion AND ICT [abstract]	5
	street-level bureaucracy AND e-government [abstract]	2
	street-level bureaucracy AND information technology [abstract]	1
Total		362

Appendix B. Theoretical frameworks and research methodologies

Article	Year	Theoretical framework	Research methodology
Aas [84]	2004		
Ameen and Ahmad [82]	2011		
Angell and Samonas [92]	2009	Weberian bureaucracy	
Barth and Arnold [75]	1999		
Ben and Schuppan [48]	2016	"Professionalization theories"	Case study
Bovens and Zouridis [5]	2002	SLB[1]	
Bruhn [50]	2015	SLB	Case study
Busch [12]	2017	SLB, institutional theory	Case study
Devlieghere et al. [61]	2016		Qualitative study
De Witte et al. [46]	2016		Case study
Henman and Adler [58]	2003	Governmentality (Foucault)	Survey
Hill et al. [56]	2012	SLB	Multiple case study
Houston [9]	2015	Self-proposed framework on holistic rationality	
Jansson and Erlingsson [39]	2014	SLB	Case study
Jorna and Wagenaar [57]	2007	SLB	Multiple case study
Kalu [88]	2001		
Kang [81]	2005		
Keymolen and Broeders [51]	2011		Case study
Landsbergen [91]	2004		
Larsson and Jacobsson [45]	2013	SLB, NPM[2]	Case study
Le Dantec and Edwards [53]	2008		Ethnography
Leenes [86]	2003	SLB	
Marston [41]	2006		Case study
Parton [90]	2008		
Paulin [8]	2013	Social contract theory	Multiple case study
Peckover et al. [54]	2008		Ethnography
Petrakaki [87]	2010	Weberian bureaucracy	
Pithouse et al. [43]	2011	Concepts of risk and systemic trust	Ethnography
Reddick [42]	2005	SLB, e-government stage model	Survey (secondary data)
Reddick et al. [83]	2011	Concepts of. discretion and e-government effectiveness	Survey
Shaw et al. [52]	2009		Multiple case study
Smith et al. [44]	2010	Concept of accountability	Multiple case study
Smith [38]	2011	Concepts of institutional trust and institutional trustworthiness	Multiple case study
Snellen [40]	2012	SLB, Mintzberg's technostructure	
Snijkers [85]	2005	Theory concerning ICT, intergovernmental relations, and state-citizen relations	
Tata [62]	2000	Concept of discretion	
Tummers et al. [55]	2009	Concept of policy alienation	Case study
Tummers and Rocco [60]	2015		Qualitative study
Varavithya and Esichaikul [89]	2005	Hartian positivism and Dworkin's interpretivism	
Varavithya and Esichaikul [59]	2007	E-government discretionary framework	
Wastell et al. [49]	2010	SLB, NPM	Ethnography
Wenger and Wilkins [10]	2009	Concept of discretion	Quantitative analysis
Wihlborg et al. [47]	2016	Actor-network theory	Case study
Zuurmond [7]	1998	Weberian bureaucracy, SLB	Case study

[1]Street-level bureaucracy; [2]New public management.

Technology and Institutional Logics

Completed Research Paper

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Abstract

During the past decade, information systems (IS) scholars have increasingly benefited from the concept of institutional logics. Whereas much of this literature looks at how actors are influenced by and seek to influence institutional logics, less research has focused on the direct link between technology and institutional logics. By neglecting this perspective, we have failed to explain how technologies, as material manifestations of institutional logics, can influence institutional stability and change. This paper has two main contributions. First, we provide an overview of IS research that draws upon institutional logics. We show that this research stream clusters into four perspectives focusing on how agentic behavior influences logics, how logics influence human behavior, how technology can influence logics, and how technology can influence human behavior. Our review shows inconclusive results regarding the role of technology in institutional stability and change, and more research is called upon. As our second contribution, we suggest an analytical framework to systematically investigate how technological artifacts relate to institutional logics and how they can change organizing.

Keywords: Institutional logics, institutional theory, organizational change, organizing, ICT, technology

Introduction

While we witness an increased diffusion of technology in organizations, its role in institutional stability and change is under-explored and often unclear (Kandathil et al. 2011). This is also true for studies applying institutional logics as theoretical lens (Jones et al. 2013; Thornton et al. 2012; Zilber 2013). Whereas much of the information systems (IS) literature has looked at how various institutional logics influence human attitudes and engage human behavior, less research has investigated the material dimensions of institutional logics such as physical objects (Jones et al. 2013; Raaijmakers et al. 2018). The reason for a more dominant research focus on human-centered aspects of IS can be traced back to the field's desire to distance itself from the previously dominating view of technological determinism (Czarniawska 2008; Leonardi and Barley 2010; Orlikowski and Scott 2008; Thornton et al. 2012). In this perspective, technology is considered "an exogenous force which determines or strongly constrains the behavior of individuals and organisations" (Markus and Robey 1988, p. 585). Technological determinism has been criticized for treating human actors as the mere audience to a theater show, and for showing contradictory results (Leonardi and Barley 2010). Due to its insufficient ability to explain the success or failure of technologies in organizations, researchers turned their attention toward social processes and how they can shape the effects of technology. However, whereas IS research has gained much from abandoning the deterministic doctrine of technology, the question is whether the pendulum has swung too far risking "assigning technology too little a role in making history" (Leonardi and Barley 2010, p. 35).

In studies of institutional logics, the role of technology is often passive, and less research has focused on how technology can have material agency. This perspective looks at the capacity technology has to act on its own apart from human intervention (Leonardi 2011). Technology can have agency through its inherent affordances and constraints, i.e., the things it can or cannot do (Leonardi 2011). In the institutional logics

perspective, material agency can be expressed through the inscription of institutional logics into technological artifacts serving as carriers for these logics. The lack of research on material components can hamper our understanding of how structures and practices become established in organizations. Material artifacts have significant social implications since they can serve as carriers for institutional change across an organizational field (Berente and Yoo 2012; Kandathil et al. 2011). Technologies can embody ideas, trigger cognitive and emotional responses, underpin the practices an organization employ, and make organizing durable (Czarniawska 2008; Leonardi and Barley 2008; Raaijmakers et al. 2018). For example, packaged software solutions such as enterprise systems (ES) becoming ways of conducting business by their inherent features. The thesis of this paper is that institutional logics studies have focused too little on how technology is shaping the way people work and organize despite technology being adopted into organizations and work life at a rapid pace.

To demonstrate our position, we build on the latest decade of institutional logics studies in high-end IS journals and conference proceedings. This stream of research shows signs of being fragmented and eclectic which can make it difficult for researchers to compare findings and cumulate knowledge across different studies. We contribute to research by synthesizing perspectives on technology and institutional logics and suggesting an analytical framework to systematically analyze the role of technology in institutional logics studies. By focusing more on technology, we can understand how human actors influence the design of technologies by inscribing logics, how technology influences organizational settings characterized by conflicting logics, and how technology is used and appropriated as a result of the logics in play.

The Institutional Logics Perspective

Institutions are central to research under the institutional theory umbrella. Institutions are social structures, often enduring, that reflect beliefs, values, and norms guiding human behavior (Scott 2014). Friedland and Alford (1991) claimed that society was ignored in organization theory and developed the concept of institutional orders to consider sociological issues. Examples of important institutional orders in western societies are family, community, religion, state, market, profession, corporation, bureaucracy, and democracy (Johansen and Waldorff 2017; Thornton et al. 2012). Potentially contradictory institutional orders coexist and form the basis of an ongoing societal transformation: "economists tend to argue that they study rational making of choices, while other social scientists study the irrational bases that prevent people from choosing. We argue that the opposition is not between rational and irrational, but between different transrational orders" (Friedland and Alford 1991). The different orders cannot be easily reconciled, and individuals must find their own solutions to the constant friction. This friction opens for creativity and rearrangement of the orders' content, i.e., the underlying institutional logics. Examples of institutional logics are participation (of the institutional order democracy), and professionalism (of the institutional order bureaucracy). Johansen and Waldorff (2017) point out that empirical studies rarely examine the relation between logics and orders, that logics are defined and examined without any reference to their corresponding orders, and that orders and logics often are conflated.

Institutional logics is a perspective that has received much attention and is increasingly referred to in prominent journals and conferences within IS and other disciplines such as management, organization studies, and public administration (Johansen and Waldorff 2017; Zilber 2013). It is a metatheoretical framework intended to assist researchers in analyzing the interrelationships among institutions, individuals, and organizations in social systems (Thornton et al. 2012). Institutional logics are "socially constructed, historical patterns of cultural symbols and material practices, including assumptions, values, and beliefs, by which individuals and organizations provide meaning to their daily activity, organize time and space, and reproduce their lives and experiences" (Thornton and Ocasio 1999, p. 804) and operate at a supra-organizational level (Thornton et al. 2012). The institutional logics perspective is premised on the idea that interests, values, and assumptions of individuals and organizations are embedded into institutional logics distinguishing the concept from macro-structural approaches that emphasizes the primacy of structure over action (Thornton and Ocasio 1999; Thornton et al. 2012). Institutional logics define the meaning and content of institutions and are important to delineate and understand an organizational field. Institutional change is often associated with a change of the dominant institutional logic for the field (Scott et al. 2000; Suddaby and Greenwood 2005) since institutional logics, once they become dominant, "affect the decision of organizations [..] by focusing the attention of executives toward the set of issues and solutions that are consistent with the dominant logic and away from those issues and

solutions that are not" (Thornton 2004, pp. 12-13). Both field-level and micro-level actors can facilitate institutional change. Field-level actors drive forth change by finding new ways of organizing and by challenging existing logics (Reay and Hinings 2009). On the micro-level, powerful actors such as institutional entrepreneurs can advocate for institutional change (Battilana et al. 2009). Moreover, less powerful actors can support the non-dominant logic overtly or covertly, and by time cause so many incremental changes that the dominant logic changes (Battilana 2006; Reay and Hinings 2009).

Whereas multiple logics can coexist within organizations, this coexistence is usually recognized as a temporary phenomenon (Goodrick and Reay 2011; Johansen and Waldorff 2017). When multiple logics exist temporarily, powerful actors work to enforce their values and beliefs upon their institutional environment for a logic to become dominant. Once a new logic is introduced into an established field, a transition phase will prevail until the new logic has replaced the existing logic. The new logic can be a hybrid of the two previously competing logics (Kandathil et al. 2011; Reay and Hinings 2009). Other scholars have more recently recognized that institutional logics can coexist over a longer period (Goodrick and Reay 2011; Waldorff and Greenwood 2011; Waldorff et al. 2013). Conceptualizing the relationship between multiple logics, Goodrick and Reay (2011) found that multiple logics can be either competitive or cooperative. Competitive logics cause organizational practices to reflect one logic instead of the other. Contrary to competitive logics where increases in strength in one logic will lead to decreases in strength in another logic, cooperative logics do not outplay each other (Waldorff et al. 2013). When logics are cooperative, organizational practices will eventually reflect both logics. Two separate ways in which logics can be cooperative are suggested (Goodrick and Reay 2011). First, logics may be facilitative, where changes in organizational practices consistent with one logic can assist the progress of changes consistent with another logic. Second, logics may be additive where a certain organizational practice could reflect more than one logic. This paper focuses the attention toward how technology can cause institutional stability and change.

Methodology

The two main objectives of this paper are (1) to identify, classify, and summarize existing research on technology and institutional logics, and (2) to suggest an analytical framework for systematically analyzing how technology influences and is influenced by institutional logics. To study these issues, papers of validated research quality were sought. As notable contributions are likely to be in leading journals, we began our search by targeting studies published in the information management category in the 2018 CABS academic journal guide. We selected journals that were ranked level 3 and 4. Next, we searched through highly respected IS conference proceedings (ICIS, AMCIS, ECIS, PACIS, and HICSS). In total, we searched 21 journals and the proceedings of five conferences.

To identify relevant studies, we used a combination of the search terms "technology" and "institutional logic*" searching title, abstract, and keywords of papers in databases that indexed the selected journals and conference proceedings. The search ended in April 2018. Abstracts, and full papers if necessary, were read or scanned to validate the relevancy of the identified papers. Studies were included if they used the lens of institutional logics to study a technological artifact as an important part of the research context. Studies were excluded if they did not match the inclusion criteria, had anonymous authors, were recurring, and if they were categorized as research-in-progress manuscripts. The final data set consisted of 25 papers.

The identified 25 papers were reviewed and coded by one author according to their focus on ideational and material aspects of institutional logics. A two-staged approach was taken. First, the papers were scanned focusing on their key elements; title, abstract, research question(s), and conclusions. As an initial result, six relationships between institutional logics, technological artifacts, and actors were identified. In the second stage, all papers were read carefully and coded using the initial coding scheme. To increase the rigor of the coding, an outside researcher was provided with a summary of each paper and the results from the coding. Disagreements were discussed and resolved.

In coding the papers, we directed our attention to the primary focus of the papers, i.e., whether human behavior is influencing or being influenced by institutional logics, and if technology played a role in this influence. Where the authors of the papers identified a specific type of influence (e.g., technology as carrier for an institutional logic), this self-identified type was used in the coding. Some of the papers discussed several perspectives, e.g., how novel technology can reflect a non-dominant logic and how actors react to the newly introduced technology. Even though several papers could be associated with multiple categories,

each paper was listed in one cluster only. Since this paper focuses on materiality as an object of study in institutional logics research, the papers were clustered based on the following criteria: (1) whether the role of technology was discussed, (2) discussions regarding human behavior, and (3) main research focus. Our analysis of the IS literature revealed that research involving technology and institutional logics can be clustered according to four perspectives A-D (see Figure 1).

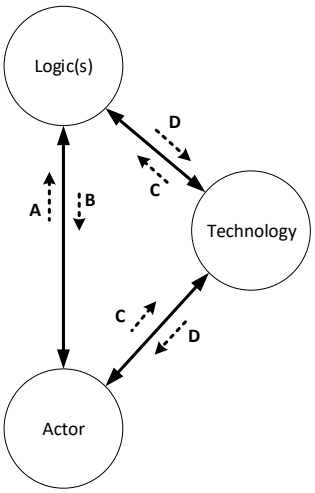

Figure 1. Illustration of Research Perspectives on Technology and Institutional Logics

These perspectives are: agentic behavior influencing logic(s) (A), logic(s) influencing human behavior (B), technology influencing logic(s) (C), and technology influencing actors' behavior (D). Table 1 provides examples of how studies were coded and categorized.

Table 1. Coding Examples

Cluster	Example	Source
A	"These contradictions provoked the emergence of a particular kind of institutional entrepreneurship, which was deeply implicated in reshaping institutionalised ways of thinking and doing."	Mangan and Kelly (2009, p. 66)
B	"[..] we posit how the behaviour of the actors interacting over virtual media is determined by interplay between two dominant institutional logics, namely logic of care and logic of choice."	Chandwani and De' (2017, p. 955)
C	"[..] to understand how material objects contribute to institutional stability and change." "Our motivation is to understand the new logics and the part played by [Investment Management Systems (IMS)] in supporting these approaches."	Kandathil et al. (2011, p. 1) (Gozman and Currie 2013, p. 1)
D	"[..] algorithms can be used to nudge users and influence the motives, behavior and decision of individuals and groups." "The enterprise system is introduced in accordance with the logic of managerial rationalism."	Janssen and Kuk (2016, p. 372) (Berente and Yoo 2012, p. 376)

Research Perspectives on Technology and Institutional Logics

The identified four perspectives on technology and institutional logics are interrelated. A technological artifact can be purposely designed to promote a certain behavior (as in perspective D) which in turn could influence the institutional environment (as in perspective C). Whereas the perspectives are interrelated, research within each of them does not need to attend to several issues. For example, studies may focus solely on how institutional logics ingrained in technology can influence human behavior without addressing any effects on the institutional environment. Thus, these four perspectives serve as useful categorizations for ordering studies on technology and institutional logics. Table 2 summarizes critical characteristics of studies within these four perspectives and lists the papers that comprise each group. Each perspective is described in more detail elaborating on the focus and findings of the studies within each cluster.

Table 2. Characteristics of Research on Technology and Institutional Logics

	A agentic behavior influencing logic(s)	B logic(s) influencing actors' behavior	C technology influencing logic(s)	D technology influencing actors' behavior
Core research question	How is the institutional environment influenced by human behavior?	How is human behavior influenced by institutional logics?	How is the institutional environment influenced by technology?	How is human behavior influenced by technology?
Dependent variable	Logic.	Human behavior.	Logic.	Human behavior.
Role of technology	Passive.	Passive.	Active.	Active.
Technology focus	Adoption, implementation, and use. Technology-oriented setting.	Adoption, implementation, and use. Technology-oriented setting.	Logic inscription, facilitator and impediment.	Logic inscription, facilitator and impediment.
Studies	Mangan and Kelly (2009); Yang and Kankanhalli (2013); Ramotar and Baptista (2013); Ismail et al. (2016); Vial and Rivard (2016)	Marschollek (2011); Mola and Carugati (2012); Sandeep and Ravishankar (2014); McElroy and Lyytinen (2015); Tumbas et al. (2015); Oostervink et al. (2016); Seidel et al. (2016); Chandwani and De' (2017); Dang (2017); Qiu et al. (2017)	Lyytinen et al. (2009); Kandathil et al. (2011); Baroody and Hansen (2012); Gozman and Currie (2013); Addo (2016)	Berente and Yoo (2012); Hultin and Mähring (2014); Janssen and Kuk (2016); Buchana and Seymour (2017); Bunduchi (2017)

A. Agentic behavior influencing logic(s). This perspective consists of studies that investigate how organizational actors exposed to institutional complexity seek to influence their environment. An agentic

behavior within the umbrella of institutional theory has been criticized (e.g., Powell and Colyvas 2008) breaking with the theory's core ideas that institutions, i.e., macro-level structures, guide human behavior. Several institutionalists have claimed that whereas institutional theory to a large extent has been able to explain institutional stability, it has failed to explain institutional change (Battilana et al. 2009; DiMaggio 1988; Oliver 1991). How can new institutions arise, and existing institutions disappear if actors are merely guided by extant institutions? The concept of institutional logics offers a solution to this problem which is frequently referred to as the paradox of embedded agency (Seo and Creed 2002). Belief systems and practices inherent in different logics create frictions in perceptions of social reality which actors seek to reconcile (Johansen and Waldorff 2017). In this cluster of papers, organizational actors enforce their values and beliefs upon an institutional environment by introducing a new logic that they advocate for. Thus, researchers are interested in how members of an organization actively work to replace an institutional logic of which they are dissatisfied. This institutional work can take several forms such as through incremental or radical changes, and through covert or overt actions (Lawrence and Suddaby 2006).

Papers studying agentic behavior share a focus on actors with strong self-interests residing in institutional environments characterized by multiple competing logics. This perspective is different than the one of the over-socialized actor adhering to taken-for-granted practices without any real reflection (Tolbert and Zucker 1999). Actors use their positions and their knowledge of the local context to influence and shape their institutional environment. The work of Mangan and Kelly (2009) argue that organizational settings that are institutionally complex can shape the outcomes of IS implementations. They studied an extensive IS implementation project in the Irish credit union movement characterized by competing logics. Their findings suggested an ongoing process of institutional change over a longer period only punctuated by shorter periods of more radical changes. Institutional entrepreneurship emerged because of the institutional contradictions in the credit union where certain actors were strongly involved in changing institutionalized beliefs and practices, and thus changing the institutional reality they experienced. Ramotar and Baptista (2013) investigated drivers for the adoption of and participation in enterprise social media (ESM). The organizational context was organizations with pre-established scripts for working and thinking and with varying interest of ESM. When ESM was introduced, its related activities conflicted with those of the existing institutional environment. Because of this, institutional entrepreneurs had to utilize several strategies to legitimate its use.

Strong self-interests can also materialize in human relations and how partnerships in IS projects play out. Because of competing logics, various powerful actors seek to enforce their beliefs and values upon the partnership and influence project outcomes, sometimes contrary to initial intentions. Ismail et al. (2016) studied a public-private partnership of an IT impact sourcing initiative. They found that the private partners were only interested in knowledge creation and knowledge sharing for commercial gains. The public partners chose another approach aiming for more openly shared knowledge for the benefit of the public without taking commercial gains into account. They found that the private partners almost exclusively chose a competitive approach to manage conflicts which ultimately resulted in a weak partnership and a domination of the private logic over the public logic. Considering that the purpose of this partnership was to produce welfare benefits to citizens of a developing country, the private logic dominance was particularly unfortunate. The study showed that the poor lacked a champion that could advocate their cause, and that the public partners also were somewhat constrained from working on their behalf. Vial and Rivard (2016) focused on how differences between parties in outsourced IS projects could be explained by different institutional logics. They found that the enactment of institutionalized practices could be explained by five strategic responses to the conflicting institutional demands: enacting acquiescence, avoidance, compromise, manipulation, and defiance (Oliver 1991).

Whereas these studies could infer that institutional entrepreneurs had a significant impact on their institutional environment, they did not study characteristics of the actors to anticipate the level of agentic behavior. Yang and Kankanhalli (2013) found that salaried physicians and physicians with higher seniority would demonstrate a more frequent use of the IS than physicians that were non-salaried and of lower seniority. The reasons for these differences are explained by their relation to their employer. Salaried physicians were more likely to adhere to organizational norms mandated by administrators since they were in a binding relationship to their employer. Physicians with higher seniority were more likely to hold higher positions in the hierarchy thus being obligated to adhere to managerial concerns such as cost savings on behalf of professional norms and autonomy.

B. Logic(s) influencing actors' behavior. The second perspective is most explored where studies seek to identify how different actors begin to act according to the dominant institutional logic within a field (e.g., how they use and appropriate technology). Organizational settings that are institutionally complex and characterized by demands associated with multiple and often contradicting logics are prevalent. The frictions that occur because of the institutional complexity are sources of frustration that actors need to make sense of. The role of technology is often peripheral and related to the organizational setting itself.

Qiu et al. (2017) used institutional logics to look at how third-party app developers within Apple's iOS platform-based software ecosystem were influenced by two salient logics and how they managed them. They found that the two logics, a logic of the profession and a market logic, in some occasions contradicted each other whereas being cooperative in other occasions. When the logics were in conflict, app developers either battled the opposing logic or sought to synthesize the demands of the two logics. Chandwani and De' (2017) studied the interaction between doctors and patients through telemedicine virtual media and found that this interaction was influenced by two dominant logics; a logic of care and a logic of choice. Doctors and patients accepted the technology if it could be appropriated to emphasize care aspects of the doctor-patient interaction thus reflecting the logic of care. McElroy and Lyytinen (2015) studied how science teams from different disciplines utilized web technologies to generate and assess evidence as part of their research efforts. They found that the use of this cyber-infrastructure was difficult due to the differing institutional logics guiding members of the interdisciplinary research teams. Furthermore, they found that one of the teams were able to work around the challenges caused by the institutional complexity. The study by Marschollek (2011) looked at public-private partnerships of ICT initiatives and how they are difficult to pull off due to differences in organizational values and practices. He applied institutional logics as theoretical lens to explore how public- and private-side logics influenced the creation of a working partnership. The study identified partnership management procedures necessary for establishing a common ground between the public and private partners guided by two different logics. Dang (2017) studied the institutionalization of enterprise architecture in several organizations. Findings suggested that organizations experienced different outcomes of the projects because stakeholders with different interests played a significant role driving the enterprise architecture implementations in different directions. Whereas multiple logics can coexist and create frictions, actors can also be guided by one dominant logic. Sandeep and Ravishankar (2014) looked at the trajectory of a public technology implementation project in India to explain poor performance. They found that a bureaucratic logic enforced bureaucratic principles that were applied rigidly by high status groups leading to poor performance of the project. The study by Mola and Carugati (2012) looked at a manufacturing company that changed its practice from using locally developed software (adhering to a logic of localism) to using another and more cost-efficient software package (adhering to a logic of managerialism). In the transition phase, they adhered to both logics aiming at a software solution that was familiar and yet cost efficient.

