Getting the Job Done: Workarounds in Complex Digital Infrastructures

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Abstract. Work today consists of complex arrangements of loosely interrelated digital tools that shape work and form digital infrastructures. These digital infrastructures can either support or hinder the workers in their daily tasks. Working in an environment where some digital tools are designed for work purposes, and others without the proposed end-users in mind creates a need for improvisation. The consequence for workers may include finding various types of workarounds when shifting between digital tools. These workarounds become important for how work is performed. Through a multiple case study, this paper explores how workarounds are manifested in different work settings through four cases in the public sector. We conceptualize workarounds as practices of flexibility, efficiency, and responsibility, and show how workarounds result in new and innovative ways of working, which can be understood as a form of infrastructuring.

Keywords: Workarounds · Digital tools · Digital work · Digital infrastructures · Infrastructuring · Innovation · Public sector

1 Introduction

Work today is characterized by complex arrangements of loosely interrelated digital tools used for work purposes. These digital tools combined form the digital infrastructure, practices, regulations, and routines in which the professionals (hereinafter called 'workers') perform their work [1, 2]. Depending on the way the digital tools included in the digital infrastructure are designed, parts of the digital infrastructure can support work whereas other parts can hinder the workers in performing their daily tasks [3]. This reality creates a situation where the workers constantly need to choose between different digital tools, to support their work during a regular workday. If these digital tools, embedded in a digital infrastructure prevent the workers from performing the tasks at hand, the workers are sometimes forced to improvise and choose alternative ways to perform their tasks. It can include choosing another digital tool to enter into the digital infrastructure, or tweaking the work task to fit the digital tool so that their workday can

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flow seamlessly [4, 5]. Alternative ways to work to smoothly continue with the workday can both be seen as types of alternative practices, and as 'workarounds'. These practices are fueled by creative and highly solution-oriented rationales and involve continuous adjustments to manage work tasks. Workarounds, in layman's terms, point towards the deviations from the routines based on improvisation to minimize the impact of obstacles in the work [6–10]. Workarounds can, as we see it, be socio-technical and involve both a specific digital tool (may it be a specific platform, a wearable device, a specific app, an AI, or other types of technology entered to ease work), and social aspects, (e.g., new practice, new routine, alternative regulation, governance, or management). Understanding the concept of workarounds, therefore, includes unpacking the relationships between a variety of digital tools included in the digital infrastructure of an organization and the enactment needed to complete the work tasks on the agenda. Based on this understanding, workarounds constitute complex relationships that are difficult to manage, and difficult to circumvent. Instead of trying to elude workarounds, this paper offers an understanding of what they may look like, how they can be coped with, and even how they can improve work. The literature on digital infrastructure targets this challenge of understanding interrelatedness between systems [11–13]. Traditionally, a variety of different types of digital tools are implemented over a long period, and they are implemented for different purposes. One digital tool in an organization can therefore be understood and treated in isolation from the rest of the already existing digital infrastructure and the social and organizational context in which it is embedded and used. In that way, every single technology is dependent on an 'installed base' of preexisting socio-technical arrangements [12, 14]. Thus, it is important to have models and methods to understand not only one type of digital tool and its use, but also how a specific technology is part of a larger socio-technical system of practices, routines, and a larger digital infrastructure [15]. In this paper, we conceptualize workarounds as a phenomenon where the digital tool at hand and the intended work task mismatch and force new practices to be created.

Workarounds happen all around us, independent of the task type and digital infrastructure at the workplace. We present four cases where we have studied workarounds within public sector organizations. The four cases include the following workers and workplaces: i) nurses in a cancer rehabilitation clinic, ii) teachers in primary schools; iii) resident physicians at a hospital, and; iv) communicators at a municipality. Workers in the public sector traditionally have a rooted role description, often associated with the classical archetype of strict office hours and a high level of bureaucracy [cf. 16] combined with an altruistic motivation to help others and to do right [17]. In this paper, we illustrate the workarounds of public sector workers and argue that the specific work context influences how they complete their work tasks within the digital infrastructure. In all four cases, the workers manage their workday with different types of digital tools. Some tools are more traditional, for example for internal administration and others are less traditional, like digital tools for monitoring patient-generated health data or communicating with patients or citizens on social media. The digital tools form the digital infrastructure in which the workers operate. The complexity of the work grows with each digital tool that is added and as the digital tools are seldomly interconnected, workarounds become a way of getting the job done. In this paper, we explore the role

