User Participation in Information Systems Development for Emerging Public Sector Initiatives

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Abstract

This study is a-posteriori analysis of information systems (IS) development in a cross-sector collaboration case to identify and address user participation challenges in emerging public sector initiatives. The major challenges in the studied case was to develop IS for future cross-sector collaboration in a setting that does not yet exist, i.e. where the tasks, stakeholders and end-users are undefined. To address identified challenges, we suggest a combination of activities based on multiple design groups, scenario-based Future Workshops, focus groups, context-specific frameworks, and practical exercises with after-action-review. We argue that while similar challenges have been discussed in relation to large-scale projects and, sometimes, cross-sector collaboration, IS development for emerging public sector initiatives pose specific issues that need to be addressed.

Keywords: User participation, future service design, cross-sector collaboration

1. Introduction

Digitalisation is prevalent in all aspects of modern societies. To understand the context, users and their tasks and needs are pre-requisites for successful information system (IS) development [19]. Since the origin of collective resources approaches in the 1970s, studies have repeatedly argued that approaches actively promoting user participation in system development lead to a better fit between the technology and the way people use it in their daily life and work [8],[19]. Examples of such approaches that have used extensively in IS development are Participatory Design (PD; e.g. [8], [30]), user-centred design (UCD; e.g. [9], [22], and user innovation (UI; e.g. [33]). However, different studies show that to create participation is not an easy task especially in large-scale projects with heterogeneous stakeholder/user groups or in the resource-strained public sector [7], [13], [23], [31].

Recently, there has been a global trend to improve efficiency in public services by involving alternative societal resources, not least in emergency management, as one response to challenges of urbanisation, de-population of sparsely populated areas, ageing populations and scarce professional response resources. Examples include the involvement of the private sector, volunteers, bystanders and citizens, sponsors, suppliers, various steering committees and contractors i.e. cross-sector collaborations [36]. User participation has been used in the public sector and cross-sector collaborations, for example in healthcare organisations and social welfare, in projects involving marginalised societal groups, to decrease education gaps, or for civic engagement [23]. Scholars have identified difficulties in doing this, since available resources often are scarce, heterogeneous, without any organisational affiliation and even partly unknown e.g. [7], [31], [25], [26].

In emergency response, at least in Sweden, new occupational groups (e.g. security guards and homecare personnel) are provided with basic training and equipment and increasingly engaged in first response. In this study, we define them as *semi-professionals*. Semi-professionals' primary jobs are not first response, but they are spread out in the community and might be closer to emergency sites than professional response resources. For example, a facility service technician that has a car and a

fire extinguisher may have the potential to extinguish a small fire before it spreads. The related stakeholders and end-users belong to different societal sectors with diverse interests and opportunities. They are assigned first response tasks in a setting that is entirely new to them [25] including undefined organisational, legal and ethical rules. Also the stakeholders/end-users themselves are partly unknown from the outset. Engaging people from one professional field to perform tasks in a different field is a rather recent but increasing trend in our society and has been studied in emergency response as well as other public sector areas [4], [34]. While the trend is new and growing [34], IS are important to facilitate e.g. communication, positioning, decision-making and alarm management. Here, user participation plays an important role to identify the need for appropriate IS. However, we have not seen any user participation studies carried out in a context where professionals actually take on new tasks in a different field previously exclusively carried out by the authorities. We, therefore believe it is of interest to apply user participation as an important component of the IS development in emergency cross-sector collaboration initiatives and explore what works well, what potentially leads to new challenges, if challenges usually associated with user participation are aggravated, and how they may be addressed.

The overall aim of the study is thus to explore how user participation can be used in IS development in emerging public sector cross-sector collaborations involving semi-professionals in emergency response. In particular, the study's objectives include *1) identifying general and context-specific challenges when involving heterogeneous stakeholders/end-users, more specifically semi-professionals and 2) addressing how these challenges might be handled.* The corresponding research question is "What are the challenges of applying user participation approaches to emerging cross-sector collaboration initiatives and how may they be handled?". The study can be seen as an instance of public sector innovation and future services implementation and may thus be of interest to the IS development community involved in various public sector social innovation projects, i.e., new products and services that create new social relations, tasks and collaborations, and in which societal resources similar to semi-professionals are involved.

