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Sofie Pilemalm Dennis Andersson Kayvan Yousefi Mojir

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Enabling organizational learning from rescue operations

The Swedish rescue services incident reporting system

Sofie Pilemalm

*Department of Management and Engineering Linköping University,
Linköping, Sweden*

Dennis Andersson

*Dennis Andersson Group for Information Systems,
Swedish Defense Research Agency, Stockholm, Sweden, and*

Kayvan Yousefi Mojir

*Department of Management and Engineering, Linköping University,
Linköping, Sweden*

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Abstract

Purpose – The purpose of this paper is to explore the re-development process of the Swedish Rescue Services Incident Reporting System from an organizational learning perspective with the purpose to suggest what is needed to enable long-term learning from rescue operations.

Design/methodology/approach – The study is carried out as a case study relying on interviews, participant observation and workshop methods. The study case is the Swedish Incident Reporting System.

Findings – The objectives expressed by the central agency leading the studied process aimed at implementing double-loop learning objectives by revising the incident reports and to improve future operations accordingly. In practice this objective was lost along the way, with the agency focussing on cosmetic changes to the report such as terminology, attributes and labels. Meanwhile the local rescue services expressed different and concrete needs, requiring new system functionality, case/experience based learning, process improvements and organizational development. A number of suggestions of such measures are provided by the study, to be used by rescue services and other response organizations.

Originality/value – The case stands out because the re-development process is driven by one stakeholder, with the ambition to include multiple stakeholders' needs. The study should be of specific interest to fire rescue services world-wide. However, considering that many tasks, learning and evaluation aspects of rescue operations are similar regardless of type of first responder involved (e.g. in firefighting, traffic accidents, and cardiac arrests), the results are also of interest to emergency management in general.

Keywords First responders, Incident report systems, Organizational learning, Rescue operations, Rescue services

Paper type Research paper

Introduction

Effective emergency management and response require a thorough understanding of the processes, systems, organizations and actors involved in a rescue operation (the rescue services, the Police, the ambulance services, etc.) (Morin *et al.*, 2000). In relation,



learning and reflecting upon performed operations is a crucial first step to enable improved future operations. This in its turn requires proper knowledge capturing, methods and support processes.

The Swedish municipal Fire Rescue Services are in the process of re-developing their incident reporting system to an incident learning system. The intention is to change the system from being a documentation of rescue operation-only system, to a lessons-learned system with post-mission analysis capabilities. Enhanced learning is in its turn expected to result in more effective rescue operations that will pave the way for re-structuring of the rescue services organizations. From an organizational learning theory perspective, the process reflects a striving to be able to use the future system for double-loop, deep learning in the organization, and to transfer tacit individual knowledge to team and organizational level (Argyris and Schön, 1978).

This study explores the re-development process from an organizational learning perspective with the purpose to suggest what is needed to enable long-term learning from rescue operations. The case is characterized by the re-development process being driven by one stakeholder, with the ambition to include multiple stakeholders' needs. The study should be of specific interest to fire rescue services world-wide. However, considering that many tasks, learning and evaluation aspects of rescue operations are similar regardless of type of first responder involved (e.g. in firefighting, traffic accidents, and cardiac arrests), the results are also of interest to emergency management in general.

Aim and objectives

Specifically, the study objectives include:

- to identify how organizational learning objectives are envisioned, articulated and actually put to practice in the re-development process, as related to different stakeholders perspectives; and
- to provide suggestions that enable organizational learning from performed rescue operations, in terms of functions and processes, with a basis in expressed user (local rescue services') needs.

Background

In this section the study context and relevant organizational learning theories are described.

The Swedish rescue services

According to the Civil Protection Act (SFS, 2003:778) the Swedish Rescue Services are divided into services provided by the state and by the municipalities. Each municipality must have at least one rescue service unit, either on its own (commonly a local fire brigade), or participate in a cooperative unit with other municipalities. The rescue service units are supported by a central agency that provides certain competence development services, and coordinates processes for documentation and archiving of rescue operations. However, the agency has no formal decision rights over local rescue service organizations. These rights belong to the municipalities.