of workarounds in work, exemplify them and discuss how they affect the workday. The research question is: *How can workarounds be understood as different types of practices from the perspective of workers?* From that we conceptualize workarounds as practices of flexibility, efficiency, and responsibility and show how workarounds result in new and innovative ways of working, which can be understood as a form of infrastructuring. Furthermore, we problematize how workarounds become a tacit and integrated part of work which in turn leads to incidental learning opportunities.

2 Related Research and Theoretical Framing

In this section, we outline the related research and theoretical underpinning which we rely on for this paper. We draw on the literature on workarounds and digital infrastructure. Within the Information Systems (IS) discipline, there is a longstanding interest in understanding technology use in relation to work. As we set out to understand the effects of the use of a combinatory digital infrastructure, we would like to analyze the use of digital tools. We will first describe the literature on workarounds, followed by the digital infrastructure and infrastructuring i.e., *influencing* the digital infrastructure. We argue that the digital infrastructure present in each of the four cases and the mismatch between the work task at hand trigger various types of workarounds.

2.1 Workarounds

From a historical perspective on technology use, IS research has moved away from the faithful-use bias [18], to a more nuanced understanding of how digital tools can be used. That has been done by emphasizing how workarounds reflect systemic flaws and reveal infrastructural deviations, which can be both good and bad at the same time. For example, following up on an early critique of IS work, redefining characteristics of IS workers and the IS workplace [19], Orlikowski [20], applied structuration theory to the nature and role of technology, or digital tools, in organizations. She argued that there is a need for alternative theories that combine prior traditions to avoid a forced choice between subjective and objective conceptions of the organization and showed how users shape technology and its effects on their work. More specifically, experts create workarounds, and by doing so, they accept "flaws" in a system as 'the new normal'. Thus, instead of fixing the system, they create ways to work around the system [21]. They institutionalize temporary solutions, indicating that digital tools can condition social practice but not determine it [20]. These temporary solutions can even become permanent ones, in terms of permanent workarounds which stay within organizations for years [4].

Another stream of literature discusses the mandatory use of information systems and illustrates the workplace as a setting where workers can be reluctant to complete their tasks, using the system in the way it is designed to be used [22–24] and that can lead to workarounds. However, as we see it, it does not have to be about any type of reluctance to comply, instead, workarounds can also include convenience and failure to understand why it is important to do a work task a certain way. Other scholars focus on understanding the affective response towards specific information systems [25, 26]. This literature examines the feelings that certain information systems trigger, and how

different types of feelings can arise during the use of specific digital tools, both in terms of dark sides and negative responses [26] as well as in terms of bright sides and positive impact of technology use [27]. In line with that, one could argue that various types of workarounds, conducted in specific digital tools, certainly trigger different emotions. Moreover, the nature of workarounds has been argued to be highly situated and emergent [28]. The same authors lift the level of abstraction and provide an outward-inward linkage of workarounds where bypassing rules, systems or digital tools are analyzed. Gerson and Star [29] early define workarounds as a series of: "misfits with the idealized representations of work" [29]. They continue by stating that various workarounds can conflict with one another, and that they can solve problems "locally and temporarily", and that each workaround can trigger other workarounds to arise. They also stress that: "There is no way of guaranteeing that two workarounds, each adequate in its local context, will not recursively prove to be incompatible in a larger context" [29, p. 267]. The early definition explains workarounds with a negative connotation whereas later definitions have a more positive connotation. Alter [6, p. 1044] defines workaround as:

> *A workaround is a goal-driven adaptation, improvisation, or other change to one or more aspects of an existing work system to overcome, bypass, or minimize the impact of obstacles, exceptions, anomalies, mishaps, established practices, management expectations, or structural constraints that are perceived as preventing that work system or its participants from achieving a desired level of efficiency, effectiveness, or other organizational or personal goals.*

Workarounds thereby rely on the notion of work systems, where both actions and actors interact and perform work with digital tools, in a functioning relationship [24]. Additionally, workarounds have been discussed from the perspective of institutionalized behavior as a way of 'establishing equilibrium' within a structure that is partly governed by pressure from outside and practice-based pressure [18]. The notion of workarounds is grounded in human agency and relies on the assumption that humans perform work, and act in a complex world [6, 24]. However, when the work system is not in harmony, due to hindrances related to what the workers want or needs to minimize the impact of obstacles, improvisations come into play [6]. There is a gap in the literature regarding the granularity of how workarounds are performed on an individual level when mixing the use of organizationally and personal information systems to complete work tasks. As Soliman and Rinta-Kahila [23] point out, there is a need to research the connection between the use of workarounds concerning individual and organizational information systems use which is addressed in this paper.

2.2 Digital Infrastructures and Infrastructuring

As discussed above, workarounds give rise to new work dynamics. Digital infrastructure and infrastructuring are two streams of research within IS that have conceptualized the way digital infrastructure impacts work dynamics. Digital infrastructure has been defined as "the basic information technologies and organizational structures, along with the related services and facilities necessary for an enterprise or industry to function." Tilson, et al. [30, p. 748]. Typically, digital infrastructures are related to an already

existing socio-technical relationship that forms an installed base on which new services are reliant [11–13, 31]. This literature emphasizes that digital infrastructures evolve from and are conditioned by what is already in place; the aforementioned installed base. Infrastructural breakdowns are considered particularly useful for analysis as they shed light on both the dependencies among the comprised components and the competence or inventiveness of actors. The theoretical lens of infrastructuring, does not only provide an interesting understanding of the technical configuration of digital infrastructures, but contributes with important insight into the users' ongoing negotiations with the digital infrastructure and how the digital infrastructure evolves over time [32, 33].

Henfridsson and Bygstad [34] summarize the literature on digital infrastructures and suggest four models, based on four different streams of literature. First, *complexity models* consider digital infrastructure in the light of complexity. Due to digitization, physical and digital resources can be separated and recombined with new physical and digital resources that organizational actors can utilize to connect and develop in an extended organization. Second, *network models* imply an underlying assumption that networks of human and technical elements drive digital infrastructure evolution. Multiple human actors translate and inscribe their interests into a technology, creating an evolving network of human and nonhuman actors. Self-reinforcing effects and large networks strengthen the digital infrastructure and drive generativity and scalability. Third, *relational models* argue that digital infrastructure is always about relations; hence, it can never be a thing, and it is nothing that can be put in the background. Digital infrastructure is thereby not a stable entity but rather an ongoing social alignment between contexts. It is an enactment process, constantly in the making, and something that emerges and continuously evolves. Infrastructure is the politics and norms articulated in relationships between humans and technology and becomes infrastructure relative to established practice. Fourth and lastly, *strategic asset models* imply a strategic choice view, in which digital infrastructure is understood as a managerial process. In this stream of literature, political action is stressed as most important when analyzing organizational responses to IT-related changes, such as when aligning new systems and tools with business strategies and the existing IT resources [34].

As infrastructures are continuously being re-negotiated and re-designed over time, as new digital tools are added, it becomes relevant to rely on the lens of infrastructuring. This is to shed light on a process that incorporates the use, design, and maintenance, of everyday digital infrastructures in which both technology developers and technology users take part in [35]. Infrastructuring encompasses a process of "reconceptualizing one's work in the context of existing, potential, or envisioned IT tools"; a process that is a natural part of workers' activities [35 p. 469]. Pipek and Wulf [35] discuss possible 'points of infrastructure' referring to the way infrastructures become visible to users, either upon breakdowns or during moments of innovation, leading to new emerging practices. This aligns with the relational view of digital infrastructure as an ongoing social process, that comprises organizational rules and norms articulated in relationships between humans and technology relative to organized practice [14]. On a similar note, infrastructuring has been used to describe and understand transformations in digital infrastructures and workarounds that bridge or extend knowledge infrastructures, when existing infrastructures prevent users from doing what they want to do [36]. In this