Other papers have looked at how affordances are enacted based on various logics guiding the users. Drawing on the theory of technology affordances and constraints (Pozzi et al. 2014), the central premise is that technologies can afford certain features which actors will enact differently based on their institutional guidance. Institutional logics are applied to explain how affordances are perceived and actualized. Tumbas et al. (2015) studied innovation behavior by actors outside an IT department suggesting that institutional logics provided a better explanation of innovation behavior than classical top-down models. These actors recognized different technology affordances thus innovating with digital technologies in various ways based on the combinations of institutional logics that guided them. The study emphasized that organizational actors interpret technologies according to their local context. Findings further suggested that these actors combined practices drawing from several logics incorporating these into their own profession. Seidel et al. (2016) explored tweets by IS academics and celebrities to find out how affordances were perceived and enacted similarly and differently based on the logics they drew upon. They found that some affordances were enacted under one logic only, that an affordance could be enacted with different intensity under different institutional logics, and that unique features could afford the same opportunities of status production to different users. The next study by Oostervink et al. (2016) has explored knowledge sharing behavior aiming at professionals using enterprise social media. They found that the professionals were guided by two competing logics of the profession and the corporation. They engaged affordances in the technology to cope with the institutional complexity that arose. Furthermore, they found that the technology could both facilitate and frustrate knowledge sharing.

C. Technology influencing logic(s). When researchers study how technology influences the institutional environment, they are interested in the effects a technological artifact has on a logic. The core focus of studies in this perspective is how the institutional environment is influenced by technology. Whereas much of institutional logics research has focused on how both macro-level and micro-level actors have advocated for a new institutional order, the role technology can play is often undermined. In this perspective, the capacity of various technologies reflects certain inscribed institutional logics and can therefore cause institutional jolts. Through the use of technology, institutional logics can be facilitated or impeded – and as a result, cause institutional stability or change.

Lyytinen et al. (2009) take a process view of technology implementation. They looked at the adoption and institutionalization of a specific technological artifact (an ERP system). Their initial thesis was that the institutionalization of the ERP system would lead to a new institutional order. They suggested that the system needed to penetrate tightly coupled institutional fields for it to cause radical changes in these fields. Addo (2016) investigated the use of an Electronic Data Interchange (EDI) system to automate and integrate customs clearance in Ghana. His focus was to identify how bureaucrats in different public agencies reacted to the managerial logic of the EDI system. He found that they tended to react irrationally by sometimes preferring manual, face-to-face, and paper-based practices despite the EDI system supporting full automation and integration. The explanation for this apparent irrationality was found in their adherence to existing and contradictory bureaucratic logics. Instead of maximizing the use of the system, they were satisfied with practices deemed as 'good enough'. The study by Baroody and Hansen (2012) investigated the implementation of electronic health records (EHR) systems within the U.S. healthcare system. They identified a broad range of competing and cooperative institutional logics demonstrating institutional complexity within the healthcare field. The EHR systems proved their usefulness in reducing common errors and redundant data as well as providing greater efficiency in many areas such as records management, billing, and medication management. However, while achieving these goals, the healthcare providers were concerned about the impact that the EHR systems had on patient treatment. They stated that such systems could impede the relationship between the physician and patient distracting physicians with data management activities of little clinical value. Baroody and Hansen (2012) concluded that significant challenges were associated with creating a system of incentives that could lead to the EHR system being experienced as useful for primary healthcare activities.

The longitudinal study by Kandathil et al. (2011) used the implementation of an ES in India to explore how the ES related to institutional stability and change through its role as a carrier of institutional structures and practices. The ES was introduced into an organizational field that was different than the inscribed institutional logic in the ES. Their longitudinal study found that the institutionalization took place through several stages. In the initial stages, the institutional logic inscribed in the ES gained dominance and was promoted by the managers. As work processes increasingly reflected the new logic, a group of engineers tried to undermine the new logic arguing that it was unfit for their organization. Their initiative failed as they lacked the required power and support for their opposition. However, their view was supported by the managers later in the institutionalization process resulting in customizations of the ES reflecting a cooperative relationship between the legacy institutional logic of flexibility and the ES-inscribed logic. The final study by Gozman and Currie (2013) examined how a dominant logic was questioned, and how new processes were introduced as a result. The researchers looked at how a technological artifact was used to facilitate the new logics that were introduced and their compliance arrangements in eight financial organizations. The authors conclude that technology played a key role in supporting and enabling activities related to the new logics.

D. Technology influencing actors' behavior. Whereas research in perspective C focuses on how technology can lead to institutional stability and change, this perspective focuses on how technology is purposely designed to encourage desired use patterns. Hardware and software thus become carriers for institutional logics, and researchers seek to study the effect on what people do. Whereas the use of technology can lead to a new institutional order, these studies do not investigate the effect on the institutional environment but merely on how people behave.

The study by Janssen and Kuk (2016) discussed technocratic governments using algorithms instead of administrative processes. They criticize the myth that algorithms are free from human interferences and biases emphasizing how they are implemented for specific purposes. Human intentions are encoded into algorithms granting their designers with power and control to define criteria and include and exclude data

leading to certain behavioral patterns of the people exposed to them. Thus, algorithms reflect the institutional logics guiding their designers. Buchana and Seymour (2017) looked at how three different institutional logics could explain IT-enabled performance in a hospital. They found that features of the used technology could reflect the identified logics in several ways such as through real-time monitoring, reporting of individual and aggregated performance for the entire organization, and resource optimization.

Whereas not covered in the two previous studies, Berente and Yoo (2012) also addressed reactions to the inscribed logics in the technology. They looked at the implementation of an ES in the National Aeronautics and Space Administration (NASA) in the months immediately after the go-live. Whereas the ES was implemented with the purpose of reflecting the logic of managerial rationalism, organizational actors drew upon other logics that contradicted that of the ES. When actors are confronted with a mandated use of technology, they react and resist according to their self-interests, especially if the newly introduced practices are in conflict with their previous practices (Currie and Guah 2007). Because they act according to their self-interests and since the ES is introduced to reflect a particular logic, the actions of the actors will counter the directive of the implementing organization. In this study, the contradictions occurred because of a clash between the logic of the ES and the logics guiding the organizational actors. As a result, the actors loosely coupled elements of their practices from those of the ES to satisfy demands aligning with all logics.

When a new logic is introduced into an institutional environment, it is often experienced as confusing and sometimes stressful for actors within the environment. Hultin and Mähring (2014) were interested in how a technological artifact could help actors to make sense of a new logic. Their paper is based on an interpretive, longitudinal case study of an emergency general surgery ward at a hospital. They combined the theoretical lens of sociomateriality with the concept of institutional logics showing how physical visualization boards were important parts of the staff's sensemaking and enactment of a new institutional logic. At first, the staff considered the visualization boards through a logic of professionalism and not through the lean logic as the management advocated. Hence, they perceived the boards to be useless and dismissed them. Their negative experiences resulted in technological changes where they, over time, found themselves enacting routines that supported the lean logic. However, the enactment of the latter logic did not imply a shift from one dominant logic to another, but rather that they became guided by two coexisting logics. Bunduchi (2017) examined the trajectory of a student led visualization tool during the processes of development, implementation, and use in an institutionally complex hybrid organization characterized by multiple logics. She found that the technology's success could be explained by its ability to navigate multiple logics throughout its trajectory. The change of the technology over time in terms of inscribed practices and features made it able to negotiate demands reflecting different logics.

Framework Development

Institutional theory has traditionally focused on how coercive, normative, and cultural-cognitive institutional pressures cause organizations to become similar. In this view, actors within organizations behave as cultural dopes mindlessly following institutionalized scripts (Fligstein 2001). More recently, institutional theorists have acknowledged that human agency plays a key role in institutional change (DiMaggio 1988; Oliver 1991; Seo and Creed 2002). Studies within clusters A and B (see Table 1) represent these perspectives. These studies often focus on the cognitive, normative, and symbolic dimensions of institutional logics instead of material dimensions such as physical objects (Friedland 2013; Jones et al. 2013; Thornton et al. 2012). This paper contributes to the institutional logics literature by directing attention to how technology can influence or reflect institutional logics represented in clusters C and D respectively (see Table 1). Studies that specifically address the role of technology are fragmented and eclectic. These studies cover a wide range of issues and ideas often without reference to analytical frameworks and systematic approaches. Some studies look at how conflicts occur as a result of competing logics, other studies investigate how technologies change over time and yet other studies focus on making sense of novel logics. The level of analysis varies and are seldom discussed across micro-, meso-, and macro-levels. Whereas some studies focus on the maturity of the utilized technology, the institutionalization of a technological artifact is seldom discussed. The eclecticism characterizing these studies is challenging since it ultimately can hinder the cumulation of knowledge about how technology relates to institutional logics and thus institutional stability and change.

We seek to address this eclecticism by suggesting an analytical framework for the benefit of other researchers. Our review has shown that technological artifacts can be designed and used in such ways that

they can facilitate the dominance of some institutional logics and impede others. Various techniques such as pattern deducing, pattern matching, and pattern inducing have been used to capture institutional logics and study their dominance (Reay and Jones 2016). This framework is based on the pattern matching technique by comparing empirical data with ideal type characteristics of institutional logics. Ideal type characteristics describe various aspects that are typical for a specific institutional logic (Reay and Jones 2016). By comparing assumptions, principles, and practices associated with technological artifacts (e.g., through affordances and constraints), we can identify whether logics are facilitated or impeded by these technologies. We focus on characteristics of institutional logics and technology based on our review of the literature and the work of Goodrick and Reay (2011) and Thornton et al. (2012). To identify these characteristics, we looked for concepts that could describe dimensions of both technological artifacts and institutional logics. Since technology can influence and reflect institutional logics in many different contexts, we sought to identify characteristics that can explain how technology relates to various logics independently of the context. Table 3 presents the characteristics that emerged from our literature review of studies that have examined how technology relates to institutional logics and their ideal type characteristics. Whereas we identified four key characteristics (empowerment, goals and values, scope of practice, and control of work processes), we acknowledge that other characteristics may exist.

Table 3. Identification of ideal type characteristics based on literature

Inter-related concepts discussed in the literature	Representative studies	Identified ideal type characteristic
Source of authority, top-down approach, control, power	Thornton et al. (2012); Sandeep and Ravishankar (2014); Berente and Yoo (2012)	Empowerment
Principle, assumption, value, ethos, vision, goal	Berente and Yoo (2012); Qiu et al. (2017); Ramotar and Baptista (2013); Hultin and Mähring (2014)	Goals and values
Scope (of practice), domain, type of task	Goodrick and Reay (2011); Bunduchi (2017); Chandwani and De' (2017); Berente and Yoo (2012)	Scope of practice
Control of work processes, affordance, constraint,	Goodrick and Reay (2011); Leonardi (2011); Tumbas et al. (2015); Seidel et al. (2016); Hultin and Mähring (2014); Vial and Rivard (2016)	Control of work processes

The *first* characteristic refers to the empowerment of individual actors, groups of people, and/or organizations that are strengthened by the institutional logics and technologies (Kandathil et al. 2011; Thornton et al. 2012). Studying empowerment is important for matching logics and technological artifacts since power can explain who is benefited or disfavored by the technology in use. If technology empowers the same organizational actor as the dominant logic, this finding suggests that the technology supports this logic. For example, public management can force public service workers to follow standardized routines they otherwise would not follow. *Second*, technology and institutional logics are guided by goals and values describing their content and intentions (Gosain 2004; Janssen and Kuk 2016). Institutional logics reflect goals, values, and prescriptions that can be associated with specific institutions (Berente and Yoo 2012; Friedland and Alford 1991; Thornton et al. 2012). This characteristic can help us understand how organizational actors must make sense of novel technologies according to the goals and values they support. For example, a logic of professionalism can be characterized by goals and values such as professional quality and a preference for clients (e.g., Goodrick and Reay 2011; Hultin and Mähring 2014; Qiu et al. 2017). A technological artifact that, for example, does not emphasize the same goals and values indicates an impediment of this logic and can thus lead to resistance by its users (Hultin and Mähring 2014).

Identifying the scope of practice reflected by a logic and technological artifact will help us understand whether the nature of work is changing, and the role technology plays. For example, technology can automate tax report processing and fundamentally change the nature of work in the organization. *Fourth*, the way tasks are conducted can be defined by technological artifacts and institutional logics through the control of work processes (Goodrick and Reay 2011; Gozman and Currie 2013; Hultin and Mähring 2014). This control is important to understand since technological artifacts can change work processes reflecting a logic that is not fully supported in an institutional environment. For example, how the use of technology is advised according to established work practices will suggest how well the technology match the dominant institutional logic. If a technological artifact is designed to support routines defined by law, this indicates that the technology is strongly supporting a bureaucratic logic.

Even though we focus on studying the role of technology in institutional logics studies we do not argue for studying merely material aspects of technology and organizing, but rather for including both social and material aspects. The dichotomous problem of whether social or material aspects have the upper hand in studies of technology and organizing is much debated (e.g., Leonardi and Barley 2008; Orlikowski and Scott 2008). Research has shown clear signs of being biased toward a focus on one of the aspects (Leonardi and Barley 2010). Solutions to the problem has been suggested by turning the attention toward different phases of the technology lifecycle and the level of analysis (Leonardi and Barley 2010). Hughes (1994) focuses on the phase of technology implementation. He argues that the choices humans make are more important in the earlier phases of the technology lifecycle and that their importance are gradually reduced as technology becomes increasingly institutionalized. When technology is institutionalized, it will begin to act more like a material determinant. To analyze the influence of technology on logics during separate phases of the technology lifecycle makes sense. For example, many choices and decisions are made during the adoption phase that influences later use of the technology. By investigating the early life of a technology, we gain insights into why technologies were designed as they were or why a specific technology was preferred over another (Leonardi and Barley 2010). Several of the reviewed studies looked at adoption, implementation, and use of various technologies. A few of the studies that directly discussed the role of technology conducted longitudinal investigations looking at the institutionalization process of technological artifacts (Hultin and Mähring 2014; Kandathil et al. 2011; Lyytinen et al. 2009). Whereas we can expect that a novel technological artifact will not strongly support a dominant logic (Hultin and Mähring 2014), we can likewise expect that fully institutionalized technologies more likely will function as strong advocates for particular logics (Lyytinen et al. 2009). Another suggested solution is related to the level of analysis. Many studies have been conducted on the micro-level seemingly concluding that every technology implementation leads to its own sociomaterial order (Leonardi and Barley 2010). Whereas micro-level actors tend to use technology in non-conformative ways, research investigating technology use at meso- and macro-levels of analysis, i.e., groups or organizations, suggest that these actors will show homogeneity in technology use and effects. This means that technology interaction seems to converge when meso- and macro-level actors use the technology (Misa 1994). Whereas several of the studies discussed various levels of analysis, none of them directly addressed how the use and effects of technology is influenced by multiple levels. Table 4 describes our framework. It consists of shared characteristics describing institutional logics and technological artifacts (Goodrick and Reay 2011; Thornton et al. 2012), the level of analysis (Leonardi and Barley 2010; Misa 1994), and the technology phase (Hughes 1994).

Illustrative Case Study

To demonstrate the utility of the framework we use a published case study, the institutionalization of visualization boards in an emergency general surgery ward at a hospital (Hultin and Mähring 2014).

Case Selection

We deemed the study by Hultin and Mähring (2014) as appropriate for our re-analysis for several reasons. First, the data were collected for a relatively long period of time. The advantage is rich data describing how technological artifacts are initially perceived by their users and how they are institutionalized. Furthermore, the data were collected through a combination of methods such as observations, interviews, participation in relevant forums, studies of archival materials, and informal discussions with medical professionals throughout the data collection period. Third, the study has looked at a group of actors that are fairly similar in terms of dedication to care aspects of their work which means that we can analyze how a group of medical

Table 4. Framework for Analyzing Technology and Institutional Logics	
Characteristic	Description
Empowerment	Organizational actor(s) gaining power through the institutional logic and the technological artifact, e.g., a government agency.
Goals and values	Underlying purposes, motivations, and desired results (often enduring) of an institutional logic and a technological artifact, e.g., adherence to bureaucratic rules.
Scope of practice	Types of tasks reflected in an institutional logic and restricted by a technological artifact, e.g., standards of a professional association.
Control of work processes	Organizing principles of an institutional logic and inherent in a technological artifact guiding activities, e.g., conformity to the methodology of a profession.
Level of analysis	Level that actor(s) conducting certain tasks belong(s) to, e.g., group level.
Technology phase (institutionalization)	Extent to which routines facilitated by a technological artifact are institutionalized, e.g., in use for more than 10 years.

professionals perceive the technology in use. Whereas the study by Hultin and Mähring (2014) was not published with the purpose of studying characteristics that can describe institutional logics and technological artifacts, the authors seem to be sympathetic to such an approach since their agenda is to find out how technology is used to enact practices associated with competing institutional logics.

Description of Case Study

The case study examines the process in which visualization boards in an emergency general surgery ward at a hospital were perceived, enacted, and continuously developed (Hultin and Mähring 2014). By focusing on the process, they were more interested in how institutional logics were understood by the users of the technology. The management initiated in October 2011 a strategic program to implement lean practices in the ward. The data collection begun in November 2012, and retrospective data was collected for the initial phase (October 2011 – November 2012). From November 2012 until September 2013, the researchers relied on real time observations and interviews to understand the developments that occurred. Hultin and Mähring (2014) found that the visualization boards were important for the medical professionals to make sense of the new institutional logic that they were introduced to. The staff is guided by a logic of professionalism adhering to professional standards and motivated by the care aspects of their work. At first, the visualization boards were rendered as useless since they did not support the dominant logic in the ward. However, and as the technology was changed according to feedback from the staff, the medical professionals found that they enacted practices that were reflecting a mutual constitution of the competing institutional logics of professionalism and lean.

Re-Analysis

To reanalyze the case, our first task at hand was to find out how the case study related to the ideal type characteristics of our framework. We sought to identify the actors that gained increased power and influence by using the visualization boards, the underlying motivations and end-goals for their use, whether the technology changed the nature of the work in the emergency general surgery ward, and how work processes changed as a result of the visualization boards. Even though we did not have access to the original data, the study provides rich descriptions of the practices of the medical professionals.

Empowerment. As part of their strategic improvement program, the hospital management initiated a change of work practices to build on management principles according to an institutional logic of lean. A specific unit created by the management was responsible for the implementation of lean practices including

the responsibility to oversee how technology could contribute to the accomplishment of strategic goals. By introducing visualization boards that supported lean management principles, management was strengthened by shifting the focus more toward management issues thus gaining increased control of the emergency general surgery ward.

Goals and values. The purpose of introducing lean management practices was to reduce average patient waiting time, increase patient throughput, and improve the quality and safety of patient services through standardization and continuous improvement of work routines. Visualization boards were implemented to support the accomplishment of these goals.

Scope of practice. The purpose of the strategic improvement program was not to change the type of work that medical professionals conduct at the emergency general surgery ward, but rather change how these work tasks were conducted. The visualization boards did not restrict or enhance their type of work. As a result, the identity of the medical professionals and scope of practice were not changed still reflecting a logic of medical professionalism.

Control of work processes. The lean logic and visualization boards were introduced to change the work practices of the medical professionals. Lean management principles assert that duplication of work tasks, differentiated routines, and recurring problems must be avoided if possible. The visualization boards were important since they supported novel lean management practices. The new standardized practices did not necessarily mix easily with the established operational routines devised by the logic of medical professionalism, and the medical professionals did not completely understand the value of the new practices.

Level of analysis. The study focused on how medical professionals such as surgeons, anesthesiologists, nurse anesthetists, surgical nurses, and assistant nurses responded to the new institutional logic and the visualization boards. The group of medical professionals reflected homogeneous use patterns of the visualization boards first resisting their prescriptions, but later, as the technology became more institutionalized, accepted them.

Institutionalization. The study by Hultin and Mähring (2014) looked at an emergency general surgery ward were the implementation of lean practices had started recently. Thus, the visualization boards were new to the medical professionals who, in the beginning, resisted them and rendered them useless for their daily work tasks. Later, the technology was changed to accommodate their negative experiences, and the medical professionals eventually found themselves following routines that reflected both the lean and the medical professionalism logics.

The role of technology. The analysis shows that the hospital management clearly favored the introduction of the institutional logic of lean by devising strategies to implement lean management practices. The implementation of the visualization boards was a part of this strategy. The purpose was to support the adoption of lean management goals such as improving patient services and making them more efficient. Except for not changing the nature of the work in the emergency ward, the visualization boards reflected values and principles associated with the lean logic.

Implications and Suggestions for Future Research

Our literature review – identifying different research perspectives on technology and institutional logics and suggesting a research framework – has implications for IS research. We have shown that IS researchers applying the institutional logics perspective, similarly to other researchers, mostly focus on how different logics influence human behavior. The role of technology may have been downplayed in a quest to embrace human-centered aspects of IS and distance ourselves from technological determinism. Whereas research convincingly has shown that explanations based on technological determinism do not hold, these observations are not arguments for letting the pendulum swing in the opposite direction. Thus, we argue that there is a need for revisiting how technology can explain institutional stability (i.e., upholding institutional arrangements) and institutional change (i.e., legitimizing new ways of organizing).

We argue that studying the direct link between institutional logics and technology can teach us valuable lessons. Material objects are instantiations of institutional logics and technologies can signal and support different aspects of organizational work such as innovation, professionalism, and market-oriented goals. We can gain knowledge about how actors influence the design of technologies through specific features that

can enhance or constrain an actor's room for maneuver. This influence is often deliberate and has the potential to shift control of work practices from professionals to system designers who neither are educated within a certain profession nor experienced in professional work. Technology is seldom adopted and implemented without being legitimized by efficiency gains and cost reductions, and as a result it may support such goals over professional considerations. In other words, technology can act as an institutional carrier and take over institutional responsibilities. 'Technological norms' can function as 'norms for human behavior' and thus regulate and order social life (Czarniawska 2008). In sum, human behavior can be guided deliberately or unwittingly by designers of technological artifacts through algorithms, programmable codes, and design considerations. Moreover, we can understand how technology influences institutional stability and change. Since technological artifacts can act as scripts for organizing, they can alter the power dynamics of coexisting logics. Technologies can thus explain why logics increase or decline in strength, and why organizational practices sometimes reflect multiple logics. Considering the increased digitization of society and organizational work life, we hold that these insights are particularly important – particularly since new technological trends such as artificial intelligence, the Internet of things, and big data analyses gain momentum.

Several conclusions can be drawn from our study. The main premise for this paper is that the role of technology in institutional stability and change is under-explored and unclear (Kandathil et al. 2011). Whereas several studies expected technology to create a new institutional order, our literature review suggests inconclusive results. Whereas longitudinal studies indicate that technology use contrary to the dominant logic is resisted in an early phase of implementation and that elements of this use later are accepted (e.g., Hultin and Mähring 2014), other studies found it challenging for technology to cause radical institutional change (e.g., Baroody and Hansen 2012). More research is necessary to understand how and why technology can influence its institutional environment. Second, human agency needs attention from IS researchers. Actors with agency are often autonomous (sometimes to the point where they reject managerial directives), they reflect on their institutional environment, and seek to change aspects they are dissatisfied with. Whereas institutional entrepreneurs receive increased attention in the institutional literature, IS researchers have been slow to adopt an agentic lens and less attention has been paid to theories such as institutional entrepreneurship (Battilana et al. 2009) and institutional work (Lawrence and Suddaby 2006). Our review has shown that agentic behavior played a vital part in the design and legitimization of new technological artifacts. Studying human agency can help us understand underlying motivations for why technology is designed to prescribe and force certain use patterns, and why certain technologies are institutionalized, resisted, or appropriated. Moreover, whereas Yang and Kankanhalli (2013) studied characteristics of actors to anticipate the level of agentic behavior, this is a promising avenue for future research that has received little attention in the IS and institutional literature.

Third, the theory of technology affordances and constraints (Pozzi et al. 2014) has been applied in institutional logics studies and seems to be a promising theoretical framework to explore the reciprocal influence between technology and institutional logics. In particular, IS researchers should pay attention to algorithms due to their important role in the design and use of novel technologies (Janssen and Kuk 2016). Our final argument pertains to the eclectic and fragmented nature of the reviewed studies which requires a systematic approach to the study of technology and institutional logics. The eclecticism can be explained by the relatively newfound IS interest in the institutional logics perspective. Fragmented findings make it difficult to compare findings and cumulate knowledge across different studies. We have therefore proposed a new analytical framework (see Table 2) and demonstrated its utility through an illustrative case. Our intention is to provide researchers with a tool to systematically investigate the interplay between human behavior and technologies based on the people using the technologies, the maturity of the technologies, and the institutional environment in which technologies are used. Future research can particularly benefit from studying the role of technology based on meso- and macro-level use of highly institutionalized technologies.

