Inside the Digital State: How Street-Level Bureaucrats Make Digital Government Work in Practice

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Abstract

Governments all over the world are currently engaged in the digitalization of public administration. Based on approximately 300 hours of ethnographic fieldwork in two highly digitalized government agencies in Denmark, this paper presents an in-depth empirical exploration of everyday life in the digitalized street-level bureaucracy. Following decades of digitalization efforts, the two examined agencies are characterized by a layering of old and new digital systems and tools, where efficiency is accompanied by increased complexity, system instability, and lack of insight and overview regarding digitalized case processing. In this setting, frontline workers employ a range of digital survival strategies to accomplish their tasks and preserve bureaucratic and professional values of transparency and responsiveness. Back-office strategies include workarounds, temporal flexibility, and collaborative IT support, whereas strategies during public encounters include avoidance, precautionary measures, and digital detective work. Frontline workers also take on new organizational roles as "digital janitors" and "liaisons" to make digital government work in practice. The study contributes with novel insights regarding the long-term impact of continued digitalization and its implications for the street-level bureaucracy and citizens' trust in government.

Keywords

Frontline work, digitalization, street-level bureaucracy, e-government, organizational ethnography

Introduction

Digitalization is currently transforming the public sector, as digital information and communication technologies (ICTs) enable new ways of working, new forms of interaction, and new modes of governing. This transformation, often referred to as "e-government" or digital government (Yildiz 2007), denotes a fundamental change in the way that governments provide information and services and interact with citizens and stakeholders. Digitalization holds the promise of increasing the efficiency, responsiveness, and transparency of government, yet these potential benefits have proven challenging to realize in practice (Ahn and Bretschneider 2011; Baldwin, Gauld, and Goldfinch 2012; Dunleavy et al. 2006; Tummers and Rocco 2015; Yildiz 2007). After decades of digitalization efforts, government agencies remain dependent on human beings to implement policy, deliver services, and enforce regulations. This study focuses on digitalization from the perspective of frontline workers, or street-level bureaucrats (Lipsky 1980; Prottas 1978), who operate on "the ground floor of government" (Hupe 2019). As intermediaries between citizens and the state, street-level organizations are "the coalface" of public services, where policy meets the realities of everyday practice (Brodkin 2011) and bureaucratic and professional norms and values are enacted on a case-by-case basis (Lipsky 2010; Møller, Pedersen, and Pors 2022; Zacka 2017).

A growing body of research has examined digitalization at the street level. We thus have some knowledge of how frontline workers respond to various digital systems and tools, including how they may both constrain and enable frontline discretion and shape encounters with citizens (Bovens and Zouridis 2002; Buffat 2015; Busch and Henriksen 2018; Lindgren et al. 2019; Breit et al. 2021). So far, however, studies have mainly focused on the implementation and uses of individual digital tools or systems. Yet digital technologies are rarely introduced on a "blank slate." E-government has a long history and, following decades of digitalization efforts, many street-level organizations are permeated by digital systems and

solutions that influence work and encounters with citizens in different but interrelated ways, and whose cumulative effects may be of a different kind than those of each digital system or tool viewed in isolation. This study brings a novel perspective to the literature on street-level digitalization by addressing the question: *"How is frontline work in government agencies shaped by continuous digitalization?* "Continuous digitalization" refers here to the ongoing introduction and adaptation of digital systems and tools. "Frontline work" encompasses tasks carried out in the organizational backstage as well as public encounters (Møller 2021).

The study is based on an interpretive research design (Schwartz-Shea and Yanow 2012; Haverland and Yanow 2012) and an inductive approach, although informed by extant empirical and theoretical knowledge. Data was generated through fieldwork in two Danish government agencies—the Danish Agricultural Agency and the Danish Customs and Tax Administration—and encompasses approximately 300 hours of observations of frontline workers and managers and 39 individual and group interviews with 49 participants. The two sites were selected for their empirical richness and potential for theory development and practice-based learning (Flyvbjerg 2006). Denmark is a global frontrunner regarding digital government. Both agencies have long been engaged in digitalization and are therefore well suited to provide insights about the implications of these efforts from the street-level perspective. Through an in-depth empirical exploration of everyday work, the study fleshes out the challenges associated with incremental digital development and the resulting "layering" of digital systems and tools that permeates many areas of frontline work today.

The findings contribute to previous studies of street-level digitalization by providing detailed insights about the ways in which frontline workers make digital government work in practice and their implications. The analysis first outlines the "digital survival strategies" employed by frontline workers as they seek to accomplish their tasks and interact with citizens in everyday practice. In the organizational backstage, these strategies include *workarounds*,

temporal flexibility, and *collaborative IT support*, while strategies employed during public encounters include *avoidance*, *precautionary measures*, and *digital detective work*. The analysis further shows how frontline workers fulfil new and indispensable organizational roles as *digital janitors* who clean up messes, fix errors, and test new solutions, and as *digital liaisons*, who create links between IT developers and the street level, explain how things work, and raise awareness of practical and legal implications of higher-level decision-making on the ground.

By calling attention to the influence of continuous digitalization on the inner workings of the street-level bureaucracy, the study adds a novel perspective to the dominant focus on individual digital systems and tools in the literature and deepens our understanding of the challenges associated with the incremental development of digital government. The findings reveal that frontline workers' frustrations should not be cast aside as mundane complaints over subjectively experienced "IT problems." Rather, they are expressions of shared and genuine concerns over the increasing complexity and looming risks of technical failures that the continuous layering of old and new digital systems and tools entails. From the perspective of frontline workers, this not only compromises their professional authority and trustworthiness but may also have significant implications for citizens' trust in government.

In identifying the organizational roles as digital janitors and digital liaisons, the study further provides novel insights regarding the transformation of frontline workers from classic street-level bureaucrats to screen-level bureaucrats, and the shifting of discretionary powers from street-level to system-level bureaucrats (Bovens and Zouridis 2002). Although this transformation and its consequences were foreseen more than two decades ago, it is only now that we are beginning to see its deep impact on the street-level bureaucracy and the enactment of public bureaucratic values in practice. In this sense, this study can also be viewed as an updated and timely "ethnography of a modern job" (Orr 1996).

Theoretical Background: Street-Level Bureaucracy and Digital Government

Researchers have long examined the ongoing digitalization of administrative processes and citizen-oriented services under headings such as e-government, digital government, digital-era governance, and digital transformation (Dunleavy et al. 2006; Scupola and Mergel 2022; Yildiz 2007). A subset of these studies focus on frontline work and street-level bureaucracy. In their seminal contribution, Bovens and Zouridis claim that "the implementation of the law has virtually been perfected" as the introduction of ICTs and digital case processing entails an evolution from street-level bureaucracies to screen-level bureaucracies and finally to system-level bureaucracies that increasingly minimize street-level discretion (Bovens and Zouridis 2002, 174). In the screen-level bureaucracy, frontline workers rely on ICT for information processing and become "digital bureaucrats operating computers instead of interacting face-to-face with clients" (Busch and Henriksen 2018, 3). In the system-level bureaucracy, decisions are made in digital systems without human intervention (Busch, Henriksen, and Sæbø 2018). With the transformation towards system-level bureaucracies, discretionary powers shift from frontline workers to "system analysts" and software designers, and new challenges arise to ensure accountability and transparency (Bovens and Zouridis 2002).