The Swedish response system is currently undergoing an extensive organizational change process. This implies new forms of collaboration among professional response organizations such as the rescue services, the Police, the ambulance services and the

alarm centers, but also bringing in complementary societal resources in terms of non-profit organizations, volunteers and semi-professionals (i.e. persons who are not first responders but who can use their professional competence in response operations being, e.g. physicians, nurses, home care personnel, guards, janitors). For the rescue services related change work revolves around new learning processes and possibly new organizational structures. The motivations are to a great extent financial – aiming to increase efficiency and reduce costs associated with rescue operations. One assumption that is being questioned is the previous 4 + 1 principle that implies that a firefighting team of four firefighters and an incident commander[1] must attend every emergency regardless of its type and size. In some local fire units this principle is replaced by more flexible constellations and advanced (smaller) units in smaller incidents. To be able to perform more effective and high quality rescue operations, fire fighters and teams being able to learn from previous performed operations is a major pre-requisite.

The incident reporting system. A central Swedish Rescue Services' tool for documenting performed rescue operations is the incident reporting system[2]. The system provides templates for emergencies, and a standardized form for post hoc operation assessment. When the operations have deviated from normal routines, or when fire fighters have been put at risk, these reports may lead to more detailed incident and response investigations, in this study referred to as in-depth investigations. The incident reporting system has been in use since 1996 and the current version since 2011. Presently about 2 million reports exist in a central database at the agency. The original aim was to use the report system for documentation only. Successively, the report template was expanded to embrace more quantifiable fields to be used for statistics.

A major revision of the incident reporting system is currently being performed by a user council at the agency. The re-development process has the objective of providing a report template that can be used to evaluate and learn from the rescue operations, implement improvements based on the lessons learned, and thereby make future operations more effective. Statistic evaluations shall also be used to demonstrate benefits and limitations of new forms of rescue organization, such as more flexible fire fighter-team constellations. The user council consists of representatives from the Swedish county councils, the municipal rescue services and the agency itself and has performed a needs analysis for the future system version. Meanwhile, a complementary research initiative has been launched by researchers at a Swedish University, also focussing on how the incident reporting system can be improved and used for organizational learning.

Organizational learning theories

Early work on organizational learning describes different types of organizational learning systems, e.g. distinguishing between single-loop learning and double-loop learning. The latter is the learning process in which an individual or organization is able to reflect upon, question, and modify the goals, values, assumptions and policies that led to certain actions. Single-loop learning is more of a repeated attempt at the same problem with no variation of method and without ever questioning the goal (Argyris and Schön, 1978). Subsequently, a four stage spiral model of organizational learning (SECI) was developed by Nonaka and Takeuchi (1995) (Figure 1). Their model takes its point of departure in tacit knowledge vs explicit knowledge and describes a process of alternating between the two of them. Tacit knowledge is personal, context

specific, and subjective; whereas explicit knowledge is codified, systematic, formal, and easy to communicate. The tacit knowledge of key personnel within the organization can be made explicit by processes of socialization, i.e. acquiring the tacit knowledge of others through interaction. In the next step, the acquired knowledge is articulated and created in a corresponding process of externalization. Finally, the knowledge can be incorporated into new products and processes for later internalization, i.e. embodying externalized knowledge in employees and/or applying it in practice. Combination refers to the ability of individuals or organizations to cross-reference multiple bodies of explicit knowledge and to connect them to a coherent whole. The four processes are continuously iterated as knowledge generation proceeds.

There is a corresponding difference in knowledge content in which tacit knowledge not necessarily needs to be expressed verbally but can be transferred by watching someone doing or demonstrating a task. Externalized knowledge, on the other hand, is expressed by word and preferably in standardized formats such as reports and handbooks. Related frameworks describe features of deep vs and surface approaches (e.g. Biggs, 1987) where deep learning is associated with intrinsic motivation and interest in the content of the task, a focus on understanding the meaning of the learning material, an attempt to relate parts to each other, new ideas to previous knowledge and concepts to everyday experiences. Meanwhile, the surface approach is based on instrumental motivation where the task at hand shall be solved, automatically reproducing terms and procedures and viewing a particular task in isolation from other tasks and from real life as a whole.

Methods

The study was performed as a case study involving documents studies, interviews, participant observation and workshops.