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The Role of Contextual Factors in the Influence of ICT on Street-Level Discretion

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Abstract

Public service workers in the frontline have traditionally enjoyed a wide freedom to make decisions during policy implementation. Research shows that technology has both constraining and enabling effects on public service workers affecting their ability to exercise discretion. What remains unclear is under which circumstances discretion is influenced by technology. Using a case study approach and drawing on neo-institutional theory, this paper studies a court to identify contextual factors affecting the phenomenon. Findings show that technology has no unilateral effect on street-level discretion, and is found moderated by contextual factors such as the degree of social complexity in a case, skills possessed by public service workers, and the need for face-to-face contact. Furthermore, the influence of technology on street-level discretion depends on the technology in use.

1. Introduction

While democratically elected representatives decide on new policies, the actual outcome experienced by citizens in the end comes down to street-level bureaucrats who implement them [1]. The discretionary power of street-level bureaucrats is well established in literature [2]. However, the introduction of information and communications technology (ICT) has been identified to have both constraining and enabling effects on street-level bureaucrats affecting their ability to exercise discretion [3]. Reducing discretion may invoke more standardized processes and erode individualized service. Alternatively, ICT may function as an action resource for street-level bureaucrats and empower them. What is less researched is under which conditions discretion is influenced by technology. Street-level bureaucracies have many similarities but there are also considerable differences. For example, they may vary in regards to inter-agency dependency, degree of centralized structures, or type of work tasks. The purpose of this paper is to identify contextual factors that function as moderators in the influence of ICT on discretion.

Street-level bureaucrats refer to public service workers such as judges, teachers, and social workers who interact directly with citizens and can exercise substantial discretion in their work [1]. Discretion is the freedom street-level bureaucrats have to make decisions concerning individuals regarding the sort, quality and quantity of sanctions, and rewards during policy implementation including the possibility of no sanction at all [1]. E-government is the use of ICT "to design new or to redesign existing information processing and communication practices in order to achieve a better government" [4, p. 237]. Internally, ICT is used to automate, semi-automate, or support work practices. Externally, ICT and the Internet in particular, have been utilized to improve service quality and interactions between government and citizens as well as achieving higher public value ideals such as openness, accountability, and legitimacy [5].

Street-level bureaucrats experience a dilemma. While they are obligated to treat citizens alike, they also need to take individualized concerns into consideration [1]. ICT can influence this tension. Reducing discretion is welcomed from a top-down perspective where discretion often is regarded as an option for street-level bureaucrats to pursue own goals violating public sector values and ideals such as fairness, equality for law, and trust [2]. From a bottom-up perspective, discretion is viewed as inevitable to provide personalized service taking social complexity into account, and technology is considered an action resource for street-level bureaucrats [2].

Research concerned with the influence of ICT on street-level discretion is scarce [3] and has mainly focused on social workers. Some studies conclude that ICT is reducing or eliminating street-level discretion, whereas other studies show nuanced effects. Furthermore, studies concerned with contextual factors relate them to rationality pressures such as demands for higher efficiency and effectiveness, where managers are forced to limit discretionary power [6, 7].

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The phenomenon is explored through a case study of a Norwegian district court. The judges manage a variety of cases applying a wide range of legal rules. A court is particularly interesting because of its independent position in the constitution common in many countries. The findings from the case study are analyzed by utilizing concepts from neo-institutional theory [8] and discussed by considering identified value positions for e-government [9]. The study is a part of a larger research project aiming at investigating how contextual factors are moderating the influence of ICT on street-level discretion.

2. Literature review

Within the information systems discipline, the view of ICT and organizational change has evolved from early deterministic models to models considering social, political, and cultural factors [10].

2.1. The influence of ICT on street-level discretion

Negative influence. Studies have found that ICT is influencing discretion negatively through information systems with various degree of automation. Increased routinization caused a reduction in discretionary power where professionals felt their autonomy weakened and decision-making was reduced to tiny adjustments [6, 11, 12]. The persuasiveness of a computer screen is found to be immense and as a result public service workers are afraid of defying it [13, 14]. Furthermore, technology prevent street-level bureaucrats from manipulating information streams through intermediary positions [15]. Some studies show that professional expertise was impaired when decision-making was shifted from professionals to citizens [16] and unqualified staff [17], and these shifts created tensions within the organizations.

Public services such as issuing traffic fines and allocating grants for students can now be done entirely without the assistance of street-level bureaucrats through the use of automated information systems [14, 18]. One study warned about the irreversible effects of decisions made by such systems [13]. While some street-level bureaucracies are able to utilize automated information systems; the findings from these cases cannot be easily transferred to traditional street-level bureaucracies such as courts, police departments, and schools [3, 18]. Automation is mainly used in street-level bureaucracies that handle thousands of cases using schematic legal rules [18].

Nuanced influence. Technology can be used for managerial supervision of formal aspects of work such as the numbers of applications, discrepancies, and complaints. However, ICT makes it difficult for managers to supervise informal aspects, i.e., how discretion is effectively used. This use is highly dependent on the task to be controlled and other contextual factors [3, 19]. While street-level bureaucrats can alternate between a personalized-flexible and distant-rigid strategy in face-to-face encounters, this is less possible using technology and thus restricts street-level discretion [20]. Additionally, computerized procedures may restrict street-level bureaucrats simply because the number of options is reduced, and could even provide them with an excuse; "the computer says what the computer says" [21, p. 574] thus hiding the discretion effectively used [14]. Furthermore, ICT can provide street-level bureaucrats with much data on their clients and hence make it possible to exert closer control over them [22].

2.2. Contextual factors

Specific conditions of street-level bureaucracies affect the influence of technology on discretion. Organizations that process a large amount of cases with many workers performing similar tasks have been found to rely more easily on informatization [18]. Centralized structures experience more pressures to utilize automation than decentralized structures since large-scale organizations can capitalize more easily on economy-of-scale arguments [18]. Also, street-level bureaucracies with efficiency oriented managers are more prone to use ICT for reducing discretion [18, 23]. Rationality pressures make managers prioritize productivity where the discretionary power of street-level bureaucrats suffers [6, 7]. Houston [24] argues that rationality objectives emphasize efficiency excessively on behalf of the quality of service delivery.

3. Neo-institutional theory perspective

Neo-institutional theory aims at providing explanations of organizational behavior and is appropriate for examining the complex relationships between ICT, organizational characteristics, institutional arrangements, and environmental conditions [8, 25]. Neo-institutional theory argues that organizational actors do not act solely on the rational-actor models of classical economists but according to social and cultural pressures to conform to current structural forms [8, 26, 27] sometimes "without any real reflection" [28, p. 176]. Thus, organizational actors do not necessarily seek to maximize efficiency and effectiveness but act because of "irrationalities' arising within the institutional context" [8, p. 369]

seeking legitimacy more than efficiency. Legitimacy is the "congruence between the social values associated with or implied by [organizational] activities and the norms of acceptable behavior in the larger social system" [29, p. 122] with the purpose of becoming "a member-in-good-standing of its class" [30, p. 94, 31]. Legitimacy is considered to be the core concept in neo-institutional theory [8]. Institutions are not organizations but "social structures that have attained a high degree of resilience" [32, p. 48] with the purpose of producing meaning and stability, i.e., they are values, norms, rules, beliefs, and taken-for-granted assumptions. These institutions can move from place to place and time to time using carriers in which they are embedded. These carriers are symbolic systems (e.g., rules, laws, and values), relational systems (e.g., governance systems and authority systems), routines (e.g., protocols and roles), or artifacts (e.g., objects that comply with standards and possess symbolic value) [32, 33].

Institutional effects consider how institutions affect organizations, organizational entities, and other institutions [34]. DiMaggio and Powell [35] introduce the term isomorphism and present three types of institutional pressures: coercive, mimetic, and normative (see Table 1). Isomorphism refer to "a homogeneity of structures observed in several fields" [8, p. 370]. Organizations respond to these pressures through various strategies. Oliver [36] proposes five strategic responses exerted through tactics that organizations enact to gain, maintain, or repair their legitimacy (see Table 2).

The influence of ICT on street-level discretion is affected by social, political, and cultural factors [3]. In this study, neo-institutional theory assists in understanding how these factors exert pressures on the judges when they make decisions, and how and why judges respond to these pressures. The judges' central institutions (investigated through public value positions) were identified. The strategic responses judges had to institutional pressures, in the form of competing value positions, were explained by contextual factors and guided by the taken-for-granted institutions among judges.

4. Research method

This research was conducted using a case study which is suitable to represent a unique case and when there is a lack of theory [37]. While a case study has limited generalizability, it can shed light on unique situations. An exploratory case study design was selected for the collection of rich descriptive data.

Table 1. Institutional pressures [35]

Institutional pressure	Description
Coercive	Formal (standards) and informal (culture) pressures. Exerted upon an organization by other organizations in an institutional environment. *Sources*: Dependency, cultural expectations, and governmental requirements through law.
Mimetic	Imitation of other organizations that are perceived to be more legitimate encouraged by uncertainty related to e.g., poorly understood technologies. *Sources:* Consulting firms, industry trade associations, and employee transfers.
Normative	Pressures that stems from professionalization. Professionals seek to define their work conditions and ensure autonomy. *Sources:* Inter-organizational networks, professional associations, and educational institutions.

Table 2. Strategic responses to institutional pressures [36]

Strategic response	Tactic	Description
Acquiescence	Habit	Following invisible, taken-for-granted norms
	Imitate	Mimicking institutional models
	Comply	Obeying rules and accepting norms
Compromise	Balance	Balancing the expectations of multiple constituents
	Pacify	Placating and accommodating institutional elements
	Bargain	Negotiating with institutional stakeholders
Avoidance	Conceal	Disguising nonconformity
	Buffer	Loosening institutional attachments
	Escape	Changing goals, activities, or domains
Defiance	Dismiss	Ignoring explicit norms and values
	Challenge	Contesting rules and requirements
	Attack	Assaulting the sources of institutional pressure
Manipulation	Co-opt	Importing influential constituents
	Influence	Shaping values and criteria
	Control	Dominating institutional constituents and processes

4.1. Context and case description

Norway is a constitutional monarchy adhering to the principle of separation of powers prevalent in many countries. The parliament is the legislative branch with the power to issue new legislation. The executive branch is responsible for enforcing legal order and has substantial influence on the legislative process with the opportunity to issue directives. The judicial branch solves disputes based on law and consists of a Supreme Court, appeal courts, and district courts.

The studied district court has more than 15 judges with an average age of approximately 50 years. The court handles more than 7,000 cases every year (including trials). Some of the trials are held with two lay judges. While the administrative staff of the court is under the authority of *The National Courts Administration (NCA)*, each judge is independent. The role of the chief judge is to coordinate the work in the court but he cannot instruct a judge to pronounce a certain verdict in any case.

The judges use several information systems in their work. *Lovisa* is the main system to handle workflow and information processing needs in the court. The adaptive case management system provides detailed support for complex legal processes, and is used by all district and appeal courts to ensure that legal processes are executed according to law. *Law Data* and *Court Data* are two database systems similar to each other with access to collections of online legal resources including laws, verdicts, and scholarly commentaries.

The court was selected as case because of the independent role judges have in the constitution, and a large amount of various cases every year. Judges have traditionally enjoyed a great amount of discretionary power, and they apply a wide variety of legal rules to solve many different cases and inquiries such as weddings, bankruptcies, and serious criminal cases such as child abuse and murder.

4.2. Qualitative interviews

A list of judges including the chief judge, "regular" judges, and assistant judges was presented to the researcher for purposeful sampling. Within the second and third group, informants were selected at random. Only one judge held the position as chief judge and he was considered an important informant to obtain a management perspective on the phenomenon. Two judges were assistant judges in qualifying positions whose opinions were deemed important since they are less experienced and were expected to rely more heavily on ICT to find necessary information. In total, seven qualitative interviews of judges were conducted.

All interviews were recorded and lasted, on average, approximately 45 minutes. The interviews were conducted within a period of eight months and by a single researcher ensuring equal conditions during data collection. After transcribing them, the judges were given the opportunity to correct any errors in the transcribed text. The interviews were semi-structured and formulated with open-ended questions to allow informants to speak freely [38]. The informants were asked about topics such as how the court was managed, current information systems and the use of them, and specific conditions influencing the usage.

4.3. Participant observations

To gain in-depth knowledge of contextual factors influencing the phenomenon, one researcher engaged in participant observation of three one-day trials *in situ.* The trials were selected based on the opportunity to participate and held within a period of 14 months. The trials were led by a judge assisted by two lay judges (including the researcher) and dealt with cases of violence and misconduct. Field notes were written down after the trials ended. The field notes focused on how the judge sought information about the cases and the defendants, the general and individual aspects of each case, and how the verdict was decided. No utterances were written down verbatim but instead the essence of the utterances was sought captured.

4.4. Data analysis

The data was analyzed to identify unique patterns in the data material [39]. Standard grounded theory techniques were used [40]. The analysis began with revealing the underlying meanings and ideas in the data material using open coding. The coding was based on the language used by the interviewees and the field notes from the participatory observations. Thereafter, axial coding was applied to identify relationships between the codes informed by concepts from institutional theory. A third grounded theory technique, selective coding, is applied to build theory but in this paper contextual factors are reported, which are mainly the results of the axial coding.

5. Findings

Findings are organized according to the pressures the court experienced from various groups, contextual factors as moderators of the influence of ICT on discretion, and the expected and emergent effects of ICT.

5.1. Demands for quality and efficiency

The community organizations in the surrounding organizational field are the Parliament, NCA, the district attorney, lawyers, educational institutions, and other district courts. These organizations subject the court to institutional pressures. The institutional pressures promoted two different public value ideals; the efficiency ideal and the service ideal [9]. The efficiency ideal is characterized by visions of cost reduction, and increased productivity and performance [9]. The service ideal is recognized by quality; commitment to public interest, citizen centricity, and service level, which meet the expectations of society [9]. In court, the coercive pressures are found to promote both ideals. Judges contrast the efficiency ideal with the service ideal and this dilemma is similar to the one observed by Lipsky [1] where the work of street-level bureaucrats is characterized by adherence to politically decided policies on the one hand and responsiveness to individual cases on the other hand.

Coercive pressures occur when stated efficiency objectives from the Parliament expect judges to complete cases within a certain period of time. If a deadline is exceeded, a case will be removed from the first assigned judge and reallocated to another judge. This routine is being experienced as slightly stressful: *"If the deadline for a case is exceeded, the case will be sent back to the chief judge … so, this is a slight stress factor"*. The efficiency of the court is measured regularly and compared to other district courts in the country creating a mimetic pressure on the court since each court "compete" in being most efficient: *"Among the large district courts, our court processes cases most efficiently"*. The chief judge was, as the only informant, positive to an increased use of automation for decision support: *"I believe it is positive because it would assist us to quickly get an overview of things that we may have spent a longer time to figure out. I am not sure that all judges think the same way. It may well be that some of the judges would think that this is not good because there is a risk that we would lean too much on the automated system".*

ICT provides judges with more information about court practice and much faster compared to 10-20 years ago. Developments in society have created an expectation that this information should increase the quality of court decisions: *"You get more information in each case. Through IT, we now have access to more legal sources than we had before when we had to go and look in heavy books. We even lacked access to some of the legal sources that we have access to now. So IT influences us by providing a better basis for making decisions"*. Judges trust this information and do not necessarily look further for any other relevant information. A judge explains: *"Even if it is not necessarily the intention, it may well be the practical outcome because it is a busy workday ... I believe that many judges will make use of systems that can help"*.

The normative pressure stemming from professionalization is strong because of judges' independent role in the constitution. Judges will not allow the court administrative staff or any other stakeholders to negatively influence the discretionary power that judges hold, unless the constitution itself is altered by the Parliament. The understanding of their role in society is learned and communicated in educational institutions, and upheld in inter-organizational networks and professional associations: *"Judges are trained in a certain way of thinking"*. Furthermore, the chief judge emphasizes that judges are expected by the legislator to exercise discretion when making decisions: *"A judge has a wide opportunity to exercise discretion. Not only that, we are required to do so"*. Also, judges are often recruited from other organizations in the organizational field such as law firms and the district attorney's office.

5.2. Contextual factors

Judges prioritize high-quality decisions over efficiency claiming that discretion is a necessary prerequisite for quality. They seek to legitimize their existence by referring to contextual factors. In addition, the interaction with technology can create emergent effects influencing how discretion is actually exercised. Table 3 provides an overview of contextual factors that are described in more detail below.

Degree of social complexity. The complexity of human and societal relationships makes it difficult for the legislator to create laws that cover every possible situation that may occur. Due to this, laws and directives are usually formulated in a way that grants discretionary power to judges. The purpose is to avoid unreasonable outcomes. A judge explains the reason for having non-schematic rules: *"The legislator would probably have to consider many possible situations ... The legislation had been much more complicated ... It would not fit with real life scenarios because life comes in so many facets ... There would be so many variations and factors that had not been foreseen and one would have risked utterly wrong outcomes in some cases. If you can exercise discretion, then a rule may be adapted and the result will be correct".* The degree of complexity varies from case to case. For example, between cases about child protection where the main goal is to achieve a result that is in the best interest of a child, and cases with speeding where the outcome is more or less set beforehand. In the former case, it is

Table 3. Contextual factors

Contextual factor	Explanation
Degree of social complexity	Life comes in many facets making it impossible to account for all kinds of possible scenarios. Discretion is necessary to adapt policies to real life situations.
Societal role of the public agency	The degree of dependency on another agencies influence how an agency considers its "rights".
Degree of professionalization	Stakeholders such as unions guard the autonomy certain groups of street-level bureaucrats.
Skills possessed by judges	The degree of computer literacy among street-level bureaucrats determines the influence on discretion.
Face-to-face contact	Face-to-face contact with citizens is either required or desired for a best possible understanding of a case and its outcome.
Consequences of decisions	Decisions with serious consequences for a citizen should be made by a human.
Technology features	Specific features of technology have the potential to affect the influence of discretion.

difficult to use automated solutions since it would be difficult for a computer to assess what is in the best interest of a child, even with increasingly more advanced artificial technologies. In the latter case, exceptions from the predefined decisions will only be assessed in a few cases such as speeding to save lives.

Societal role of the public agency. Judges cannot be instructed to make certain decisions since they are independent of other public agencies in the executive branch. One of the judges explains his view on managerial control of his decisions: *"The chief judge may well read my decision. But he cannot come to me and say that I should judge in a particular way. It would have been absolutely impermissible"*. The independent and individual assessment of a case is important for judges and their discretionary power is deemed necessary: *"This has simply to do with the rule of law […]. An individual assessment should be made by a judge. A decision will not be independent and individual if automation is used"*.

Degree of professionalization. Judges as a group of street-level bureaucrats are highly professionalized with strict qualification criteria and professional associations protecting the integrity and rights of the judges. Due to this, judges tend to conform to norms of conduct and expectations related to work tasks. The high degree of professionalization makes judges very protective of their position in society. They are also concerned with how society assesses judges as a profession: *"The courts in Norway enjoy a large degree of trust from society … compared to courts internationally too"*. The discretionary power that judges enjoy are important for their integrity. Major efforts are made to ensure that judges are competent to conduct the tasks of the profession: *"The process of appointing judges is very thorough"*.

Skills possessed by public service workers. Judges have a fairly high average age and many of the judges are not as computer literate as the younger judges. The court arranges internal courses on how to utilize ICT. Still, the younger judges believe that they are better able to make use of all the features that the technology in court offers: *"I should have liked to see how the older judges go forth when they search 'Law Data' which is a tool adapted for us. There are dozens of useful features but you must be aware of them. And it seems like they spend a lot of time and focus on training without focusing on the right things. For example, if everyone could have a course in how to get the best possible results when searching for verdicts. This is often what you look for"*. The degree to which ICT is able to provide a judge with more relevant legal sources and thus provide a better basis for the judgment depends on the skills of the judges.

Face-to-face contact. In some cases, face-to-face contact is required. For example, in child protection cases, a judge is expected to explain the decision that is made to a child that asks for such an explanation. One of the judges explains the problems associated with the use of ICT in these cases: *"From a psychological perspective, one has stressed that children should meet whoever has made the decision that they should stay with mom or dad and explain why … this is no easy task for a computer"*. In other cases, face-to-face contact is not required but still desired. Defendants would like to inform the judge about their specific case and the experience of being listened to is stressed. A judge describes an actual experience: *"[The defendant] gave me good feedback because I had listened to him … I based my decision on what he had said but I still came to the opposite result. It was okay. He had been listened to"*.

Consequences of decisions. Judges make many decisions every day and the consequences vary. In some criminal cases, the defendant may face many years in prison. The degree to which technology should assist when making decisions with such dramatic consequences, is challenged. One of the judges explains her approach: *"The important thing for me is that I make good and right decisions ... That they are as good as possible. That they are as correct as possible ... Efficiency is also important but it cannot be that important that we compromise quality. We must have good quality in what we do"*.

Technology features. In addition, the functions and capabilities of the information systems in use were found to influence the phenomenon. ICT is no black-box and the functions and capabilities of the information systems must also be considered since discretion is likely to be influenced according to the technology in use [41]. For example, templates provided in one of the systems were found to have a habitual effect on the street-level bureaucrats.

5.3. Expected and emergent effects of ICT

The judges assessed technology to have no influence on their discretionary power. The chief judge elaborates: *"As far as I can see, IT has not in any way limited a judge's ability to exercise discretion … The judge has a greater opportunity to obtain information with a better basis for his or her decision. But there are no restrictions in the judge's ability to exercise discretion."*. While judges expressed this belief, the study showed that institutional pressures are being exerted upon the court that judges are both aware and unaware of and thus affect how the court respond to these pressures.

The normative pressure stems from the judges themselves. The court responds to this pressure through an acquiescence tactic where the court consciously and strategically chooses to comply with this normative pressure. The role of the judge is discussed regularly in local and national forums where judges meet, e.g., in the union organizing judges in Norway: *"Almost every judge in the country is a member of the union … The union discusses various topics to safeguard both our profession and our role in society"*. The chief judge explains, *"there is a dialogue about these things"* among chief judges.

Two coercive pressures are exerted upon the court; namely pressures towards higher efficiency and better quality. The analysis shows that judges are not aware of all the effects of these pressures and the court is thus precluded from responding accordingly. According to the taxonomy by Oliver [30], the court responds to these pressures through acquiescence tactics of compliance and habit, and a defiance tactic of dismissal. The main response to the coercive pressures is compliance; judges conform to the routine of using technology to gather more information. Even though more information is collected, technology is so time-saving that it makes them spend less time on each case now compared to 20 years ago, offering more time on complex cases. The efficiency goals of the court are considered legitimate and judges accept such requirements: *"It is important to finish a case. We cannot spend like 14 days on every case just because it should be perfected … so efficiency is important"*. The judges are clearly concerned with the quality of the decisions they make: *"It is okay that efficiency is important. But it cannot be so important that quality is compromised. What we do must be of good quality"*. Another judge elaborates on the relationship between the efficiency and quality demands: *"There is a balance between quality and efficiency. The legislation clearly states the expectations in terms of quality and politicians impose requirements for efficiency. And this is a continuous balance ... There is always a new case. At the same time, you should be able to vouch for the decision you have made"*. While judges comply with demands for efficiency, they do not allow efficiency to compromise quality.

The use of templates is an example on how the judges sometimes follow rules that are taken for granted. One of the judges explains: *"The use of templates may reduce discretion ... We base our decisions on the information in the template without exercising too much discretion ... And that is a risk that we must be aware of"*. Another judge describes her reaction: *"Decisions have become much simpler. I had never written a decision as short as the templates. So the first few times I saw them I thought; is this good enough? Then I … looked at what others had written … and thought; it is sufficient"*. The findings show that even though judges use templates to a large degree, there is also an example of a judge that dismissed the template and made necessary time to write a full verdict: *"It was a specific decision where I removed the template text and wrote it in full. I thought it was necessary. And then I got a call from one of the lawyers afterwards whom thought it was very good that I had written more than just ... because they observe that the same text is repeated in every case … So I realized that the dismissal of the template was noticed"*. The dismissal of the template is an exception to the main rule, which is using the templates by habit.