2. Background: user participation and challenges

In this section, we briefly describe user participation approaches and challenges, the study context and related work. User participation has long been an important topic in IS development [16], [22] and can be defined as 'the behaviours and activities that users or their representatives perform in the system development processes' [10]. It is believed that user participation provides many benefits and can lead to a more accurate definition of IS requirements, democratic design process, a user-friendly user interface, and a greater acceptance rate of the IS by the users [8], [20]. User participation can be realised through different approaches, including Participatory Design (PD), user-centred design (UCD) and user innovation (UI). However, research shows that the approaches overlap and may not be completely separated [17].

PD has its roots in Scandinavia in the 1970s when it had political connotations and a clear ideology based on democratic principles and the full and active involvement of users. The end-user group was then relatively homogenous, mostly consisting of shop-floor workers [6], designers, and sometimes trade union representatives and journalists. In later generations, the approach was extended by defining and categorising users to include larger groups and by the successive involvement of heterogeneous stakeholders in increasingly complex work environments, inter-organisational contexts, and large-scale systems [7]. UCD emerged almost at the same time as PD, however, its focus was on user interface design as a starting point to identify user's needs for IS [17], [22], rather than on democracy. Stakeholders/end-users are not viewed as equal partners to system developers and are mostly advisors or sources of information in the development processes. UI emerged in the 1980s and focuses on innovative system functionalities suggested by lead users whose needs are perceived common to other users in the future [33]. UI emphasises innovative characteristics of the design solution and not the active involvement of stakeholders in the design process. A pre-requisite to run UI is usually to have a specific problem in a distinct organisational context and the existence of a group of lead users who can provide innovative solutions for that problem [13].

However, user participation has also been associated with various challenges manifesting themselves to different extents in the above mentioned approaches. It has been argued that user participation may have negative effects on project performance because it is time and resource consuming given that system developers are required to contact, motivate, and practically involve stakeholders who do not always have the time to participate in design groups [23], [31]. Related

challenges include holding meetings, upholding democratic principles, resolving conflicts in design groups, offering a focal point for stakeholder contributions, and limited time for evaluating results (e.g. prototypes) [7], [13], [31]. Furthermore, user participation projects often only deliver small, stand-alone IS in contexts with low organisational complexity [7], [31]. It has been argued that the difficulties increase in contexts with multiple sets of stakeholders from different organisations or societal sectors or who may lack organisational affiliations, not least in the public sector [7], [25], [31]. Recent research also shows that the notion of users has changed to the notion of people/stakeholders (e.g. in civic engagement, e-government) and that contemporary user participation embraces a poly-voiced notion of stakeholders rather than focusing only on end-users. Recent studies show that many user participation initiatives do not focus exclusively on technology design but also embrace social infrastructure development, organisational frameworks or policy context design, for example by changing existing infrastructures, improving processes and collaborative work [3], [23]. Therefore, user participation has evolved in terms of both who the participants are and the outcome should be expected from design work and design groups. Such evolution is in line with current trends in societies and the need for IS, i.e. emerging cross-sector public section initiatives. In the study, we use the notion of user participation as an umbrella term, referring to user participation in IS development, and associated challenges generally, even if many examples are taken from the domain of PD.

2.1. Study context and baseline

Emergency response services aim to save lives and minimise damage to property and the environment in case of an emergency. Emergency response systems globally show many similarities in terms of organisations involved, tasks to carry out, needs for equipment and IT support, even if organisational structures, command and control structures, and legal systems differ. In Sweden, the four major response organisations are the municipal fire services, the Police, the emergency medical services and SOS Alarm (the national alarm centre).

Cross-sector collaborations with semi-professionals are currently being developed in a rapidly growing number of Swedish municipalities. The idea is to utilise existing human resources employed by, or under contract with the municipality, for example nurses, security guards, homecare personnel, taxi drivers, and caretakers. They are dispatched as first responders while waiting for the professional response organisations, thereby decreasing the first response times to accidents and acute medical emergencies. If the design of related support and IT artefacts fail to meet the first responders' needs, consequences can be devastating since emergency response is ultimately about saving lives and minimising human suffering.

ESKORT is a cross-sector collaboration emergency response research project, set in the municipality of Norrköping. It aimed to identify, train, equip, and evaluate the use of semi-professionals in the municipality. The project ran from 2015 to 2017. It included the analysis of potential semi-professional groups, identification of user needs, and providing them with proper equipment, training, and IT support for alarm management, geographical positioning and navigation. Our study is a-posteriori analysis of the IS development in the project.