Public administration scholars have only recently begun to examine in detail the role of "data professionals" in street-level organizations (Fest et al. 2023). Instead, research on street-level digitalization has primarily been preoccupied with assessing its implications for frontline workers' discretion (Busch and Henriksen 2018). Buffat (2015) argues that most studies adopt either a "curtailment" thesis, i.e., that street-level discretion is diminishing, or an "enablement" thesis, i.e., that street-level bureaucrats simply use their discretion in new and unanticipated ways. Recent studies have continued to focus on street-level discretion when examining the impact of newer digital technologies such as automated case processing and algorithmic decision support on frontline workers' decision-making and enforcement styles

(Meijer, Lorenz, and Wessels 2021; de Boer and Raaphorst 2023). Both Meijer et al. and de Boer and Raaphorst find support for curtailment as well as enablement, but also call for the literature to move beyond the dominant focus on discretion.

Studies have also examined how ICTs impact the nature of frontline workers' encounters with citizens (Breit et al. 2021; Busch, Henriksen, and Sæbø 2018; Hansen, Lundberg, and Syltevik 2018; Pors and Schou 2020; Lindgren et al. 2019; Løberg 2022; Tummers and Rocco 2015). ICTs transform the nature of these encounters as face-to-face interactions are replaced or supplemented with digitalized communications, e.g., via email or digital self-service systems, and may also have significant implications for information processing. For example, the fragmented information that can be drawn from digital case management systems may lead workers to respond with "complication" as they seek to create coherent narratives about citizens (Løberg 2022). When face-to-face interactions are maintained, frontline workers often go beyond their roles to help when citizens' problems do not fit digitalized service categories or when digital tools create obstacles for them (Pors and Schou 2020; Tummers and Rocco 2015). These findings suggest that frontline workers play a central role in the successful implementation of e-government policies by adapting and changing their behavior to fit the needs of new situations.

Overall, these empirical studies demonstrate that there is nothing deterministic about digital technologies: Their impact depends on how they are used and adapted in practice, which again is influenced by rules, resources, norms, values, and interpretative schemes in particular social and organizational contexts. Consequently, public administration scholars increasingly adopt a *sociotechnical perspective* (Orlikowski 1992; 2000; Barley 1986) and study digital "technologies-in-use" to advance our understanding of their impact on work and organization in street-level bureaucracies (Buffat 2015; Høybye-Mortensen 2019; Meijer, Lorenz, and Wessels 2021; Busch, Henriksen, and Sæbø 2018).

The extant literature also points to the broader implications of digitalization for street-level bureaucracy, including frontline workers' changing tasks and roles and, not least, the potential implications for public bureaucratic values such as legality, accountability, and transparency (Bovens and Zouridis 2002). Yet, while the gradual replacement of street-level bureaucracy with screen-level and system-level bureaucracies has been documented widely, studies still tend to focus on the implementation of particular digital technologies in isolation. Few have attempted to explore impact of digital technologies on frontline work from a more holistic perspective (i.e., not restricted to particular ICTs), and the implications of street-level digitalization for fundamental public bureaucratic values also appear to have received less attention in recent years. As street-level organizations have long found themselves under continuous digitalization, such an approach seems warranted.

Research Approach, Methods, and Data

The purpose of this study is to develop a rich and empirically grounded understanding of digital government as a ubiquitous phenomenon that permeates all aspects of frontline work, and its impact on how this work is carried out. The research approach is inductive in the sense that it builds on extant theoretical and empirical knowledge in the formulation of the research question as well as in the interpretation and discussion of the findings but applies an open-ended approach to data generation and analysis. The research design is based on multi-sited organizational ethnography (Ybema et al. 2009). An ethnographic approach is well suited to the aim of obtaining an in-depth understanding of how abstract phenomena (such as digital government) work in practice from the perspective of those involved (Watson 2011), and to generating new insights and theoretical ideas that are firmly grounded in empirical observations (Brodkin 2017; Schatz 2009; Yanow 2009).

Research context. The two sites—the Danish Customs and Tax Administration and the Danish Agricultural Agency—were purposefully selected for their empirical richness and potential for fostering theory development and practice-based learning (Flyvbjerg 2006). Denmark is a global frontrunner with regard to digital government. The two agencies are among the most proactive in this development and employ the highest and second-highest number of internal IT developers, respectively, among Danish government agencies. The past two decades have seen continuous digitalization initiatives, e.g., digital case management systems, digital self-service systems, automated case processing, and the use of GPS antennas and tablets during inspections. Some digital systems are provided by external IT vendors, while others are developed in-house. IT support is centralized at the Agency for Governmental IT Services (SIT), which serves approximately 29,000 users. While this study focuses on the day-to-day work of frontline workers and managers, it should be noted that, particularly in the tax agency, efforts to digitalize case processing have repeatedly devolved into public scandals with massive delays, budget overruns, premature staff reductions, and useless systems (Christensen and Mortensen 2018). Implications of this context for the transferability of the findings will be discussed in the concluding section.

Table 1 presents an overview of the nature of frontline work in the two agencies. Both agencies employ large groups of frontline workers who perform inspections and/or deliver government information and services to a broad range of stakeholders, e.g., citizens, non-citizens, business owners, farmers, and professional consultants (e.g., accountants, agricultural consultants). Frontline workers in the tax agency are a broad mix of highly experienced and inexperienced employees of all age groups. Their educational backgrounds range from unskilled to basic office training to professional degrees in tax administration or accounting. In recent decades, they have indeed become "digital bureaucrats" (Busch and Henriksen 2018) and interact with citizens only via telephone, email, and letters.

Whereas the tax agency is almost a system-level bureaucracy, the agricultural agency still has elements of the traditional street-level bureaucracy, where frontline workers interact with citizens face-to-face as well as by digital means. The agricultural agency is responsible for the administration of several support schemes funded by the state as well as the European Union. To ensure compliance with regulations, inspectors conduct physical inspections of, e.g., farms and plant nurseries. However, the agency also experiments with "administrative" inspections, where farmers self-report via apps or self-service systems. A separate unit conducts negotiations with landowners as part of the government's policy to combat climate change. Most frontline workers at this agency have a professional degree in agriculture or practical experience as farmers, and often both.

Table 1. Characteristics of the two research sites

	The Danish Tax Agency	**The Danish Agricultural Agency**
Core task	Ensure correct taxation + correct and timely payments of taxes and debts	Ensure implementation of and compliance with Danish and EU regulations + correct and timely payment of subsidies to farmers
Street-level bureaucrats	Professional education (e.g., bankers, bookkeepers, accountants) + unskilled workers (in-house training)	Professional education (e.g., agriculture specialists, land surveyors, gardeners, veterinarians)
Nature of public encounters	Case processing, communication of decisions, provision of guidance on rules, regulations, and use of digital self-service systems	Physical + administrative inspection, provision of certificates, land negotiations, and guidance on rules, regulations, and digital self-service systems
Forms of interaction	Phone, email, letters, messages via self-service systems	Face-to-face, phone, email, letters, messages via self-service systems

Methods and data. Following the practice-based approach outlined earlier, the present study seeks to understand the impact of continuous digitalization by focusing on technologies-in-use in particular social and organizational contexts (Orlikowski 2000). Fieldwork for the study was conducted through shadowing, meaning that the researchers followed in the footsteps of selected participants throughout their working day (Czarniawska 2007). This involved observing them working at their desks, accompanying them on inspections, listening to telephone conversations with citizens, participating in all kinds of meetings (physical and online), and joining them for lunch and informal conversations. Observations focused on uses of digital technologies, including individual reflections, conversations with co-workers, and meetings with higher-level bureaucrats, managers, IT developers, etc. Four frontline workers and four frontline managers in each agency (16 participants in total) were shadowed for three days each, with few exceptions, amounting to 46 days (~300 hours) of observations. The author shadowed the frontline workers while another member of the research team shadowed the managers. In the tax agency, observations took place in four different units in one location. In the agricultural agency, observations took place in three different units across four locations and out on inspections.