Case study

Case studies focus on a real phenomenon, be it, e.g. a setting, an incident, an organization, or an IS (Yin, 1994). Often, several data collection methods are used to enhance study validity and reliability. Case studies are generally of an explorative, descriptive or explanatory character. According to Yin (1994), they should include the stepwise procedures of designing the study, conducting it through preparing for

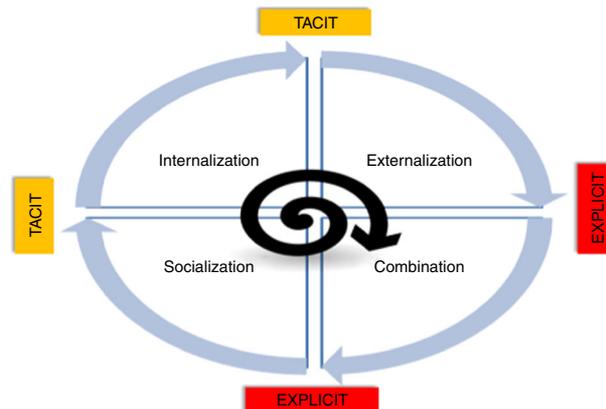


Figure 1. SECI model developed by Nonaka and Takeuchi (1995) showing how tacit knowledge is made explicit in an alternating process of externalization, internalization and socialization

data collection and collecting the evidence, analyzing the evidence and composing the case study report.

This study was performed as an exploratory case study designed to include the steps as suggested by Yin. The case is the incident report system itself which have been studied by different qualitative methods. The data gathered was then analyzed from an organizational learning theory perspective and using a research model. The stakeholders in the case study are the central agency, the fire fighter workers' union and local rescue services representatives, chosen to together provide different perspectives on system/learning vision, administration and end-user needs.

Document studies. Document studies are the selection of available documents on a topic, which contain information, ideas, data and evidence written from a particular standpoint. In case studies, they are typically applied in the first exploratory phase as one of many interdependent data sources (Travers, 2001). In this study, a strategic sample of in total 12 incident reports and three in-depth investigations were initially reviewed. The reports come from a local rescue station in south Sweden. They have been chosen by the rescue station fire chief as being representative for incidents and reports at the station, and stem from the years 2007-2012. Each document was analyzed in its own sense by two researchers and the major results from the analysis were presented at the initial workshop described below. Further, the researchers analyzed memory notes and two needs analysis reports produced by the central agency user council.

Future workshops. In the study, two future workshops were subsequently performed. Future workshops take their point of departure in users' work situations. The users are first encouraged to reflect upon their experienced problems and difficulties and then to stepwise formulate first visionary, then feasible (design) solutions to the problems (Ehn *et al.*, 1996). In organizational learning contexts, future workshops can be said to relate to communities of practice (CoP). A CoP is a group of people who share a work profession, a practice or an interest. They can emerge on their own but also be developed and designed on purpose to generate knowledge in a particular area. Through the sharing of information and experience, the group members learn from each other and have the possibility to develop both on a personal plane and in their professional role (Lave and Wenger, 1991).

In this case, six representatives were selected in dialogue with the fire chief (see above), the central agency and a previous research project on learning in the rescue services. They were supposed to together represent system/learning vision, administration and end-user needs. Three representatives came from local rescue services in three different municipalities; two from the fire fighters' union; and one representing the central agency user council. The workshops were moderated by the two researchers. The aim was to confirm and/or modify the analysis stemming from the incident reports and to identify user needs and suggestions for improvement of the current incident reporting system.

Interviews. Interviewing is a commonly used method to gain understanding of, peoples' experiences, and what meaning they make out of them. In this study, two complementary semi-structured interviews were applied with the help of an interview guide containing a predefined set of questions covering certain themes (Bernard, 2000). The interview respondents were both part of the central agency user council and one of them has worked full-time with the incident reporting system since 2006. The aim of the interviews were to complement the workshop results, identifying similarities and differences between the two groups (user council and

workshop group) but also to find out which of the proposed solutions are organizationally and technically feasible.

Participant observation. Participant observation is the observation of subjects in their natural settings, by the researcher participating in their day-to-day lives and work. It has proven beneficial in work re-design and the design and implementation of new technology, in gaining contextual first-hand information on the work activities the technology is aimed at supporting (e.g. Hasu and Engeström, 2000). It is usually a time-consuming approach involving lengthy stays in the field. But also shorter stays has been show beneficial, e.g. in the area of IS development, for providing input to the system under development (Pilemalm *et al.*, 2000). For the purpose of this study, a one day participant observation was performed by one of the two researchers, taking place at the local rescue services in Linköping, county of Östergötland and involving the fire chief and a fire fighter. The aim was to receive yet another perspective on the incident report system, but most important, to view the current system and the incident report in practice (since this was not possible at the workshops).