6. Discussion

The findings have shown that judges may be both aware and unaware of the influence of technology on their discretionary power. While judges are not necessarily aware of the emergent effects of ICT, they clearly argue against any reduction in their freedom to make decisions. The arguments are based on contextual factors. Figure 1 exemplifies how a contextual factor (here illustrated by the degree of dependence on other organizations in the institutional field) serves as a categorical moderating variable (the dependence is either low or high).

The discussion of contextual factors can be organized along three lines of arguments; how street-

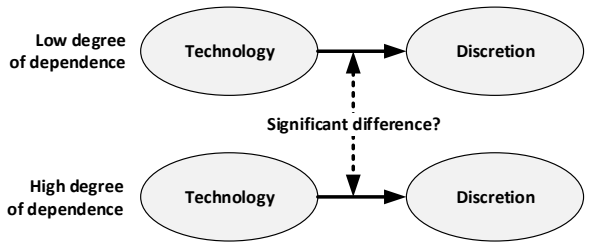

Figure 1. Contextual factor moderating technology and discretion

level bureaucrats prioritize between rival value positions, the nature of service provision, and the interaction with technology. The two former arguments are related to legitimacy since street-level bureaucrats argue for why their discretionary power is needed. The latter argument explains the effects that technology has the ability to create [42].

6.1. Prioritizing between rival value positions

Rival value positions are justified or rejected based on contextual factors. For example, the efficiency ideal is considered inappropriate when cases of high social complexity are taken into account. Likewise, the efficiency ideal is favored when considering cases of less social complexity such as speeding.

Judges accept technology as a tool for improving efficiency and quality. When rival value positions are challenged, a survey of Danish local authority managers showed a heavy bias towards efficiency [23]. While the chief judge emphasizes efficiency as important, he states that high quality is expected from society and politicians through law, an aspect also taken into consideration when appointing judges to their office. The identified normative pressure show that judges are protective of their profession and that the quality of a verdict is more important than the time spent to reach a verdict. This can be illustrated by one of the judges who dismissed the template text and wrote a full verdict instead. She was praised by a lawyer for doing this. What would her reaction be if the lawyer had criticized her for using valuable time instead of reaching a verdict quicker? One could easily assume that it would not be as easy to dismiss the template the next time a similar situation had occurred. Considering this particular case, it is easier for independent judges to prioritize the service ideal than for other public agency managers. This is consistent with findings by DiMaggio & Powell [35] which proposed that "the greater the extent to which an organizational field is dependent upon a single (or several similar) source of support for vital resources, the higher the level of isomorphism" (p. 155).

The degree of professionalization is varying in street-level bureaucracies. Judges demand a high level of autonomy. While public service agencies such as police departments and schools also are characterized by a high degree of professionalization, other agencies such as social service offices have workers with various backgrounds related to education and experience. Professionalization is related to work meaningfulness [2] where reducing discretion or shifting discretionary power to other groups of people are frown upon.

6.2. The nature of service provision

The findings seem to imply that the amount of exercised discretionary power is largely a matter of whether politicians want to grant street-level bureaucrats this power or if politicians want decisions based on schematic rules. For example, the criteria for deciding taxes in Norway are purely schematic which allows for automation but at the same time constrain the possibilities for individualized treatment. This may imply that Lipsky's claim stating that "the nature of service provision calls for human judgment that cannot be programmed and for which machines cannot substitute" [1, p. 161] may be questioned based on the value priorities made by politicians. From the perspective of the citizen, the opportunity to present an individual case to a street-level bureaucrat is important because it provides a client with the feeling that they have been listened to. While citizens emphasize the face-to-face contact with government that has been one of the main characteristics of street-level bureaucracy, ongoing discussions debate if the personal contact between client and public service worker should be sacrificed for rationality purposes. This sacrifice has already taken place in several public agencies [18].

Another perspective of service provision is the consequences of decisions that street-level bureaucrats make. This can be illustrated by the work of the judges where penalties can be severe, e.g., life sentence. Automating decisions can be questioned from the rule of law principle where citizens want to be sure that a case has been processed thoroughly and that all necessary aspects have been considered. This perspective is even more important when consequences are serious.

6.3. Interaction with technology

The ability street-level bureaucrats have to utilize information systems is a factor moderating how ICT is influencing discretion. Computer literacy in street-level bureaucracies varies to a great extent. Furthermore,

even those who are experienced with the use of computers may have challenges with utilizing advanced features of technology. The findings indicated that judges could miss out of important information because they were not able to take advantage of all the advanced search features that the database systems provided. This practice could ironically lead to a result where judges that utilized the features of the databases trusted the information provided whereas the other judges had to exercise their discretionary power instead.

In addition, there are variations in terms of what features various technologies offer. When templates were provided, judges tended to use these because they assisted them in a busy work life. Where judges knew about advanced search features, they utilized these to provide them with more information. Several studies have provided evidence of how persuasive computer screens can be implying that street-level bureaucrats, as professionals, can potentially put aside their professional and experience-based judgment and instead choose a solution that the computer suggests. The potential danger of this practice is that it could be institutionalized. Even with more and more advanced technology such as artificial intelligence, one could argue that human judgment is needed because computers only base their decisions on algorithms and not on real life interpretations. While this is the reason for why aircrafts are flown by pilots and humans are driving cars, there is technology available that can do the tasks of humans, e.g., aircrafts are mainly flown by pilots during take-off and landing where the rest of the flight is made by the autopilot.

7. Concluding remarks

Analyzing a court and drawing on neo-institutional theory, the influence of ICT on the discretionary power of street-level bureaucrats is investigated and the moderating effect of contextual factors is sought explicated. This study shows that ICT influences the discretionary power of street-level bureaucrats depending on factors related to context here identified as: (1) social complexity, (2) societal role of a public agency, (3) degree of professionalization, (4) computer literacy, (5) the degree to which face-to-face contact is required or desired, and (6) the potential consequences of decisions. Moreover, in this study the utilization of databases was highly dependent on the skills of the street-level bureaucrats. In addition, the information processing software used to organize the workflow contained templates that was found to have a habitual effect on the street-level bureaucrats.

Previous research has mainly focused on the effects of changes in the discretionary power of street-level bureaucrats, and evaluations of these effects. This research contributes to the e-government literature by focusing on the contextual factors that moderate the influence ICT has on street-level discretion, and by considering how functions and capabilities of technology may influence the phenomenon. Furthermore, this study utilizes concepts from neo-institutional theory which is not known to have been previously applied in this research area.

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Opportunities and challenges of digitized discretionary practices: a public service worker perspective

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ABSTRACT

Public service workers exercise discretionary power during policy implementation. Due to an immense diffusion of information and communications technology (ICT) in public service provision, they are increasingly exposed to reforms aiming at more efficient and fair decision-making. Whereas extant literature has found that ICT can both enable and constrain public service workers' ability to exercise discretion, we know less about underlying explanations for these inconclusive findings. This paper addresses this research gap by exploring how and why public service workers react to digitized discretionary practices. We draw upon institutional logics to show the underlying considerations of public service workers when they are faced with multiple conflicting demands from market-oriented goals of digitization and professional norms. To identify their reactions and underlying considerations, we have conducted a multiple case analysis of two Norwegian organizations; a district court and a tax administration office. We conclude that public service workers are positive to digitization when it promotes professional aspects of their work and that professional discretion is considered necessary to accomplish tasks of greater complexity.

1. Introduction

Street-level bureaucrats (SLBs) are public service workers such as judges, teachers, and social workers who interact directly with clients. Common for SLBs is that they exercise a substantial amount of discretion during public policy implementation (Lipsky, 1980, 2010). In the last two decades, however, SLBs have witnessed that digital tools intended for private and commercial purposes stimulate the emergence of novel technology-driven organizational forms and practices in the public sector. The result is technology influencing traditional street-level work by supporting and automating decision-making (Bovens & Zouridis, 2002). Whereas the literature has concluded that information and communications technology (ICT) can have both enabling and constraining effects on the freedom SLBs have to exercise discretion (Buffat, 2015), less is known about the conditions under which ICT can influence street-level discretion (Buffat, 2015; Busch & Henriksen, 2018; Hupe & Buffat, 2014). Possible characteristics of public service provision that can explain these differences can be attributed to conditions such as culture, type of tasks, and work organization (Buffat, 2015). This study seeks to explain these differences by exploring the attitudes and behavior of SLBs.

To better understand attitudes and behavior of SLBs exposed to digitized structures and practices we here bring in the institutional lens. Digitized structures are often embedded in various institutional arrangements characterized by multiple institutional logics and demands (Johansen & Waldorff, 2017). Institutional logics are belief systems providing participants within an organizational field with "institutionalized templates for organizing" that direct their focus toward certain goals and their associated means (Friedland & Alford, 1991). The tensions arising from multiple competing logics can lead to a shift in focus and goals (Thornton, 2004), internal conflicts (Glynn, 2000) and instability (Besharov & Smith, 2014) if the organization is unable to handle the institutional conflict (Svenningsen, Boxenbaum, & Ravasi, 2016).

In digitized street-level bureaucracies, the institutional logics of state-professionalism and market-managerialism are salient (Hupe, Hill, & Buffat, 2016; Meyer, Egger-Peitler, Höllerer, & Hammerschmid, 2014; Noordegraaf, 2016; Pollitt & Bouckaert, 2011). Adhering to a state-professionalism logic, SLBs are considered professional rule-followers driven by inner motivations to help clients handle difficult life circumstances rather than the prospect of financial benefits (Christensen & Lægreid, 2018; Tummers & Rocco, 2015). Reflecting goals associated with a market-managerialism logic, they must also align with goals of efficiency and cost reductions (Meyer et al., 2014).

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On a daily basis SLBs need to cope with the conflicting demands from these two logics, and our study investigates how attitudes and behavior of SLBs can explain the impact digitization has on discretionary practices. The specific research questions we address are the following:

1. which strategies do SLBs adopt to cope with institutional complexity in digitized street-level bureaucracies?
2. which characteristics of public service provision can explain their preferences for a particular strategy?

To answer these questions, we have conducted a multiple case analysis of two Norwegian public sector organizations: a district court and a tax administration (NTA) office. They consist of SLBs who are professionals and expected to yield strong opinions about their work. Both organizations use case management systems (CMS) with predefined paradigms regulating how SLBs should conduct their work. We selected our case organizations since they represent different types of public service provision. Judges are independent and handle all types of inquiries brought to the court. SLBs in the NTA office report to superior management and specialize in tax matters. The two diverse empirical settings allow us to explore digitized discretionary practices through actors with different constitutional roles and responsibilities related to public policy implementation.

The paper is organized as follows. First, we describe digitization in public service provision and introduce the theoretical lens for our study. We thereafter present the research context and methodology of our study. We continue with presenting findings from our empirical analysis before discussing how SLBs react to digitized discretionary practices. We end the paper with concluding remarks and implications for practice and research.

2. Digitization and institutional complexity in public service provision

Public organizations are increasingly digitized as results of managerialization and marketization (Meyer et al., 2014; Pollitt & Bouckaert, 2011). Whereas digitization refers to the technical process of encoding practices into technical tools (e.g., CMS), digitalization involves the wider socio-technical system (Yoo, Lyytinen, Thummadi, & Weiss, 2010). The present study focuses on digitalization and thus the socio-technical system. The emphasis is on how technologies influence humans and their work practices. Bovens and Zouridis (2002) described various technological influences of digitized street-level bureaucracies as street-level, screen-level, and system-level bureaucracies. A street-level bureaucracy describes public service provision in the traditional sense where SLBs interact closely with clients and exercise discretion. In a screen-level bureaucracy, ICT is most commonly utilized for information processing where SLBs get access to more relevant information from clients and public databases. Albeit to a lesser extent, digitization has in the system-level bureaucracy led to the replacement of discretionary practices where decisions are made completely without human intervention (Peeters & Widlak, 2018; Wihlborg, Larsson, & Hedström, 2016). Characteristics of these categories are presented in Table 1.

The digitization of public service provision intends to serve multiple purposes: considerable cost reductions (Bovens & Zouridis, 2002), easy and fast access to public services for clients (Jansson & Erlingsson, 2014), and enforcement of certain procedures and interpretations of rules that may limit the freedom of SLBs (Henriksen, 2018). Digitalization can help SLBs to acquire more relevant information and thus have a more solid foundation for decision-making, they can communicate more easily with clients, and shift their focus from repetitive tasks to tasks that require analytical skills (Cordella & Tempini, 2015). ICT has also been considered a tool to tame the power SLBs have during policy implementation. The professionalized aspects of their work have made SLBs into powerful ministers on the street-level (Lipsky, 2010) who make up policies “despite the massive mechanisms designed to control and direct their behaviour” (Prottas, 1978, p. 288). Because of their influence, the actual outcomes of public policies can be experienced differently by clients (Lipsky, 2010). ICT has been used to solve several issues such as preventing rent-seeking behavior (Schuppan, 2009), hindering manipulation of information streams (Peeters & Widlak, 2018), and avoiding corruption (Smith, 2011) and bureaucratic and personal biases (Rodríguez & Rossel, 2018; Wenger & Wilkins, 2009). Whereas certain biases can be explained by factors such as differences in organizational rules, procedures, resources, and technical capacity (Rodríguez & Rossel, 2018), other biases are discriminatory favoring certain clients above others due to factors such as gender and race (Bovens & Zouridis, 2002; Rodríguez & Rossel, 2018; Wenger & Wilkins, 2009).

Extant research has shown that ICT can both constrain and enable the ability SLBs have to exercise discretion. However, less is known about the socio-technical influences that can explain effects of increased digitization (Buffat, 2015; Busch & Henriksen, 2018; Hupe & Buffat, 2014). Current research has focused on the need for interaction with clients (Lipsky, 2010), social complexity (Lipsky, 2010), technological features (Giest & Raaphorst, 2018), and professional autonomy (Tummers, Bekkers, & Steijn, 2009) as factors that can explain how street-level discretion is influenced by digital tools. Close interactions with clients are deemed important since SLBs more easily can identify unique characteristics of each case and clients can present their cases for them (Lipsky, 2010). Due social complexity, life situations are often better described through rich narratives instead of standardized text blocks frequently occurring in forms (De Witte, Declercq, & Hermans, 2016). Høybye-Mortensen (2013) studied how technological decision-making tools influenced decision-making practices in three different public agencies. She concluded that the more formalized the decision-making tools, the stronger was the impact on caseworkers' discretion. Finally, SLBs expect to be trusted with their professional expertise (Hupe & Hill, 2007). To be held accountable hierarchically resonate poorly with their sense of autonomy and can make them less inclined to use digital tools (Giest & Raaphorst, 2018).

Since technologies can serve multiple purposes, SLBs in digitized street-level bureaucracies must deal with tensions between the adherence to bureaucratic rules and professional norms on the one hand, and the need to address societal and managerial expectations on the other hand (Busch & Henriksen, 2018;Hupe et al., 2016; Meyer et al., 2014; Noordegraaf, 2016; Pollitt & Bouckaert, 2011). We use the theoretical lens of institutional logics to describe these tensions and explain how and why SLBs react to the digitization of discretionary practices. The two coexisting logics of state-professionalism and market-managerialism are salient within public service provision (Hupe

Table 1
Characteristics of street-level, screen-level, and system-level bureaucracies (Busch, 2018).

Characteristics	Street-level bureaucracy	Screen-level bureaucracy	System-level bureaucracy
Organizational role of SLB	Autonomous professional	System operator	System facilitator
Human interaction	Full interaction	Partial interaction	No interaction
Role of technology	Information processing tool	Decision support	Autonomous decision-maker
Resource use	Less efficiency	More efficiency	High efficiency
Individual attention	Full attention to client concerns	Partial standardization of decision-making process	Standardized, non- reversible decisions

et al., 2016; Meyer et al., 2014; Noordegraaf, 2016; Pollitt & Bouckaert, 2011). The logic of state-professionalism describes work scripts that reflect principles of Weberian-style state bureaucracy. The scripts allow SLBs to exercise control of the work they conduct within the boundaries of public policies (Pollitt & Bouckaert, 2011). The logic is characterized by professional conduct and core values such as fair and equal treatment of clients, attendance to client needs, procedural safeguards, professional autonomy, and impartiality (Freidson, 2001; Lipsky, 2010; Meyer et al., 2014). The logic of market-managerialism prescribes work practices emphasizing public interest, managerial control, and reconsideration of work roles. This logic introduces different priorities often associated with market mechanisms such as efficiency, performance orientation, competition within the public sector, and market receptiveness (Ferlie, Ashburner, Fitzgerald, & Pettigrew, 1996; Lynn, 2006; Pollitt & Bouckaert, 2011). Prior research and theory within the street-level bureaucracy, public administration, and professions literature describe these logics and characteristics of street-level work (Evans, 2016; Lipsky, 2010; Meyer et al., 2014). Table 2 contrast these two logics showing that each logic provides distinct values, modes of governance, control of knowledge and practice, and conceptions of what constitutes quality public services.

Institutional complexity can lead to institutional change which often is associated with the introduction of a new logic in the field. When this happens, incumbent institutional arrangements are challenged leading to frictions and questions regarding previously undisputed truths. When one institutional logic becomes dominant, it influences the behavior and decision-making in an organization "by focusing the attention of executives toward the set of issues and solutions that are consistent with the dominant logic and away from those issues and solutions that are not." (Thornton, 2004, p. 13). Institutional studies have found that multiple institutional logics can coexist within organizations both temporarily and for a longer period. New logics can also be hybrids of previously competing logics (Reay & Hinings, 2009). More recently, scholars have recognized that the coexistence of multiple logics can be a long-lasting phenomenon (Goodrick & Reay, 2011; Waldorff, Reay, & Goodrick, 2013). While several studies have focused on how field-level actors facilitate change, less studies have paid attention to how individual actors experience and react to institutional complexity caused by competing logics (Bjerregaard & Jonasson, 2014; Hupe & Buffat, 2014; McPherson & Sauder, 2013; Pache & Santos, 2010; Smets & Jarzabkowski, 2013). These studies show that less powerful actors can support the non-dominant logic overtly by using their knowledge of the context to devise activities that support their interests (Battilana, 2006; Reay & Hinings, 2009). Furthermore, old logics can be supported covertly by micro-level actors even though they appear to be accepting the dominant logic (e.g., Khan, Munir, & Willmott, 2007; Townley, 2002). Svenningsen et al. (2016) found that individuals within the same context, exposed to the same institutional tensions, responded differently. They focused on how cognitive-affective characteristics could explain these differences.

For our empirical analysis, we study judges in a court and caseworkers in a tax administration office. They are SLBs who traditionally have exercised considerable control of their work. As professionals, they engage in specialized street-level work that requires certain entry credentials for professional practice and adherence to a set of professional norms defined by government authorities and professional associations. The adherence to bureaucratic rules is an obvious aspect of their professional norms alongside with making decisions that are fair, attend to client needs, and preferably make clients satisfied. The work they conduct cannot be easily standardized and rationalized, and the exercise of discretion is a central aspect of this work. Thus, their work is strongly associated with the state-professionalism logic. Faced with digitization, they experience expectations of increased efficiency, reduced costs, and reconsiderations of work and work roles. Those are demands associated with a market-managerialism logic. These conflicting demands lead to institutional complexity, tensions, and agentic behavior; the judges and caseworkers reflect on the potential consequences of digitization and act accordingly. An adherence to societal and managerial expectations does not mean that bureaucratic rules and professional norms are put aside, but rather that SLBs increasingly strive to reconcile and satisfy multiple and opposing demands. In the present study institutional logics are applied to describe such shifting bases of legitimacy and help us delineate and understand digitized street-level bureaucracies.

3. Research context and methodology

We have selected a multiple case analysis since it favors the collection of rich data in multiple contexts. This methodology is particularly suitable for generating new and more robust theory of complex social phenomena and to prepare for theory-testing studies (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Yin, 2014). We use data from the case analysis to develop propositions that explain SLBs' reactions to digitized discretionary practices. These propositions can be used in other studies for theory-testing purposes.

3.1. Case organizations

Two case organizations were selected based on theoretical replication (Yin, 2014) to yield the opinions of actors with different responsibilities related to public policy implementation. Our attention was directed toward a district court and a regional tax administration office because of the differences in terms of societal mission and main work tasks, as well as our interest in studying street-level bureaucracies where professional practices seemed to be influenced by multiple institutional logics. Our initial observations suggested that these case organizations were constantly faced with pressures to meet strict professional standards, be loyal to the intentions of the policy maker, and achieve managerial goals.

The district court handles all incoming cases into the justice system in its region and employs 20–30 judges including judges in qualifying positions. The cases they handle include trials regarding varying matters such as commercial disputes and drunk driving along with grave cases of child custody and murder. Some of the trials are held with two lay judges. Judges in Norway are highly trusted and expected to use their professional judgment in the court room. Since judges are constitutionally independent, no judge can be instructed to make certain verdicts nor can another judge in the district court overrule a decision that is made. The court is an interesting case to study the digitization of discretionary practices since clients expect a due process where considerations by a judge can be inspected or challenged.

The second case organization is an NTA office employing 20–30 caseworkers ensuring the financing of the welfare society by handling tax matters. The NTA office is dependent on several other public agencies in a bureaucratic hierarchy. Representing the executive branch, its responsibilities and tasks are to exercise daily operational authority on tax matters. Decisions that are made can be overruled by the manager and as well as their peers. Contrary to judges, caseworkers in the NTA office are not independent but rather motivated by and co-responsible for achieving NTA goals. They are dependent on superior agencies to maintain their legitimacy and defend the resources that are allocated to them. This dependency makes the NTA office an interesting case to study since an increased achievement of objectives will increase their legitimacy.

3.1.1. Technology in use

The main information systems used in both case organizations are CMS developed for decision support in a large variety of cases. The CMS in the court is the award-winning[1] system *Lovisa* used in all Norwegian

[1] Global Awards for Excellence in Adaptive Case Management

Table 2
Institutional logics in digitized street-level bureaucracies (adapted from Goodrick & Reay, 2011; Meyer et al., 2014; Thornton, 2004; Thornton, Ocasio, & Lounsbury, 2012).

Characteristic	State-professionalism logic	Market-managerialism logic
Source(s) of authority	Government regulation and professional association.	Public agency hierarchy and management.
Mode of governance	Bureaucratic; based on laws, rules, and directives with multiple controls applied. Professional norms.	Contractual performance objectives and management tools.
Education/ training	Educational programs, requirements, or training are determined and controlled by a state and/or a profession.	Educational requirements or training determined by management.
Entry to practice	Credentials determined by a state and/or a professional association.	Credentials determined by management.
Scope of practice	Tasks that SLBs perform reflect state-determined parameters, and desires and standards of a professional association on content and boundaries of work.	Tasks that SLBs perform reflect management decisions and citizen preferences on content and boundaries of work.
Control of work processes	Work processes are subject to state rules, procedures, and routines and/or influenced by profession-determined standards controlled by SLBs.	Work processes are regulated by managerial rules, procedures, and routines.
Performance evaluation	Quality of work measured in terms of predictability of decisions according to state regulations and professional norms.	Quality of work according to contractual goals.

Table 3
Case management systems used by the case organizations.

Case org.	CMS	Description	Data sources	Support systems
Court	Adaptive case management system ("Lovisa").	Handling workflow and detailed support for legal processes.	Judge, police, court administration. Data provided before and during a case.	Databases ("Law Data" & "Court Data") providing access to online collections of legal resources.
NTA	Case management and workflow system ("SL").	Handling workflow and support for administrative routines.	Third party organizations such as employers, kindergartens, banks, insurance and credit card companies, housing companies, voluntary organizations, client. Data provided before and during a case.	Databases ("Law Data" & "Court Data") providing access to online collections of legal resources.

district and appeal courts. The *SL* system is a CMS used in all NTA offices in Norway. Both systems ensure that employees get the necessary guidance and knowledge they need in complex subject areas, that deadlines are met, and that users are provided with support so that procedural legislation is adhered to. Lovisa contributes to the quality of the court system by ensuring that trials are settled without errors and unnecessary delays whereas the SL system helps the NTA by supporting mandatory routines. In addition, the organizations use *Law Data* and *Court Data* which are databases that provide access to a wide variety of online legal resources such as legislation, decisions, and academic literature. The information systems in use by the case organizations are listed in Table 3.

3.2. Data collection

The data was collected by the first author. Data from personal interviews were utilized in addition to field notes from participant observations. The findings we present are a synthesis of the interviews and field notes. Table 4 provides an overview of the data collection.

