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Who is the Target User of a Patient Record System?

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Abstract: Information systems aim to serve different users and their varying needs. This emphasizes user centered development because users, as experts of their work practices and contexts, have insights how the future system should serve their needs. However, it is ambiguous what is meant by the user centeredness, or who actually are the users. The issue is emphasized in large-scale public sector information systems, that are used by and influence myriad of individuals, some of who may be perceived as users or end-users. These users may not necessarily share a common interest towards the system. Under the circumstances the identification and definition of a user is exemplified since the system may not serve all the user groups in a similar manner or at the same quality level. We aim at identifying the users in a large-scale information systems project, namely a patient record system, in a single qualitative case study. Our identification of different levels of users provides a base for conceptualizing the user, and for explicitly addressing them either proactively in the development or later when conducting a post-mortem analysis.

Keywords: Users, Information systems development, Public sector Information Systems

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1. Introduction

Public organizations provide different services to citizens (Lindgren & Jansson, 2013). Several public information systems (IS) are used to support the authorities and institutions and their employees, i.e. individual actors providing the services (Sundgren, 2012). While it is common to speak of a citizen receiving public services as a customer (Alford, 2002; Jansson et al., 2012), the notion of a user is not discussed explicitly in context of large-scale public sector IS. Traditionally, and implicitly, the IS users have been assumed to be those who actually use the system (Gulliksen et al., 1999; Bano & Zowghi, 2015). Yet there is a fundamental difference here: public services target citizens (Axelsson et al., 2010; Lindgren & Jansson, 2013) while information systems serve their users (Delone & McLean, 1992). These two are not necessarily the same, meaning the ultimate target actors of the system not being evident or trivial.

For a long time, IS research has explored addressing the users in IS development (ISD) (Swanson, 1974; Iivari & Iivari, 2006; Iivari & Iivari, 2011; Abelein et al., 2013; Oo Tha, 2019; Martikainen et al., 2020). Despite the early taxonomy of end-users (Cotterman & Kumar, 1989) explicit definitions or methods in identifying the IS user in different situations are rare. In fact, IS user has remained largely

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untouched in detailed inspection (Iivari et al., 2010; Amrit et al., 2013), although, for example, the users' interests may not be entirely shared (Damodaran, 1996). This is because the stakeholders' interests are intrinsic (Donaldson & Preston, 1995). While a high-level compatibility of different interests could be shared, the stakeholders do not necessarily agree on ends and means (Vidgen, 1987; Kirsch & Haney, 2006). While some stakeholder needs may be fulfilled, some others may not be addressed with a similar emphasis or at all. This underlines the importance of identifying the users and their types (Bano & Zowghi, 2015; Lukyanenko et al., 2016; Abusamhadana et al., 2019), making the question of who is the IS user relevant.

User involvement in ISD is ambiguous (Iivari & Iivari, 2006; Iivari & Iivari, 2011). Practical instructions on how to consider the users are superficial or contradictory (Pekkola et al., 2006). Different ISD methods address the users differently (Iivari & Iivari, 2011) and the developers conceptualize the users in different ways (Isomäki, 2002). Despite this diversity, addressing the users is said to be a key to success (He and King 2008; Hsu et al. 2012; Wing et al., 2017; Oo Tha, 2019; Abusamhadana et al., 2019; Martikainen, 2015; Martikainen et al., 2020). The users are experts in their domain and have insights about their work and work practices which should be leveraged in ISD (Cherry & Macredie, 1999; Abelein et al., 2013). User participation generates psychological buy-in among the participants, result in superior systems requirements, improves the relationship between the developers and the users (Markus & Mao, 2004), and eventually produces user-satisfaction (Abelein et al., 2013). However, who is the ultimate user is not always explicit as different actors have different interests towards the system (Damodaran, 1996).

In the context of public e-service development, discussion on the user participation is scarce (Karlsson et al., 2012) even though an in-depth exploration of the user engagement in IS implementation has been urged (Cherry & Macredie, 1999; Chan & Pan, 2008). In this paper, we seek an answer to the question, "*Who is the target user of user-centred development of a large-scale IS*?" We address the question by conducting a case study in the largest ISD project of Finland. We adopt the grounded theory approach (Urquhart, 2012) to inspect how the developers in the patient record system development project define IS users and how they address them.