Data analysis and research model. The workshops and interviews were audio recorded and complemented with memory notes. The participant observation relied on memory notes. The workshop data material further included post it notes where the workshop participants had written their needs and ideas. The organizational learning theories presented above was then used in a research model guiding the analysis of study results. The model includes relevant constructs from the theories and is summarized in Table I.

Results and analysis

The results/analysis first presents the current incident reporting template and in-depth investigations. This is followed by the categories design for statistics and evaluation, design for learning and organizational learning support processes, as expressed by the different actors participating in the study. For each of the perspectives, an organizational learning analysis is also performed. The types of organizational learning and knowledge format identified from different actors/perspectives are then summarized in Table II.

Current incident reporting template and in-depth investigations

The studied reports related to fire in buildings, to gas or toxics leaks and to suicides. An overview of the current incident reporting template, describing the twelve sections it includes, is provided in Figure 2. In the quantitative parts (field 1-8), the studied templates contain isolated elements such as number of units on site, number of vehicles on site, response delay, and checkboxes for e.g. no deficiencies in equipment and no response delay. The template also holds a single text field (11) for evaluating the

Actor/perspective/data source	Organizational learning types	Knowledge format
Incident report template/ investigations agency/user council local rescue services/fire fighters union/end-users	Single loop – double loop surface – depth	Tacit- externalized/explicit practical – visual/verbal informal- formal/codified/ standardized

Table I.
Summary of constructs in
research model guiding
analysis of results

operation. In all the studied reports this field was filled in with either the statement “very good” or contained no information at all.

In the qualitative parts of the report, there are nine pre-defined lines dedicated to the cause of the emergency (field 9) and another nine lines to the description of the course of events in the rescue operation (field 10). The studied templates were filled in similarly and sparsely, in these fields. The descriptions provide e.g. the decisions taken by the incident commander, sometimes with reference to relevant laws and procedures. Field 10 further provides nine lines to describe preventive measures that can prevent this type of emergency (e.g. fire detectors) and nine lines for measures that can improve future rescue operations.

Several preventive measures are mentioned in the analyzed incident reports. However, response improvement measures are mentioned only in two reports; these describing problematic operations where standard operating routines were not followed, and then described in very brief terms. All the three in-depth investigations contain suggestions for improvements of rescue operations. In two of them these are

Actor/perspective	Organizational learning type focus	Information/knowledge format	Corresponding actual and requested incident report system measures
Current reports	None	Quantitative data, codified information	Need for extended template allowing for richer descriptions
Agency/user council	Statistic based; superficial; single-loop,	Quantitative data, codified information	Cosmetic: attributes, fields, terminology; only template
Rescue services/end-users	Statistic and case/experience based; depth; double-loop	Socialization and externalization of tacit/information knowledge	Template and process: new content and functions; support for motivation and systemized feedback; complementary concrete learning initiatives

Table II.
How the different actors/perspectives embrace organizational learning and how this is exemplified in corresponding incident report system measures

Incident reporting template	
1 Fire and rescue service	
2 Incident	yy mm dd hh mm ss
3 Incident scene	Alarm to SOS alarm <input type="text"/>
4 Object	Alarm to fire and rescue service : <input type="text"/>
5 Time and date	First vehicle out at : <input type="text"/>
6 Decision on resources	Arrival to incident scene : <input type="text"/>
7 Extra resources	Response operation begun at : <input type="text"/>
8 Injuries and damage	...
9 Cause of incident	
10 Response process	
11 Evaluation	
12 List of documents	

Notes: Headings of its sections are listed in 1-12. A snapshot from Section 5 is exemplified

Figure 2.
Overview of the current incident report template

also brief, without specification of how they are to be carried out and by whom, e.g. “work on routines” and “teach new firefighters this course of events”. The third investigation takes the form of a systemized conversation where the entire rescue team has been interviewed. The conversation illustrates the reasoning and judgments lying behind important decisions, such as entering a building without smoke-helmeted firefighters. This investigation (from 2007) also elaborates on concrete improvement measures that are implementable. However, one of the other investigations (from 2012) refers to the 2007 systemized conversation, pointing out that at that time suggested improvement measures have not yet been carried out.