Qualitative interviews were conducted with each of the sixteen participants before and after shadowing, individually or in pairs (frontline worker + manager). Pre-fieldwork interviews were approximately 30 minutes long, semi-structured, and focused on workers' backgrounds, tasks, and responsibilities. Post-fieldwork interviews were more openly structured, lasted approximately one hour and focused on participants' uses of and reflections on digital technologies with reference to our observations. Group interviews were conducted with four to five additional frontline workers in each organizational unit. They followed a thematic interview guide, focused on uses of and reflections on digital technologies, and lasted one hour. We also conducted interviews with higher-level managers and agency directors

focusing on organizational history as well as current challenges and strategic initiatives in relation to digitalization. The final data set includes 28 individual interviews and 11 group interviews with 49 different participants. All interviews were recorded and transcribed verbatim. Field notes were transcribed with as much detail as possible and supplemented with analytical and theoretical memos (Emerson, Fretz, and Shaw 2011; Charmaz 2014). Table 2 presents an overview of data sources. Sample interview guides can be found in Appendix 1. All names in the analysis are pseudonyms.

Table 2. Overview of data sources

Data source	Agricultural Agency	Tax Agency	Total
Observations	22 days of shadowing: 4 frontline workers + 4 frontline managers in 3 units (4 geographical locations)	24 days of shadowing: 4 frontline workers + 4 frontline managers in 4 units (1 geographical location)	46 days/ 300 hours in 7 units/ 5 locations
Individual and group interviews	16 interviews with shadowed participants (pre- and post-observations), 3 individual interviews with directors, 3 group interviews with additional frontline workers (13 in total)	12 interviews with shadowed participants (4 group and 8 individual, pre- and post-observations), 1 individual interview with director, 4 group interviews with additional frontline workers (16 in total)	28 individual interviews + 11 group interviews with 49 different participants
Additional meetings	1 introductory meeting with higher-level managers, 2 online meetings with participating units (preliminary findings + member checking)	1 intro meeting with director + all frontline managers, 2 online meetings with participating units (preliminary findings + member checking)	6 meetings

Coding and analysis. The analysis was a recursive process of searching for significant patterns of thought and action in the generated data and critically reviewing these patterns in light of relevant theoretical perspectives and insights from the extant literature. This involved shifting attention between data excerpts and the larger dataset as well as between data and theory in several overlapping phases, as is typical for qualitative interpretive research (Schwartz-Shea and Yanow 2012; Charmaz 2014) (see Appendix 2 for a process overview).

The first phase of analysis began during fieldwork, where the daily write-up of field notes spurred reflections on participants' "doings and sayings" and observed organizational practices (Schatzki 2006). Analytical memos were used to capture emerging themes (Emerson, Fretz, and Shaw 2011). The research question addressed here grew out of puzzles described in some of these analytical memos. The second phase consisted of sorting, categorizing, and coding all data. First, all field notes and interview transcripts were imported into NVIVO and sorted according to a) locations, actors, technologies, etc., and b) broad analytical themes. Themes were developed inductively based on the analytical memos as well as discussions in the research group and two rounds of pilot coding (Braun and Clarke 2006).

The third phase of analysis involved inductive coding inspired by grounded theory techniques (Charmaz 2014). The inductive coding focused on selected analytical themes that were related to the research question, e.g., "bureaucracy," "caretaking of digital technologies," and "digital interferences". This coding formed the basis for another round of thematic analysis (Braun and Clarke 2006), which involved gradual refinement of identified subthemes within the broader themes and their interrelations. During this process, the broader dataset was revisited to refine and contextualize emerging interpretations. This included a search for "negative cases," i.e., data that prompted reconsideration or rejection of initial interpretations (Schwartz-Shea and Yanow 2009). The process also involved engagement with the extant literature to compare emerging findings against extant theory and findings from other studies.

Findings

The findings are presented in four subsections. The first subsection outlines the curious observation that, even though frontline work in both agencies is highly digitalized and digitalization efforts have been happening for decades, there is a feeling among frontline workers that the process is in its infancy. The second subsection details the challenges experienced by frontline workers and the "digital survival strategies" they employ in everyday practice, namely *workarounds*, *temporal flexibility* and *collaborative IT support*. The third subsection demonstrates how frontline workers take on roles as *digital janitors* and *digital liaisons*, i.e., indispensable links between managers, legal experts, IT specialists, and higher-ups to make digital government work. The fourth subsection focuses on the public encounter and shows how frontline workers perceive technical failures and errors as threats to their professional authority and trustworthiness when viewed through the eyes of citizens. Consequently, they *avoid digital tools* or take *precautionary measures*. Further, they often engage in *digital detective work* on behalf of citizens.

"There is NO digitalization in the public sector!"

> Thursday morning, the tax agency. I am standing beside Chelsea in front of her elevated desk, looking at the screens. Like most of her co-workers, Chelsea has two monitors and a laptop in a docking station. This setup allows her to view three screens at once. This morning, her email application is open on the laptop screen. One of the bigger screens displays the digital case management system, while the other screen displays one of the digital registries that she uses to find relevant information on cases. She has just been assigned to a new case in the digital case management system but is having trouble finding the information she needs. She decides to ask a co-worker for help. As we begin to walk, Chelsea turns around: "I better bring their CPR [Central Person Registry] number!" she says. She unlocks the computer, finds the information in the digital registry, writes the number on a post-it, and then walks towards the open office space next door.

We locate a middle-aged woman with dark hair working in front of her computer. She too has three screens in front of her. The woman looks up at Chelsea. "Can I just finish this?" she asks and turns back towards the screens: "It's a bit complicated, this one!" "Yes, please," Chelsea responds, "we don't want any errors to happen!" After a few minutes, the woman turns towards us. Chelsea explains the issue and leans over the desk as they look up additional information in the digital registry. The two women discuss their experiences with the software program, as they try out different search strategies to find information that can help them figure out how the case should be handled. Chelsea sings along quietly to the radio playing in the background. After a while, the dark-haired woman looks up at me: "And who is this colleague of yours?" she asks. I explain that I am a researcher studying digital government. "Good luck with that!" she responds in a sarcastic tone: "There is NO digitalization in the public sector! Everything is manual!"

(Field notes, tax agency, Day 11)

One needs to spend only a few minutes in each agency's offices before realizing that digital information and communication technologies are ubiquitous. All employees (including managers) routinely use hardware such as laptop PCs, monitors, tablets, and smartphones, and software such as email, video conferencing, group chats, intranet, and digital registries and repositories. In addition to this, both agencies boast a plethora of digital case management systems for different types of cases and tasks. Since the pandemic and lockdown, remote work has become increasingly common. In other words, the artefacts of digital government are highly visible: Decades of digitalization efforts have resulted in a "layering" of old and new digital systems and tools, without which frontline workers would be mostly unable to accomplish their tasks, including encounters with citizens. Even physical inspections in the agricultural agency, where frontline workers see, smell, and touch crops, creatures, fences, and fodder, rely on digitalized information and checklists, GPS antennas, tablets, and digitalized communication (notably, one unit has a pigeonhole cabinet in the storage room; a reminder that the complete shift to digital communication is fairly recent).