The study baseline comprises several years of research in various emergency response projects in Sweden aimed at developing the emerging collaborations. For example in [25, 26], we used user participation approaches for the development of collaborations between civil volunteers and fire services in rural areas, and for the cross-sector collaboration between Nyköping municipality fire services and elderly care personnel. The current study specifically addresses stakeholder/end-user identification and involvement when developing cross-sector collaboration with semi-professionals from scratch in an entirely new project context. In contrast to the previous studies, the infrastructure for the semi-professionals' tasks, work context and responsibilities did not yet exist and the primary users were not known beforehand.

To facilitate the involvement of diverse stakeholder groups and keep participants focused on the ensuing user participation process, we developed a context-specific framework that is described in detail in [36]. It is based on a socio-technical system perspective and consists of fifteen dimensions categorised into five parent-dimensions by which various aspects of the collaborations are defined. The fifteen dimensions are: *type/role, attitude, training, background, task and responsibility, availability/accessibility, incident type, communication method, information technology, emergency supplies, organisational structure, leadership, costs/benefits, environment, and regulations* and *legal issues*.

3.   Methods

Our study was carried out as a case study based on a qualitative interpretive approach [21]. Accordingly, user participation is understood in terms of social construction and the meaning people bring to the study object, i.e., the user participation activities. The study is also inspired by participatory action research (PAR) [28], in which the interaction between researchers and other relevant actors is central. In the study, the interaction between researchers and stakeholders was central to the understanding of the various aspects of user participation. The studied user participation activities included two Future Workshops [15], six focus groups, and an exercise/after-action-review [32]. Regular project meetings were also counted as user participation activities since the participants tried to take collective actions and decisions. 10 meetings were held with the average of 2.5 hours per meeting with an average of 5 participants under a period of 2 years.

Five researchers participated in the ESKORT project. Three had the double role of designers and carried out this study. The other project participants included representatives from the fire services, the municipality, an IT company, the Police, the healthcare sector, home health care, facility services, and a security guard company. The role and number of participants in each user participation activity are explained in the results section. The data was gathered from observations of the user participation activities by one of the researchers, who was mainly responsible for the organisational and needs analysis, had developed the context-specific framework, and is the primary author of this paper. A project diary was used to note observations from the user participation activities with a specific focus on the identification and involvement of end-users and other stakeholders. An example is shown in Figure 1.

ESKORT Project diary example

Activity: Future Workshop 1 , April 2015

Aim: Stakeholder identification

Number of participants: 13

Participants : Fire services (3 persons), Home health care (2 persons), municipality safety representative (1 person), the Police (1 person), emergency medical services (1 person), security guard company (1 person), researcher group (4 persons)

Work method: To discuss in two groups to identify potential semi-professional candidates, related stakeholders and potential challenges. The context-specific framework was presented and used to guide the participants. The group discussed the current status of emergency response in the municipality, what the problems are, how and in which emergencies semi-professional can contribute, who can be a semi-professional, how they can be engaged and what the related primary challenges and needs are.

Example of observed challenges:

Participants mentioned that it was difficult to discuss the intended cross-sector collaboration when they did not have enough related experiences.

Fig. 1. An example from the project diary used to categorise the challenges

Spontaneous actions (e.g. modifying Future Workshop) or planned actions (e.g. the use of scenarios) were taken successively to handle the identified challenges. The project diary was also analysed to find the roots and causes of the experienced challenges (see example in Figure 1). All user participation activities were analysed using interpretative, thematic analysis and four major themes/challenges were identified (see Section 4). To avoid bias in the results, the other two researchers/authors, who were active and present at project meetings and also in the data gathering activities, provided feedback on the retrospective analysis, e.g. in terms of whether they agreed on the challenges identified, why they occurred and how they had been handled and with what result.