3.2.1. Sampling

The guidelines for purposeful sampling provided by Lincoln and Guba (1985) were followed when selecting informants. Our research questions were the starting point and informants were selected based on who we believed were best able to inform us about the impact of digitization on the discretionary practices of SLBs. *In the court*, a list of judges was presented from which we could choose judges by random based on their position (chief judge, judges in permanent positions, and assistant judges). *In the NTA office*, the manager assisted us in selecting informants based on their position (manager, lawyers, and caseworkers) so that they could yield various views on the research questions. The data collection became an iterative process where data were constantly compared. Data relevant for the research questions were pursued by seeking new informants that could yield new insights and by making continuous adjustments to the interview guide. Through this process, the sample of informants evolved, and the data became increasingly focused until theoretical saturation was reached (Eisenhardt, 1989).

Table 4
Overview of data collection and participants.

	District court	NTA office
# of interviews	7	9
Informants	Chief judge, judges (in permanent positions), and assistant judges (in non-permanent positions)	Manager and caseworkers
Participant observations	4 trials in situ	–

3.2.2. Semi-structured interviews

The informants represented different positions in their organizations including managers and employees in ordinary and qualifying positions. In total, 16 interviews were conducted across the two organizations. All interviews were semi-structured and formulated with open-ended questions to allow informants to speak freely (Myers & Newman, 2007). The interviews were conducted face-to-face and recorded. On average the interviews lasted approx. 45 min, varying between 20 and 100 min. After transcribing them, the informants were given the opportunity to correct any errors in the transcribed text. The interviews covered key areas such as expectations of the case organizations, management and control, formulation and implementation of public policies, legal principles and processes, decision-making processes, current use of information systems, and specific conditions influencing this use.

3.2.3. Observations

To gain more in-depth knowledge of the phenomenon, the first author engaged in participant observations in the court observing the actions of the judges, how information about the cases was collected, the routines the judges followed when using the information systems, and how a verdict was decided. The participant observations took place in four one-day trials in situ during a period of two years and were based on the opportunity to participate since the researcher was

summoned as a lay judge. The trials dealt with cases of violence, misconduct, and drunk driving. Field notes were written down after each trial ended. The field notes did not contain any verbatim utterances but instead the essence of the communication was sought captured. Key observation events included pre-trial meetings, the trials, meetings during the trials, and post-trial meetings discussing the final verdict.

3.3. Data analysis

Qualitative analysis software (NVivo) was used to assist in coding and analyzing the data as well as searching through the entire data material whenever needed. The purpose of the analysis was to identify the different strategies that the SLBs devised and the characteristics of the context that could explain these strategies. We searched the public administration and institutional logics literature that could inform us about how individuals cope with multiple demands from institutional logics. With this theoretical framework serving as a reference, the first author engaged in a first-order analysis involving a detailed coding of the interviews and field notes. In this step, we cycled between data, emerging theory, and relevant literature as strategies and characteristics of public service provision emerged. The codes were consolidated into concepts labelled by the language of the informants whenever possible. When an in-vivo code was not available, a simple descriptive phrase was used. Related concepts were then identified and grouped into categories (open coding). Next, we engaged in axial coding (Strauss & Corbin, 1998) searching for relationships between the categories. Our coding resulted in nine characteristics of public service provision explaining important considerations that SLBs make regarding digitized discretionary practices. We further looked for patterns in the data material identifying strategic responses relating to each of the contextual characteristics resulting in five strategic responses: compliance, acquiescence, habitual acceptance, appropriation, and defiance. Fig. 1 illustrates the data structure of our analysis describing the underlying motivations SLBs have for particular strategic responses.

4. Findings

The court and NTA office continuously face efforts to digitize their work motivated by requirements of increased efficiency, effectiveness, and cost reductions. During the last decade, they have initiated several digitization initiatives. The court has digitized various aspects of its work such as large amounts of court documents and pre-trial communication between court actors. The NTA has received public praise for its digitization efforts. It has carried out several projects achieving goals such as reduced costs, improved convenience for taxpayers, and increased efficiency. Digitization efforts have mainly focused on online interactions and improved information processing. CMS use is mandatory in both case organizations to ensure that specific routines are followed.

Based on our empirical data, we identified five types of strategic responses that SLBs adopt to cope with institutional complexity in digitized street-level bureaucracies. Their attitudes toward digitized discretionary practices vary from compliance to active resistance: compliance, acquiescence, habitual acceptance, appropriation, and defiance. We further found how certain characteristics of street-level work motivate the strategies that SLBs choose. Table 5 lists strategic responses, their underlying motivations, and representative quotes that illustrate our findings. The representations are translated into idiomatic English.

4.1. Compliance

One strategy that SLBs adopt is to actively comply with computerized routines. When SLBs comply, they accept digitized discretionary practices as a conscious and strategic act anticipating benefits that serve their own and their organizations' interests.

4.1.1. Decision quality

Compliance suggests that SLBs believe computer systems, under certain circumstances, can improve decision-making. Decision quality is determined based on the extent professional norms are followed in the decision-making process. SLBs are motivated by the professional aspects of their work. If technology can help them to do a better job, they are positive to digitized discretionary practices. The CMS is used for a variety of tasks to assist SLBs in their daily work: collect information, keep track of case parameters (e.g., who is assigned to a case, basic case information, and completion time), and ensure that procedures required by law are followed. Both judges and caseworkers agree that technology enables them to follow professional norms more easily:

> I use the IT systems a lot to read. And learn. [..] You become proficient with good IT systems. Caseworker 3.

It is worth noticing that SLBs' understanding of what decision quality is may be influenced by the views of clients and their relatives. Clients' perceptions of decision quality are dependent on their status in the case (e.g., if they are convicted), the penalty level (e.g., if they face a long jail sentence), their sense of justice (e.g., if they feel the decision is correct according to their circumstances), and how they have been treated during the process (e.g., if they have been listened to by the SLB). Relatives belong to another group of people that may be emotionally involved and have strong opinions about the decisions that SLBs make (e.g., court decisions). These reflections lead to the suggestion of the following proposition:

Proposition 1. The perception of improved decision quality makes SLBs more positive to digitized discretionary practices.

4.1.2. Societal considerations

Policy makers and public managers can deliberately remove discretionary power to ensure standardized decision-making. For example, in cases of overspeeding there are generally no room for exceptions. Social considerations suggest that such exceptions should not be made since overspeeding is dangerous regardless of whatever (good) reason the client may have. Furthermore, to potentially assess each case of overspeeding is costly and would ultimately result in down-prioritizing other police tasks. Hence, the following proposition is suggested:

Proposition 2. SLBs are more positive to digitized discretionary practices if they are of societal interest.

4.2. Acquiescence

Whereas SLBs can comply to digitized discretionary practices willingly, they can also accept computerized practices reluctantly. Adopting an acquiescence strategy means that they ideally prefer to retain their discretionary practices but acknowledge that technology add benefits that are beneficial for street-level work. When SLBs acquiesce, their actions are not as active as in a compliance strategy.

4.2.1. Routinization

Routinization is the practice of converting work processes into routines, i.e., sequences of actions expected to be followed. Such routinization is mostly expected in street-level work of less complexity. SLBs acquiesce in cases where routinization is salient and where perceived benefits of digitized discretionary practices are too significant to ignore them. Our study suggests that SLBs become more positive to automated routines by time. They get accustomed to new tasks and see the benefits of replacing routine tasks with tasks requiring analytical skills. The following proposition is put forward:

Proposition 3. SLBs are more positive to digitized discretionary practices if routinization of work processes can yield significant gains compared to current practices.

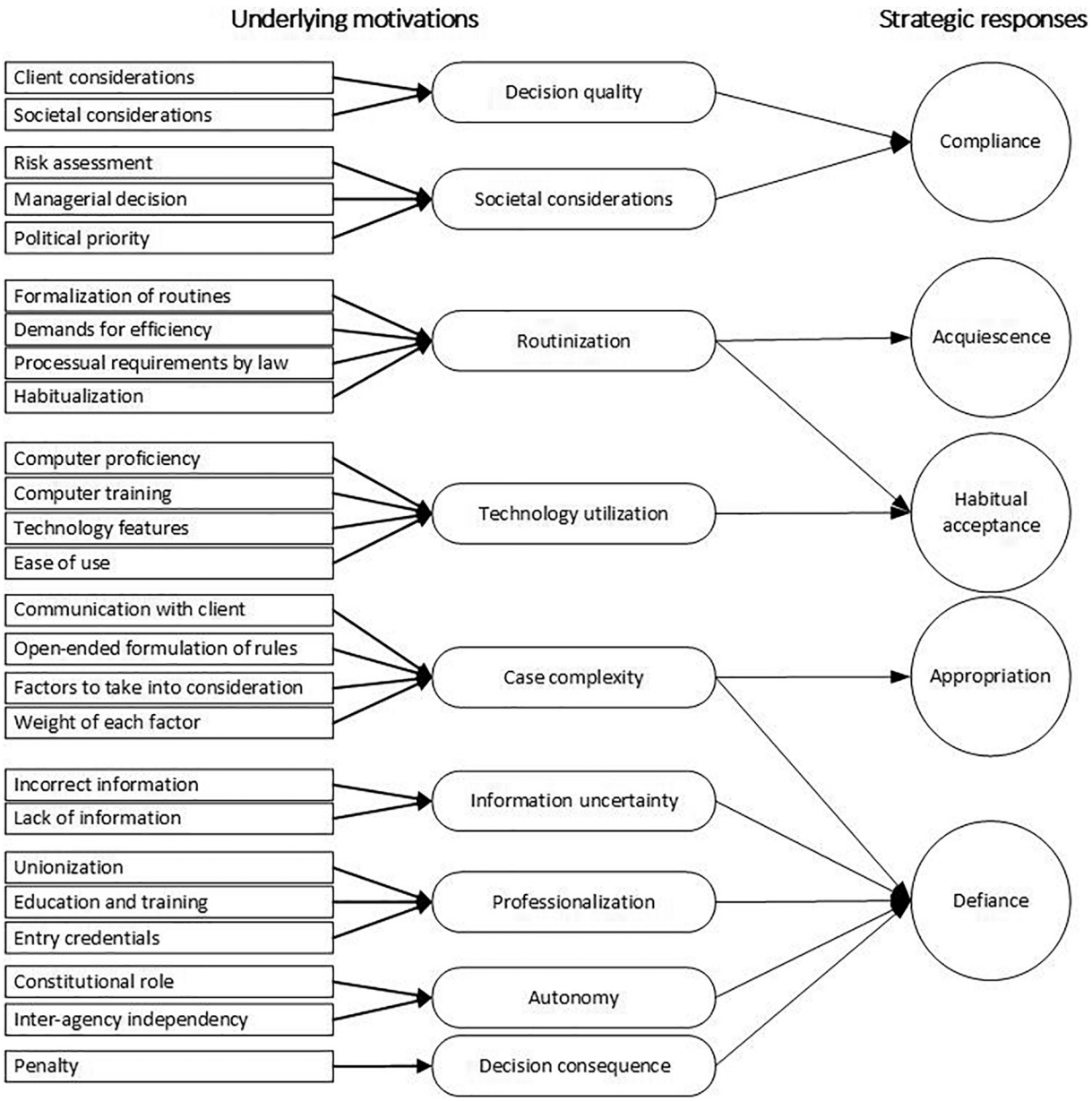

Fig. 1. Data structure.

4.3. Habitual acceptance

SLBs can accept digitized discretionary practices through habitual behavior. This behavior occurs when computerized routines become institutionalized. Habitual behavior can be a result of both conscious and unconscious acts.

4.3.1. Routinization

When processes are routinized, SLBs become familiar and comfortable with these routines to the point that they are repeated and taken-for-granted. Our findings suggest that the use of technology seems to have a habitual effect on SLBs. They can collect information more quickly and they trust the information provided by the computer screen. The SLBs do seldom look any further for more information from other sources.

4.3.2. Utilization of technology

The extent to which SLBs can utilize technology is based on a variety of factors such as computer proficiency, computer training, the features that technologies afford, and their ease of use. Habits may be established based on the convenience that technology offers in streamlining work processes and can be the practical outcome of technology use even if it is not intended. We observed that SLBs tended to use technology whenever it could assist them in conducting their work tasks more efficiently. In certain occasions, the SLBs use templates with pre-filled information for decisions. These templates are used for repetitive work tasks where different cases have similarities in terms of the type of information and the conditions for various outcomes. Our study suggests that younger and more computer proficient SLBs are more likely to utilize the features various technologies have to offer. Thus, the following propositions are suggested:

Proposition 4. When technology can ease the workload SLBs have, they are inclined to accept digitized discretionary practices habitually.

Proposition 5. SLBs with high computer proficiency are inclined to accept digitized discretionary practices habitually.

Table 5
Strategic responses.

Strategic response	Public service provision characteristic	Example	Representative quotes
Comply	Decision quality	Actively accepting benefits of technology	"It is a completely different world [..]. Now we can analyze large amounts of data much faster and people respond more quickly [..]. So, our societal mission is solved in a better way now." (NTA#2) "Through IT, we now have access to more legal sources than we had before [..]. So, IT influences us by providing a better basis for making decisions." (Court#1)
	Societal considerations	Actively accepting benefits of technology	"I think that IT systems lead to more equal treatment." (NTA#4)
Acquiesce	Routinization	Reluctantly accepting benefits of technology	"We see things pass that are wrong. However, they will not be checked since we must prioritize other areas. And this is not a good feeling [..]. So, there have been discussions about what is the smartest thing to do. If what the computer systems have picked out is the best selection." (NTA#9)
Accept by habit	Routinization	Following taken-for-granted computerized routines	"Even if it is not necessarily the intention, it may well be the practical outcome since it is a busy workday [..]. I believe many judges will make use of systems that can help." (Court#4) "The use of templates may reduce discretion [..]. We base our decisions on the information in the template without exercising too much discretion [..]. And that is a risk we must be aware of." (Court#2)
	Technology utilization	Following taken-for-granted technological features	"I should have liked to see how older judges go forth when they search 'Law Data' [..]. There are dozens of useful features, but you must be aware of them." (Court #6)
Appropriate	Case complexity	Adapting technology use to individualized situations	"It is a template that you need to customize a bit [..]. But you follow certain use patterns. Occasionally, we face the problem that Lovisa recommends a certain decision, and then you have to do something completely different." (Court#6)
Defy	Professionalization	Following professional norms	"This has simply to do with the rule of law […]. An individual assessment should be made by a judge. A decision will not be independent and individual if automation is used." (Court#4)
	Information uncertainty	Prioritizing fair treatment	"We must get hold of the facts in a case [..]. We contact the taxpayer and get the facts. And sometimes, taxpayers do not respond, and we have to make an assessment." (NTA#1)
	Case complexity	Prioritizing individualized care	"[..] life comes in so many facets [..]. If you can exercise discretion, then a rule may be adapted, and the result will be correct." (Court#1)
	Decision consequence	Prioritizing respectful treatment	"From a psychological perspective, one has stressed that children should meet whoever made the decision that they should stay with mom or dad and explain why [..]. This is no easy task for a computer." (Court#5)
	Autonomy	Opposing digitized discretionary practices	"Because we want to retain our ability to exercise discretion as granted by law. And we would not accept reduced discretionary power since we are loyal to the law and the legislator. And that is the aim of and our job. ICT shall not put anything of this aside." (Court #1)

4.4. Appropriation

Yet another strategy that SLBs can adopt is appropriation which is a mild form of resistance to technology use. Appropriation refers to how SLBs "may choose not to use the technology or use it in ways that undermine its 'normal' operation" (Orlikowski & Robey, 1991, p. 153) contrary to the intentions of its designers and adopters. Whereas technology is purposely designed to encourage certain use patterns, its use may be adjusted according to the needs and goals of SLBs. Appropriation can be done overtly by openly adapting the use of the technology, or covertly by decoupling elements of practices from expected routines (Berente & Yoo, 2012; Jorna & Wagenaar, 2007; Keymolen & Broeders, 2011).

4.4.1. Case complexity

SLBs often handle complex cases which require them to take many different factors into consideration. Because of complex social relations, even seemingly similar cases must be treated differently. The nature of social relations makes it difficult to create computerized routines that capture this complexity. By initiating a non-intended use of the technology, unreasonable outcomes can be avoided, and procedures adapted to individual situations. This leads us to our fifth proposition:

Proposition 6. Case complexity makes SLBs more inclined to appropriate technology to avoid rigid routines.

4.5. Defiance

When SLBs choose defiance as strategy, they actively refuse computerized routines that can influence their discretionary practices. When SLBs defy digitized discretionary practices, they challenge their application area arguing that there is something about the nature of public service provision calling "for human judgment that cannot be programmed and for which machines cannot substitute" (Lipsky, 2010, p. 161). Their negative stand against digitized discretionary practices can be expressed actively where their opposition is defended and even presented as a virtue. Being negative to digitized discretionary practices is the most common response of SLBs (Busch & Henriksen, 2018). Several underlying motivations can explain why they defy digitized discretionary practices.

4.5.1. Professionalization

The more professionalized SLBs are, the more likely they are to be negative to any influence on their ability to exercise discretion. The degree of professionalization is stronger in the court where almost all judges are organized as members of the union reflecting their long history as a profession. The union has been active in discussing a variety of topics that safeguard the profession of judges and their role in society. These discussions include the use and effects of technology in increasingly digitized courts. Whereas judges are highly professionalized, caseworkers experience increased professionalization. Compared to earlier practices where caseworkers were hired without any formal education and thereafter received training at work, they are now often educated within areas such as law and economics. Whereas entry credentials for work in the NTA office can be decided by management based on the competence the office needs, requirements for becoming a judge are enshrined in law. To become a judge, one is required to have completed law education and two years of practice in a court or law

firm as well as gained substantial experience afterwards:

> The process of appointing judges is very thorough [..] It is not just a lawyer, but a character who is appointed [..] The person under consideration must be able to demonstrate high quality in his or her work, show respect for other people, be conscientious and thorough. All these things.
> Chief judge.

Judges and caseworkers are motivated by the professional aspects of their work. Professional norms are often taken-for-granted and upheld by professional associations delineating street-level work. Whereas caseworkers are subordinated to management and experienced that they were strictly controlled by hierarchical structures, the judges did not experience any kind of control from management due to their constitutionally independent status. One of the judges explained how they will prioritize professional norms over managerial goals if they are required to make such a prioritization:

> There is a balance between quality and efficiency. The legislation clearly states the expectations in terms of quality and politicians impose requirements for efficiency. And this is a continuous balance … There is always a new case. At the same time, you should be able to vouch for the decision you have made.
> Assistant judge.

Computerized routines are defied since they influence discretionary practices which are considered a vital professional aspect of their work. The following proposition is put forward:

Proposition 7. Highly professionalized SLBs are inclined to defy digitized discretionary practices since they consider technology to influence professional aspects of their work negatively.

4.5.2. Autonomy

Professionals often have *autonomy* in their work. Autonomy is the state of having a self-directing freedom to make certain choices. Whereas judges belong to a group of SLBs that enjoy a high level of independency due to their constitutional status, caseworkers in the NTA office enjoy limited autonomy even though they are increasingly professionalized. When SLBs have autonomy, they will defy efforts that impair their professional status and ability to exercise discretion. We propose that the level of autonomy is likely to influence the acceptance of digitized discretionary practices:

Proposition 8. Autonomous SLBs believe that digitized discretionary practices can lead to less autonomy and are therefore more inclined to defy technological influence.

4.5.3. Information uncertainty

SLBs may not have sufficient information required to make decisions. In some cases, they are not able to retrieve this information either and hence forced to exercise discretion to identify the most likely factual basis for their decision. This observation leads us to suggesting the following proposition:

Proposition 9. SLBs are more inclined to defy digitized discretionary practices in cases with uncertain information.

4.5.4. Case complexity

In some cases, SLBs must take a variety of factors into consideration and assess them individually. For example, a dispute concerning child custody can involve a question of full custody or whether custody should be shared between parents. In all cases, a judge is required to listen to details about the case, and if necessary ask for further information before deciding. The details in these cases can vary to a significant extent. Reasons for why a parent considers herself or himself better suited to have the custody of the child can depend on widely different reasons such as accusations of domestic violence, psychological issues, job security, and the (imagined) wishes of the child. The potential complexity of cases suggests the following proposition:

Proposition 10. SLBs do not consider digitized discretionary practices to be suitable for decision-making in complex cases and will therefore defy technological influence.

4.5.5. Decision consequences

Decisions can affect clients in several ways. Following up on the previous example, the nature of child custody cases implies strong emotions and decisions that judges make will have a considerable impact on the lives of the child and its parents. Since the consequences of certain decisions can be severe, clients will seek to present their case and arguments before decisions are made. We therefore propose:

Proposition 11. SLBs consider decisions with severe consequences to be unsuitable for a technological influence of discretionary practices and will therefore defy it.

5. Discussion

This study shows how SLBs react to institutional complexity created by digitization. Whereas SLBs traditionally have enjoyed professional autonomy adhering to professional norms associated with a logic of state-professionalism, digitization efforts can promote goals such as efficiency and shifts in work roles associated with a market-managerial logic. Emerging from an empirical analysis of SLBs residing in digitized public agencies, we advance our understanding of how and why technology can influence discretionary practices in public service provision. One contextual explanation relates to the attitudes and behavior of professional SLBs who reflect on how digitization changes street-level work and seek to influence their work environment. The aim of this study has been to investigate how SLBs consider the opportunities and challenges that increased digitization creates, and how they react to multiple and conflicting goals. Our research is guided by the following research questions:

1. which strategies do SLBs adopt to cope with institutional complexity in digitized street-level bureaucracies
2. which characteristics of public service provision can explain their preferences for a particular strategy?

We found that SLBs react to a potential impact on their discretionary practices through five strategic responses: compliance, acquiescence, habitual acceptance, appropriation, and defiance. These responses are explained by several characteristics of public service provision such as case complexity, information uncertainty, professional autonomy, and societal considerations. Our work – studying SLBs' strategic responses to digitization and their underlying motivations – has implications for research on street-level bureaucracy. The literature has shown that discretionary practices characterized by routine tasks most often are influenced by ICT and that more complex discretionary practices seem to continue as before. Since SLBs are motivated by helping clients and attending to individual needs, they have great interests in how digitization impacts street-level work and their discretionary practices. Our findings suggest that SLBs working in the area between routinized, mass-transactional tasks on the one hand and complex tasks on the other hand, are increasingly exposed to and influenced by various technologies. Whereas Lipsky (2010) claimed that society is not prepared "to abandon decisions about people and discretionary intervention to machines and programmed formats" (p. xix) and that "the nature of service provision calls for human judgment that cannot be programmed and for which machines cannot substitute" (p. 161), our findings suggest that society *does* leave certain decisions to computers and that public service provision is changing to a certain

degree. However, this influence happens gradually and is characterized by moving SLBs from the streets in front of computer screens in office buildings.

Similar to previous research, our findings further suggest that the digital imprint on street-level discretion is influenced by different digital tools and that SLBs may be inhibited from fully utilizing technology as a result of limited training and age (e.g., Giest & Raaphorst, 2018; Høybye-Mortensen, 2013). Further research should investigate how and why different technologies can have different effects on discretionary practices. Moreover, since street-level work shares some characteristics across different public services (Lipsky, 2010), we posit that our findings not only apply to judges and caseworkers in Norway, but also to SLBs working in different countries and other types of public service provision where SLBs are professionalized, resources are scarce, and demands for efficiency and effectiveness are high. However, despite many similarities, street-level bureaucracies may differ in terms of societal role, work tasks, clients, and the consequences of the decisions SLBs make. Therefore, further research is required to establish the validity of our findings in other contextual settings.

Our second contribution is to the institutional literature. Organizational and individual responses to institutional complexity has become central to our knowledge about institutional change (Smets & Jarzabkowski, 2013). Yet, extant research has mostly focused on the role of field-level actors (Bjerregaard & Jonasson, 2014; Johansen & Waldorff, 2017; McPherson & Sauder, 2013; Pache & Santos, 2010). This study adds to research that pays attention to how micro-level agency can explain institutional stability and change. Other studies have shown that individuals within the same context exposed to the same institutional challenges respond differently based on cognitive-affective characteristics (Svenningsen et al., 2016) or social identities (Meyer et al., 2014). We contribute by showing how specific characteristics of street-level work motivate the reactions of SLBs. The characteristics we identified were decision quality, societal considerations, routinization, technology utilization, case complexity, information uncertainty, professionalization, autonomy, and potential consequences of decisions. Whereas SLBs may differ in opinions, they share much of their perceptions of street-level work meaning that SLBs within the same context, exposed to the same institutional challenges, mainly respond in the same way.