Despite this pervasiveness of digital systems and tools, frontline workers in both agencies often express the sentiment that digitalization is still in its nascent stages. Some even claim, as in the field note above, that "there is NO digitalization in the public sector!" Yet, most seem to feel positively towards digitalization as such. They willingly give examples of how digital systems and tools, such as tablets, have improved efficiency and communications with citizens and other stakeholders (e.g., other agencies). When asked in group interviews about their dream scenarios for the future, most would like to see more digitalization, not less—but most of all, they want what they already have to work better. Frontline workers generally share the experience that the many digital systems and tools that permeate their tasks do not always work as intended. Suboptimal functionality, non-integrated systems, and frequent breakdowns often result in cumbersome operations and long waiting times for both frontline workers and stakeholders. The dynamic appears to be that as dependence on digital systems and tools increases, so do frustrations, and the consequences of technical failures are becoming more widespread, more critical, and sometimes more difficult to solve.

It would be easy (and not entirely incorrect) to categorize frontline workers' complaints over "IT problems" as a type of everyday gripe that is an artefact of social life in most organizations—they are something that everyone has in common and therefore an easy topic for small talk, but not necessarily indicative of the nature or extent of actual problems. As frontline managers in both agencies spent a great deal of time dealing with "IT problems," one manager reflected on the need to differentiate between different kinds of problems:

> On our way back from the meeting, I ask the frontline manager Robert to elaborate on his comments. "It easily becomes blurred" he says, "when the employees complain about 'IT problems.'" He therefore likes to differentiate between three different types of problems: The first type of problem is "errors in the systems," for example, if the systems they must use to report inspections are not working. "They should complain about that!" he says. He encourages the employees to "latch on" [to the IT support staff] until it is solved, so that they can get on with their work. The second type of problem

is about "system performance." But that is very subjective, he says: "When is it too slow? Is 10 seconds a long time to wait? That is hard to do something about." The third type of problem is really ideas for development. But this cannot be based on individual requests, it is a long process with many different considerations. So it is also difficult to accommodate that kind of complaint. I ask about the issue of stability, as I have heard several frontline workers talk about the fear of technical failure, particularly during encounters with citizens. My impression is that this keeps many of them from using, for example, their tablets during inspection visits. Robert nods slowly. "Yes," he says, "that is probably a fourth type of problem."

(Field notes, agricultural agency, Day 18)

The frontline manager recognizes that "IT problems" do cause difficulties, but also argues that many complaints reflect "subjective" preferences. However, a closer analysis of frontline workers' experiences and strategies reveals that there are more pressing issues at stake. The following sections outline the challenges experienced by frontline workers, the *digital survival strategies* they employ and the *roles* they take on to make digitalization work in practice, and finally how these challenges impact *encounters* with citizens and stakeholders.

Digital Survival Strategies: Workarounds, Temporal Flexibility, Collaborative IT Support

In both agencies, there is a generalized expectation among frontline workers that digital systems and tools will fail. Many appear somewhat surprised when things actually work, indicating that errors and breakdowns are normal:

Catherine tries to log on to the system, but it does not seem to work: "Now I can't access [the system] … oh, there it is! Well, it has been reported as being out of order the past few days." She tells me she signed up to receive notifications of errors "back in the day," which is why she knows. She continues: "I was just about to think that I wasn't going to be able to access it today, but it turned out it was just slow."

(Field notes, tax agency, Day 2)

In addition to server breakdowns and technical failure, frontline workers also find that many

operations are quite cumbersome, and that digital systems and tools have been developed

without taking into account how they are to be used in practice, including the fact that one

system or tool is often part of a longer sequence of operations necessary to complete a task.

During a lively discussion, two frontline workers agreed to characterize IT developers as

people with "paper towel rolls in front of their eyes." One of them holds up his hands in front

of his eyes to illustrate the apparent tunnel vision of IT developers, indicating that "they only

see their own little part of the process" and not the complexity of the combined tasks and

processes that must work together in everyday practice (Field notes, agricultural agency, Day

15). As a result, ad hoc solutions and *workarounds* are an integral part of frontline work:

> "Well, it is time for a coffee break!" says Marty. As he is getting up, a female co-worker walks over to us with her tablet in hand. "Can I ask, even though you are not a *super user* [i.e., a designated expert in a particular system or tool]: Have you encountered this, that it [the software] won't synchronize photos?" She explains that she has a huge forest inspection case, and now the system will not synchronize her photos; "I would be really upset to lose 29 photos!" she says. "Harriet says hers didn't work for three months, she told me this. She ended up taking screenshots of all the photos and emailing them to herself." "That is some workaround!" Marty replies. The woman says she heard that if you uninstall and reinstall the system, then you lose everything. "There is no backup, is there?" she asks. "No," says Marty, "it's a closed system." They continue to discuss how the agency promised that this and another system would be "operationally stable!" They both laugh out loud: as if! The woman says she might develop a new routine, to just double-take the photos with her mobile phone, in addition to using the tablet software, to make sure that she has a back-up. Marty agrees that something needs to be done. He glances over at me: "I am glad to see you are writing all this down!" He says that he hopes I will write a very critical report to the agency [i.e., higher-ups], so they can get some proper equipment.
>
> (Field notes, agricultural agency, Day 14)

Many frontline workers express the feeling that things could be much more efficient if only

the digital systems were more dependable and better integrated, and if digital tools and

software were made to fit the task at hand. Importantly, these workarounds are not only

experienced as tedious and time consuming; they may also have implications for data security

and compliance, as the continued conversation between Marty and his co-worker illustrates:

> There is a queue at the coffee machine. Instead of waiting, Marty walks over to the red-haired woman and continues their small talk about her problem with the case management system for forest inspections. She explains that the system now contains over 2,000 photos from inspections. "So definitely don't press 'Show all images'!" she says. "Then things go completely wrong!" "Then it blows up!" Marty says. The woman explains that instead you need to zoom in until the screen shows only the section of the map that you need to use. Then you need to cut out that section and copy it into Power Point, where you then create the actual report. Marty looks at her as she explains the routine. "Shut up!?" he says loudly in an incredulous tone: "That is really stupid!" Like "Two steps forward and five back," completely "Old Norse!" [i.e., extremely outdated]. He then asks the woman: "Why do you even have to take the photos in that system?" She explains that it is because "they" [i.e. higher-ups/the audit office] want them to be geo-tagged. Marty says it's fine that they want to have them geo-tagged, but that disappears anyway when you copy-paste it into Power Point! He continues to comment in an upset tone: "It's stupid!", "pointless," "If you don't even use it in the report, then you can just stick it where the sun doesn't shine!" "That is really where you lose me completely!" The woman says that quite often she has not done it anyway, because she doesn't want to bother with it. She then goes on to explain that after they have copy-pasted the images and worked out the report in Power Point, they then must enter another case management system and then another one, etc. Marty continues to listen and comment with an expression of disbelief. "You just have to not think about it," says the woman with a half-smile.

> (Field notes, agricultural agency, Day 14)

When systems crash or response times are slow, frontline workers generally employ a

strategy of *temporal flexibility*, i.e., they postpone or switch tasks. Particularly in the

agricultural agency, where frontline workers divide their time between the field, the office,

and their home office, they often end up going home to complete the work later, sometimes

late in the evening, or waiting until the next day. Following the interaction observed above,

Marty later asks his co-worker as she leaves: "What are you going to do about that mess?"

She says she will try to reboot at home, or otherwise just wait: "Sometimes, *time* is the solution!" This flexibility is generally considered one of the perks of the job and something that is highly valued by many. However, it is also clear that with regard to making digitalization work in practice, much depends on this temporal flexibility. If frontline workers in the agricultural agency insisted on working "nine to five," they would spend a lot of time waiting.