4.   Results

The results embrace user participation in a general system development process including project initiation, stakeholder identification, organisational analysis, needs analysis, and design (Figure 2). We present each phase with the identified user participation challenges. We also describe the actions taken to handle them and the outcome of each phase.
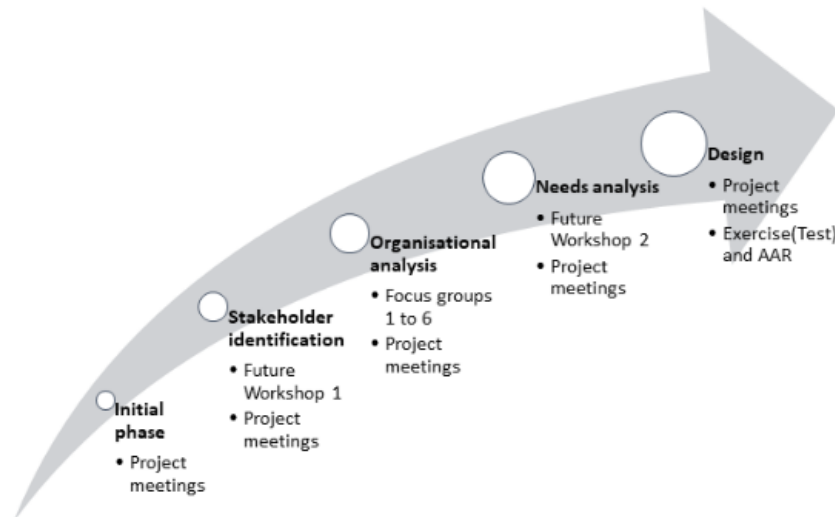
Fig. 2. The ESKORT project development process.

4.1. Initial phase: formation of the core design group

Challenge: Unknown end-users and stakeholder groups. The first challenge encountered was simply that we knew about potential end-user groups, but not who they actually were in the specific collaborative context. Similar challenges have been noted in user participation in public sector initiatives, e.g. in a future service implementation of a social welfare project in which the end-users and owners of intended IT systems were not clear in the initial phase [23]. In our case, the entire cross-sector collaboration was also new and related tasks not yet defined. For example, in the initial project meeting, one of the researchers said:

> "…What are the tasks that they [semi-professionals] should do? Who are they? From what perspective we should discuss them? It is too broad."

Therefore, we found it difficult to include representatives of all stakeholders, as user participation approaches often have emphasised, e.g., in the MUST method which is based on participation of users and managers from project start [16].

Action: Formation of core design group. We decided to form a *core design group* including the available stakeholders with the project manager, a group of researchers, a representative from the fire services, the municipality's security manager and a representative for the IT-company responsible for developing the alarm management system prototype for semi-professional's dispatching, navigation, and communication. The members were thus already part of, or closely related to the project. During regular project meetings, the group made decisions concerning data review (e.g. organisational analysis), design activities (e.g. future workshops and focus groups), and ongoing project progression. Meetings were held every 2 to 3 months during the 2 years. However, the core design group initially lacked active representation of end-users.

4.2. Stakeholder identification

The semi-professionals – end-users – can come from various occupational groups. Thus, we needed to devote much attention to end-user/stakeholder identification and analysis. To perform a separate stakeholder identification was deemed essential by the core design group. The purpose was to understand the potential and challenges of using semi-professional resources in cross-sector collaborations and, not least, to identify and involve them.

Challenge: Lack of sufficient competence in the core design group to explore all stakeholder aspects. An important part of stakeholder identification focuses on stakeholder characteristics. Thus, we introduced the context-specific framework to the core design group intending to explore all framework dimensions and facilitate identifying related stakeholders. However, the core group's collective competence was insufficient to discuss all the cross-sector collaboration dimensions. Personas or 'fictive user presentation' has been used as a technique to understand stakeholders if they are not represented [6]. However, they must be known in order to create their personas. Also, some

studies claim that personas do not support user participation and may draw attention from real participation of real stakeholders [e.g. 6].

Action: Formation of the extended design group. An *extended design group* was formed by involving other important potential stakeholders (known at this stage) who could help explore the various dimensions. A similar approach was used in a public sector project in social welfare [23] in which the project objectives were divided and assigned to the different stakeholder groups. The approach of iterating between design groups has been utilized before in large-scale projects in, e.g. PD [24], but to our knowledge, not in projects of smaller scale. The extended design group included the police, the municipal home health care, fire services day personnel (e.g. inspectors and technicians), and a security guard company. Some of the new stakeholders were also potential end-users (e.g. fire services day personnel) and some were managers of possible end-users. The gradual involvement of additional stakeholders in the design process is not new (see e.g. [23]) but in our case, the framework supported their identification.

Challenge: Lack of shared understanding. It has been claimed that stakeholder understanding of project core values are often taken for granted in user participation but in reality is difficult to achieve [12]. Divergent interests and knowledge of participants may lead to various conflicts between stakeholders in activities [e.g. 31]. In the stakeholder identification, the lack of shared understanding of the project core values and concepts (cross-sector collaboration, emergency situations and semi-professionals), was observed in both groups. One example was different interpretations of the term 'emergency situation' between the fire services and homecare representatives, since both groups had worked with emergency situations but in different ways.