Finally, we make two recommendations to policy makers and public management related to the digitization of discretionary practices. The first recommendation concerns the utilization of different digital tools. Giest and Raaphorst (2018) studying barriers to digitized public service provision recommended that policy makers and public management should pay attention to the ability SLBs had to utilize various technologies. Our findings are similar and suggest that there are considerable differences in how SLBs utilize technologies based on their training and age. SLBs that are more familiar with ICT and are younger seem to be more trustful of novel technology. Therefore, we recommend that digitization efforts having the potential to change street-level work and influence discretionary practices should be accommodated by thorough digital training of SLBs.

The second managerial recommendation suggests that policy makers and public management should pay attention to how technology can support the professional aspects of street-level work. Our propositions represent early steps toward an understanding of the attitudes and behavior of SLBs in digitized street-level bureaucracies. SLBs are strongly motivated by helping clients (Tummers & Rocco, 2015). They are professionals who have power and autonomy, reflect on their work, and actively seek to influence it. Therefore, to avoid resistance from SLBs, assertions on how technology can improve public service provision should be stated clearly.

6. Conclusions

This study began with an effort to unravel reasons SLBs have for why discretionary practices can be or should not be digitized. We have focused on the attitudes and behavior of SLBs who are in possession of professionalized knowledge and traditionally have exercised a substantial amount of discretion in street-level work. We were able to show that SLBs react strategically to the influence of digitization. Our study can help resolve the inconsistency in the extant literature which states that technology both can enable and constrain the ability SLBs have to exercise discretion. We observed that SLBs are positive to digitized discretionary practices when professional aspects of street-level work are enhanced, and societal considerations suggest practices to be digitized. We also saw that technology can create habits that influence discretionary practices and become taken-for-granted over time. We conclude that certain aspects of street-level work are changing. Technology has led to a change from traditional discretionary intervention on the streets to screen-level work where technology is used for information processing tasks in discretionary practices.

Our findings have relevance to the work of public management and policy makers. They should pay attention to how different digital tools can provide different results as well as the ability SLBs have to make use of the various features that different technologies offer. Computer proficiency can explain attitudes toward digitized discretionary practices. The more proficient SLBs are, the more they seem to understand the opportunities and challenges of digitization. This study shows that resistance against digitized discretionary practices are far less likely when technology supports professional aspects of street-level work. The literature has convincingly shown that SLBs are motivated by helping clients and working for a better community. Therefore, any technological aid that can assist in a busy work situation is appreciated. These findings might encourage public management and policy makers to include SLBs more in change processes and ensure proper training in digital tools.

In conclusion, the data show that digitization can create tensions in street-level bureaucracies that SLBs must cope with. They reflect on the impact of digitization in public service provision and react accordingly. The attitudes and behavior of SLBs are potential explanations to whether technology enables or constrains the discretionary practices of SLBs. Whereas recognizing the impact technology can have on discretionary practices is important, the literature rarely investigates this prominent issue. Digital solutions have experienced radical changes in supply and capacity and have the potential to shift bases of legitimacy from street-level work driven by professional norms to goals associated with a market-managerial orientation. We hope that these findings provide some initial paths and suggestions for further research to explore.

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Conceptualizing Digital Discretion Acceptance in Public Service Provision: A Policy Maker Perspective

Completed Research Paper

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Abstract

Public service provision is increasingly exposed to digital discretion which is the use of computerized routines and analyses to influence or replace the discretionary practices of public service workers. In this study, we interview parliamentary members and analyze e-government strategy documents to identify under which conditions policy makers accept digital discretion in public service provision. Policy makers define the boundaries for how efficiently public service workers can use technology. Our findings suggest that acceptance can be explained by five factors: (1) information quality, (2) whether clients are entitled to public services, (3) the extent to which the legislation is prepared for digitization, (4) if digital discretion provides opportunities for reorganizing the public sector, and (5) whether discretionary practices are sought harmonized because of political priorities. Our work further contributes by suggesting propositions and a model conceptualizing how these factors are interrelated to the acceptance of digital discretion.

Keywords: Digital discretion, decision-making, automation, e-government, public service provision, policy making, document analysis

Introduction

Public service workers make multiple decisions every day characterized by matching recognized situations to rules (March 2009). Public service provision has traditionally involved discretion since rules often require interpretation. However, what can be observed is an increased diffusion of digital discretion understood as information and communications technology (ICT) influencing or replacing the professional judgment of public service workers (Busch and Henriksen 2018). How public services are organized and provided is fundamentally changing. For example, a man received an 11-year court sentence based on several factors among them his high risk of recidivism as predicted by a proprietary risk assessment algorithm (Israni 2017). And artificial intelligence (AI) has proved itself to outperform teachers when assessing English essays (Markoff 2013). While public service workers continue to safeguard their ability to exercise discretion arguing that public service provision is complex and require their unique professional skill sets (Busch and Henriksen 2018), we have less knowledge about how policy makers consider digital discretion in public service provision. Their opinions are important since they, to a considerable extent, influence national digital agendas and define the boundaries of digitized public service work. The purpose of this paper is to understand how policy makers view the opportunities and challenges presented by an increased digitization of public service provision. The specific research question addressed in this study is:

Under which conditions do policy makers accept digital discretion?

Studies within digital discretion has mainly taken a public service worker perspective focusing on how ICT can constrain or enable discretionary practices. Studies have investigated how fully or partially automated services change the role of public service workers, their work processes (Bovens and Zouridis 2002) and influence their professional judgment (e.g., Wenger and Wilkins 2009; Wihlborg et al. 2016). However, studies have also shown that public service workers can overcome mandated use of ICT (Jorna and Wagenaar 2007) suggesting that fully automated services are not suitable for traditional public service agencies such as courts and schools but for mass transactional public services (Bovens and Zouridis 2002). Less attention has been directed at underlying considerations explaining digital discretion acceptance. Whereas public service workers are reluctant to digital discretion explained by the degree of professionalization, case complexity, and the need for personal interaction between clients and public service workers (Busch and Henriksen 2018), studies taking a policy maker perspective have mainly focused on how policy makers grant public service workers discretion through the legislation (e.g., Reddick 2005).

The empirical basis for this research is an exploratory case study. Data is collected by interviewing parliamentary members and analyzing central e-government strategy documents. The interviewed members of the parliament worked specifically with public services at the local government level. E-government strategies are policy maker perspectives on investments in, deployment, use, and management of e-government (Chen et al. 2010; Persson et al. 2017). E-government strategy documents are pursued in many countries shaping how the public sector should address the opportunities and challenges that digitized societies present.

Based on our analysis, we found that policy makers view digital discretion favorably when (1) structured data and correct information are available, (2) clients are entitled to a public service, (3) legislation can be expressed in programmable codes, (4) services can lead to reorganizing how public service work is done, and (5) politicians choose to prioritize harmonized practices in favor of individualized considerations. Our study addresses a gap in the e-government literature by taking a policy maker perspective showing under which conditions policy makers consider ICT suitable to constrain the discretionary practices of public service workers. We further contribute by providing propositions and a model depicting how the various considerations made by policy makers are interrelated to the acceptance of digital discretion.

The paper is organized as follows. First, we present related research followed by a presentation of the research context and methodology. Thereafter, our findings are presented showing how policy makers view digital discretion in public service provision before we present a model of digital discretion acceptance. The paper ends with some concluding remarks.

Related Work

Digital discretion is the use of computerized routines and analyses to influence or replace human judgment in public service provision (Busch and Henriksen 2018). In the past decade, public service provision has been exposed to an intensive use of ICT (Buffat 2015). The structures of public agencies are changing turning them into screen-level and system-level bureaucracies (Bovens and Zouridis 2002). Structural changes are accompanied by extensive changes in work processes (e.g., Bruhn 2015), in the relations between public service workers and clients (e.g., Tummers and Rocco 2015), and in the use of various digital channels (e.g., Madsen and Kræmmergaard 2015; Wihlborg et al. 2016). Furthermore, the digitization of public services has led to an increased focus on digital self-services where clients can help themselves. The changes taking place are so immense that public service workers in the frontline of public service provision, frequently referred to as street-level bureaucrats (Lipsky 2010), are moved into office buildings and placed in front of computers which influence their discretionary practices (becoming screen-level bureaucrats). Ultimately, they are turned into system-level bureaucrats merely facilitating automated services (Bovens and Zouridis 2002). Table 1 compares characteristics of street-level, screen-level, and system-level bureaucracies.

Table 1. Characteristics of street-level, screen-level, and system-level bureaucracies (adapted from Reddick et al. (2011) and Bovens and Zouridis (2002))

Characteristics	Street-level bureaucracy	Screen-level bureaucracy	System-level bureaucracy
Organizational role	Autonomous professional	System operator	System facilitator
Human interaction	Full interaction	Partial interaction	No interaction
Role of technology	Information processing tool	Decision support	Autonomous decision-maker
Resource use	Less efficiency	More efficiency	High efficiency
Individual attention	Full attention to client concerns	Partial standardization of decision-making process	Standardized, non-reversible decisions

Despite massive changes in public service provision, the topic has received relatively little attention in the e-government literature and many studies are conceptual (Buffat 2015; Busch and Henriksen 2018). Empirical contributions focus on how technology acts as an 'action prescription' (constraining the room for maneuver) or an 'action resource' (enhancing the room for maneuver) for public service workers (Hupe and Buffat 2014) who more often experience that technology acts as an action prescription for several reasons such as fair decision-making (e.g., Reddick et al. 2011), error prevention (e.g., Houston 2015), cost reductions (e.g., Pithouse et al. 2011), and enhanced political legitimacy (e.g., Jansson and Erlingsson 2014). Digital discretion also intends to prevent corruption, reduce power of rogue public service workers (Wenger and Wilkins 2009), and prevent manipulation of information streams (Snellen 2002). Routinization of work processes through full or partial automation of services such as the issuance of traffic fines has led to reduced autonomy among public service workers (Bovens and Zouridis 2002; Bruhn 2015; Wihlborg et al. 2016). The ultimate change to a system-level bureaucracy is applauded since it removes any personal biases when for example granting financial support to economically disadvantaged clients: "The expert system is blind and will not look out the window to check whether you have come by car" (Bovens and Zouridis 2002, p. 181). However, this change has raised new concerns since system designers are granted power to make choices previously made by public service workers in the frontline. They can affect decisions by interpreting vague legal terms, devising considerations to be made, and selecting definitions to be used. By doing so, they convert legal rules into algorithms and decision trees that can be decisive for outcomes of policy implementations.

Research further concludes that it is difficult to utilize fully automated services in traditional public service work such as in courts and schools (Bovens and Zouridis 2002; Buffat 2015; Busch and Henriksen 2018), and that mass transactional public services are more suitable for digital discretion

(Busch and Henriksen 2018). As humorously portrayed in the British comic "The computer says no!", public service workers are afraid of defying information presented on a computer screen even when their professional judgment indicates otherwise (Wihlborg et al. 2016). Other studies suggest that ICT can act as an action resource by collecting more information about clients thus providing a solid foundation for decisions (Busch 2017). Moreover, public service workers can create work-arounds for mandated use of ICT resulting in suboptimal ICT usage such as hiding the discretion effectively used (Jorna and Wagenaar 2007). These findings suggest that ICT is suitable for supervising formal aspects of decision-making whereas informal aspects are not influenced (Buffat 2015).

Less attention has been directed at underlying considerations about digital discretion acceptance, i.e., under which conditions ICT can serve as action prescriptions or resources. Research in this stream has mainly taken the perspective of public service workers who are generally reluctant to any influence on their discretionary practices. A variety of reasons can explain their lack of enthusiasm. Public service workers that enjoy a high degree of autonomy (e.g., Aas 2004) and have well established standards for their occupation (e.g., Busch 2017) are more likely to resist digital discretion. These public service workers are highly professionalized, have specific entry credentials for their profession, are often unionized, and have strong opinions about their work (e.g., Tummers and Rocco 2015). The consequences of decisions are another source of contention where public service workers and clients expect decisions with profound consequences to be made by humans. Furthermore, some cases are more complex than others requiring rich information about each case. Case complexity is often emphasized pointing out that even seemingly similar cases are different to some extent, and that it is difficult to standardize decision outcomes. Yet another reason is a client's desire to talk to a public service worker directly presenting his case while arguing for a certain outcome (De Witte et al. 2016). This paper looks at underlying considerations from a policy maker perspective. Policy makers have a considerable influence on digitization policies and practices and can influence the ability public service workers has to exercise discretion on the local government level. This perspective has mainly looked at how policy makers grant public service workers discretion through the legislation. Rules are formulated using indefinite terms such as "reasonable" and "satisfactory" demanding interpretation (e.g., Reddick 2005). The reason for formulating policies with indefinite terms is the social complexity of cases that makes it difficult or even impossible to formulate policies with schematic rules (Busch and Henriksen 2018).

Research Context and Methodology

Little is known about the conditions under which digital discretion is accepted among policy makers and public service workers (Buffat 2015; Busch and Henriksen 2018; Hupe and Buffat 2014). In this study, an exploratory case study is selected since it allows for a collection of rich descriptive data and is suitable for presenting a unique case in research areas where there is lack of theory (Yin 2014). Our approach is to use the empirical data to develop propositions inductively and suggest a conceptual model of digital discretion acceptance among policy makers that can be tested empirically in further research.

Research Context

The Parliament is the supreme legislature in Norway which issues policies, exercises control with the government, and ensures finances for the safe operation of the state. It consists of 169 members (MPs) distributed among 12 standing committees. Data has been collected from MPs in The Standing Committee on Local Government and Public Administration which has 15 members representing seven political parties. It handles matters regarding local government, regional and rural policy, and the organization and operation of state and government administration. Their views on digital discretion are interesting since they have a considerable influence on digitization priorities. The second data source is e-government strategy documents issued by the government. The Digital Agenda for Norway (2016) is an authoritative white paper prepared by the Norwegian government for further treatment in the Parliament. This type of white paper is used to either inform or raise discussions about certain matters and is often the basis for more formal propositions to the Parliament such as new laws. The Digitization Circular (2017) consists of prescriptions and advice influencing how e-government is implemented and is issued by the government without requiring parliamentary approval. Norway was deemed an interesting context for this study since the country is ranked among the foremost countries in the world

in terms of e-government maturity and readiness (United Nations 2016). Norway has initiated many digitization efforts that have substantially changed how public services are provided. For example, digitization in the Norwegian State Educational Loan Fund has automated the processing of applications leading to a 50 % reduction in case processing time for clients, reduced sick-leave, and significant cost reductions. The Norwegian Tax Administration has digitized many of its services including the tax report which now is handled completely without human interaction resulting in reduced administrative costs and improved services. Other initiatives look at how building permits for specific application areas can be automated. Like many other countries, Norway has also partially digitized many public services without removing the discretionary power of public service workers.

Data Collection

Our study has made use of personal interviews and documents as data sources.

Interviews. MPs representing each political party in the committee in the electoral period 2013-17 were approached. MPs representing The Norwegian Labour Party (MP #1), The Centre Party (MP #2), The Progress Party (MP #3), and The Socialist Left Party (MP #4) were interviews whereas MPs from The Conservative Party, The Christian Democratic Party, and The Liberal Party of Norway, also represented in the committee, were not able to participate in the study. Neither the Parliament committee chairman nor other committee members had any firsthand experiences with digitization initiatives. Four interviews were conducted in total. Based on the availability of the parliamentary members, the interviews were conducted face-to-face, through telephone, or through e-mail. Interviews were formulated with structured or semi-structured questions. Face-to-face interviews with semi-structured formulated questions were preferred as they allow the informants to speak more freely (Myers and Newman 2007). Three of the interviews were recorded. On average the interviews lasted approx. 30 minutes. The parliamentary members were given the opportunity to correct any errors in the transcribed text. Key areas of inquiry were: (1) intentions of the legislator manifested in new legislation, (2) policy implementation issues, (3) potential areas and prerequisites for digital discretion, and (4) societal, organizational, and professional opportunities and limitations of digital discretion.

Documents. We selected the two most central e-government strategy documents that each represents current political views on digitization in Norway:

- The Digital Agenda for Norway (Ministry of Local Government and Modernisation 2016).
- The Digitization Circular (Ministry of Local Government and Modernisation 2017).

The Digital Agenda for Norway (DA) is the main document used to express the government's political views on digitization. One of the main purposes of the document is to present the Norwegian government's overall policy for how ICT can be utilized to achieve a more user-oriented and efficient public administration. The second document we selected was The Digitization Circular (DC) issued annually. It is a compilation of normative prescriptions and recommendations for digitization in the public sector and applies to the ministries and all public agencies. These documents were deemed appropriate for two reasons. First, the DA contains exact details about the government's long-term political ICT views, and it offers a broad coverage including an historical account of ICT politics in Norway as well as future outlooks. The DC provides detailed recommendations reflecting the political views of the incumbent government which are useful when we investigate persistent and changing considerations by the policy maker. Second, interviewing policy makers in prominent positions in the Norwegian government is challenging since they often are unavailable for research-related interviews.

Data Analysis

We cycled among data, findings, and relevant literature. As the initial step, a first-order analysis was conducted involving a detailed coding of the interviews and e-government strategy documents. The coding was based on standard grounded theory techniques and guided by the research question. Relevant concepts in the data were identified and grouped into categories (open coding). We used simple descriptive phrases to label the concepts. The context was further consulted in cases where the researchers had difficulties with associating a concept with a specific category. To increase the rigor of

our coding, an outside researcher was provided with definitions of the first-order concepts and asked to match a sample of interview quotes and document text passages with the concepts. Disagreements were discussed until they were resolved. In the final step of the coding process we immersed ourselves in axial coding (Strauss and Corbin 1998) looking for relationships between categories consolidating them into second-order themes. Concepts continued to emerge from our analysis until we had a clear understanding of relationships between categories and related themes, and until the analysis failed to reveal any new relationships. The data was coded using qualitative data analysis software (NVivo) to keep track of the coding process allowing for a quick reference to similar concepts with representative quotes and text passages from our data that could be collapsed into fewer categories and themes.

Findings

The final data structure is illustrated in Figure 1 ordered from specific, first-order categories derived from the empirical data to more general, researcher-induced second-order themes.

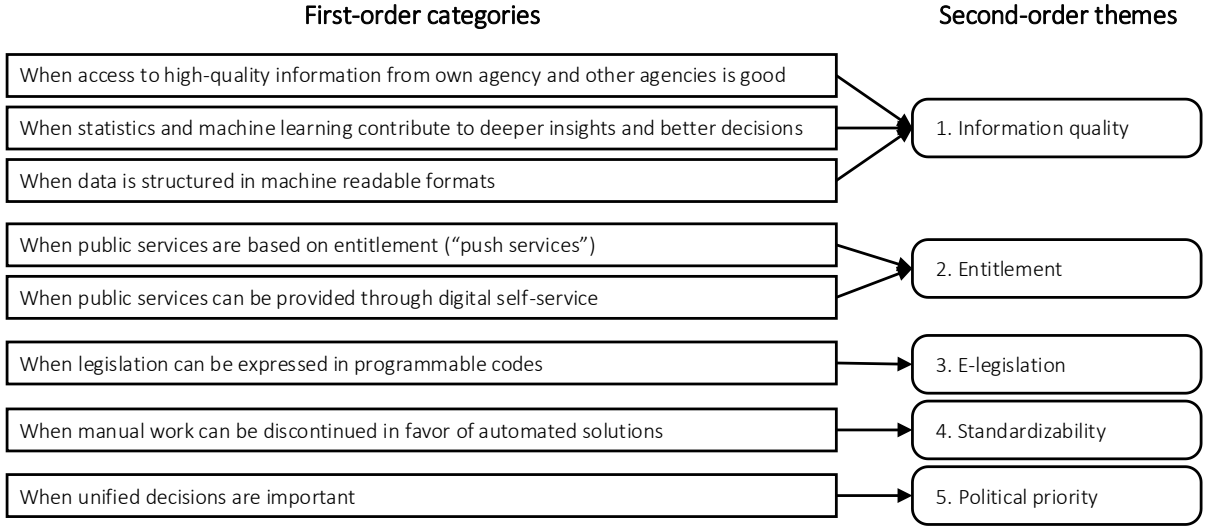

Figure 1. Data structure

Table 2 provides representative quotes from the interviews and text passages from the e-government strategy documents that substantiate the identified second-order themes.

Theme 1: Information Quality

First, policy makers emphasize the use of quality-assured information. This information can be utilized as a solid foundation for better decisions. A general conception of information quality that has been widely adopted is information *fit for use* by those intended to use it (Wang and Strong 1996). The concept can further be operationalized into intrinsic, contextual, representational, and accessible information quality denoting that information has a quality in its own right and is dependent on the context of use, how it is formatted and presented to users, and how it can be securely accessed (Wang and Strong 1996). Information intended for digital discretion presupposes certain vital attributes. First, the information must be correct. To ensure intrinsic information quality, reliable sources must be used, and users should provide their information only once:

"Public administration should reuse information instead of asking users again [..]. This is [..]one of the government's main priorities in its ICT politics." (DA, 2016, p. 44)

To be able to use pre-filled information for automated services, the public administration must reuse the information it already has. Second, the digitization of society generates substantial amounts of data that can be utilized in different contexts if it is fit for the task at hand. For example, data generated in businesses, public data like maps and traffic data, and real-time information collected from sensors in public spaces. The purpose is to identify patterns irretrievable through traditional data analysis methods.

Table 2. Representative quotes and text passages underlying second-order themes

Theme 1: Information quality	
Access to high-quality information	*"The use of correct information increases the quality of case management, thus strengthening the rule of law. [..] Digital services can be improved, streamlined, and automated through reliable access to quality assured information from own entity and other entities."* (DA, 2016, p. 44)
Deeper insights and better decisions	*"New methods of statistics and machine learning can handle substantial amounts of data, [..] understand [..] mechanisms and connections, uncover hidden patterns, and put forward focused questions. Through [these methods] we wish to contribute to deeper insights and better decisions."* (DA, 2016, p. 107) *"Clearly, you can make things much smarter by gathering information in a smart way forming the foundation for better decisions."* (MP #3)
Data in machine-readable formats	*"Agencies that establish new or change existing [..] digital services should foresee that data from these services can be made available in machine-readable formats."* (DC, 2017, §1.3)
Theme 2: Entitlement	
"Push services"	*"When a service is suitable for it, citizens will receive what they are entitled to without needing to apply, so-called "push services". Decisions about child benefits are normally made without [..] recipient participation."* (DA, 2016, p. 41) *"When you know you're entitled to [..] if you apply for parental leave after a child is born, it is not a question of whether you will receive it. It is not about exercising discretion."* (MP #2)
Digital self-service	*"[..] We continue working towards digital self-service [..]. This means that decisions can be made, and services offered, without the citizen having to apply for the service."* (DA, 2016, p. 29)
Theme 3: E-legislation	
Regulations expressed in programmable codes	*"Full or partial automation of judicial assessments is an option as part of the digitization of public services and work processes. Automation of judicial assessments presupposes legal rules expressed in programmable codes which require regulations suitable for such rule application."* (DA, 2016, p. 54) *"Rules must be technology-neutral. No new regulatory barriers should be made, and existing, unintended obstacles must be removed."* (DC, 2017, §1.2)
Theme 4: Standardizability	
Technological possibilities for standardization	*"It may as well be that there are areas here [..] suitable for so-called automated decisions [..] such as a traffic fine, right? 5 km/h above the speed limit. Then you get a [..] fine. There is nothing to discuss. So, this is an excellent example [..]"* (MP #1) *"Greater commitment is needed to realize benefits of digitalization, and greater courage is needed to carry out difficult changes such as discontinuing manual work where digital solutions and automation can take over."* (DA, 2016, p. 86)
Theme 5: Political priority	
Unified decisions as political priority	*"In that case, it must be done after politically determining that something which has been based on the exercise of discretion now must be standardized."* (MP #4)

The combination of structured, unstructured, and real-time data can uncover relationships public service providers never would have looked for and be used in areas such as in combating crime. Third, data must be presented in a way that facilitates ease of use. This can be done by making data available in machine-readable formats for internal and external use:

"The long-term goal is that data in public agencies is available both for internal and external use in machine readable formats." (DA, 2016, p. 49)

New information systems are required to make data from various services available in machine-readable formats and with description of its content (metadata). Fourth, information security is a prerequisite for confidence in the digital solutions. Information should be handled using a risk-based approach assessing current threats and vulnerabilities and followed up through internal controls.

