

Adaptation of Clinical Information Infrastructures by and for Users

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Abstract. This paper reports work-in-progress, investigating user-driven adaptation of a large complex EHR system in two Danish regions. It focuses on the experiences of so-called ‘physician builders,’ tasked with adapting the system, and identifies five issues and challenges that are of particular concern to the builders. Finally, it discusses how working as a builder can be seen as ‘voluntary work’.

Introduction

Electronic Health Record (EHR) systems are commonly considered the backbone of hospital IT infrastructure (Bansler et al, 2016). While early adopters of EHR systems developed their own software in-house, medical centers and hospital systems today usually prefer to rely on generic software packages from large software vendors such as EPIC and Cerner. These packages are produced to meet the perceived needs of a particular sector, e.g. large hospitals, and will, of course, not always meet the specific needs of the individual customer. They have, so to speak, a ‘one size fits all’ set of generic features. However, they are usually also highly configurable and thus able to provide flexible and adaptable solutions to a wide range of organizational needs (Bansler & Havn, 1994).

Their organizational implementation and use will, therefore, necessarily entail a mutual adaption of technology and organization. It is important to emphasize that this is not a onetime activity, but an ongoing process of technological innovation and organizational transformation. New versions of the software package

will be issued at regular intervals and the needs of users will develop over time, both as a result of organizational learning and because the context of the organization evolves.

Despite the importance of this mutual adaptation process, it has so far not received the attention it merits. This paper aims to begin remedying this situation by reporting on an ongoing case study of user-driven adaptation of a large EHR system. The study focuses on the post-implementation phase and seeks to understand the role and experience of end users, e.g. physicians and nurses, who have been trained to configure the software to local needs.

The case presented here concerns the ongoing user-driven adaptation of a large, complex EHR system (referred to as the *Health Platform*) from the American vendor Epic in two large hospital systems in Denmark. The system serves 17 hospitals with a total of about 44.000 users (e.g., physicians, nurses, radiologists, and medical secretaries).

The main takeaway from the study is that user-driven adaptation is not simply a technical issue, but a site of organizational and professional politics.

The Study

This section briefly describes the Health Platform, the organization of the user-driven adaptation program, and the methods used for data collection in the research project.

The Health Platform

Denmark has a single payer tax supported health care system. The country is divided into five regions, each governed by a council with popularly elected members. The regions' main responsibility is health care and they own and operate the public hospitals within their respective geographical areas (Danish Regions, 2012; Kierkegaard, 2013).

In 2013, the Capital Region and the Zealand Region jointly decided to replace their existing portfolio of health information systems with an integrated EHR system from Epic. The system was configured to meet the requirements of the Danish health care system and rolled out across all 17 hospitals in the two regions from May 2016 to December 2017. The roll-out was fraught with technical and organizational difficulties and it drew heavy criticism from physicians as well as independent health IT experts and the Danish Public Accounts Committee (Rigsrevisionen, 2017). At the time of writing, there is still widespread dissatisfaction with the new system among physicians and other health professionals. According to a recent user satisfaction survey from the Capital Region, 61% of the physicians disagree or strongly disagree with the statement that “the Health Platform

supports my work” while only 14% agree or strongly agree with the statement (Capital Region, 2018).

Epic’s software package can be configured at three levels: system-wide (global), local, and individual. System-wide configuration requires considerable experience and expertise and is carried out by specialists in the Capital Region’s IT department, often in close collaboration with Epic. At the local level, the scope of configuration is more limited and it can be carried out by so-called ‘physician builders’, i.e., physicians (or other healthcare professionals) who have attended Epic classes on how to create and configure various documentation and ordering tools, templates and reports (*builds* as they are called in the jargon of Epic) so that they better match the needs and workflows of a specific medical specialty or hospital department. Finally, individual users can ‘personalize’ the set-up of their user interface and create templates, macros and short-cuts.

The current paper focuses solely on the local configuration carried out by physician builders.

The Physician Builder Program

The two regions have established a common physician builder program. At the end of 2018 the program comprised approximately 50 trained and certified builders. Most of the builders are physicians, but there are also some nurses in the program. Builders are affiliated with a hospital department and they typically spend between 10% and 50% of their time on tasks related to the local configuration of the EHR system. The rest of their time is spent on their normal duties as a physician or a nurse in the department.

Depending on its size, each medical specialty, e.g. cardiology, oncology, and psychiatry, has been allocated one or two builders responsible for configuring the EHR to the specialties’ specific needs and requirements. Instead of configuring the system at the level of the individual hospital department, the intention is to reconfigure the system at the level of the specialty. This means, for instance, that all cardiology departments in the two regions should, in principle, use identical system configurations. The decision to carry out adaptations at the specialty level instead of the department level is motivated by top management’s longtime desire to standardize clinical processes and documentation practices across departments, hospitals and even regions.

Responsibility for providing technical assistance to the builders lies with the Capital Region’s IT department (the hospitals do not have their own IT departments). To assist the builders, a new role as *mentor* was created in the IT department. A mentor is a health professional, typically a nurse, who has been trained and certified by Epic. Each mentor specializes in specific system areas and tools, which means that builders often have to interact with several different mentors.