Current state: organizational learning analysis. The template does not, in its current state, contain the necessary contents to be able to provide learning from rescue operations, neither at individual or organizational level. It is a system designed for documentation, where the causal relationships between codified, standardized, quantitative data may be used for statistic evaluations (e.g. how number and type of resources on the emergency site affected the outcome of the operation). The number of textfields dedicated to describe and evaluate the response operation is limited and leads to sparse formulations also expressed in a standardized manner. It is not clear what such formulation implies and it raises questions like: “what is ‘very good’, compared to what?” in the example above. The templates do not provide the opportunity to report in detail the circumstances that allowed the operation be problematic or run smoothly.

The in-depth investigations proved somewhat better in terms of learning purposes usability. However, some of the reported shortcomings in them were later identified as erroneous. When discussing one of the reports related to a fire in an apartment claiming victims with the workshop fire fighters, the behavior of the rescue team was found not to deviate from standard procedures, even though the report stated so. Instead, the behavior was rational given the uncertain nature of the current incident and insufficient resources available at the time. This is a clear example of tacit knowledge not highlighted by the in-depth investigations. In the systemized conversation case tacit knowledge was better externalized and related to adequate improvement measures. In summary, the learning aspect is markedly subdued in the current incident reporting template. There are many ways to improve the incident reporting system but a first fundamental step would seem to build in more comprehensive report possibilities.

Revised incident report: design for statistics and evaluation

Central agency: according to the central agency interview respondents, one clear purpose of the incident reports is to document the rescue operation and provide a basis for statistics. This purpose will not vanish with the revised report; rather its usability for statistics will be improved. This means that variables, terminology, definitions, attributes and labels will be refined. The revised report template also needs a more dynamic and flow-oriented content as compared to current more flat version. Unnecessary clicks, ambiguous definitions and irrelevant questions need to be removed. Further, the agency respondent having worked longest with the incident report claims that new technology is needed to collect great amounts of data for the future report and mentions the possibilities the introduction of smartphones and high-speed cameras can bring. It is currently not possible to estimate rescue operation effectiveness and quality on the basis of the incident report. But if it

contained checkboxes e.g. for “goal achieved”, from where to measure fulfillment of pre-defined goals this would be possible, the respondent claims.

Rescue services: in the workshops, the participants also deemed the current electronic template version as complicated, counter-intuitive, and not interfacing well with the surrounding ISs. As an example, if the checkbox for “deviations from plan” is crossed, the user is automatically transferred to another part in the template, enforcing 10-15 minutes of extra work, according to one respondent. This extra labor contributes to a tendency to report only severe deviations that have exposed the rescue personnel for risks and where important routines or laws have been violated. The respondents suggested that it in the revised report should be possible to select pre-defined alternatives and thereby receive a specialized version of the report depending on the current situation. The choice of alternatives should be made stepwise and interactively, making it possible to dig deeper into parts of the report, if the situation requires.

At the fire station where participant observation was performed, some data were already transferred automatically from other systems to the template, under and even before the rescue operation. This is, however, not common for all fire stations in Sweden, since they rely on different surrounding systems that have different capabilities for transferring data. However, the workshop respondents agreed that mandatory automatic data transfer need to take place in relation to the revised report in the future. Using existing communication technology at the push of a button on the site was here seen as a possible method, leaving the commander with the responsibility of adjusting and completing the report. They also agreed with the agency on the potential of connecting the high-speed cameras that some rescue services already bring to the emergency site.

Such as the for being able to use the revised reports for measurement of operations, the workshop participants emphasized the need to define mechanisms and criteria from where to perform such measures. Suggested criteria included man hours, risk and consequence analysis, cost-benefit analysis, key figures and saved value from templates. Key persons need to be appointed to define and develop the criteria.

The workshop participants also suggested entirely new content to the incident report, in order to provide for new measurements. For instance many fire fighters are subject to health risks and long-term effects by repeatedly being exposed to toxins and other contamination hazards. Today, the organizations keep no track records on these matters, making it difficult to prove cause and effect in the case of a firefighter developing diseases over time. Further, two of the workshop participants claimed that the response time, as being defined in the current incident reporting system, does not include preparation or recovery time. This gives an insufficient perspective on the operation and firefighter work time as a whole:

For instance, when the rescue team has witnessed a suicide and failed to talk the person out of it, team members may be very psychologically affected and the recovery time is much longer than in “ordinary” cases, and when this is not documented, the response time and work time as a whole is not calculated or displayed properly.

