

User mobilization in bottom-up infrastructural transformation

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Abstract. User mobilization plays a critical role in bottom-up processes of infrastructural transformation. In this study, we take a user perspective to how infrastructures transform, and investigate the work required to mobilize users. Our research is based on a case study of a project developing a novel solution for supporting data sharing in patient handovers in the context of primary care in the municipality of Oslo. We focus on the work of user representatives in the project activities, and specifically in their effort to engage their local organizations. In the analysis we identify three types of work for user mobilization: the work to identify benefits, anchor in the local leadership, and give a sense of ownership. We contribute to the literature on bottom-up user-driven change processes by showing the work required for user mobilization and conclude with implications for supporting users' learning.

Introduction

This paper reports from an empirical study on the work to transform the socio-technical information infrastructure for patient handover in primary care in Oslo, Norway. Specifically, we investigate the activities to design and develop an application for patient handover that is expected to scale to serve all patients in the Oslo municipality. We focus on the work of user representatives (health workers) in these activities. While other ongoing IT implementations in Norwegian healthcare have taken a suite-system approach with large upfront investments and proprietary off-the-shelf software products, (e.g. the implementation of Epic in the middle health region (Ellingsen and Hertzum,

2019)), this project follows a bottom up approach, with limited upfront investment, iterative user-driven design and gradual scaling. This approach leaves more space to user participation. However, while user participation is recognized as a critical resource in transforming healthcare infrastructures, it remains understated and under researched (Garmann-Johnsen et al., 2020). User participation is not only the work to configure systems to local needs that is restricted to a design space defined by vendors (Ellingsen & Hertzum, 2019). It is also the work to engage users in a design process to transform organizations and data practices and procedures, while also contributing to technology design.

Recent studies argue for bottom-up processes of infrastructure development and emphasize strategies of ‘cultivation’, ‘growing’ and ‘coping with’ the existing infrastructure, conceptualized as installed base (Hanseth and Bygstad, 2017; Klein and Schellhammer, 2017; Modol, 2017; Mozaffar et al., 2017; Vassilakopoulou and Marmaras, 2017). In these approaches, user mobilization plays a critical role (Grisot et al., 2014). However, most research investigating strategies for infrastructure development and scaling take an organizational perspective (Vassilakopoulou et al., 2017) rather than foregrounding the work of individuals, such as user representatives, to mobilize users. As Hertzum and Simonsen point out the competences needed by health workers, such as to *prepare and make change*, are “thinly spread” (Hertzum & Simonsen 2019). In addition, Parmiggiani and Grisot show how when users engage in data practices, their involvement is emergent rather than only organized (Parmiggiani & Grisot, 2020). Thus, understanding the *work* of mobilizing users in bottom-up change processes is important in order to develop insights on how individuals can be supported in terms of competences and learning.

In this study, we address the following research question: *what is the work to mobilize users in user-driven health information infrastructure transformation?* By framing the research as transformation of an infrastructure rather than a system, we want to emphasize the open ended nature of the design-process of transforming an infrastructure, and also that the pre-existing socio-technical constellations play a critical role in shaping the transformation process (Aanestad et al., 2017)

To address this research question, we have conducted a longitudinal case study based on qualitative data. Our analysis focuses on the work of the user representatives in mobilizing users in their local organizations, and specifically on the work to identify benefits, anchor in the local leadership, and give a sense of ownership. Our findings contribute to foregrounding the many types of work required by users to transform a health infrastructure. We contribute to the literature on bottom-up user-driven change processes within the infrastructure literature by showing the work required for user mobilization and conclude with implications for supporting learning and with future research directions.

The paper is structured as follows. In the next section we describe the research design, data collection and our approach to data analysis. We then provide a description of the case. Then, we present our findings organized in three subsections about the different types of work: identifying benefits, anchoring in the local leadership, and giving a sense of ownership. Finally, we discuss our findings and contribution, and research implications.

Method

The research presented in this paper is based on a longitudinal case study of the digital patient-handover project. The research is longitudinal as the authors have conducted intensive fieldwork in the project since February 2020 (fieldwork activities are still ongoing at the time of writing, May 2021). We have relied on four main sources of data in our research: observations, reflective sessions, interviews, and documents (see table 1). As we started fieldwork at the start of the pandemic in Norway, our data collection has been mainly digital (in Teams) except for few interviews and observation of work practices. Observations have been our primary source of data. We attended 2-3 project meetings per week where we have been able to conduct rich observations of the project team’s discussions about technology design, implementation plans, coordination of work. These meetings have been video recorded and the audio selectively transcribed for further analysis. Second, from October 2020 we have conducted two weekly reflective sessions with the project leader and with a user representative. These sessions were inspired by the reflection on action approach (Schön 1983) and dedicated to making our informants reflect on the activities of the past week, the status of the project as well as future plans. Third, we conducted semi-structured interviews with user representatives from the city districts about how they engaged their local organization, and we have conducted interviews with the head of the municipal Health Agency’s department for IT development to understand the larger context of the project. Fourth, we had access to the project documents, and we have analyzed policy documents about the digitalization of healthcare in Norway and in the municipality of Oslo.