way, infrastructuring occurs as acts of infrastructural alignments and navigations when actors—either individually or collectively—assemble material, mental, social, and cultural resources to adapt seamlessly to new situations [4, 32, 36]. Infrastructuring is often needed due to the complex, messy, and unevenly distributed nature of digital infrastructures which requires that individuals are in continuous negotiation with an existing digital infrastructure [14, 37, 38].

To sum up, infrastructuring can be used as a lens to describe infrastructural transformations and their relation to workarounds, as workarounds bridge or extend the knowledge infrastructure when existing digital infrastructures prevent the users from doing what they set out to do [32, 39]. Based on that, we argue, that when analyzing workarounds, the perspective of infrastructuring has explanation power, particularly when it comes to understanding how novel practices created by workers contradict existing organizational setups.

3 Method

To explore workarounds in the public sector we applied a qualitative approach in our cross-case study [40]. This approach was adopted for two main reasons. *Firstly*, it enables the investigation of a contemporary phenomenon within its natural setting [40]. Since the main objective of this study was to develop a rich, theoretical understanding, an exploratory approach, which enables predicting similar results, seemed particularly useful. *Secondly*, it facilitates the exploration of workarounds within the domain of the public sector, still within different contexts. Thus, whenever there are two or more cases, a cross-case analysis of the findings is likely to be more robust in confirming, challenging, or extending existing theory and knowledge [40]. We have chosen four cases, which include four types of 'workers', namely cancer rehabilitation nurses [41], primary school teachers [42], resident physicians at a hospital [37], and municipal communicators [38]. Our empirical data include observations, interviews, and written materials such as instructions meeting notes, and log data (see Table 1 for an overview).

In all our four cases, the workarounds and the understanding of the practices constituted a natural part of working life. The data analysis was focused on understanding workarounds as practices. That is, to identify when, how, and why workarounds and infrastructural breakdowns arose in the various contexts. In the analysis, we also focused on consequences in terms of infrastructuring for the individual on the one hand, as well as for the organization on the other hand. The empirical data was analyzed using an abductive approach, i.e., where the understanding of the empirical material grows gradually by oscillating between theory and empiricism. That step was followed by identifying the cause of the tension or conflict from sanctioned practice and grouped the material according to three specific types of workarounds: a) the reason behind a workaround; b) which problem(s) the workaround creates or solves, and; c) the effects of the workarounds. The third and last analytical step included a grouping of the previous themes into an understanding of three types of workarounds where each type refers to a specific type of practice which we elaborate on in the results.

Table 1. Data collection for the four cases.

Data type	Cancer rehabilitation nurses	Primary School Teachers	Resident physicians	Municipal communicators
Observations and engagement in practice	Observations of the work of the nurses both concerning patient contact (in consultations, in telephone conversations, and video consultations) and in clinical work. The observation time spanned 20 full workdays	Observations of teaching activities involving teachers planning meetings, classroom teaching, and reflection sessions. An estimation of observed time is 60 h	Observations from longitudinal collaborative research involving both physicians. The engagement included participation in everyday work activities at the hospital, as well as online activities	Observations of municipality communicators' activity on a municipality Facebook page, involving discussing with citizens during one month
Inter-views	6 individual semi-structured interviews with nurses and 5 workshops which included a group of nurses	6 post-project interviews with participating teachers	15 semi-structured interviews with physicians	21 semi-structured interviews with municipality communicators and managers
Other relevant data that informed the analysis	Documents, log data, data on planning, data from the design process, and meeting notes over three years	Documentation of teaching and learning material including teacher instructions/ planning documents, teacher reflection notes over three years	Log data, project documentation, meeting notes, and informal communication over five years	Sentiment analysis of the Facebook posts from the municipalities' Facebook pages over three years

4 Results and Analysis

In this section, we use illustrative examples to demonstrate how workarounds can constitute different practices, based on the cause of the tension or conflict from sanctioned practice. The practices outlined herein should not be seen as exclusive but rather as overlapping and mutually related, however for an analytical reason we present them as three separate entities. The practices we have identifies in the performed workarounds are: i) practice of flexibility; ii) practice of efficiency, and; iii) practice of responsibility (see Fig. 1).