Frontline workers' frustrations are exacerbated by an apparent lack of adequate IT support. IT supporters are located in a centralized unit that serves all government agencies, and many frontline workers find that the IT support personnel are not sufficiently familiar with the particular digital tools on which their work depends, including both software and hardware. For example, one frontline worker explains that no one in the IT support unit has expertise in tablets, although tablets have been introduced widely across the agency in recent years. Many share the experience that they "get parked in the system" or that IT supporters mark a request as completed even if the issue is not solved, and suggest that their particular digital systems and tools are being neglected whereas other areas have greater priority.

Consequently, frontline workers in both agencies uphold a practice of *collaborative IT support*. Field notes include numerous examples of help-seeking, advice-giving, collaboration to identify and fix errors, and sharing of workarounds and informal knowledge about expert co-workers. Reporting errors to the IT support unit was mainly a way to keep track of the prevalence of technical failures. In addition to workarounds and temporal flexibility, this collaborative IT support appears to be a key digital survival strategy.

New Organizational Roles: Frontline Workers as Digital Janitors and Digital Liaisons

In addition to employing digital survival strategies, frontline workers also take on new roles to make digitalization work in practice. The first is the role of *digital janitor*. For many, an integral part of their tasks and routines is to mend holes and create links between systems, for example when case processing procedures span different digital systems that do not communicate, or when operating older systems that cannot automatically integrate data from, e.g., digital registries. Consequently, many frontline workers spend their time performing manual operations such as copying and pasting data from one system to a digital spreadsheet and into another system, almost like they are "hand stitching" systems together:

> Catherine has been with the tax agency for 15 years. She handles taxation of large private companies. I sit beside her as she logs on to a case management system, and then another case management system. She explains that the law differentiates between cases; sometimes interest must be calculated on the day of the company's deposit, at other times only 3 days later. The system, which was created for different tasks, cannot do it automatically, because weekends and holidays must be subtracted. Also, the relevant numbers cannot be transferred from one system to the other. She pulls out a cardboard calendar from underneath her desk mat and counts days. She enters the relevant numbers into a digital spreadsheet, calculates and copy-pastes the result into the case management system. The case management system also does not allow her to forward documents (appendices) attached by the companies. Instead, she must download them, save them as pdf files, and upload them into the system. "At least we no longer print and scan them," she says with a quiet laugh. Policy states that her colleague must now approve the case before the payment of interest can be made to the company. Again, the system is not designed to handle this operation. Upon notification, her colleague will therefore create a new case in the case management system and transfer all attachments by downloading and uploading them once again, and approve the payment. This routine is repeated for all cases, each of which takes about 10 minutes to complete. Sometimes the payment is less than 3 euros, sometimes it is millions. Regardless of the amount, all cases must be processed correctly, as even a few cents unaccounted for will remain in the system and mess up all calculations going forward.

> (Field notes, tax agency, Day 1)

Despite this cumbersome routine, Catherine did not believe that the digital case management system would ever be updated. As she laconically remarked: "It is much cheaper to have

three people at our pay grade do this manually than to pay IT developers to create a system that actually works!" (Field notes, tax agency, Day 1). While a cheap solution, these copy-paste operations are still costly and likely increase the risk of errors. In an effort to change this situation, Catherine has long been engaged in a process involving several internal and external stakeholders with the ultimate goal of changing the law to make it fit the (lack of) functionalities of the digital system. This would save her a great deal of work, yet she has no fear that she would be made redundant. In her view, the digital systems will likely continue to produce errors that need to be corrected by humans.

Frontline workers are also tasked with cleaning up "messes," such as numerous errors stemming from the automated processing of cases that turned out to be out of sync with extant policy (something that could easily happen again due to the frequent changes to rules and regulations in both tax and agriculture). Such errors require frontline workers to "backtrack" system operations and manually correct each case. This again requires them to figure out exactly what the automated system had done, which is not always self-evident.

> Martha says that there are indeed 50-60 people here whose job it is to take care of the errors that arise as a result of the automation. She emphasizes, however, that only a small proportion of cases land here—the Customer Center also takes care of many, and when you think about how much runs automatically and runs really well, then there is very little left. "Most of it runs really well," she repeats and then continues: "But if there weren't those mistakes and those things, then there would be no reason for us to be here, you could say." I mention my curious observation that, in one of the other units, they mainly process cases manually, because for various reasons they cannot be automated, and they wish it could be more automatized. Yes, says Martha, and here we sit and clean up after that which runs automatically! But there are also quite a few things that *we* have to do manually. Collateral [i.e., a specific type of case], for example, that can almost only run manually, it cannot be automated.
>
> (Field notes, tax agency, Day 6)

Frequent policy changes also create other tasks. For example, adaptations to existing digital systems must be tested before they are put to use. Frontline workers are involved in testing adaptions and reporting errors to higher-ups who then communicate with IT developers to fix them. For some, this is an integrated part of their job on which they spend approximately three months per year. As policymakers typically change the rules annually, the old "legacy system" must be adapted accordingly, even though it was never designed for that. Because of this continuous incremental development, digital systems gradually become more fragile and less stable, and the risk of technical failure, breakdowns, and errors in the data on which frontline workers base their inspections in the field increases. As one participant explained:

> The challenge with [one of the newer digital case management systems] is that every year when new rules are made, the system has to calculate something extra, or in a new way, and then they [the IT developers] just build that on top of it. And the system becomes more and more fragile, because new calculations are added. I mean, it really does need someone to start over and build new tasks from the ground. But because all the rules are changed every year, they add new tasks every year, and that, I think, is getting worse and worse. Because there is not going to be less political attention to how much financial support farmers will receive. So every year, they change it [the rules] a little bit, for the Ministry to make their own mark. It is challenging, because then every year there is something new to add, and no one has tested whether it works. It would be nice if they could add more stability, but I do not really think that it is possible, in this agency. And we do not make the rules ourselves, so we cannot simply decide that now we will start over, and then make a set of rules and not change it.
>
> (Interview with frontline worker, agricultural agency, Day 16)

In addition to the role of digital janitors, frontline workers in the two agencies also fulfil an important role as *digital liaisons* who span formal divisions of labor between frontline workers, frontline managers, IT developers, legal experts, and the higher-level civil servants who are formally responsible for the functionality, accuracy, and legality of a given digital case process. Because the majority of these actors lack proper insight in terms of how the

digital systems actually work in practice, and because they typically only focus on one process in isolation, it is difficult for them to foresee the implications of seemingly "technical" decisions on the ground. Consequently, they depend on the insight and expertise of frontline workers to identify, understand, and fix errors and inconsistencies.

 In the following example, Martha and her co-worker Jack called for a meeting with the so-called "process owners," i.e., higher-level civil servants responsible for a particular digitalized process. The purpose of the meeting was to discuss how to handle cases in which business have failed to provide sufficient information. During the meeting, Martha repeatedly called attention to the fact that a decision that had been made by the legal department was not only practically impossible to implement, it also entailed favorable treatment of these businesses over others who made a similar mistake but in a different digital process, and were therefore left to suffer the consequences.