Furthermore, each specialty has appointed a so-called *leading medical expert* who is responsible for reviewing proposed new builds as well as changes to existing builds.

Overall responsibility for the builder program lies with a board of deputy directors from each of the 17 hospitals.

Data Collection

Data collection began in September 2018 and will continue at least until the end of 2019. It is based on both primary and secondary methods. Primary data collection involves meetings and interviews with physician builders, chief physicians, information architects, IT specialists, IT managers, and senior managers. So far, I have interviewed 13 builders (12 physicians and 1 nurse), an information architect, 2 support staff and a middle manager in the IT department, and a senior manager. In addition, I have had formal and informal meetings with numerous physicians, chief physicians, senior managers, and administrators.

In terms of secondary data, I have collected and analyzed a multitude of documents including, e.g., policy documents, minutes from council meetings, organizational charts, and user satisfaction surveys from the two regions as well as Epic's teaching material.

The builders' experience

This section presents and discusses five issues and challenges that are of particular concern to the builders. Before doing so, I will briefly consider the question of why they became builders in the first place.

Reasons for joining the builder program

There are many different and often quite personal reasons for becoming a builder. About half of the interviewees joined the program because their superiors asked them or talked them into doing it. As one of them humorously put it, "I was forced to volunteer." The other half applied for the position as builder on their own initiative, for different positive or negative reasons: an interest in IT; a "love of systems;" an interest in "making things work" and helping colleagues; a desire to participate and influence the process; and a wish to spend less time on patient care.

Thus, the builders interviewed are a diverse group with quite different motivations for joining the program. Regardless, they all find their role as builders more or less frustrating.

Uncertain career prospects

Some of the younger builders are particularly worried that being a builder could be detrimental to their career, because it does not count towards career advancement in the same way as, for instance, research and clinical experience: “It is like throwing your career in the deep freezer” as one of them expressed her concern. She further speculated that this has led, or could lead, to a situation where it is impossible to attract first-rate physicians to be builders.

Time pressure

The original idea was that about 50% of the builders’ time should be allocated to their duties as a builder, but in reality, it varies enormously how much time the builders actually have. Some have just a few days per month while others have 20%, 50% or, in a single case, even 100% of their time. There are two common reasons why many builders have less time for the task than planned: The host departments are struggling to manage their clinical workload with the available staff and have difficulty doing so when physicians serve as builders. Also, the builders do not want to spend too much time on this task, because they are afraid this could hurt their career (see previous section). Not surprisingly, the builders who have less than half of their time officially allocated to their duties as builder complain about lack of time to do the job.

Unclear role expectations

Several builders complain that role expectations are unclear or contradictory and that there are no clear lines of authority. As mentioned above, each builder is affiliated with and paid by a particular hospital department, but at the same time s/he is supposed to serve the needs and requirements of all departments within the specialty. This, of course, begs the question for whom is the builder working. Is it the host department, the hospital, the region, the IT department, or the Health Platform? As one of the builders remarks:

“But, in principle, one could ask, why should one department pay for work done for another department?”

There is no consensus on this and the lack of clarity creates tensions and confusion amongst the builders and within the program as a whole. In some cases, builders work for an entire specialty, but in other cases, they have been told to solely work for their own department:

“And this is primarily because either the hospital directors or the particular department managers have monopolized the physician builder and told them, we want you to only build for us. This is completely... At best, they have misunderstood the whole concept, or they have deliberately chosen to ignore the decision about how things should be done. Because there is only *one* physician builder, or in some cases two, for each specialty. That is, you actually

have the responsibility for contributing to the whole specialty and not just to your own hospital.”

Strained relationship with the IT department

Almost all of the builders are very dissatisfied with the way the IT department treats them. The builders’ dissatisfaction is rooted in what they perceive as the IT department’s lack of responsiveness, competency, and mutual respect.

Firstly, virtually all builders complain that it is extremely difficult to get in contact with the mentors in the IT department. One builder, for instance, describes the situation as a communicative “Berlin wall” between the builders and the mentors. It is not possible to call or email the mentors directly. Instead, the builders have to write to a generic email-address without knowing who will read their message or when they will get a response:

“[You can] send a mail to an anonymous email address (...) and then you might get an answer after a couple of days perhaps. And it might be from someone named Marianne, but Marianne’s surname and telephone number is not listed. And this is *infuriating*. It feels as if I’m being treated as a preschooler, who doesn’t know how to behave herself.”

Secondly, builders generally find that they get little help or support from the mentors, because their technical skills and competencies are too limited. As one of the more experienced builders explains:

“If I have some problems or there is something I can’t figure out [how to do], then they [the mentors] can’t figure it out either. They know as little as I do. That’s how it is. They are not stupid or incompetent or recalcitrant, they just don’t know more than I do.”