Action: Brainstorming and literature review for a collective overview. To create a shared understanding, different ways have been suggested, e.g., articulating project core values, creating guidelines and dialogical processes between stakeholders [7], [12]. However, these methods presume some kind of common existing target context to start from. Thus, the core design group instead devoted an initial meeting using brainstorming and open discussions to gain an overview on the project, key organisations, and the intended cross-sector collaboration. Participants could ask their questions, voice their concerns freely and achieve some consensus on the project values and concepts. At the end of the meeting, all participants had a reasonably clear view of the project subject and aims.

Challenge: Developing a collaboration, which does not yet exist, in a resource-strained environment. The difficulties in achieving user participation have in part been explained by the fact that related activities are time- and resource-intensive [7], [13]. The need to concentrate user participation where it contributes the most has been pointed out, e.g. in relation to large-scale systems [24].

Here, the semi-professionals had different occupations, working on different time schedules (e.g. day/night). They had no dedicated time for the project and no formal responsibility to participate regularly in the development of the collaboration. In addition, to develop the semi-professionals' activities from scratch posed specific participation issues. According to [7], special instruments are required in user participation activities to facilitate the design work. Here, stakeholders did not have any reference point from which to discuss the current context and we did not find it feasible to ask them to reflect upon a work situation that they had never experienced:

> "I think it will progress faster if we can find something concrete to work with. Now I have the whole world
> to work with. All situations everywhere with all actors. Then it's hard to ... feel like we're on the right track."
> (municipality representative, core design group)

Action: Scenario-based Future Workshop supported by the framework. To enable and focus the user participation, the core design group decided to involve the extended design group in a Future Workshop, a design workshop technique commonly used in PD to allow participants to design their working environment [15]. Workshop participants can criticise their current situation, develop new ideas, suggest solutions and discuss implementations. The point of departure is normally the current work situation, and the discussion is often open. However, scenarios have also been used in Future Workshops to create shared points of departure among participants [5]. Using fictive dilemmas has been found suitable in recent public sector initiatives to help hold focus on the subject [2].

Since no work situation and setting existed in our case, we adapted the original Future Workshop concept using the framework and constructing scenarios. The core design group developed three short and easy-to-understand future fictive scenarios and provided them to the stakeholders to trigger the discussions. The scenarios were a traffic accident, a cardiac arrest and a fire in a building. To reduce the risk of a too narrow focus, the scenarios were selected to cover the most frequent emergencies in the municipality.

There are frameworks designed to either formalise user participation activities or conceptualise the related challenges [e.g. 14]. However, they are mostly developed for designers. We have not found frameworks specifically designed for participants to support their contribution. Initially, we used the framework as a support instrument to provide a basis for participation in the workshop, giving focussed discussions, as the framework dimensions defined the boundaries.

User participation outcome: Identification of potential end-users and other stakeholders. The fire services day personnel, homecare personnel, facility services personnel, and security guards were selected as the most suitable potential semi-professionals given the current collaboration/project context. A list of additional stakeholders of relevance for cross-sector collaboration was also compiled. Some core organisational issues and needs, emerging from the literature review and the Future Workshop were summarised for use in the subsequent phases.

4.3.   Organisational analysis

The purpose of the organisational analysis was to explore different organisational aspects of cross-sector collaborations with the help of the selected, potential semi-professional groups.

Challenge: Developing a collaboration, which does not yet exist, in a resource-strained environment. The participants in the extended design group were still not sufficiently heterogeneous to cover all aspects of the emerging collaboration, e.g. certain framework dimensions regarding regulations/legal issues and leadership. More important, the extended design group did not include all identified end-user groups. The intended work context and the related tasks and responsibilities were also still entirely new to the perceived users. Therefore, we deemed that traditional user participation methods might not be the best solution for the organisational analysis. Also, it was almost impossible to find a joint time slot for all end-user representatives for a workshop.

Action: Focus groups supported by the framework. We decided to involve both the operational and management levels of the identified end-user groups in focus group interviews. In focus groups, a group of people address a particular topic to form a collective view [21]. The method stems from the field of traditional qualitative research methods. However, it has sometimes been used in user participation IS approaches [2] and can possibly be seen as a form of user participation because the interviewees play the major role and the interviewers act mostly as moderators. Our intention was to create the opportunity for participants to discuss the setting collectively while focusing on the subject using the context-specific framework. Four focus group interviews were performed at the operational level of the interviewee's respective organisations and two at the management level. By using the framework, the overall scope of questions was identified beforehand and questions were designed to yield sufficient and relevant information covering all dimensions. For example, interviewees were asked about their ability to interrupt their work to take part in emergency response, and about how they could achieve a balance between their current and potential new tasks.