Method	Activity	Themes
Observation	Observation (51) of meeting scenarios and stakeholder constellations. Two contextual observations (2) of healthworkers practices.	Information sharing and cooperation regarding technology design and service development; strategizing, sharing information, organizational development, etc. Insight into service practices “before” digitalization.
Reflective sessions	Weekly sessions with the project manager and one user representative. (From september 2020 – May 2021)	Reflections on the ongoing progression of the project, challenges, interdependencies, networking.

Interviews	Interviews with project manager (2), user representatives (2), and head of development (2).	Experiences about the local organizations, motivating and engaging users in project activities.
Documentation	Access to the project portfolio. Policy document.	Technical design, presentations, work descriptions, working documentation, etc.

Table 1: Data collection

To analyze our data, we followed three steps and an interpretive approach (Walsham, 1995). First, after each data collection session we discussed among us the highlight of the session. Second, we utilized Nvivo to systematically code our data by theme guided by core concepts from infrastructure theory (Braun and Clarke, 2006). Lastly, we have utilized a technique of ‘writing through codes’, inspired by (Crang and Cook, 2007), in which we articulate the themes by writing them out until they “work as arguments: individually and as a whole.” (p. 158).

Case

We have conducted research on the design activities of the project team developing an IT application for patient handover and for making patient data available to healthcare workers across organizations as patients move along their care journey. The context of the study is primary care in the municipality of Oslo, where currently patient data is fragmented and stored in various Electronic Patient Record (EPR) systems and health registries. Information sharing practices across health organizations are based on electronic messages, phone calls and paper-based documents. In this study, we focus on the work of the core team which includes representatives from four city districts, two municipal agencies and a rehabilitation centre.

The patient handover process is a critical part of the care process. In their care trajectory patients move across care services with different locations, forms of care, and information and communication practices. As patients move, it is critical that their patient data and information are made available to healthcare professionals. The overall initial aim of the project is stated as “taking back control over data” and articulated in three parts: to develop an information hub with access to necessary information across organizations, to support reuse of data using structured data and standardized information models, and to create an interface with an overview of patients. The project started in 2019, ran a small pilot test, and was set up with a core team of developers, user representatives and a project leader. The project can be described as having a low budget and a bottom-up approach to stakeholders’ engagement. The stakeholders’ engagement into project sessions has varied over time depending on user representatives’ and project leaders’ efforts to motivate participation in the design process (Dæhlen &

Grisot, 2021) which has been especially challenging during the pandemic. Since the Covid-outbreak in March 2020 until September 2020 the project did not have dedicated developers, and have since September 2020 until May 2021 had one developer. The project has a core team, a steering group, and a reference group. In this paper we focus on the activities of the core team.

The core team conducts weekly meetings on technology design, and implementation planning. Overall, the team works with identifying requirements, designing functionality of applications, and creating novel procedures for data practices. Various experts are also collaborating with the team, for instance pharmacists, coordinators of the municipal EPR system, jurists, and participants from other ongoing relevant projects.

Findings

In this paper, we describe and analyze the work of user representatives. They are professional health workers, often with experience in technology-related change management in their local organization. We focus on the work to engage their local organizations, and we identify three types of work: identifying benefits, anchoring in the local leadership, and giving a sense of ownership.

User mobilization by identifying benefits

Since early 2020, one of the main topics in the design meetings has been to understand the benefits the novel solution would bring to the health workers. This was explored after newly appointed user representatives expressed some frustration. They expressed concerns about how to convince their local organization to join the project. They said: “we are going to get questions on what the benefits are, what is it that [the existing EPR] doesn’t already give, like, what are the differences?”. Thus, the core team worked on specifying concrete benefits that would make sense to health workers. For instance, they discussed how the data in the novel solution would enable richer and more structured information than previously in the transfer of patient across services. However, understanding the benefits, conveying them to users, motivating and enabling participation has been challenging. For instance, the novel solution would initially overlap in functionality with existing systems and a transition period from the existing practices to novel ones was envisioned. This would make the benefits less visible in the initial stages of implementation. One representative said: “it is a hard sell because right now we can’t just swap one system for the other, we have to do [register] in both for a period”. The identification of benefits was also instrumental in anchoring the project with the local leadership.

User mobilization by anchoring in the local leadership

User representatives also worked to mobilize users by anchoring in the local leadership. This was a critical work as in the local organizations user representative faced the challenge of not having enough resources formally dedicated to the project. A user representative explained how they tried to set a local change process and did not succeed because of lack of formal mandates:

“it became completely unruly for the service and for themselves [health workers]. [...] So after having tested it out we just had to say: ‘that did not work, what now?’ [...] it became evident that if this is not embodied [nedfelt], read out loud and anchored all the way to the top and economically, so we can free up workers responsibilities—unless we can actually set aside money, it won’t become anything”

This became evident in June 2020 during the weekly design meetings, it was decided to free up (buy out) health workers in order to engage them in the project work. Another example is from the start of 2021, when a user representative talked about her experience of trying to free up two local health worker team-representatives to work on defining novel data practices:

“I hope that they can have a clean mandate every Thursday so they can work together. I think this is a critical criterion for success, so they can collaborate, which teams should start, how to we engage them, what functionalities do we start with. [...] that is, mandate to work 20 percent for [team representative 1] and [team representative 2]”

Afterwards, the user representative said that the process of freeing up health workers time “is a never-ending battle.” The representative expressed worry that the local administration still did not understand the scope of what was required, and that there was a general lack of knowledge of what such project entailed.