Thirdly, many builders often feel that the mentors treat them as adversaries rather than collaborators, and that the IT department wants to control them and keep them in a subordinate position:

“But I think they fear that we’ll become too proficient out here. (...) So, if we overtake them, because we are becoming more and more sophisticated and competent, then they are afraid that they can’t control it. And this is why we are being held back.”

It is important to note that the builders’ criticism is not directed personally at the mentors, who they generally find friendly and helpful, but at the way the IT department manages the builder program.

Overly bureaucratic approval procedures

Before a new or revised build can go into production, it must be described in detail in an elaborate Excel sheet, reviewed by the relevant leading medical experts and, finally, approved by a mentor. The builders readily accept the need for some level of quality assurance, but find the approval procedure to be overly bureaucratic, lengthy and time consuming. As one builder puts it:

“It is a process so cumbersome, you can’t imagine. It is super easy to do [the technical part], but the bureaucracy we have to go through, it is... and it is so undynamic.”

Another builder jokingly compared the process to that of obtaining permission to build within a conservation area (which is virtually impossible in Denmark):

“It is easier to get permission to build a garage on a protected plot of land than it is to get approval to go on with a new build.”

Some builders implied that the strict approval procedures are rooted in a general distrust in the builders’ intentions and abilities:

“They [the mentors] are supposed to keep an eye on us physician builders. (...) It is as if they are afraid that we’re trying to cut corners when it comes to standardization.”

Standardization versus local adaptation

As for the feasibility of making adaptations at the specialty level, instead of the department level, opinions are divided. A few of the builders find this to be quite straightforward, but most think it is impractical, because there are, often small, but essential variations in clinical processes across departments and hospitals, even though they belong to the same specialty. The variations are, for instance, due to differences in hospital organization, staff composition and competencies, building layout and facilities, and available medical technology.

One of the builders explained why he believes it is a huge mistake to target the specialty level instead of the department level:

“I think one of the biggest mistakes they [the managers of the Health Platform] have done in relation to get this building program up and running is that they have said we want... The politicians have said, we want patients to get the same treatment at the surgical department in Hillerød, as they get in Herlev and Hvidovre and Bispebjerg and so on. And the underlying idea is good enough. (...) [But in practice,] the geography is different, things are not done in exactly the same order – even if the end result is the same. And this means that you have to build it [i.e., configure the system] in slightly different ways at the different hospitals.”

Another builder argues that experience has repeatedly shown that this kind of IT-driven standardization is futile:

“you can’t come with an IT system and – we’ve seen it a hundred of times – and standardize [the clinical processes]. You can’t do it.”

According to a third builder: “this is simply... this is just *so* stupid.”

Further, it is worth mentioning that many builders are disappointed with what they have been able to achieve so far, despite their best intentions and efforts. They feel constrained by the red tape and bureaucracy imposed on them and by the lack of support from the IT department. They want more autonomy and control over what they do and how they do it, and they believe this would be much more productive.

Discussion and conclusion

In trying to understand the significance of the builders' experiences, it might be useful to view the physician builder program as a kind of 'volunteer organization' (Wilderom & Miner, 1991), in the sense that the success of the program hangs on attracting, engaging and retaining a sufficient number of experienced and dedicated physicians as builders. In this perspective, the builders are viewed as 'volunteers,' that is, as someone who voluntarily undertakes a service or duty, but can also easily opt-out if they want to.

The builders act as 'technology-use mediators' (Bansler & Havn, 2006; Orlikowski et al, 1995) and 'bridge-builders' between the IT specialists on the one hand and the physicians, nurses and other healthcare professionals on the other hand. This requires that they not only have intimate knowledge of clinical work processes and requirements, but also that they are highly respected by their colleagues. In other words, it is essential to attract the right people to join the program and to maintain their interest in serving as mediators.

Seen in this light, it is quite alarming that the builders are so frustrated with the way the program is designed and run. Consequently, it is imperative to understand their motivations to volunteer, develop suitable incentives to foster participation, and finally tackle the identified issues and challenges.

Physicians' motivations for joining the program are multifaceted and complex, as indicated above. There is not space to go into detail here, but it should be noted that there is an extensive literature on motivations for volunteering and that it is important to recognize that volunteer work is undertaken not just for the pursuit of self-interest, such as career advancement, but also for altruistic and relational motives (Lopes, 2011; Prouteau & Wolff, 2008). Hence, it is not a simple and straightforward task to design appropriate measures and incentives to attract and retain experienced builders.

It is, however, obvious that management must address the three (interrelated) issues about uncertain career prospects, time pressure, and unclear role expectations. Although these issues can, in principle, be resolved through a revision of task and incentive structures, it requires paying attention to the builders' concerns.

Moreover, the findings also raise some more difficult and thorny issues rooted in basic organizational tensions that must be resolved, or at least managed, if the program is going to succeed. At least three such tensions can be identified: (1) the tension between the builders and the IT department, (2) the tension between the perceived organizational need for coordination and control and the builders' wish for autonomy and empowerment, and (3) the tension between the perceived need for system-wide standardization and the perceived need for adaptation to local needs and requirements.

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