Theme 2: Entitlement

Entitlement means that clients are entitled to certain public services and no formal applications are therefore required. There is no need for exercising discretion since the client is entitled to the service. For example, in Norway child benefits are paid out to one of the parents soon after a child is registered in the national registry. This is done without any human interference provided that the authorities know the parent that should receive these child benefits. One of the parliamentary members elaborate on how public services such as parental leave can be further simplified and automated:

"So, [we] have a system where you can apply for parental leave. You can do that automatically. But if you make some changes to the period you are on leave, the automation stops. The computer system cannot manage this change. [..] In order to make changes, it is a lot of paperwork [..] Clearly, this must be easy to simplify." (MP #2)

Public services based on client entitlement need to be identified:

"The identification should include [..] which services that remain to be digitized and which services that are suitable for digital self-service, prompt decisions, automated case handling, and push services." (DA, 2016, p. 42)

By automating services that clients are entitled to, they are ensured to receive these services. In addition, clients are envisioned to receive fairer and faster treatment compared to manual processing. This is of particular importance for underprivileged groups of people who have not been able to apply for certain public services despite being entitled to them. Reasons for why they have not received these services may be attributed to physical or mental disorders as well as mere ignorance. Another issue is that whereas certain clients do not need services they are entitled to, digital discretion can increase the number of clients receiving benefits. Thus, digital discretion may reduce costs in terms of reducing the need for public service workers but increase the public expenditure of the benefits themselves.

Theme 3: E-Legislation

In many occasions, regulatory adjustments are needed as they can lead to simplifying solutions and making work processes more efficient. The diffusion of digital discretion is strongly linked to how rules are formulated since digital processing of cases is considerably hampered without associated changes in regulations. Some rules are designed with open-ended terms such as 'reasonable' and 'satisfactory' granting discretionary power to public service workers who must make decisions on various matters. If processes are to be automated, distinct discretionary terms must be replaced. Furthermore, rules must be formulated schematically for algorithms to be able to handle both the conditions for and outcomes of decisions. The policy maker provides examples of how e-legislation can lead to digital discretion:

"The service 'Build without applying' was developed in conjunction with simplifications of the regulations in the Planning and Building Act. The service enables many construction projects to be launched without applying to the municipality. User involvement was central in the development of the service." (DA, 2016, p. 39).

Regulations are among the strongest means of policy makers and must be used strategically. The government has initiated several efforts to simplify how public services are provided and regulations should not be used unless strictly necessary. When regulations are required, they must be adapted to the increased digitization of public service provision. Much of current regulations have been formulated with traditional paper processing in mind resulting in regulations that take little account of digital work processes in public agencies. Since regulations form the basis of case processing, it is vital that

regulations facilitate digital processing. In some occasions, regulations need to be completely changed. The policy makers have provided recommendations on how digitization-friendly legislation can be achieved, for example through lists with checkpoints. Furthermore, policy makers emphasize the importance of identifying and assessing the impact of current regulations early in digitization projects.

Theme 4: Standardizability

The potential to reorganize public agencies is vital for policy makers. They recognize that even though choice of technology is important, digitization is not merely about "electrifying" the public sector. They further reckon that work processes must be changed to realize digitization benefits. While possibilities for reorganizing structures and work processes are incentives for accepting digital discretion, it seems to be a significant difference between written e-government visions and realized benefits acknowledged by policy makers who emphasize that greater commitment and courage is needed to realize benefits of digitalization. They point out the importance of identifying opportunities for standardizing manual work tasks including exploiting emerging technologies such as big data and AI. The automation of case processing may have an impact on how public services are organized and designed in the future. When work practices change, the need for competence changes accordingly. Routinized jobs disappear being replaced by more specialized and knowledge-intensive jobs creating a growing need for adapting the workforce to innovative technologies. Several reasons can explain why e-government visions are not realized. First, there is a lack of strategic ICT competence in public management. A mismatch between defined digitization goals and actual needs of public agencies is observed where public agencies define goals of digitization that are unrealistic or lack strategic foundation:

"Investigations show that the lack of technology competence among top management is one of the biggest barriers to digitizing public services. [..] A systematic program for competence development for public managers [has been] launched [..]. One action is to strengthen the strategic ICT competence of management groups [..]. The purpose [..] is to raise awareness among top managers about how digitization can contribute to the development of an agency, to goal achievement, and to better services for clients." (DA, 2016, p. 52)

Second, the scope of digitization projects tends to be too ambitious which makes projects notoriously complex. The high level of complexity and associated risk stems from ambitious and complex goals and the many stakeholders involved in digitization projects representing various interests. Smaller digitization initiatives seem to be under-prioritized financially. Third, digitization initiatives are exposed to insufficient governance and coordination. An interaction between employees, technologists, and the operational side of a public agency is a good starting point for developing new solutions and work processes pointing out that although ICT solutions are to be used by several public agencies across various sectors, the ICT solutions are designed with the tasks and objectives of one specific public agency in mind. Finally, the public sector has often been slow in utilizing opportunities offered by innovative technology. Whereas automated systems and AI are not common in public agencies, they are envisioned to focus their efforts being better able to fulfill their societal mission.

Theme 5: Political Priority

Political priorities can explain digital discretion acceptance. The exercise of discretion can lead to different outcomes even in comparable cases. While such differences are not desirable in general, policy makers do in some occasions find these differences unacceptable. Therefore, they seek to harmonize discretionary practices to ensure more equal decisions. Coordinated practices in these cases are regarded as more important than individual considerations. For example, to ensure equal competitive conditions among companies across Europe, discretionary practices are sought harmonized by European regulators:

"This is done to ensure harmonized discretionary practices in decisions by various European regulators." (DA, 2016, p. 169)

A change towards more harmonized discretionary practices can be associated with subsequent changes in the legislation leading to more standardized outcomes. Another motivation to promote more equal

treatment of similar cases is the potential number of complaints. Some public agencies use substantial resources to handle client complaints causing indignation among clients and an increase in the workload of already pressured public service workers.

Discussion

The literature recognizes that digital discretion can both enable and constrain public service workers. It further points at understanding the context of digital discretion as important (Buffat 2015; Busch and Henriksen 2018). Researchers within this domain have mostly taken a public service worker perspective. The literature suggests that the diffusion of digital discretion is dependent on a variety of factors such as the complexity of a case often requiring rich information presented in the form of a narrative by the client (e.g., Busch 2017), the degree to which routines are fixed or flexible (e.g., Jansson and Erlingsson 2014), and the capabilities and characteristics of the ICT in use (e.g., Paulin 2013). Our findings suggest that policy makers from different political parties (adhering to different political ideologies such as socialism, conservatism, and liberalism) are positive to digital discretion under certain conditions. The data structure in Figure 1 displays the five second-order themes representing the key concepts that emerged from the study. The dynamic interrelationships of the concepts are represented in Figure 2 which constitutes our main contribution; it provides an illustrative model of factors that can explain the acceptance of digital discretion by policy makers.

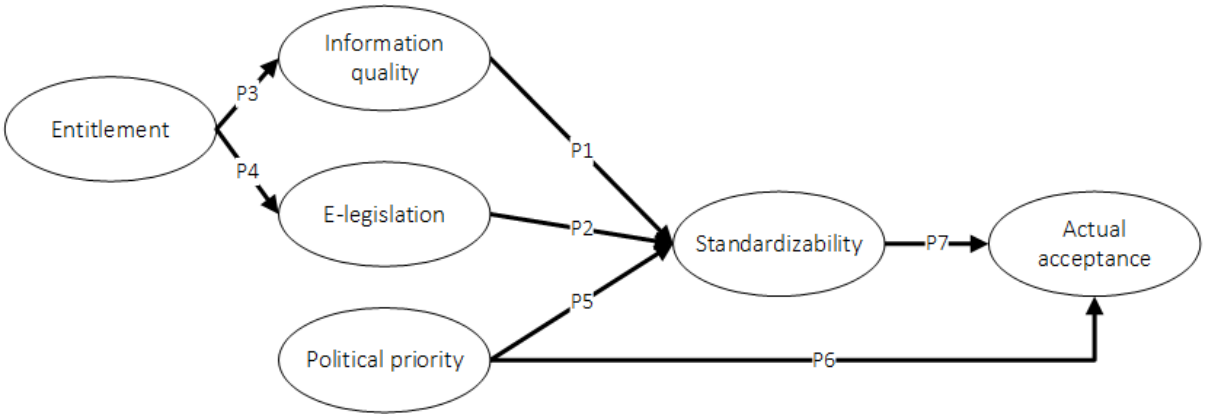

Figure 2. Digital discretion acceptance by policy makers

The model focuses explicitly on considerations of policy makers are interrelated to the acceptance of digital discretion rather than the view of public service workers which has dominated prior research (Busch and Henriksen 2018). Compared to policy maker considerations, the issue of standardizability is the main source of contention for public service workers who generally hold that most of the public services they provide require human judgment which computers cannot substitute (Lipsky 2010). Thus, whereas they welcome efforts such as ensuring services clients are entitled to, they doubt that traditional public services can benefit other than by standardizing parts of the decision-making processes (Busch and Henriksen 2018).

Information quality. We found that information quality was important for how policy makers view opportunities and challenges of digital discretion. Information quality is related to the standardizability of public services. These findings are consistent with the e-government literature which focuses on correct data input as a prerequisite for correct decision outcomes (Henriksen 2018). Using the conceptualization of Wang and Strong (1996), information is expected to be fit for use in a specific context and represented in a way that is understandable for its users. Moreover, it should be consistent with formats that can be interpreted and used by computers (Dawes and Helbig 2015). Incorrect data inputs can be explained by errors from various sources such as public agencies (storing and handling data from the clients multiple times), external organizations such as employers and financial institutions, and clients themselves (Henriksen 2018). The data quality of client inputs can vary dependent on how easily forms can be understood and filled out (some forms require the expertise of lawyers and other professionals), whether clients intentionally provide incorrect information (for

example to protect their identity), and whether clients can remember necessary information which can be difficult when approaching public services needed in difficult and stressful life situations (Dawes and Helbig 2015). Thus, we suggest that:

P1: Information quality is a prerequisite for standardizing public services.

E-legislation. Legislation formulated with programmable codes is a key concern among policy makers and widely considered as a prerequisite for standardizing work processes and digitizing public services. These findings are consistent with other studies discussing legislation and digital discretion. Automation has been utilized in public service agencies characterized by mass transactions and schematically formulated legal rules (Bovens and Zouridis 2002; Busch 2017; Smith et al. 2010). Whereas technologies such as AI has developed rapidly during the last decade, challenges still remain in terms of translating norms into algorithms that can be supported by AI (Bench-Capon 2015; Ingolfo et al. 2014). Research on legal informatics and AI is mainly conducted within the discipline of computer science dominated by significant elements of technical challenges associated with automation in public administration (Henriksen 2018). Thus, standardization and automation are still associated with a digitization-friendly legislation since AI is not yet ready to handle a legislation in non-programmable codes. This leads to our second proposition:

P2: E-legislation is a prerequisite for standardizing public services.

Entitlement. All parliamentary members emphasized public services that clients are entitled to as good candidates for digital discretion. The e-government strategy documents expressed views in favor of standardization and digital self-services where clients help themselves. The e-government literature has shown that several benefits clients are entitled to, still are handled through formal applications. However, these benefits can easily be decided on based on certain objective criteria (Henriksen 2018; Madsen and Kræmmergaard 2015) such as age (e.g., whether a child is entitled to a place in kindergarten) or income (e.g., if a student is entitled to receive student grants). Since the criteria of these public services and benefits are objective, entitlement is associated both with information quality and e-legislation. Objective criteria imply that both data inputs and the criteria can be more easily expressed in machine-readable codes supporting contextual information quality. Furthermore, these criteria can be expressed in programmable codes suitable for e-legislation. Therefore, we propose that:

P3: Public services that clients are entitled to can more easily be presented in machine-readable formats.

P4: Public services that clients are entitled to can more easily be expressed using schematically formulated rules.

Political priority. Policy makers can prioritize to replace discretionary practices with routinized practices. Such change faces policy makers with a well-known dilemma choosing between individualized or more equal treatment of clients (Jorna and Wagenaar 2007; Lipsky 2010; Tummers and Bekkers 2014). Several studies have focused on the role of the public service worker. This literature has almost unanimously concluded that public service workers argue for an individualized treatment of clients (Busch and Henriksen 2018). Their preferences are explained by job motivation; helping clients (Tummers and Rocco 2015), case complexity (Busch 2017), professionalism (Susskind and Susskind 2015), and the fear of becoming redundant due to automation (Henriksen 2018; Susskind and Susskind 2015). Whereas an active prioritization of routinized practices is associated with standardizability, the main concern of policy makers is the necessity of harmonized practices within certain areas of public service provision. For example, by ensuring that companies have equal conditions when competing in the European market, and by emphasizing that public interest considerations are more important when for example reactions to certain criminal acts are decided. We put forward the following propositions:

P5: Political prioritization is positively associated with standardizability.

P6: Political prioritization is positively associated with digital discretion acceptance.

Standardizability. The extent to which discretionary practices can be standardized was directly associated with the acceptance of digital discretion. These findings are consistent with other studies on digital discretion (e.g., Bovens and Zouridis 2002; Wihlborg et al. 2016) and the e-government literature

which to a large extent has discussed how ICT and digital services are associated with organizational changes (see outline in Cordella and Tempini 2015). Standardizability is linked to both partial and full standardization of work processes reflecting an influence or replacement of human judgment. Partial standardization means that certain aspects of the decision-making processes can be standardized typically in case preparations where ICT can be used to collect information more easily (Ben and Schuppan 2016; De Witte et al. 2016). Full standardization of work processes is linked to automated services where the whole decision-making chain is executed by computers without any human involvement (Bovens and Zouridis 2002; Smith et al. 2010; Wihlborg et al. 2016). We propose that:

P7: Standardizability is positively associated with digital discretion acceptance.

Limitations

Three potential limitations are highlighted. First, the selected documents are not produced for research purposes but for communicating current digital agendas to society at large, public agencies, and the Parliament. Thus, they do not discuss digital discretion in-depth (Bowen 2009). To mitigate this problem, we have interviewed MPs to gain a more thorough understanding. The second potential limitation is a biased view of ICT politics since the selected documents reflect considerations of the incumbent government and thus are more likely to present positive and visionary views of digitization initiatives rather than discussing their challenges (Bowen 2009). The selection of e-government strategy documents is justified by representing the dominant view of ICT politics acknowledging that the government was supported by a majority of the Parliament. Finally, the generalizability or transferability of findings is often questioned in single case studies. A study cannot satisfy requirements to be simple, accurate, and general at the same time and researchers are forced to emphasize one or two of these three ideals (Thorngate 1976). A case study generally trades off some generalizability, but provides a credible account of empirical observations and has relative conceptual simplicity (Thorngate 1976; Weick 2005). The context under study represents policy makers in a country that is highly industrialized and ranks among the top e-government countries in the world (United Nations 2016).

Concluding Remarks and Future Research Recommendations

This paper reports findings from an exploratory case study. We have interviewed MPs and analyzed central e-government strategy documents. Motivated by the importance of policy makers in digitization initiatives, we add to a scarce literature dominated by a public service worker perspective. The purpose was to find out under which conditions policy makers consider digital discretion suitable for public service provision. Our second-order analysis generated the five themes that constitute the key elements of our model of digital discretion acceptance: (1) information quality, (2) entitlement to public services, (3) digitization-friendly legislation, (4) opportunities to standardize manual work practices, and (5) politically prioritized harmonization of discretionary practices. Our main theoretical contribution is the presentation of seven propositions and a model that suggest how these elements are interrelated.

This paper represents first encouraging steps of examining digital discretion considerations by policy makers. Future research could benefit from addressing several issues. First, future efforts should investigate more underlying reasons for policy maker considerations. Whereas most studies within digital discretion are conducted using qualitative methods, we have suggested propositions that can be tested quantitatively in other contexts and provide the basis for further conceptual work. Second, even though policy makers describe conditions that can make digital discretion suitable for public service provision, to what extent policy makers pursue these efforts remains unclear. Whether policy makers are interested in exploiting opportunities digital discretion provides is an arena for future research efforts. Surprisingly, we discovered that policy makers across different political ideologies did not prioritize digital discretion differently. Future research should find out whether policy makers from different political backgrounds share their views on digital discretion in other contexts as well. Fourth, digital discretion raises unintended issues such as an increased number of clients receiving benefits they are entitled to and governance issues such as the need to adapt the digital competence of the workforce. Finally, more research should focus on how considerations by policy makers differ or coincide with views put forward by public service workers to identify shared opinions and issues of contention.

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Digitizing Discretionary Practices in Public Service Provision: An Empirical Study of Public Service Workers' Attitudes

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Abstract

Public service workers have traditionally enjoyed a wide freedom to make decisions about clients. With the increased use of ICT in public service provision, discretionary practices are influenced or replaced by computerized routines, known as digital discretion. Based on the assumption that public service workers are motivated by helping individual clients, this paper focuses on characteristics of public service provision that can explain their digital discretion acceptance. To find out, we surveyed public service workers (n=125) within several types of public service provision and used structural equation modeling (PLS-SEM). We conclude that professional motivations and the nature of public service provision make it difficult to completely digitize discretionary practices. Policy implications include paying special attention to the opportunities that technological innovations can create and the potential inability of public service workers to fully utilize digital tools due limited training and age.

1. Introduction

Public service workers have traditionally exercised discretion during policy implementation making decisions about clients within various public services such as policing, social work, and nursing [25, 31]. Discretion is the professional judgment of public service workers, acquired through years of formal training and experience, which they use to adjust decisions concerning clients and to decide on actions to take (if any) to ensure the best potential outcome [27, 31]. The fundamental dilemma of discretion is that policy outcomes can become different than intended by the policy maker [10, 31]. Public service workers ultimately become policy makers on the street-level ('street-level ministers') where their actions create precedence for similar cases [31]. Digital discretion, the use of information and communications technology (ICT) to influence or replace the professional judgment of public service workers [11], has been introduced to address these policy discrepancies. As a result, face-to-face client interactions on the street-level are replaced with computerized interactions from massive office buildings [5, 43], and public service provision risk becoming less attentive to individual needs of clients. Despite an increasing digitization of public services, little is known about the conditions under which digital discretion becomes prevalent in public service provision [8, 11, 33]. The potential resistance of public service workers is important to understand the success of digitized discretionary services [8]. Moreover, since the purpose of digitized public services is to improve them, the views of public service workers can help us understand if and how public service provision can be improved by digital discretion. Our study is guided by the following research question: *which characteristics of public service provision can explain attitudes toward digital discretion among public service workers?*

There are different definitions on what constitutes a public service worker. We use the term street-level bureaucrat (SLB) which describes public service workers such as police officers, teachers, nurses, and other professional workers who interact directly with clients and are able to exercise a substantial amount of discretion in their work [31]. A vast majority of studies takes a SLB perspective and explain the necessity of professional judgment by factors such as social complexity [29], job motivation [e.g., 3, 40], a preference for helping clients [e.g., 40], and potential consequences of the decisions public service workers make [e.g., 9, 12]. Other studies identified reduced workload [e.g., 17], increased decision quality [e.g., 7, 12], and mere coercion [e.g., 12, 43] as reasons for why SLBs accept digitized discretionary practices.

Whereas most of the research within this stream has been conducted using qualitative research methods [11, 37], this study is different by drawing upon a quantitative, cross-sectional study. To answer our research question, we first reviewed the literature

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to identify characteristics of public service provision that can explain attitudes toward digital discretion. Characteristics were then operationalized into a survey instrument. 125 SLBs were surveyed representing eight types of public services.

This paper addresses a gap in the knowledge about digital discretion [8, 11]. Our paper has two main contributions. First, we address a gap in the literature that hitherto mostly has studied if discretion is influenced by technology. Results are inconclusive and contextual explanations have largely been ignored. We increase the understanding of how SLBs consider opportunities to digitize discretionary practices and demonstrate the relative importance of public service characteristics to explain attitudes. Our study shows that SLBs within several types of public services are in general reluctant to digital discretion since the nature of public service provision calls for their professional judgment. Moreover, whereas previous research mainly has looked at barriers to digital discretion [11], this study is among the first that, from a SLB perspective, identifies opportunities for digitizing discretionary practices. Government agencies may address these findings when developing and implementing e-government services. Second, we provide measurement scales for the benefit of other e-government researchers.

2. Related work and model development

Lipsky [31] acknowledges that the term 'street-level bureaucracy' embodies a paradox; namely how SLBs can treat clients alike and at the same time pay attention to individualized concerns. The latter part of the term (bureaucracy) is related to juridical aspects of discretion that constrain SLBs. They are rule followers and the exercise of discretionary power is only possible in cases where rules grant SLBs this power. The former part (street-level) is associated with how rules are interpreted thus enhancing the influence of SLBs in policy implementation.

However, the introduction of ICT has changed the scenery of public service provision [8] and several structural changes have taken place [5]. Client interactions become computerized and automated instead of being handled face-to-face [5, 7, 40, 43]. In some occasions, clients can provide services to themselves through digital self-service solutions [23]. Observing these changes, Bovens and Zouridis [5] claimed that SLBs are turned into screen-level and system-level bureaucrats where the former label describes SLBs relying increasingly on computerized information and the latter label indicates SLBs as mere operators of automated services.

Research suggests that SLBs often find themselves constrained by ICT. Where they previously fully controlled decision-making, ICT is now used to prevent corruption [35, 37] and human errors [e.g., 26], reduce costs of expensive discretionary practices [e.g., 36], increase political legitimacy [e.g., 29], hinder deliberate biases and manipulation of information [e.g., 39, 42], and in general make fairer decisions [e.g., 37]. These changes are welcomed from a top-down perspective where discretion is seen as a problem for policy implementation. From a bottom-up perspective, SLBs are mostly reluctant to any influence on their discretionary power arguing that discretion is necessary to adapt policies to local conditions and to provide just and fair outcomes. ICT can also enable SLBs by providing more information about each client being able to exert control over them [28]. Other findings indicate that ICT is suitable to control formal, but not informal aspects of discretionary practices [8, 30], and that SLBs can hide behind computers (such as in the British comic; "the computer says no!" [43]) reducing judgment costs.

Less attention has been paid to characteristics of public service provision that can lead to digital discretion [8, 11]. Research suggests that digitizing and automating traditional street-level bureaucracies such as courts and schools are challenging [5, 8]. Instead, mass transactional public services seem to be more suitable for digital discretion [5, 11]. Increased standardization of public services such as tax reporting lead to reduced autonomy among SLBs [5, 7, 18, 33, 43], even handing power over to system designers that can make choices about how vague legal terms should be interpreted by converting them into algorithms and decision trees that can be decisive for policy outcomes [5, 24].

A variety of reasons can explain why SLBs oppose reduced autonomy [18]. They are often highly professionalized with well-established standards for their occupation and specific entry credentials for their professions [25]. Many are unionized [22] and they have strong opinions about their work [18]. These opinions are often rooted in personal motivations to favor and assist clients whenever possible [40] and in the nature of public service provision [31]. SLBs claim that public services are characterized by challenges such as consequences of decisions [9, 12], case complexity [17, 36], legislation complexity [1, 10], and the need for interaction [17]. We reviewed this literature to develop our model and hypothesize about public service characteristics that can explain SLBs' attitudes toward digital discretion.

2.1. Decision complexity

The exercise of discretion is related to prevailing statutory provisions of law [31]. The legislation that SLBs use as the basis for their decisions may contain terms that invite SLBs to determine the meaning of them [22, 27, 29]. The process of interpreting legal terms can be lengthy and complicated, yet necessary. Since "life comes in so many facets" [9, p. 2967], it will be impossible for policy makers to foresee every situation that can occur. Open-ended rules ensure just decision outcomes. Thus, we hypothesized:

Hypothesis 1a: Legislation complexity will positively influence decision complexity.