> I log on to the online meeting and Martha introduces me to the two higher-level bureaucrats (PO1 and PO2), who accept my presence. Martha and Jack asked for the meeting because they were dissatisfied with the legal department's decision on how these cases should be processed going forward. Jack shares his screen to present the first of a number of examples that he and Martha compiled in the morning. PO1 says "That's great, it seems to be the answer to the problem we had, is it not solved then?" Martha says there is more to it and she and Jack continue to explain the problem. Jack shows another example. He says that the risk of mistakes is huge if they are to go back and make all the corrections that the decision from the legal department entails. Martha agrees. PO1 says "So this is one of those that cannot really be solved?" Jack says yes, "but there is another example, and it gets even worse!" PO1 says, "So essentially you think that this process of backtracking and removing interest and payments is going to be too messy?" Jack says "Yes, but we *should* do it anyway." Martha says that she does not really understand the legal department's decision. She compares it to another decision on a different set of cases. "I just think it kind of goes against other examples in the system, where the businesses made a mistake, maybe it is just me, but I think the businesses in this case are treated more favorably than many others who also made mistakes in the system." PO1 asks how this discussion came about in the first place. Martha explains that they discussed in a team meeting and received an answer that did not make sense, and then continued to sort it out. She says they have never been told to do something

like this before. Jack continues his presentation of the examples. Later in the meeting, M repeats: "So then we treat these businesses favorably, because they made a mistake!" Towards the end of the meeting, PO1 concludes that they need to "go another round" with the legal department because "What I hear is that this cannot be administered in practice?" Jack confirms: "We actually have a problem with everything that the legal department told us to do!" PO1 says that the legal department "often makes decisions where they do not consider the operational level, but that is why we are here." He asks Jack and Martha to forward their examples. PO2 rounds off the meeting and asks for examples of how it is done "elsewhere in the shop," to create better grounds for dialogue. Then "we will challenge the legal department on this."

(Field notes, tax agency, Day 6)

Public Encounters: Avoidance, Precautionary Measures, and Digital Detective Work

Frontline workers' digital survival strategies and new organizational roles belong to the organizational backstage. The organizational "frontstage," i.e. public encounters, present different problems, as instability, breakdowns, and errors cause problems not only for frontline workers but also for citizens and stakeholders. For example, in the agricultural agency, a frontline worker explains how the system used by farmers to register key information that forms the grounds for inspections (and which they are required to update on an annual basis) always crashes on the day that it opens up for new registrations. This results in long waiting times and frustrated citizens and stakeholders. During a meeting, a frontline manager remarks: "This year it will be different, they say! They say that every year. I'll believe it when I see it! But how hard can it be?!" (Field notes, agricultural agency, Day X). Later, a higher-level manager suggests that the agency's lower scores in a recent user satisfaction survey can be attributed to those respondents who primarily interact with the agency through the digital systems, as satisfaction with inspectors is consistently high.

Although the performance of digital self-service systems does not necessarily reflect poorly on frontline workers, some still feel that their suboptimal digital tools and the imminent risk

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of technical failure compromise their professional standards and trustworthiness as representatives of the state. An inspector in the agricultural agency explained that some of their tools are less accurate than those used by their counterparts in the private sector:

> Arnold explains that he really sees a lot of potential in digitalization. All that paperwork today, he says, it would be great if that could be handled digitally! But our equipment is not always the best, he continues. For example, our antennas are less precise than those used by land surveyors, "and still my measurement and judgment is the authoritative one!" He continues, "Because I am the authority!" Arnold says he wishes their equipment would measure up to that used by others in the business.
>
> (Field notes, agricultural agency, Day X)

In addition to feelings of professional inferiority, this lack of accuracy raises genuine concerns for Arnold regarding his authority and trustworthiness as a representative of the state. His co-workers expressed similar sentiments. Some even *avoid using digital tools* during public encounters because if the system crashes, they will not only be unable to complete their report in the field but will also look unprofessional. As one frontline worker remarked: "You come off as an amateur to the farmers when you stand there and fumble with the digital tools." Another frontline worker explains that his ability to detect fraud and provide proper guidance depends on his undivided attention. In his experience, digital tools steal attention from the interaction with citizens and undermine rather than support his work. Others praise the potential of digital tools, highlighting for example how tablets increase flexibility and serve as pedagogical tools vis-à-vis citizens. Still, they take *precautionary measures*. For example, Marty always arrives early and takes the time to ensure that his tablet and digital systems are working properly before knocking on a farmer's door (Field notes, agricultural agency, M Day X 9 Feb).

As indicated above, frontline workers in both agencies generally identified positively with their role as bureaucrats and representatives of the state. As the earlier example of their role

as digital liaisons also illustrates, many enact bureaucratic values such as equity and fairness in practice, although they rarely express them explicitly. Another example of this is the fact that many frontline workers take on *digital detective work* on behalf of citizens to solve problems and provide answers when digitalized case processing results in errors or ambiguity. One agricultural inspector recounted an ongoing process where the assessment of an error as either "technical" or "human" has significant implications for farmers. She and her co-workers had pursued the issue even in the absence of managerial attention:

> It is my first day shadowing Jane. Like other inspectors, she divides her time between the regional office, her home office, and physical inspections. I am sitting next to her at her desk. She has not spoken for a while, but now she leans back and sighs. I ask what she was working on. She explains that last year, the agency launched an app where farmers could send in geo-tagged photos of their fields within a deadline to prove compliance with regulations. They need this approval to receive subsidies. The app is an example of how the agency is seeking to transition from physical to administrative inspections in some areas. At first, they accepted photos via email, but the Audit Office did not approve, because the photos were not geo-tagged, and so there was no way of knowing whether they were genuine. Then they developed the app, but some farmers experienced problems. The rules state that if they miss the deadline due to a technical error, they can get a dispensation. However, only IT specialists were able to distinguish technical errors from human errors. The inspectors could not make that judgment. Jane says she believes some farmers received a rejection even though they had correctly reported a technical error. This is quite problematic, she says, because even if these cases concern only small areas for grazing, a rejection means that all other payments of hectare subsidies will be put on hold. For some, this amounts to more than 1 million DKK (approx. 135,000 EUR). Farmers often do not have great finances, she explains, and the bank expects that they will get the money, so the consequences can be severe. It has now been decided that they will reopen some of the cases and that the inspectors should be the ones to inform the farmers, because they are used to talking to them. Those in the administration hardly ever talk to farmers. "It is not exactly a dream job," she says. Most people are nice about, but it is really not smart. Next year, the process should be under control much earlier; there has not been anyone [i.e., higher-ups] to approve what could be done.

> (Field notes, agricultural agency, Day 4)

In another case, a frontline worker in the tax agency spent half a day trying to find the answer to a question regarding payment of a debt that was not her responsibility, as the task actually belonged to a different agency. However, the citizen had already talked to at least eight different employees when Martha took her call, and so she took it upon herself to help her. However, it turned out not to be so easy:

> After consulting with her co-workers, Martha realizes that she is in fact not able to inform the citizen about what will happen if she does not pay her debts on time, because no one knows exactly how the automated digital case processing works and hence in what order the system will process the different debts and payments. Unwilling to accept defeat, Martha continues her efforts throughout the day. After having repeatedly explained the problem from the citizens' perspective, a senior co-worker tells her to let it go. "You just want to help her, I know. You have a good heart," she says. Martha looks at her: "Sometimes I really HATE this system! Do you know what I mean? Don't you ever feel like that?" Martha once again asks the senior co-worker for help, as she is in close contact with those responsible for the digital processing. The senior worker makes a video call to ask them while Martha is listening in. They too cannot give an answer. They advise her to not make any binding remarks. As long as she underscores that the agency is not giving a precise answer, only an assumption, then the citizen cannot blame her for the consequences. Martha is clearly frustrated by this response. Later she tells me: "If we cannot provide an answer, then who can? We are the tax agency! We really should know and be able to explain it!"
>
> (Field notes, tax agency, Day 5).