In both cases sections for exposure to contamination hazards and preparation and recovery time, could rather easily be introduced in the revised report, according to the respondents.

Revision work: organizational learning analysis. The above relates to a new design of the template, and in the case of the agency, to changes relating to terminology,

attributes and text fields. The rescue services take this one step further by suggesting both new functions in the ensuing template and concrete criteria to enable estimations. They also lift the importance of pointing out key persons to perform work. But in the main the organizational levels are in agreement, believing that the proposed changes will improve the capabilities of calculating statistics and to measure goals and efficiency of operations. The related learning can be categorized as superficial learning aimed at putting together the best possible constellations of future response operation teams and equipment based on figures. It can also be defined as single-loop learning since it reflects an attempt to learn from operations using the same methods as before; only refining the data or adding some new variables. The learning content is codified, standardized, easily expressed and seems to involve no apparent conflicts in the organization.

Revised incident report: design for learning

Central agency: the user councils' major revision of the incident reporting template shall also include building in prerequisites for evaluation of the rescue operations, oriented towards organizational learning according to the agency respondents. One of them describes the future incident reporting system as going further than organizational memory and becoming an organization lessons learned system that is linked to other documents about the incidents available at the local rescue services' ISs.

However, when talking further to the agency respondents it is clear what will actually be revised in the report template is mainly related to its quantitative parts, as reported above. This pattern is re-produced in the user council work. The council has provided seven regional seminars where needs from local rescue services in relation to the future report have been collected. The memory notes/needs analysis from these seminars include substantial perceived organizational processes and learning needs, e.g. "need for training on new incident reporting system", and "alternative ways of documenting decisions". However, the agency's own analysis of the same documentation revolves around statistics. For instance, it is stated in the memory notes that:

Overall, it was difficult to make the participants identify needs for new variables for statistical analysis; this may be explained by the current set of variables fulfilling most needs for statistics. Another explanation may be that few of the participants are active in their organizations' analysis work. This means that the [...] seminars were necessary but not sufficient [...] and that the question of statistical needs should be passed on to politicians and to managers in the rescue services.

Rescue services: in the workshops and at the local fire station, concrete needs revolved to a great extent around organizational learning issues. Improvement suggestions to the revised report concerned feedback and transferal of mission experience, relating to both good and bad examples. For instance, selected incident reports could be sent to certain central agency units for transformation into development and training implementations, e.g. the agency could provide quarterly experience transfer events based on these. Similarly, at local level it was suggested that reports and experiences were discussed at work place meetings, supported by computerized visualizations and simulations. Several participants claimed that an improved reporting system needs to focus not only on deviations, but also on learning from good examples. One respondent exemplified with a story from a recent rescue operation:

When [the incident commander] during a fire in a night club took the decision to evacuate a nearby hotel this decision eventually turned out to save several lives.

The referenced decision was based on the fact that the incident commander had handled an operation at the very same night club earlier, and knew that it was not secured from the spreading of fires. It was a decision based on personal experience that had not been incorporated in the current incident reporting system. A suggested improvement was that future reports in the system are linked together so it is possible to see recurring incidents or alarms at the same physical locations, and what the outcome of the response was.

The workshop participants further claimed that the current incident reporting system and related routines has a one-sided focus on the incident commander. The incident commander is currently solely responsible for filling in the report. It is difficult for him or her to remember everything and have the competence and motivation to do it with adequate quality and sufficient level of detail. Sometimes, the commanders pile up several reports and fill them in months later, making it almost impossible to remember all the details, according to respondents at the local fire station. This provides no good material for organizational learning. They suggested that the incident commander should become more of a team leader and collect broader documentation from his or her co-workers, getting the group perspective in short (5-10 minutes) briefings, before the report is filled in. Several participants further claimed that much of the quantitative data in the report (e.g. GPS tracks) should be distributed to the benefit of other response organizations, and to city and traffic planning experts.

Also, the Swedish Rescue Services has to deal with entirely new threats, such as people attacking firefighters, placing gas bottles in the vehicles, and traps in arson fires. Since the organization until now has been (as compared to many other countries) relatively spared from such threat situations they are not yet documented and reported. The future incident reporting system needs to incorporate threats, according to the respondents. Also here, a beginning would be to introduce a checkbox, indicating exposure to threat and if the answer is "yes" being further linked to be able to describe the threat and its consequences. Finally, the respondents emphasized the need to define criteria to identify good and bad learning examples and at what organizational level they should be used (local, regional, national). Checkboxes for operation success factors and potential for learning/usability for training purposes could be a start.