Fig. 1. Workarounds as practices of flexibility, efficiency, and responsibility.

Practice of Flexibility

In the four cases, we have seen that certain workarounds are deployed as a response to actual or perceived inflexibility in established systems and structures. Inertia and bureaucracy, therefore, create a need to think new and differently to achieve a certain goal, often by using additional hardware or software. An example of that can be drawn from the cancer rehabilitation case where the clinical practice wanted to use video consultations in their work. The clinic had some patients who had difficulty transporting themselves to the hospital and the employees desired to run an up-to-date clinical practice that offered possibilities for these patients, via video consultation tools. However, the hospital is a closed heavyweight infrastructure, which does not allow for flexibility or the addition of new digital tools. The consultation tool was not controversial as such, and it was designed and developed to fit the already established infrastructure of the hospital. However, getting the new consultation tool approved, would take administrational effort. To avoid that administrative hurdle, or postpone it, the workaround was to bring in a new computer, that would run on 4G network and operate outside the firewalls of the hospital, as illustrated by the following quote: *"It is just too difficult to try to get the video consultation tool approved, without testing it. We need it to be tested, but to test it, we need to find a way to test it. This is kind of a deadlock"* (from the cancer rehabilitation case with the nurses).

Similarly, another example comes from primary schools, where teachers experience regulations to inhibit innovations and the development of the teaching practice. In an educational context, the discrepancy between teachers' need for flexible and user-friendly

digital tools and the organization's demand for security and economy constitutes a recurring dilemma. For example, restrictions related to the number of programs and services that are sanctioned and that bans the use of cloud services is highlighted as a problem that hampers the work of teachers, as illustrated by: "*We have a vision and a desire to reach a goal, but then there are so many things getting in the way, such as technical devices and applications we are not allowed to use*" (from the primary school case with the teachers). The teachers experience that they are hostages in contradictory demands. On the one hand, policy documents require teachers to digitalize their teaching practice, on the other hand, other (often local) regulations create difficulties in developing their practice. Therefore, teachers rebel against existing digital tools and regulations and choose services that best suit their needs.

Opposite to how the nurses and teachers abandon sanctioned systems to be able to put innovative ideas into practice, communicators in the municipality case, occasionally avoid social media platforms and retreat to more traditional communication channels. The communicators in our case use social media, such as Facebook, Twitter, and Instagram for external communication in the municipality to bring about citizen dialogue and ultimately to meet expectations in a digital society. However, social media platforms are unpredictable. The communicators experience that social media platform algorithms increasingly impact their work and put concepts of transparency and openness in a new light. The following example sheds light on how a communicator, after having posted information about an unpopular political decision, steers over the negative comments from the social media platform to the telephone. We see here how the communicator creates an alternative route to meet the critical audience in a closed environment and change a negative situation into a positive experience for the citizens.: "*Then there were immediately long harangues about how they* [commenters on Facebook] *didn't think this* [the political decision] *was a good idea. But then I just replied that "thanks for your comments, feel free to contact me on the phone", just to get rid of them. And then they became 'wow' we are talking on the phone, and they were very nice so then that issue was gone*" (from the municipality case with the communicators). The examples manifest how the worker, flexibly, shift between social media platforms and more traditional technology to keep control of the dialogue. All three examples illustrate how the technology at hand does not align with the worker's intended work practice and how practices of flexibility serve as workarounds to have the work done responsibly.