In sum, some frontline workers perceive technical failures, errors, and breakdowns as potential threats to their professional authority and trustworthiness as representatives of the state in the eyes of citizens and stakeholders. In order not to compromise their standards, they avoid using digital tools or take precautionary measures. Many take on digital detective work on behalf of citizens to clear up errors and ambiguities created by digital case processing.

Discussion

Digitalization has long been transforming public policy and service delivery. Studies of digitalization in the street-level bureaucracy have so far focused on how the introduction of a particular digital system constrains or enables street-level discretion and affects public encounters. This study adds a novel perspective by approaching digitalization as a continuous process of introducing, adapting, and "layering" digital systems and tools and exploring this process from "inside the digital state," specifically from the perspective of the street-level bureaucracy. Figure 2 presents an overview of the study's key findings.

Figure 2. The Impact of Continuous Digitalization on Frontline Work

Layering of old and new digital systems → increased complexity, lack of integration
Incremental development of legacy systems → increased fragility and instability
Automation and fragmentation of case processes → lack of insight and overview

Individual and collective "digital survival" strategies   New organizational roles

Strategies employed in the organizational backstage:
Workarounds
Temporal flexibility
Collaborative IT support

Strategies employed in public encounters:
Avoidance
Precautionary measures
Digital detective work

Digital janitors (cleaning, fixing, testing)
Digital liaisons (linking, explaining, raising awareness)

Overall, the analysis shows that frontline workers in the two agencies operate in a highly digitalized environment where the digital systems and tools that permeate their work are perceived as suboptimal at best and as ridden by a lack of transparency, stability, and dependability at worst. Notably, frontline workers in the two government agencies are not

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opposed to digitalization. If anything, they dream of more and better digitalization, including stable and dependable systems, up-to-date and functional digital tools, transparent processes, and adequate IT support. In response to the challenges they experience, frontline workers employ a range of individual and collective "digital survival strategies," both in the organizational backstage and in encounters with citizens and stakeholders and take on new organizational roles. In this way, they seek to enhance efficiency, mitigate what they perceive as threats to their professional authority and trustworthiness, and take responsibility for making digital government work in practice.

The digital survival strategies identified in the organizational backstage are integrated aspects of everyday practice that enable frontline workers to do their work. To accommodate the lack of functionality, frequent breakdowns, and long waiting times, they employ intricate workarounds and a great deal of temporal flexibility and collaborate to help each other when formal IT support falls short. If frontline workers did not employ these strategies, agency operations would suffer. Temporal flexibility, for example, is generally considered a benefit for employees, but it is in fact integral to the organization. This calls to mind Brown and Duguid's (1991) seminal discussion on the disparity between what is formally recognized as work and what is actually needed to accomplish the job. To paraphrase, "[t]he burden of making up the difference between what is provided and what is needed" to make digital government work in practice rests with frontline workers (Brown and Duguid 1991, 43). Street-level research has long pointed to discrepancies between frontline workers' responsibilities and their abilities to fulfil them (Brodkin 2011; Lavee 2020). Digitalization does not change this, only the nature of what is needed to get the job done.

In encounters with citizens and stakeholders, frontline workers either avoid using digital technologies or take precautionary measures so as not to compromise their professional authority and the trustworthiness of the state and engage in digital detective work on behalf

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of citizens who are "lost in digitalization." The inclination to take on responsibilities beyond formal requirements is in line with previous studies that have shown that frontline workers often provide additional help to clients whose problems are "too complex for digital services" (Løberg 2022, 19; see also Tummers and Rocco 2015; Pors and Schou 2020). However, in the present study, citizens' *problems* are rarely very complex. Instead, it is the complexity and lack of transparency in digital case processing itself that prompts frontline workers to "move towards" citizens (Tummers and Rocco 2015). In doing so, they appear motivated by public-bureaucratic values such as responsiveness, fairness, and transparency and the fundamental principle of the rule of law: that citizens should be able to know which rules apply, how these rules will be applied, and hence what to expect (Bovens and Zouridis 2002). Notably, while discretion is certainly curtailed by digitalized case processing, it remains a factor when frontline workers decide whether to take on digital detective work.

On an organizational level, frontline workers fulfil roles as digital janitors who clean up messes, fix errors, and test new solutions. The need to correct wrongful case processing and engage in the development and implementation of innovations is also not new to frontline work, but the findings suggest that the scale of this work has changed. The layering of different digital systems results in a surprising number of manual operations, and while automated case processing is efficient in expediting cases, it is also efficient when things go wrong: whereas an error might have previously resulted in the need to reopen 15 or 50 cases, the number can now easily be 5,000 or even 50,000.

Frontline workers also act as digital liaisons in relation to frontline managers, IT developers, and responsible higher-ups. As the analysis shows, those formally responsible for the digitalized case processes generally have little insight into operational details and are therefore completely dependent on frontline workers to educate them on the consequences of decisions on the ground. This is consistent with previous work on frontline workers and e-

government (Tummers and Rocco 2015) and street-level research in general: Given their position at the "ground floor of government," frontline workers possess special knowledge and are uniquely positioned to raise awareness of the practical implications of decision-making on the ground (Carnevale and Stivers 2019). When no one has sufficient insight and overview of all digitalized systems and processes, haphazard problem-fixing may result in violations of fundamental public bureaucratic principles such as equal treatment, despite good intentions from everyone involved. In such a situation, frontline workers may be the only ones with sufficient knowledge to detect inconsistencies across similar types of cases and hence the only ones able to call attention to such violations.

Interestingly, while frontline workers appear mindful of public-bureaucratic values such as transparency, fairness, and responsiveness, both in their encounters with citizens and in their role as digital liaisons, the workarounds they apply in everyday practice risk undermining other values, such as compliance with data security. Even so, these findings suggest that the relationship between frontline workers and the bureaucratic organization is not necessarily antagonistic, as is often assumed (Lipsky 2010). Rather, the study highlights the prevalence of a value-based conception of bureaucracy among frontline workers (Møller, Pedersen, and Pors 2022) and a positive identification with their role as representatives of the state, somewhat similar to what Busch et al. (2018) refer to as "state professionalism," and certainly different from the "citizen-agent" narrative that is prevalent among other groups of frontline workers in other types of contexts (Maynard-Moody and Musheno 2022).

It would be easy to minimize frontline workers' experiences of "IT problems" as routine complaints that mostly fulfil a need for small talk (much in the same way as the weather), yet their frustrations are most apparent in relation to public encounters. Perceived through the eyes of citizens, the challenges are real predicaments that are closely related to frontline workers' role as mediators positioned at the edge of the state. Decades of incremental

development of old legacy systems results in fragility and instability with consequences for efficiency and responsiveness, as this also creates additional waiting time for citizens. Automated case processing creates "black boxes" that make it difficult to detect and correct errors and inform citizens about grounds for decisions and implications of noncompliance. Digital tools with poor functionality mean that frontline workers fall short in comparison to their peers in the private sector, and yet their less accurate measurements are authoritative. For some frontline workers, these challenges entail a risk of compromising their professional authority and trustworthiness as representatives of the state and may eventually jeopardize citizens' and stakeholders' trust in government.

It is important to note that numerous digitalized processes are carried out every minute of every day without problems. Digitalization has without doubt increased efficiency in both agencies compared to the old days of "pen and paper." Still, the identified challenges are not mere "childhood diseases" associated with the initial phases of digitalization, but rather a more permanent state of affairs that appears integral to the long process of transitioning from street-level bureaucracies to screen- or system-level bureaucracies (Bovens and Zouridis 2002; Busch and Henriksen 2018). Because the two agencies have both been involved in digitalization from a very early stage, they still rely on old legacy systems, which creates particular kinds of problems. Yet the findings suggest that the roles of digital janitor and digital liaison are also required in relation to new digital solutions such as automated case processing and the use of algorithms. Frontline workers' abilities and opportunities to enact these roles should therefore be considered when planning new digitalization initiatives, as should the interplay between new digital systems and processes and those already in place.