This was a general challenge for the representatives who themselves struggled to manage their own time and several roles and responsibilities within their local organizations. One representative said that his organization decided impromptu who would become user representative arguing “who can assign around with this here?”. The user representative later expressed that they felt inadequate in this role. Another representative described herself as a “multi-artist”, meaning that they had worked there for a long time, and experienced that the organization “pulls you in [to different projects] all the time”. Only one of the user representatives had been able to establish herself as working only with the project. Her local organization is the first implementing the application.

User mobilization by giving a sense of ownership

Another challenge faced by the user representatives was about conveying the socio-technical complexity of the project to local participants. For instance, following a presentation about the novel functionality with fictional, neatly constructed data, a local section leader was positive. She proposed to roll out the novel solution to the entire organization of 271 employees by hiring extra health workers for a couple of weeks. This was in contrast with the user representative

concerns about how challenging it would be to start defining novel data procedures in a single team of health workers. The user representative said:

“the next step now is to reality-orient. But, I am more happy with having to lower expectations than having to all the time trying to keep it up. Which is a comfort. [...] What worries me is this quick-fix line-of-thinking, that the system will fix all the [health-]professional challenges of the organization. [...] we can't just give people a new digital tool, they need to understand what lies behind”.

She then pointed out that some of this work would be to give a sense of ownerships to health workers:

“they need the time to become an ambassador, and find out why we have made the choices and why we are here, get a sense of ownership to the project. [...] because they [team representatives] are meeting the next node in the network, and again it takes them time to become good ambassadors”.

Later in the year the two team representatives attended the city districts weekly ‘news show’—set up by the head-of-district—to present the project for all employees. In a later weekly reflective sessions, the user representative explained that one of the team representatives wanted full responsibility of tutoring the use of the application to the caseworkers (health workers who currently are responsible for ensuring patient transfer across organizations). The user representative said, “[team representative 1] asked me to tie my hands behind my back, which is a good sign. She is leading the entire teaching session”. In the following months leading up to the official start of implementation in the two teams, the user representative of that district expressed a surprise towards the section leaders ‘forward leaning’ attitude towards the uncertainties that the change process necessitated.

Discussion

In this study, we asked, *what is the work to mobilize users in user-driven health information infrastructure transformation?* We have approached this question by foregrounding the work of user representatives—professional health workers with a background in local, often technology related, change processes. We have presented their work to mobilize their local organization in order to engage local health workers, and analytically identified three types of work: identifying benefits, anchoring in the local leadership, and giving a sense of ownership.

User mobilization is a core issue in the literature on bottom-up information infrastructure evolution. In their seminal work, Hanseth and Lyytinen (2010) argue that to bootstrap a change process is important to motivate users so that they have “real motivation to use the IT capabilities.” Grisot et al (2014) also show that making a solution attractive for users triggers a self-reinforcing adoption dynamic. We expand on this stream of work by taking a user perspective into bottom-up infrastructure evolution and showing the work it takes to mobilize users. As our findings show, user mobilization requires different types of work, and the

individuals engaged in mobilizing users must face several challenges and tradeoffs. User mobilization is not simply the activity to enroll and motivate users, it also requires learning to work to mobilize users. Our findings show that three core aspects are critical. First, user representatives need to learn to navigate the organization. As our data shows, user representatives had to engage not only health workers, but also leaders at different levels and in different roles in the organization. Second, user representatives need to learn to enact persuasive tactics to engage their local organization. For instance, in our case this required user representatives to see themselves as ‘ambassadors’ of the new technology into their own organization, a new role they needed to learn how to perform. Third, user representatives need to learn which competences are required to act as ‘user representative’. This is however a very explorative and emerging role, and not well defined a priori. Our data show how this is not a role that can be assigned only based on availability, but a careful consideration of individual expertise is required.

When developing infrastructures, user mobilization is also distributed across different local contexts. Information infrastructures are sociotechnical arrangements that cross organizational boundaries and support open and heterogeneous user groups. This infrastructural dimension adds complexity to the task of mobilizing users. As our findings show, user representatives work to engage their local organization, but a strategy that works in one context does not necessarily work in another. Our findings therefore also show the importance of attending to users and involving users from different local contexts.

In conclusion, we have presented a study on user participation in infrastructure transformation and foregrounded the work of user representatives when engaging their local organizations. We think that our findings and contribution have two main implications. First, we show that user mobilization is a complex task that requires support from the local organization in addition to attention to the ongoing learning processes implicated in engaging users. Second, further research is needed to improve our understanding of the many, multifaceted roles implicated in acting as user representative in bottom-up user-driven processes.

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