User participation outcome: Identification of final end-user; cross-sector collaboration challenges, opportunities, needs. Fire services day personnel was found to be the most promising potential semi-professional group. They were accordingly selected as the main candidates for the needs analysis in the next phase. Other end-user groups were excluded for example because their organisations did not support the collaboration or because they had tight daily schedules. Lists of general opportunities, challenges and additional core needs were produced.

4.4.   Needs analysis

In the needs analysis phase, the selected end-user's needs were further analysed.

Challenge: Developing a collaboration, which does not yet exist, in a resource-strained environment. A Future Workshop was held and the invited stakeholders were fire service day personnel, fire service instructors and fire service dispatchers. However, once more we found it difficult to gather all the stakeholders since they had different work schedules. Also, it was still difficult to identify needs based on hypothetical tasks:

> "What is the vision and the objective of this (new collaboration) and what we [as semi-professionals] do
> ...what is the ambition level?" (end-user participant).

In [25], in a similar context of involving civil citizens as first responders, Future Workshops were used not only for needs analysis, but also to negotiate, identify, and formulate tasks jointly.

Action: Prototype-based Future Workshop and narrowed focus. We decided to change the workshop format and hold it with a reduced set of participants. To trigger the discussions, a

presentation was made of a prototype smartphone application for receiving alarms and obtaining navigational aid. The application was a part of the alarm management system that had been developed by the IT company in parallel with the needs analysis and was based on the core needs identified in the stakeholder and organisational analysis. The number of participants (two end-users and four members of the core design group) was insufficient to run all phases of the workshop. Therefore, the end-user representatives were given time to think about their needs individually and then discuss them with each other and with the core design group. We limited the dimensions to training, emergency supplies, and information technology, which were essential for the project design and test phase.

User participation outcome: User needs list. The user needs list included both needs for organisational restructuring (e.g., the need to have somebody that can take over the main work tasks when performing an emergency response) and detailed needs on training, IT, and equipment.

4.5.   Design

Designing the collaboration was not only about developing a product, but equally about creating a basic foundation/infrastructure including training and equipment.

Challenge: Designing and evaluating a collaboration, which does not yet exist, in a resource-strained environment. As for the semi-professional's evaluation of the collaboration and the iterative design of the application, common user participation tools include prototypes, mock-ups, roleplaying, and wireframes [29]. A pre-requisite to run the methods is an existing organisational context and processes that the participants are familiar with or have worked in. Such pre-requisites were absent here.

Action: Scenario-based exercise and core design group as decision-maker. Given the challenge to use common user participation tools, we decided to capture the end-user's voices by creating the future cross-sector collaboration context using an exercise/simulation. The smartphone application and the identified end-user's needs were tested and observed in an exercise involving a simulated traffic accident with two victims, and followed by an After-Action-Review (AAR). AARs are explicitly used for participant feedback; something that previous studies [24] have suggested user participation needs to focus on. Group exercises and games have been used as user participation techniques [18], [29], but again the underlying assumptions often rely on existing organisational settings. Here, we based the exercise on a future scenario designed by the core design group. It helped to create a small part of the new context and to hold focus. The experience from the observation of the exercise and the AAR was sent back to the core design group who refined training topics and emergency response equipment.

User participation outcome: Basic infrastructure for the cross-sector collaboration. Outcomes of relevance for the study include a training package, an equipment list, and the requirements for the alarm management system including the smartphone app.

5.   Discussion

In the following, we first discuss the identified challenges and then our selected combination of activities in a wider user participation context.