Whereas the legislation often has open-ended rules, other rules may use fixed terms reflecting public services that groups of clients are entitled to [35]. Decisions about these services are often based on objective criteria such as age (e.g., whether a child is entitled to a place in kindergarten) and income (e.g., if a student is entitled to receive student grants). Busch [10] found that policy makers were more likely to accept digital discretion in cases where clients are entitled to public services, also expressing views in favor of digital self-service solutions where clients can help themselves whenever possible. We argue that SLBs are likely to reflect the opinions of policy makers since they exercise little or no discretion in these cases. Therefore, we hypothesized that:

Hypothesis 1b: Public service entitlement will negatively influence decision complexity.

Clients can be different in terms of maturity, their need for support, economic status, and life experiences. The situations they represent can vary from simple matters such as over-speeding to serious cases such as murder. The severity of a decision outcome is found to be related to the perceived importance of discretion [9, 12]. For example, judges can sentence clients to several years in prison and make decisions about child custody matters which obviously create strong emotions among clients involved [9]. The potential decision severity usually means that clients have an ardent desire for SLBs to make professional assessments of their cases. We therefore hypothesized:

Hypothesis 1c: Decision severity will positively influence decision complexity.

2.2. Public service characteristics, discretion importance, and decision quality

The complexity of decision-making influences the need clients have to interact with SLBs [37]. Clients often prefer to talk to SLBs arguing that their case is unique and requires a certain outcome [17]. Clients tend to be increasingly satisfied with decisions if they have had the opportunity to present their case and explain their actions directly to a SLB even if the SLB decides on a decision in their disfavor [9]. We hypothesized that:

Hypothesis 2a: Decision complexity will positively influence need for interaction.

Public service provision is characterized by SLBs making decisions about clients. These clients represent circumstances that can be unique and require the attention of SLBs [7, 22, 29]. For example, a criminal may have experienced a traumatic upbringing through which the actions of this client must be understood. Therefore, each case needs to be sufficiently illuminated, and cases that are seemingly similar may be different to some extent which makes it difficult to standardize decision outcomes. This is the reason why SLBs have discretionary power; they must have the opportunity to think creatively and devise appropriate actions adapted to each client if necessary [31]. Thus, our hypothesis became:

Hypothesis 2b: Decision complexity will positively influence perceived importance of discretion.

Professional identity is another characteristic that influences the perceived importance of discretion. It refers to whether a SLB identifies herself with the conduct, aims, or qualities that a profession is characterized by. The literature supports the notion that increased identification with a profession favors professional judgment [e.g., 18]. SLBs enjoying a high degree of autonomy (e.g., [1]) and having well established standards for their occupation (e.g., [25]) are more likely to resist digital discretion. A strong professional identity suggests that the decisions SLBs make cannot be made by untrained people [32]. SLBs argue that their unique expertise is necessary to guarantee reasonable decision outcomes. We therefore hypothesized:

Hypothesis 3: Professional identity will positively influence perceived importance of discretion.

Governments rely increasingly on the use of ICT for implementing policies [33]. Technologies often play a key role for the tasks of SLBs since they devise actions to be taken and provide SLBs with much information [28, 33, 39, 43]. The literature has identified the flexibility of a technological tool to be of importance for how much discretion SLBs can exercise [30]. In some cases, technology is found to reduce the room for maneuver that SLBs have [8]. Technology creates decision paths that need to be followed based on previous choices, and the more choices SLBs make, the more limited will subsequent choices be. Technology can also enhance the room for maneuver. By being flexible, supporting existing work practices, and providing more information, the perceived importance of discretion increases. We therefore hypothesized:

Hypothesis 4: Technology flexibility will positively influence perceived importance of discretion.

Information quality is identified as being important to the quality of decisions. With ICT, SLBs now have access to vast amounts of information that can help them make better decisions [9, 24]. Information quality is often related to the term 'fit for use' which denotes how information need characteristics that allows it to be applied and used in a specific context and in an understandable format for its users. Information may be erroneous for several reasons. For example, public agencies storing and handling client data multiple times, wrong data inputs from external organizations such as financial institutions, and clients deliberately providing incorrect information [16, 24]. We hypothesized that:

Hypothesis 5: Information quality will positively influence perceived decision quality.

2.3. Attitude toward digital discretion

Computer self-efficacy refers to an individual's perception of its own ability to use technology to accomplish as task [6, 15]. The term implies that a computer is used to accomplish specific tasks. Since Compeau & Higgins [15] first developed their measure of computer self-efficacy in 1995, ICT has changed considerably. In the mid-90's, ICT was purchased and installed at workplaces. Today, ICT refers to a variety of technologies such as smart phones, smart watches, tablets, cloud applications etc. Therefore, when we refer to the use of technology, we mean use in a broad sense including a variety of technologies. Although computer self-efficacy is not specific to the use of discretion, empirical evidence suggests that SLBs with greater computer self-efficacy will perceive discretion in decision-making processes to be less relevant [9, 12]. Like Compeau & Higgins [14] demonstrated that task performance increases with increased computer self-efficacy, we argue that SLBs mastering technology also rely more on the choices and decisions it makes [37]. Thus, we hypothesized:

Hypothesis 6: Computer self-efficacy will positively influence attitude toward digital discretion.

Research shows that digital discretion is difficult to utilize in traditional public service work such as in courts and schools [5, 8]. Mass transactional public services such as loan assessments and police controlling over-speeding seem to be more suitable for digital discretion [5, 11]. SLBs argue that public policies need to be interpreted and adapted to real-life situations [8, 11, 17, 29, 31]. By doing so, the quality of their decisions increases since they can produce outcomes that are more fair and reasonable taking individual circumstances into consideration [7]. Moreover, the more important SLBs consider discretion to be for their work, the less positive they are toward digital discretion [11]. We therefore hypothesized:

Hypothesis 7: Perceived importance of discretion will positively influence perceived decision quality.

Hypothesis 8a: Perceived importance of discretion will negatively influence attitude toward digital discretion.

The literature supports the notion that perceived decision quality is important to explain whether SLBs accept digital discretion or not. Whereas SLBs in general are reluctant to digital discretion, they are more likely to accept it in cases where they can see that public services are improved. Research suggests that SLBs will prioritize professional norms over managerial goals if they are required to do so [40]. A positive attitude reflects beliefs that computers, under certain circumstances, can make decisions that are better than the decisions they make themselves [5, 42]. Whether a decision is better or not is judged in terms of whether SLBs believe that computerized decisions follow the norms of their profession [40]. Our hypothesis was therefore:

Hypothesis 8b: Perceived decision quality will positively influence attitude toward digital discretion.

Figure 1 presents our research model and hypotheses.

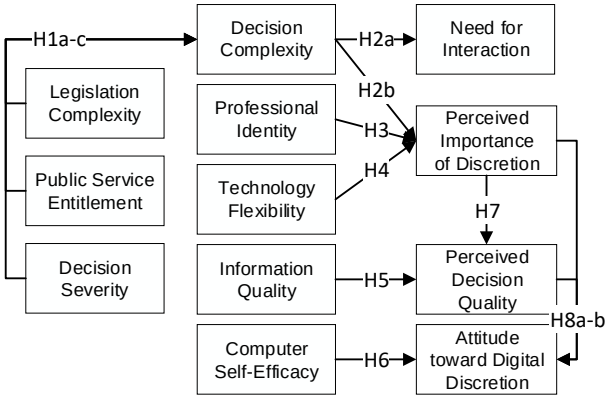

Figure 1. Research model

3. Survey methodology

To test our hypotheses, we conducted a cross-sectional study of 125 SLBs within several types of public service provision.

3.1. Data collection and sample statistics

We used the definition of street-level bureaucracies by Lipsky [31] when selecting public agencies. A random sample of public agencies in Norway was drawn from agencies providing several types of public services. Potential agencies were contacted through phone and e-mail. Executives were informed about the research project and subsequently invited to participate. Executives then distributed the survey link to respondents. We offered gift certificates to increase participation (they were given to two of the respondents after a draw). In total, 125 SLBs completed the survey whereof 90 (72%) used the gift certificate option. Respondents from several types of public service provision participated: food safety authority (FSA), public roads administration (PRA), directorate of fisheries (DF), customs offices (CO), county governor office (CGO), courts (CRT), municipal building planning and permit offices (BPO), and municipal kindergarten administration offices (KAO). Whereas some of the SLBs conduct field inspections (FSA, PRA, DF, CO), often alone, other SLBs work with case handling (CGO, CRT, BPO, KAO).

No missing values were reported. The mean work experience was 19.6 years (SD=11.4) ranging from 0 to 45 years. The respondents used two types of technologies. Those working with field inspections mainly use handheld devices with apps installed. SLBs working with case handling use case management systems. Table 1 provides an overview of the final sample with its respondents and street-level bureaucracies.

Table 1. Sample statistics

Years work experience	# of respondents	Type of public service	# of respondents
0-5	17	FSA	17
6-10	18	PRA	21
11-15	12	DF	26
16-20	20	CGO	8
21-25	25	CO	4
26-30	11	CRT	21
31-35	6	BPO	19
36-	16	KAO	9

3.2. Operationalization of constructs

The operationalization of constructs combined previously validated indicators with new indicators developed to fit the context. Computer self-efficacy (CSE) was operationalized with four items adapted from Sasidharan et al. [38]. Information quality (IQ) used four adapted indicators from Au et al. [2]. Decision complexity (DC) was measured with five indicators from Barki et al. [4]. Perceived decision quality (PDQ) was measured with items adapted from Paul et al. [34]. Attitude toward digital discretion (ADD) was adapted from Venkatesh et al. [41].

We developed several items based on extant literature and 16 interviews with SLBs in context conducted prior to the survey. Candidate indicators was pretested on three IS researchers and four SLBs. A list of questions was presented to subjects who assessed them according to the constructs. Based on the results of the pretest, questions were rephrased or deleted from the candidate list. Items were developed for the following constructs: decision severity (DS), technology flexibility (TF), professional identity (PI), need for interaction (NI), legislation complexity (LC), perceived importance of discretion (PID), and public service entitlement (PSE). In addition to the multi-item measures, questions about type of work and work experience (in years) were collected.

The original measurement instrument had four and five items for each construct. To avoid survey fatigue, all constructs were adapted to and measured by using 7-points semantic-differentials scales [13]. During our analysis, several indicators were dropped due insufficient loadings. The measurement instrument with retained indicators is shown in the Appendix (the complete measurement instrument is

available upon request). For the convenience of the respondents, the questionnaire was presented to them in Norwegian.

4. Data analysis and results

Data analysis and hypotheses testing were conducted using structural equation modeling with the partial least squares (PLS) estimation technique using SmartPLS. We adopted best practices for reporting PLS-SEM results from Hair et al. [19].

4.1. Instrument validation

The first part of our analyses included instrument validation through four steps starting with indicator reliability. Initially, our constructs had four or five indicators and our analysis revealed to low indicator loadings for some constructs. The model was subsequently modified by removing indicators that had unsatisfactory loadings. After the modification, we found that all outer loadings (OL) were above the recommended level of .70 except for CSE3 (.689) which is acceptable in exploratory research [21].

Second, the internal consistency reliability of the constructs was evaluated by their composite reliability (CR). All CR values were above the recommended value .70 [19]. Cronbach's Alpha was omitted since it assumes that all indicators of a construct are equally reliable [20].

Third, we assessed convergent validity by using the constructs' average variance extracted (AVE). All AVE values were above the recommended threshold of .50 [19]. These tests showed satisfactory values, and the variance caused by random errors did not challenge the validity of the model.

Table 2. Measurement reliability and validity

Con.	Item	OL	CR	AVE	Con.	Item	OL	CR	AVE
CSE	CS3	.689	.766	.624	NI	NI2	.905	.916	.846
	CS4	.879				NI4	.935		
DC	DC1	.775	.838	.634	LC	LC1	.763	.824	.609
	DC2	.877				LC2	.806		
	DC4	.730				LC3	.772		
DS	DS1	.859	.877	.703	PID	ID1	.880	.855	.747
	DS3	.827				ID3	.848		
	DS4	.830			PSE	PS2	.811	.854	.745
TF	TF2	.936	.833	.716		PS4	.912		
	TF5	.746			PDQ	DQ1	.835	.879	.645
PI	PI1	.746	.848	.584		DQ2	.846		
	PI2	.784				DQ3	.746		
	PI4	.810				DQ4	.781		
	PI5	.712			ADD	AD1	.869	.929	.767
IQ	IQ1	.769	.869	.688		AD2	.853		
	IQ2	.879				AD4	.908		
	IQ3	.837				AD5	.872		

The fourth step assessed the discriminant validity (DV) of the constructs through the Fornell-Larcker criterion [21] and revealed that all indicators loaded higher on their respective constructs. The square root of each construct's AVE was higher than correlations between constructs. Reliability and validity metrics are summarized in Table 2.

4.2. Model validation

Figure 2 shows the research model with path coefficients (β), hypotheses, and explained variance of endogenous variables (R^2).

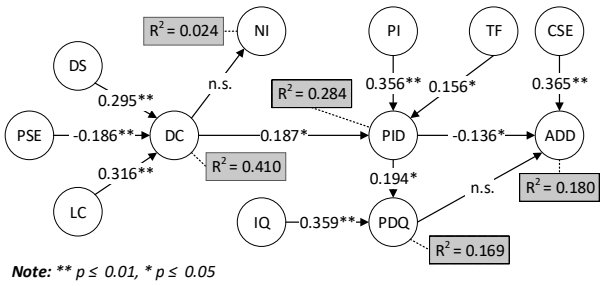

Figure 2. Results of hypotheses tests

As depicted in Figure 2, ten of our 12 hypotheses were empirically supported. Decision severity (β= .295, t=3.003, p<.01) and legislation complexity (β= .316, t=3.643, p<.01) are found to have positive and significant impacts on decision complexity. A significant negative influence of public service entitlement on decision complexity was found (β=-.186, t=2.340, p<.01). The model predicted 41.0% of the variance for decision complexity (R^2=.410).

Additionally, decision complexity is found to exert a positive and significant influence on the perceived importance of discretion in public service provision (β=.187, t=1.992, p<.05). Professional identity is positively linked with perceived importance of discretion (β=.356, t=3.947, p<.01) as well as technology flexibility (β=.156, t=1.661, p<.05). Moreover, both information quality (β=.359, t=4.566, p<.01) and perceived importance of discretion (β=.194, t=2.098, p<.05) exert positive and significant influences on how SLBs perceive decision quality. Our structural model predicts 28.4% of the variance for perceived importance of discretion (R^2=.284) and 16.9% for perceived decision quality (R^2=.169).

Perceived importance of discretion (β= -.136, t= 1.737, p<.05) and computer self-efficacy (β=.365, t =4.521, p<.01) explained SLBs attitudes toward digital discretion with an explained variance R^2 of

.180. This coefficient of determination represents weak predictive power [21]. Table 3 sums up results from the hypotheses testing.

Table 3. Summary of hypotheses tests

Hypotheses	Independent variables	Dependent variables	Support
H1a	LC	DC	Yes
H1b	PSE	DC	Yes
H1c	DS	DC	Yes
H2a	DC	NI	*n.s.*
H2b	DC	PID	Yes
H3	PI	PID	Yes
H4	TF	PID	Yes
H5	IQ	PDQ	Yes
H6	CSE	ADD	Yes
H7	PID	PDQ	Yes
H8a	PID	ADD	Yes
H8b	PDQ	ADD	*n.s.*

The model is further evaluated by looking at effect size (f^2). This measure allows us to assess the contributions of exogenous constructs on endogenous constructs by simulating the inclusion and exclusion of exogenous constructs [21]. All exogenous constructs showed either weak (f^2 >=.02) or moderate (f^2>=.15) effects on their respective endogenous constructs [19] except the non-significant influence of perceived decision quality on attitude toward digital discretion. This effect size was below the acceptable minimum (f^2=.01).

As our final assessment, we validated the model by the predictive relevance of exogenous constructs (Q^2) and effect size (q^2), as shown in Table 4.

Table 4. Predictive relevance and effect size

Relations	q^2	Q2	Relations	q^2	Q2
LC‣DC	.05	.23	IQ‣PDQ	.08	.10
PSE‣DC	.01		PID‣PDQ	.02	
DS‣DC	.05		PID‣ADD	.01	.12
DC‣PID	.02	.18	PDQ‣ADD	.00	
PI‣PID	.08		CSE‣ADD	.10	
TF‣PID	.01				

We performed a blindfolding procedure (omission distance=7) suggesting that decision complexity (Q^2=.231), need for interaction (Q^2=.011), perceived importance of discretion (Q^2=.180), perceived decision quality (Q^2=.095), and attitude toward digital discretion (Q^2=.117) have sufficient predictive relevance [19, 21]. The effect size q^2 was calculated manually for each construct and revealed either weak (q^2>=.02 and q^2<.15 [19]) or unsatisfactory effect size of predictive relevance (q^2<.02 [19]).

5. Discussion

The goal of this research was to understand how SLBs consider opportunities to digitize discretionary practices. Whereas Lipsky [31] argued that "the nature of service provision calls for human judgment that cannot be programmed and for which machines cannot substitute" (p. 161), the literature has shown that public services are increasingly digitized [5, 43] and that novel technologies create opportunities for innovation in the way public services are provided [8, 10, 11]. This research is exploratory, and we have tested a potential conceptualization of digital discretion acceptance encouraging further theorization. In our theoretical model, we tested 12 hypotheses relating characteristics of public service provision with SLBs' attitudes toward digital discretion. We found empirical support for our model using empirical data from 125 SLBs preoccupied with several types of public services.

This study makes two important contributions. First, we contribute by addressing a gap in the literature and empirically testing theoretical assumptions [8, 11]. The relationships between public service characteristics and SLBs' attitudes toward digital discretion have received little attention in previous research. Our study reveals the influence of factors that can explain how discretion, decision quality, and digital discretion are perceived among SLBs. Moreover, we also identify opportunities for digitizing discretionary practices from a SLB perspective which is less researched in extant literature. Second, we provide measurement scales that, although in an early stage of validation, can be useful for further research within e-government.

5.1. Implications and future research

This study has looked at SLBs' resistance and accept for digitized discretionary practices. We identified two main explanations for their attitudes toward digital discretion. First, how and why SLBs consider discretion as important can contribute to our understanding of attitudes toward digital discretion. Our study identified professional identity as the strongest explanation for the perceived importance of discretion followed by decision complexity. Considering that SLBs often are highly professionalized, these findings imply that if public services, and discretionary practices in particular, are to be digitized, government agencies need to address

how professional norms can be achieved. SLBs are strongly motivated by helping clients, and their support of digitized services depends on the professional outcome the digitization. Decision complexity is closest to describe the nature of public service provision which Lipsky [31] identified as the main problem with digitizing public services. There is something about the complexity of life that makes discretion inevitable, and digital discretion research seem to confirm that it is difficult to remove or influence discretionary practices within traditional street-level bureaucracies [5, 11].

Second, computer self-efficacy is strongly linked to a positive attitude toward digitizing discretionary practices. Reasons for this can be that people with high computer self-efficacy are more likely to understand the opportunities and challenges that digital discretion represents. Since they can see the benefit of it, they are also more likely to accept an influence [9, 12]. Similarly, information quality is positively associated with a perception of better decisions.

Two hypotheses were non-significant. Related to H2a, it is possible that the indirect measurement of the clients' need for interaction is not able to sufficiently capture precise information regarding the clients' situations. Future studies should explore other and more direct operationalizations of the clients' need for interaction. A missing finding regarding H8b may be due to external factors that affect decision quality (e.g., time and other resources). Since these are factors not related to digitization, they are not relevant for measuring the attitude towards digital discretion.

These findings serve as starting points for future research on barriers and enablers to the digitization of discretionary practices. Two aspects of particular interest are the potential connection between specific e-government features and SLBs' attitudes toward digital discretion, and second, how SLBs conducting different types of tasks respond to increased digitization. This would entail a comparison between innovations in public service provision such as artificial intelligence and traditional technologies to find out if decision complexity and individualized concerns can be addressed. Moreover, the tasks of SLBs within different occupations should be examined to find out how different tasks relate to different digital tools and SLBs' attitudes toward digital discretion. Whereas this study has focused specifically on SLBs' attitudes, other factors should be investigated to understand opportunities for digitizing discretionary practices. For example, how technology can influence discretionary practices regardless of SLBs' attitudes and political priorities.

5.2. Limitations

Despite our contributions, we recognize that our study has some limitations. First, our sample consists of SLBs exclusively residing in Norway with shared understandings of public service provision. Acknowledging this shortcoming, we hold that Norway represents SLBs in a highly industrialized country comparable to other top-ranking e-government countries in the world. Second, whereas some public services are underrepresented (and others not represented) in our sample, we have tested a possible conceptualization of digital discretion acceptance with respondents representing a wider variety of public service provision than most other studies within this stream. Third, the validation of our model shows low values on some metrics. However, we argue that our study represents early theory development about digital discretion acceptance, and that lower values are common and acceptable in exploratory studies [19]. And fourth, the number of respondents (n = 125) is relatively low and future studies should seek to increase sample size.

6. Appendix: measurement instrument

Technology Flexibility (TF)
2. When using technology, decisions are often
... taken by the system (1) - (7) taken by me*
5. In general, I experience that technology has led to
... reduced use of discretion (1) - (7) increased use of discretion*

Information Quality (IQ)
1. I often experience that the software provides information that is
... completely wrong (1) - (7) completely correct
2. I often experience that the software provides information that is
... totally irrelevant (1) - (7) very relevant
3. I often experience that the software provides information that is
... completely outdated (1) - (7) completely updated

Decision Severity (DS)
1. My clients often perceive my decisions as
... completely unimportant (1) - (7) crucial*
3. My decisions affect the lives of my clients
... to a small extent (1) - (7) to a considerable extent*
4. To my clients, my decision outcomes are often
... uninteresting (1) - (7) interesting*

Decision Complexity (DC)
1. When I make decisions, I must often take
... identical factors into account (1) - (7) a range of factors into account
2. When I make decisions, I must often take
... a few factors into account (1) - (7) many factors into account
4. The decisions I make are
... always routine (1) - (7) always new

Need for Interaction (NI)
2. When I make decisions, clients often consider personal interaction with me as
... completely unimportant (1) - (7) crucial* (*continued*)

4. Often, my clients consider the ability to present their case personally to me, as
... completely unimportant (1) - (7) crucial*

Legislation Complexity (LC)
1. Often, the legislation has
... definitive terms (1) - (7) discretionary terms*
2. Usually, an interpretation of the legislation is
... completely unnecessary (1) - (7) completely necessary*
3. The context, in which a legal rule is applied, is often
... completely insignificant (1) - (7) crucial*

Public Service Entitlement (PSE)
2. Often, I experience the outcomes of my decisions to be
... my judgments (1) - (7) predetermined*
4. When I make decisions, I exercise discretion
... to a less extent (1) - (7) to a large extent (R)*

Computer Self-Efficacy (CSE)
3. If there is little time to complete my work tasks, to complete them with an unfamiliar technology would be
... difficult (1) - (7) easy
4. If I am shown how to do my work tasks using a technology, to complete them would be
... difficult (1) - (7) easy

Professional Identity (PI)
1. The decisions I make
... can be taken by most people (1) - (7) must be taken by professionals*
2. Usually, the decisions I make require
... no formal education (1) - (7) formal education*
4. To make decisions, my professional training is often
... completely unnecessary (1) - (7) completely necessary*
5. Often, I experience that the decisions I make require
... general skills (1) - (7) specialized skills*

Perceived Importance of Discretion (PID)
1. Often, when I make decisions about clients, discretion is
... completely unnecessary (1) - (7) completely necessary*
3. I often experience that my decisions
... can be easily standardized (1) - (7) cannot be standardized*

Perceived Decision Quality (PDQ)
1. I often experience that my decisions are
... unfair (1) - (7) fair
2. I often experience that my decisions have
... bad outcomes (1) - (7) good outcomes
3. Once I have made a decision, I often have
... a bad conscience (1) - (7) a clear conscience
4. Often, I experience that my decisions are based on
... a poor foundation (1) - (7) a solid foundation

Attitude Toward Digital Discretion (ADD)
1. Using technology to influence my decision-making is
... a bad idea (1) - (7) a good idea
2. If a technology can influence my decisions, I will
... not use it (1) - (7) prefer to use it
4. I consider the use of technology in decision-making as
... unfavorable (1) - (7) favorable
5. I consider the use of technology in decision-making as
... damaging (1) - (7) beneficial

* Indicators developed in this research

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