The paper is organized as follows: in section 2 we discuss the theoretical background. In section 3 research settings and methods are presented. In section 4 we show our findings. The paper ends with discussion and concluding sections.

2. Theoretical Background

Being user-centered in ISD is a wide concept. User-centeredness could mean e.g. user focus, work-centeredness, or user-participation (Iivari & Iivari, 2006). User involvement has also been defined as a "a subjective psychological state reflecting the importance and personal relevance of a system to the user'" (Barki & Hartwick, 1989). User involvement consequently does not mean that the users necessarily participate in the development tasks (Thakurta, 2014; Bano & Zowghi, 2015; Wing et al., 2017). User involvement has been characterized on the continuum of informative, consultative, or participative user-involvement (Damodaran, 1996). It can be summarized that effective user

involvement is argued as users having possibilities to influence the development process (Damodaran, 1996; Pekkola et al., 2006).

In ISD, the target user has usually been defined as a person who will use the system for performing tasks that are part of his or her work activities (Gulliksen et al., 1999; Bano & Zowghi, 2015). This connotes with the definition of a first level user or an end-user (Cotterman & Kumar, 1989; Damodaran, 1996). Yet the concept of the user of a socio-technical IS is much broader. The second category of users are those who do not interact with the system but either benefit from the outcomes of its use (Damodaran, 1996) or use the system through an intermediary (Alsos & Svanæs, 2011). Damodaran (1996) for example argues that also users who do not directly use the system should be included in a systematic user analysis, as their interests may significantly differ. Further, it has been argued that the needs of those whose lives may be affected by a system should also be considered (Isomäki, 2002, p. 16). Although this has been acknowledged, those users not directly interacting with the system are often overlooked (Alsos & Svanæs, 2011).

Technological evolution and certain development methods (Taylor et al., 1998; Isomäki, 2002) have blurred the distinction between the developers and the users (Pouloudi, 1999). It has become increasingly difficult to distinguish IS users (Iivari et al., 2010). In complex contexts, such as public sector (Alanne et al., 2015) and large-scale systems (Tuunanen & Rossi, 2004), the task is even less trivial as the number of stakeholders rapidly increases and their knowledge becomes scattered. Public e-services may be developed for nationwide user groups (Axelsson et al., 2010). Involving all possible users individually is a daunting task (Cherry & Macredie, 1999; Abusamhadana et al., 2019). The complexity of the context and limitation of resources makes the question of who to address in user-centered IS development very arduous.

Addressing the users in ISD is consequently a multidimensional concept, varying in how it is applied in real life systems development. In general, it is rarely comprehensively defined who the developers consider as the target system users (Alsos & Svanæs, 2011). Most often they are the first level users i.e. those who use the system hand-on while working (e.g. Hsu et al., 2012; Abusamhadana et a., 2019; Martikainen et al., 2020). Consequently, they and their needs, expectations, desires are elicited and addressed. What is not often explicitly discussed is if and how are the needs of the more indirect users considered.

3. Research Setting

Our case focuses on an ultra large-scale IS renewal project for a group of health care and social care organizations in Finland. They include a set of municipalities and specific agencies. The patient record system is estimated to serve around 35.000 social and healthcare professionals and influence around 1.6 million citizens. The system is estimated to cost approximately 200 M€, and the total project around 600 M€. Project is thus one of the largest IS projects ever in Finland.

The decision to renew the patient record system was based on a need to integrate data from hundreds, if not thousands, of individual systems to raise the service level back to an acceptable level. Previous problems include the use of numerous non-integrated systems, and poor usability

and maintenance. Healthcare and social care were also operating in separate silos. While healthcare was the initial driver of the project, social care was decided to be involved and included. The aim was to connect these separate fields of practice through a single system so that the service experience to the citizens is improved and standardized no matter what service they needed.

Our study follows an interpretative qualitative single case study approach (Walsham, 1995) where the focus is on human interpretations and meanings, embracing the importance of social issues in ISD. This approach was chosen in order to draw implications from a large IS project (Walsham, 1995). The case was selected because of its unique nature in size and complexity.

Data collection was conducted between November 2019 and February 2020 by interviewing the main actors in the project organization. They were assumed to have the best information about the development practices and processes, and the users. The interviewees were selected through snowballing sampling (Morgan, 2008). First three interviewees were assigned by our contact person. Later we asked each interviewee to name the next potential person. The list of the interviewees is presented in Table 1 with their corresponding expertise.