The study hence supports the argument that digitalization entails large amounts of "invisible work" for employees and managers (Justesen and Plesner, forthcoming), yet it seems pertinent to ask: "What is invisible to whom?". In this study, the work frontline workers do to

make digital government work in practice appears highly visible to those on the ground, whereas the problem of invisibility is related to the digitalized case processes. Many frustrations stem from the fact that the "invisible work" carried out by digital systems leaves frontline workers unable to understand, verify, and explain the grounds for decision-making to citizens.

…

Still missing:

- *Contributions / relate more to extant literature (SLB and beyond)*
- *Future research – how to proceed from these findings (ideas: emotional work related to digitalization, role of IT developers, citizens' perceptions of digitalized encounters, de-skilling/re-skilling of SLBs)*
- *Limitations*
- *Transferability*

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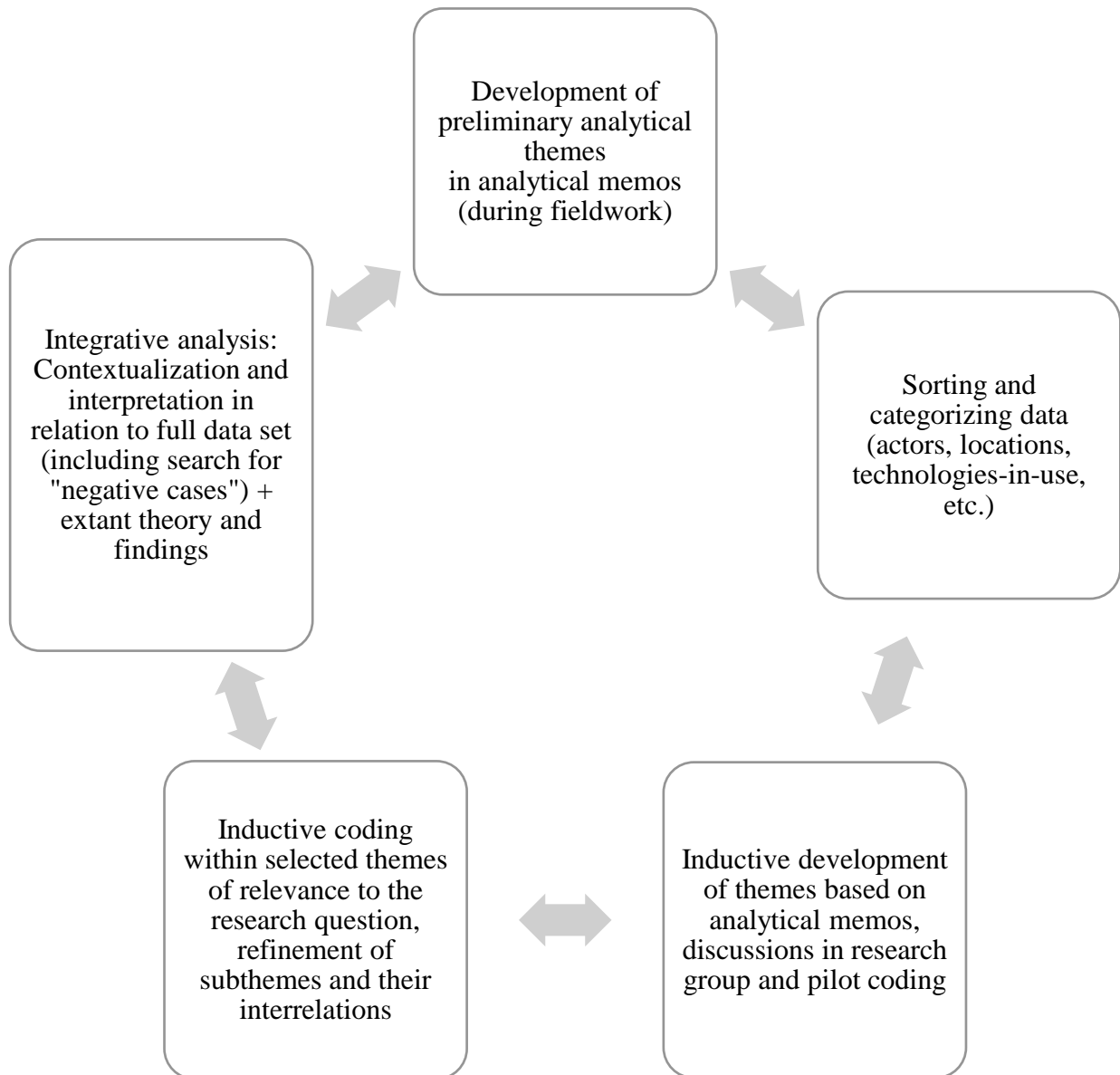
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Appendix 1. Sample interview guides (currently missing)

Appendix 2. Analytical process

Development of preliminary analytical themes in analytical memos (during fieldwork)

Integrative analysis: Contextualization and interpretation in relation to full data set (including search for "negative cases") + extant theory and findings

Sorting and categorizing data (actors, locations, technologies-in-use, etc.)

Inductive coding within selected themes of relevance to the research question, refinement of subthemes and their interrelations

Inductive development of themes based on analytical memos, discussions in research group and pilot coding

Appendix 3. Coding schemes (==preliminary and incomplete==)

Coding scheme – field notes – overarching codes

Name	Description	Files	Ref.
Organizational context	Characteristics of the organizational context with implications for digitalization initiatives & experiences		
Organizational complexity	*Statements and observations that convey an organizational perspective on IT, e.g., general challenges, interdependencies*	25	105
Political leadership	*Statements and observations concerning political priorities, policy change, etc.*	18	32
Hierarchy	*Implications of hierarchical organization and decision-making processes, e.g., "it is a long way to the top from out here"*	14	24
Accountability	*Accountability measures, relations (e.g. towards citizens, Audit Office, etc.)*	27	87
Specialization and division of labour	*Specialization and division of labor, e.g., between SLB, legal experts, IT specialists*	21	52
Digitalization as lived experience	SLB experiences, work practices and strategies in relation to digitalization		
Digitalization attitudes	*SLB attitudes towards digitalization*	15	26
Digital work practices / digital case processing	*Observations and explanations of specific digital tasks/routines*	24	105
	Observations of "digital multi-tasking"	3	3
	Overview (or lack of)	14	22
	Data quality (or lack of)	5	9
	Residual information	1	1
	(Lack of) fit between systems and tasks	5	11
Software issues	*Stability, breakdowns, (lack of) access*	28	140
Hardware issues	*Locations, accessibility, procurement*	26	67
Lack of competences	*Errors and problems attributable to lack of competence*	5	10
Caretaking of digital systems and tools	*Fixing errors in digital processes*	4	8
	Cleaning up digital traces/ "housekeeping" (e.g., deleting emails)	6	8
	IT maintenance and development, e.g., participation in meetings, testing systems	11	32
Workarounds	*Manual operations, temporal flexibility, analogue fixes (e.g. "shadow documents")*	25	79
IT support	*Formal and informal IT support*	21	57
Digital interferences – co-workers	*Digital disturbances during interactions with co-workers (digital tools require separate attention)*	21	55
Digital interferences – citizens	*Digital disturbances during interactions with citizens (digital tools require separate attention)*	24	91