5.1.   User participation in social innovation contexts: challenges and means to handle them

The studied case may be viewed as an instantiation of emerging trends of social innovation and future service implementation in the public sector, i.e. new products and services that create new social relations, tasks and collaborations [11], [23]. From our study, it is clear that the context itself, i.e. *developing and evaluating a collaboration, which does not yet exist, in resource-strained environments* gave rise to the foremost difficulties. The difficulties manifested themselves throughout all development phases, taking various forms and were handled by various means in each phase. In contrast, user participation approaches, in most cases, assume an existing organisational context, known processes and identifiable participants [1]. Furthermore, the literature discusses the challenges mostly in relation to large-scale projects or projects with multiple stakeholders where it is difficult to create user participation [7], [31]. However, as shown in our study, social innovation projects do not need to be large-scale to pose similar challenges. On the contrary, we had to devote much of our efforts to identifying and defining the context and selecting the primary end-users. We thus tried to form *two interacting design groups* involving initially available and known stakeholders. While user

participant approaches emphasise creating project groups, design groups and steering committees including different stakeholders [15], the functionality of such groups and their interaction is often taken for granted. In the study, we problematize this functionality by pointing at how the lack of sufficient end-user representation was evident in both groups. On the other hand, we also show how the design group's interaction enabled us to involve stakeholders where they were most needed, considering the limited time and responsibility they had in the project. The core design group was also a stable and highly motivated group with an average number of six participants in the project meetings.

Utilizing many user participation techniques e.g. organisational games, role-playing and contextual inquiry [18], [15], [29] becomes difficult when an organizational setting is absent. At the same time, to design future services of semi-professionals require a substantial exploration of the intended context. Therefore, we used *focus groups*. We found the method helpful since it made it possible to involve the various stakeholders and end-users separately, including the operative versus management level. Participants, not least at the operative level, could discuss and understand the context collectively and freely, and had the opportunity to complement one another. This, in contrast to traditional design groups which sometimes run the risk of being dominated by management representatives [30]. A limitation of focus groups is however that they do not support participants to experiment or experience the future and may thus be unreliable as a source of knowledge for actual practice. In our case, the results from the focus groups should thus be seen as a platform for other user participation activities.

In the subsequent needs analysis and design, *future scenarios* helped the participants to visualise the context and to trigger the discussion. Scenarios are used extensively in user participant approaches [5], however, we found their role specifically important in future service design when the context is not well known, and where an end-user was expected to switch between ordinary occupational tasks and a completely new assignment.

Since the context was entirely new for the semi-professionals it was challenging for them to discuss possible tasks, training, legal aspects, IT support, etc. We had to simulate the real setting. The *experiment* and the following *AAR* was possible to perform by involving a few end-users and some additional stakeholders. Experiments are used as technique in e.g. PD to test outcomes (e.g. prototypes) [31]. However, in our study, they were also used to create an opportunity for the participants to act in a future setting. They provided helpful new information on user challenges and needs, for example legal issues concerning medical treatment, and the need to inform victims and professional resources about the role of semi-professionals in emergencies. In the AAR, also the fire and ambulance services, contributed to identifying new needs, e.g. the benefits of sending the exact GPS position of the accident once the semi-professionals arrive at the emergency site. Our experience is thus that, the combination of the experiment and AAR is very useful to help participants reflect upon a future context. On the other hand, real experiments are often expensive and time-consuming, which is also noted by other researchers [31].

Context-specific frameworks can be used for supporting analysis of complex domains, to facilitate the understanding of the context and the related actors and stakeholders, e.g. for analysing cross-sector collaborations [4]. In our study, the lack of shared understanding was a clear challenge. The use of the emergency response context-specific framework was perceived to facilitate the inquiry processes and identification of relevant stakeholders, bring structure to activities, and keep focus while trying to retain the central role of end-users in the participation processes. For instance, organisations that had knowledge and experience about one or more of the framework dimensions and who might be affected by the collaboration were considered potential stakeholders. Without the framework, it was not clear which criteria should be used to recognise an actor as a stakeholder, i.e. the risk that important organisations were overlooked decreased when using the framework. Also, without the framework, for example 'organisational structure' and 'legal issues' might have been overlooked in the focus groups, although these aspects became increasingly important later during the final candidate selection. The importance of instruments to facilitate the inquiry process, and shape the user participation processes has been emphasised in large-scale projects [7]. The framework was therefore a central inquiry instrument for providing a point of departure in design activities. For example, after a brief presentation of the framework for the participants, they started using it and innovatively divided the discussions/activities in order to cover all dimensions. Several participants mentioned that the framework helped them to focus on related topics instead of having sporadic discussions. Similar frameworks based on sociotechnical system theory already exist, for example the framework by [27]. However, they are often general and on an abstract level, implying that they may

not be sufficiently concrete, simple and straightforward to support active user participation. For example, it is not clear how the participants can find out which are the important aspects of cross-sector collaborations, for example with regard to legal issues, responsibilities and training. Therefore, we suggest the use of context-specific frameworks in user participation activities when the frame of reference is absent or unclear for the participants.