Table 7: List of Interviewees

Interviewees' Position and Index	**Expertise**
Management [M1]	Technology
Management [M2]; [M3]; [M10]	Development
Management [M4]	Product
Management [M5]	Operational
Clinical Leadership [Clin1]	Clinical and Social Care
Management [M6]	Usability
Management [M7]	Customer and Product
Consultant [C1]	Social Care
Management [M8]	Product
Management [M9]	Unit

The interviews followed a thematic open interview protocol where the interviewer does not steer the discussion. The interview questions dig into the case details and events, as perceived by the interviewees. All interviews, approximately an hour each, were conducted by two interviewers and face-to-face in the case organization premises. All interviews were recorded and analyzed in Finnish. Only illustrative quotations are translated into English.

Data analysis followed Grounded Theory Approach (Urquhart, 2012). Data was analyzed by the first author line by line without any initial theoretical framework. We were interested in how the interviewees define the user and the development principles, and how they describe the project practices. For instance, the interviewees described the project, and all issues were taken as significant. Each incident was named with a descriptive code. Similar codes then were grouped into larger groups to represent collective conceptions. Finally, the relationships between the groups of codes were drawn. An example of the coding procedure is presented in table 2.

Table 8: Coding Examples

Data Extract	Code	Interpretation
"The system's end-users are healthcare and social care professionals, and those citizens using the client portal" [M2].	"End-users as professionals", "End-users as citizens who use client portal", "End-users as those in direct use-relationship to the system"´.	Those who directly use the system are perceived as the system's end users. Professionals and management use the IS directly through its user interface. Also, the end-users who use the client portal have a direct use-relationships to the system, and are thus perceived as end-users.
"[the user is] organizational management, who uses different reports and management functionalities and such. They, again, are end-users" [M2].	"End-users as organizational management", "End-users as those in direct use-relationship to the system".	

4. Findings

4.1. IS Users Defined

The system users were defined to be those who directly use the system: "The system's end-users are healthcare and social care professionals, and those citizens who are using the client portal" [M2]. Citizens not using the client portal are not perceived as the system's end users or customers. They are rather regarded as the customers of the client organizations: "the customers don't include citizens. Citizens are the customers of the client organizations" [M2]. Citizens not having a direct use-relationship with the system were considered as indirect users: "citizens are indirectly [considered]… while they are end-users in one sense, they are not customers" [M2]. Organizational management, on the other hand, were perceived as being direct end-users as they receive information and use the management support functions provided by the system. All this resulted in user experience including all the professionals using the system hands-on: "If you think about the user-experience, the system is only used by the social and healthcare professionals" [M8].

However, when talking about the person whose needs were to be fulfilled, the customers were placed on the center: "In principle, [the system] is defined to answer the needs of patients and customers" [M2]. Hands-on user relationship was also emphasized: "The system is developed for

the citizens. We have around 1.5 million citizens getting their things done through the system" [M4]. Yet the citizens were not perceived as the direct beneficiaries of the system: "Even though the citizen is at the center, the benefits reach them only indirectly" [M2]. The citizens benefit from the system only through the direct users' improved actions: "[The benefits are gained] indirectly in that sense that work of [healthcare or social care] professionals become easier and they treat patients accordingly" [M2]. Streamlining the professionals' work processes was defined as the "business case" [M5].

The logic of serving professionals was also apparent in the implementation goals. Initially the goal was "to streamline the work of professionals". Later, it was defined as to produce "a unified tool, which serves the work of professionals in all different contexts" [M6]. Also a more high-level goal: "the creation of wellbeing" [Clin1] was also mentioned. To achieve this, streamlining the work of professionals was seen essential. This issue of goal levels indicates that the work of direct users has a causal relation to producing the benefits to indirect, yet the main group of stakeholders.

The user viewpoint was strongly emphasized through the direct users' critical role. Serving the end-users was seen as a key for fulfilling the project goals "because it will lead [the end-users] to producing other goals" [M2]. The citizens were not addressed directly if they had indirect use-relationship with the system. It was assumed that their needs are addressed by involving the direct users (aka professionals): "The way how the needs of citizens were addressed… It is mostly left as our client's responsibility, as they [citizens]are clients of our clients, to bring their needs to us" [M8].