Practice of Efficiency

We have also seen examples of how workarounds are used primarily from an efficiency point of view. In the case of the physicians, we see how workers, often due to lack of functionality, use the digital tools in other ways than intended, to make the workday more efficient. One physician describes how nurses tend to enter information into certain fields, that are not meant for that type of information, in the electronic patient record. This leads to the records not being correct because it is entered in an unstandardized way: "*There are so-called gray lines in the calendar, which can be a bit of anything that the nurses enter, either during our administration time or after regular working hours,*" (from the hospital case with the resident physicians). Some scribbles are also left on paper, instead of in the EPR. Further, the physicians highlighted dilemmas arising from using top-down, standardized healthcare systems and more bottom-up, individualized systems and other

types of digital tools in parallel. One physician tells that they have created a private Dropbox folder, to circumvent security, instead of using the established collaboration tool at the department (which has a similar function): *"..the simplest is of course that you have a folder or that you have a Dropbox folder…so that it is available everywhere* [at the hospital computer] *it won't be good, because then it will only be available on that particular computer"* (from the hospital case with the resident physicians).

Similarly, in the case of primary school, teachers are encouraged to collaborate with colleagues outside of the local school. The teachers in our case were part of a Nordic school development project was developed innovative teaching models across local and national borders, using technology. For communication, the recommended technology was Project Groupware, intended for the project. However, due to various factors such as lack of dynamic functions supporting for example co-writing or the fact that the project groupware did not constitute a natural part of teachers' other (professional or private) use of technology made they use other channels such as e-mail, closed Facebook groups, or Google drive to manage their internal communication to make cooperation more efficient. The teachers developed a more flexible repertoire to support their work as illustrated by the project report: *"Teachers were usually not far from ideas and were creative and found solutions to problems… most of the problems were converted to challenges, which were solved in one way or another"* (from the primary school case with the teachers).

Practice of Responsibility

Practices of responsibility relate to workarounds that are based on a kind of consequence ethic where the action that has the best consequences in practice is the most correct, even if it violates current regulation regarding which system to use or principles of, for instance, openness and transparency. One example of this can be derived from the cancer rehabilitation case. The nurses have a calendar system, into which they report patient meetings. The calendar system does however not allow for them to organize the patient rooms, and by being limited in that way, it does simply not take their workday into account. Furthermore, it takes much time to open sometimes, so it is simply not reliable. The system is mandatory to use but the current calendar, where all the actual information needed to run a clinic, is kept in a paper calendar at the office. The paper calendar is the most reliable source of information, but the digital calendar is filled in simply to keep the administration at hospital administration happy. The analog calendar, however, fits the practice seamlessly, the digital one is only seen as a hassle: *"Well, to be honest, everything we need is here [points towards the analog calendar at the nurses' station]. It has everything. See!"* (from the cancer rehabilitation case with the nurses). The calendar is not complicated, but the digital calendar is simply so far from what they need, that they are unable to make it work even though the digital one is connected to the existing digital infrastructure, and the analog one is outside of those boundaries.

Another example derives from the municipality case. In Sweden, the principle of openness is a constitution that strongly permeates the work of authorities. Everything that is judged to be public information must be saved and be accessible. When increasingly more conversations are moved from email to asynchronous chats in social media, doubts tend to arise as to what information falls under the principle of openness and what does not. To bypass these doubts workers, use tools like Snapchat, that do not

automatically save the written conversations. A municipal communicator explains this workaround using an example from fellow municipality workers patrolling the streets at night to ensure security. These workers normally use Facebook, Twitter, and email when communicating to youths in the street and with co-workers but have switched over to Snapchat: *"They* [the patrolling workers] *chose it* [Snapchat] *to feel safe, that conversations are not saved. If they receive an alarm about a conflict somewhere in town, for example, it will not be saved. And that's a conscious choice they have made, to deviate from the classic municipal* [tools/systems]. *I'm not sure if you are allowed to remove history [conversations in a chat]. They saw it as an anonymous tip* (…) *Difficult, you want to reach out all the time but it [how to do it] changes all the time"* (from the municipality case with the communicators). In both examples, the workarounds include making the work increasingly safe, resilient, and reliable for patients and citizens. For the patients, it is about the fact that the system is reliable, and for the citizens, it is about enabling them to dare to report events. Thus, these workarounds can be understood as a practice of responsibility from the worker's perspective.