5.2.   Focusing on user participation outcomes

Some of the major outcomes of the ESKORT project itself include the list of challenges and needs, the training packages, lists of emergency equipment, and the alarm management system prototype with the associated list of requirements. Although the main goal of the study was user participation in IS development for emerging public sector initiatives, the process led to broad outcomes contributing to a new infrastructure. The outcomes are in line with recent studies which show that many user participation IS development activities in fact embrace social infrastructure development as well as technology design [3], [23]. It may be argued that we did not succeed in designing an entirely new infrastructure, since we had to focus on training, supply and IT aspects. On the other hand, all other needs such as organisational changes, tasks, responsibilities, insurances, agreements and legal aspects, have also been documented and handed over to Norrköping municipality to be used in further IS development. Regarding practical implementation of the project results, the fire services started to train their day personnel in accordance to the suggested training package. The municipal board of Norrköping gave an assignment to the working group for elderly and safety to investigate how the project results could be developed and further implemented in the municipality. The smartphone application prototype was further developed and used for data collection in another research project, and is being used by SOS Alarm (the Swedish public safety answering point) in the development of a real application. We have also formed a network with other Swedish municipalities to see how the semi-professional concept might be transferred to them.

5.3.   Choosing the optimal combination of user participation tools for social innovation

User participation challenges have been discussed in relation to large-scale projects with numerous stakeholders [7], [31] or a specific group of stakeholders (e.g. children, citizens) [3], [25]. In recent years, we have, seen a growing number of public sector initiatives relying on social innovation, future service implementation, and containing elements of cross-sector collaboration. The specific trend of using semi-professionals in emergency response is expanding rapidly, at least in Sweden, and involving a growing number of occupations, e.g. parking lot guards, homecare nurses, and taxi drivers. From an international public sector perspective, social innovation has gained attention in different forms to respond to social needs, for example in healthcare, social care and social integration [11], [23]. The user participation challenges identified are not "new" neither in a general IS development context nor entirely different from those reported in similar public sector projects. However, our study contribute with highlighting the additional complexity added when people from different occupations and work schedules are to be involved in design activities in resource-strained environments, to design entirely new, demanding tasks (e.g. live-saving) in a context very different from their regular. The most important issue then becomes dealing with the challenges, and proposing combinations of tools to suit the current cross-sector/semi-professional and/or public sector innovation context. Here, it is impossible to make far-reaching claims for generalisation and any project should pick the most optimal combination of tools, given the context. Nevertheless, we have experience from using similar combinations (multiple design groups, focus groups, scenario- and framework based Future Workshops and, sometimes, exercises/AAR) in a number of projects on emerging collaborations between emergency response actors, other semi-professional groups (elderly care and technical division personnel) and civil volunteers, with similar outcomes as in this study [26], [35]. As to the context-specific framework, [36] claimed that applying context-specific frameworks in user participation processes has the potential to support identifying appropriate and relevant stakeholders, formalising and facilitating the processes. The combination suggested might thus be a good source of inspiration for similar initiatives.

6. Conclusion and future work

In this study, we addressed the user participation challenges in the specific case of *semi-professionals in emergency response*, reflecting recent trends of pooling resources and competencies in networks and/or in future service implementation. The identified dilemmas are not entirely new but possibly more complex when the user groups involved are unknown and assigned entirely new tasks in a resource-strained environment. We suggest a combination of activities and tools for user participation, as a source of inspiration for similar emerging public sector initiatives leaning on social innovation, not least in emergency response.

On the other hand, the difficulty of successive involvement of all the identified stakeholders within the timeframe and scope of the project remained, in spite of the actions taken. For future work and further implementation of the collaboration, more stakeholders should be involved. Examples include the alarm centre, which would likely handle the dispatch of the new resources, but also the unions, IT contractors and other parties ensuring that all framework dimensions are covered. Furthermore, even though the study participants expressed that our approach and the framework worked well, these are subjective evaluations. More formalised efficiency criteria of the framework as a support tool in user participation (e.g. ease of use, reliability, completeness and relation to designed artefacts) should be identified. Finally, we have used the notion of user participation in a general sense, which is based on our growing assumption that HOW you address and involve the users is more important than actually picking a specific design methodology (e.g. PD, UCD, and UI). It would, however, be interesting to address this matter in more detail and consider user empowerment versus effective stakeholder involvement in IS development.

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