All this underlines a perception that the direct use-relationship directs the definition of end-users, i.e. whose needs the system targets in the first place. Citizens and other indirect users enjoy the system through its services. They benefit the system indirectly, through its direct users. The relationship with the system also seems to define which stakeholders are mostly focused.

4.2. Addressing Users in Development

It is apparent that the system was designed with a strong emphasis on professionals who are its direct users. This is visible in the practice of involving the professionals in the system design: "when comparing [this case] to other IS acquisition projects, the viewpoint of what the users need is exceptional" [M6]. During the tendering, the professionals evaluated candidate systems. They also defined the work processes and aligned them with the system functionalities.

The users were later granted with a possibility to give feedback and propose development ideas. In fact, the amount of user feedback exceeded the expectations: "We opened the idea bank to the end-users for their ideas… we learn that it was a far too open forum. Yet it enabled us to make changes quickly. However, then the others started to moan why such thing were done" [M4]. This put a need for a centralized decisions-making mechanism to coordinate different proposals and change initiatives. This also points out the emphasis on listening hands-on users. They were continuously involved in the development in various ways.

Serving direct end-users is apparent also on the usability efforts. An improved usability was a significant selection criterium in the tendering. In fact, the chosen system was described having the best usability compared to its challengers. This led the usability professionals becoming integrated

in the ISD process so that they could analyze the needs and system usability, and perform usability tests. Direct end-users were participating in those tests.

Some citizens participated in the development of the client portal. For instance, after the client portal had been introduced, the citizen feedback initiated new development actions. For example, "we didn't realize that some citizens still have those shorter phone numbers. First, it was impossible to enter those… we fixed that, and now it is enabled" [M8]. Although this example illustrates only a small action, it exemplifies the influence of the direct users, citizens in this case.

The focus on direct users was also explicit in the user stories. They were used in evaluating the system candidates. The user stories narrated typical scenarios, through which the systems were demonstrated. This exemplifies the professionals being the main target stakeholders. The professionals themselves also used their experiences to create the stories. Altogether the stories were perceived useful as they conveyed information, which could have been easily otherwise ignored.

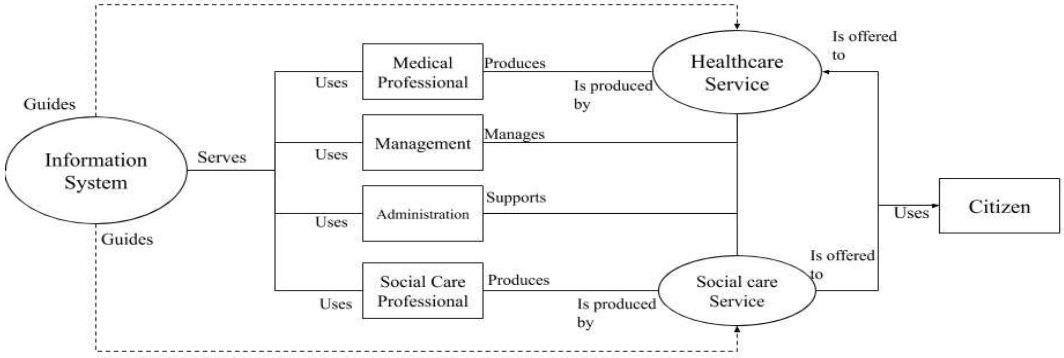
It was apparent the direct users' needs were not aligned. In a large and complex project these diverse needs may have not been treated entirely equally. Social care workers were complaining about the difficulties in adapting to the new scheduling functionalities: "I have tried to explain that the basis [in social care] is that even though the system would enable modern booking functionalities, we should not take them into use immediately because we have to first learn how to use an electronic calendar" [C1]. In this situation the development activities were targeted to healthcare professionals. The functionalities, perceived as unsuitable by the others, were still taken in to use: "Those responsible for the booking functionalities are from the healthcare sector. They are strongly stuck with the healthcare sector model. I just heard that this model still dominates. Since they don't have background in social care, they don't know how people work there" [C1]. The functionalities were also described as not being well aligned with the social care: "Reporting is quite quantitative. It is not understood that we [in the social care] receive a lot of qualitative material" [C1].