5 Discussion

Work is becoming increasingly digitalized and the complexity of the digital infrastructures that support work increases with it [43, 44]. Considering that, it is vital to understand infrastructural breakdowns when there is a mismatch between the task at hand and the digital tools. Workarounds have been conceptualized as activities of adapting, improvising, and changing work to minimize the impact of various types of obstacles and thus increase efficiency in everyday work [6]. In this paper, we extend this understanding to also involve the practice of flexibility, efficiency, and responsibility which can all be seen as a form of innovation, that arises through everyday infrastructuring as the workers navigate and switch between different digital tools to perform their work tasks. We further develop the concept of workarounds as a goal-driven adaptation to a situation and a set of new, yet responsible actions that form new, innovative practices. Although workarounds can be seen in that light, the other side of the coin is that workarounds also include a deviation from the rules, regulations and often also include a mismatch between the workers' skillset and the digital tool at hand [22]. However, what we have illustrated in this paper is that workarounds constitute infrastructuring, that pushes new innovative ways of conducting work, and that workarounds emphasize responsibility and altruistic behavior in our cases.

By drawing on the literature on digital infrastructures [30, 34] and infrastructuring [14, 35] we argue that workarounds are distinctive, yet mutually interrelated practices of flexibility, efficiency, and responsibility that together form practices of innovation. First, workarounds emerge as a response to the need for *flexibility*, which includes new hardware, new digital tools, and new types of processes to innovate established practice, bypassing management expectations [6]. We show how that can be realized with help of certain digital tools (e.g., by using cloud-based services, or by bypassing a firewall by bringing in a new computer). However, when workers use tools that would help them conduct their work tasks, they are met by structural constraints [6] concerning what digital tools are and are not a part of the already existing digital infrastructure.

Our empirical cases provide examples of workarounds related to perceived inflexibilities around digital technologies and policies [45]. Secondly, the desire for *efficiency* is realized through establishing workarounds as an integrated part of the work, for the work to flow seamlessly for the workers [4]. This is in line with Alter's [5] definition of workaround as a means to achieve the desired level of efficiency and where the alternative of not using workarounds is seen as more time-consuming and inefficient compared to the workaround. Thirdly, workarounds occur as acts of *responsibility*. It constitutes pragmatic stans where the action that has the best consequences in practice is considered the most 'correct', even if it violates current regulation regarding which digital tools to use or even contradicts principles of openness and transparency. All of our cases reflect accountability, responsibility, and loyalty towards the patients, students, and citizens [1, 17]. Workarounds in the line of work where accountability is high towards others become a balancing act between staying within the rules or performing workarounds to get the work task done; a judgment call, depending on the work task at hand [5]. Viewing contradictions between the existing digital infrastructure and intended activities with roots in innovation could change the negative connotation of workarounds to positive ones. Based on that, we would like to forward workarounds as a form of infrastructuring which can lead to incidental learning and can be seen as an innovative part of 'getting the job done'.

6 Conclusion

In this paper, we explore the role of workarounds as a part of work. We provide examples of different types of workarounds and discuss how they affect work. We conceptualize workarounds as practices of flexibility, efficiency, and responsibility, and show how workarounds become a tacit and integrated part of work which result in incremental learning opportunities and ultimately lead to new and innovative ways of working. Hence, workarounds can be understood as innovation, which means, flexibility in actions, to perform work efficiently and responsibly. We further argue that the way the workers innovate can be seen as a form of infrastructuring. In that sense, workarounds entail going against the sanctioned systems and structures, by being innovative yet responsible for one's actions. A future area of research could be to validate these workarounds in other contexts and to study workarounds in an organization over an extended period to see how workarounds as a form of infrastructuring are embedded (or not) within the existing digital infrastructure. Another future avenue would be to develop a framework of workarounds that others can use to illustrate infrastructural changes, new ways of working, and innovation in practice.

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