5. Discussion

While the user involvement in the ISD has been studied and urged, the practice of involving them has remained ambiguous especially in the context of large-scale systems development. Particularly discussion about who is the target user and what are the implications of such choice are rare. In this paper, we have studied who are the target users of a patient record system development. Figure 1 shows the relationships between different user groups and the IS in a patient record system. It illustrates that the development of a large-scale public sector IS addresses directly healthcare and social care professionals, administration, and management (Thakurta, 2017), considering citizens and even public services only indirectly. Citizens using the client portal is an exception, since they were considered directly in that narrow context. Medical and social care professionals are the primary user of the system as they provide services to citizens. Administration uses the system directly when they support to the actual customer service, such as billing. Management is also in a direct use-relationship as they use the management functionalities towards the professionals (e.g.

monitoring citizen feedback) and to receive information about the services (e.g. about the patient flow).

Figure 11: Use-Relationship to IS



In our case, addressing the users directly was an efficient and effective approach – at least in theory. First, they were given a possibility to influence development (Damodaran, 1996; Pekkola et al., 2006). However, it is uncertain how effective the involvement actually was since measuring their influence or observing large scale system changes remains a mystery. There is a possibility for non-efficient involvement of users (Wing et al., 2017; Martikainen et al., 2020). While both parties may be interested in collaboration, the users perceive their views may not be efficiently considered (Martikainen, 2015). Our findings parallel with the literature that involving only some groups of users (Abusamhadana, 2019) especially hands-on users (Cherry & Macredie, 1999) is a typical user-centered approach.

As Figure 1 illustrates, the citizens were not defined having a direct use-relationship with the system (apart from through the citizen portal which provided only limited functionality). They were defined as indirect users, since their "system usage" took mainly place through the professionals providing services (Thakurta, 2017). Indirect users were not involved in the ISD. They were addressed through the professionals and their experiences of typical users. This approach is common in the form of intermediaries (Axelsson et al., 2010; Karlsson et al., 2012).

Although direct users were addressed, their interests were not aligned but numerous interpretations and opinions were common (c.f. Vidgen, 1997). Especially the users from the social care and from the healthcare had very differing needs and dissimilar expectations. Also the management had different priorities. While they embraced the systematicity with project management, such as holding on to the schedule, the operational level interviews revealed different views: "if you think about the project deadlines, they are being held on a bit too tightly. Of course there is a certain schedule but there are reasons for asking whether we can be bit flexible with it. But the train keeps on going…". This kind of pluralism in user needs is often the case in ISD (Vidgen, 1997; Kirsch & Haney, 2006). The interests of hands-on users may also differ from those of indirect users (Damodaran, 1996). Our findings indicate that the healthcare professionals and their opinions dominate how the citizens' needs are addressed. However, in our case the objectives are twofold. This means both healthcare and social care should be considered. This imbalance may cause

problems later when the social care is becoming more in the focus of the development (Lindgren & Jansson, 2013).

We argue that in large-scale ISD, the services supported with an IS need to be put in the center. Not individual users nor technologies. This emphasis on the service process will shift the perspective of who are the users and how their needs should be considered. While the perspective of patients has been argued relevant (Alsos & Svanæs, 2011) in our case they seem to be the "silent stakeholders" (Pouloudi et al., 2016).

6. Conclusion

We explored how the IS users are addressed in a large-scale public sector IS project. Our findings indicate that only those who have a direct use-relation to the IS are directly addressed. Secondary users, although defined as the main stakeholders, were addressed mainly through intermediaries. The citizens were thought to be at the main focus, but they and the other indirect user groups were actually considered as indirect beneficiaries. This results in the IS mostly its direct users, professionals at healthcare and social care.

Our case demonstrates that addressing the users and user groups in the development of a large-scale public sector IS is not easy or easily balanced. One reason for this is the large number of stakeholders, whose interests' conflict, or at least are not aligned. This is also apparent in our case where the users' interests are not shared but some groups are overemphasized at the cost of others. Those dominate the development, evidently influencing on the perceptions of the final system and its quality.

Our findings illustrate what addressing the users means in practice. This helps researchers and practitioners in defining what the ambiguous concept of user-centeredness means. However, deeper analysis about how the intermediaries address the needs of main beneficiaries (citizens in our case) is still urged. Also, it would be beneficial to explore the user-side perceptions and how their needs are addressed. This should include all user groups, both hands-on users and more indirect users.

Our main limitation is the single case study approach. This surely provides somehow narrow perspective, which should be taken into account when generalizing the results. Second, only the developer organization employees were interviewed, and mostly from the management level. Such perspective does not thoroughly describe the operational-level issues.

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