Revision work: organizational learning analysis. The current revision of the incident reporting system is in part, in theory, dedicated to double-loop organizational learning with operation increased efficiency as possible outcome. But in reality it does not provide such enablers. Meanwhile the type of learning the end-users request is concrete, long-term and based on cases, experience and lessons identified. This reflects a depth and double-loop oriented learning perspective where you explicitly first articulate tacit knowledge (socialization) moving from individual to work team level and then lift it to organizational level (externalization e.g. by means of transfer events) and back for internalization in new individuals. The perspective thereby also demands new methods for decoding, verbalizing and visualizing the learning material inherent in the renewed report. While using the report data for statistics/evaluation showed no apparent conflict in the organization using the very same data for learning purposes seem much more complex, involving obvious contradictions between theory and practice.

Organizational learning support processes

Central agency: the short-term plan for the re-development process is only to provide built in opportunities and pre-requisites for organizational learning in the ensuing

template itself – not to provide the supportive processes, according to one of the agency respondents. To build these processes are up to the local fire rescue services/ municipalities themselves. The same goes for actual implementation of identified improvements measures for operations, stemming from reports. Here, the local services would need a joint IS to handle improvement measures, to perform follow-ups and to appoint responsible key persons, the agency respondent claims.

Rescue services: in the workshop and at the local fire station, the participants on the other hand engaged heavily in discussions on the process surrounding incident reports, and the problems and bottlenecks connected to it. A major obstacle defined included lack of time and motivation. It was claimed that the local rescue service personnel do not see a clear purpose with the current reports, nor a recipient. The respondents stated that nobody ever reads the reports with the potential exception of the appointed incident investigator. Feedback to the operation participants may be sent via e-mail but are not always read by them. Potential experiences and suggestions for improvements are not integrated in training or transformed into implementable measures since there are no individuals appointed as responsible. The reports, in fact, just end up as elements in a central agency database:

If you don't even get the new gloves you asked for, the motivation is negatively affected.

The central agency, the local rescue service chiefs and the municipality officials must provide better and systemized feedback on the reports, according to the respondents. As for distribution of experiences from rescue operations, the local rescue teams have good opportunities for reflection. But experiences are seldom spread to the other teams at their fire station, even less to other rescue services. Also, the current reporting system lacks information about what other response organizations contribute in the operation, it is only noted in the template whether they participate. This makes improved collaboration difficult.

Also, there are many other local and informal learning initiatives side by side with the incident reports, in-depth investigations and systemic conversations. The workshop participants mentioned several operative oriented bottom-up approaches where local fire fighters engage in a question or topic. An example is fire fighters with an interest in mountain climbing who has developed methods for roof safety. Local learning initiatives often remain local but are sometimes lifted up to the entire fire federation.

The workshop participants agreed that improvement measures need to be sanctioned at the management level; that key persons should be identified and appointed as responsible for the implementation, and that a high quality incident report system with key arguments that are shared among the right organizations is a prerequisite for the distribution of experiences. It is essential to be able to show in the future report that what happens in one municipality can happen in another and then convince the right persons to spread experiences and counter-measures to the response organizations in these municipalities. A process for distribution of experience was sketched, including the organizational levels of:

- work team;
- across work teams;
- entire rescue services;
- central agency;

- the County Council Boards;
- Swedish Work Environment Authority;
- the rescue educational services; and
- other response organizations.

The respondents further agreed that organizational learning work must take place within current financial or personnel resources in the rescue service organizations. Also, there is an awareness that cultural hindrances for organizational learning exists. For instance, there is an unwillingness to report one's own operations in negative terms. An example mentioned is an apartment fire where everybody knew that things went wrong but nobody did anything to provide learning from the incident:

We know that things went wrong so there is no need to advertise it.

Revision work: organizational learning analysis. While the supportive processes are practically left out by the agency, it is actually the major focus of the rescue services' expressed needs. In other words, there are perceived conflicts relating to what are the measures needed to achieve organizational learning from the incident reports, and to who has what responsibilities to make sure learning occurs, i.e. over who has what responsibility in the knowledge socialization and externalization processes. There are also divergent perspectives as to what is the actual content of – inclusions in – the learning process. Here, the perspective on learning is much broader on the part of the rescue services that stretch learning sources beyond the incident report to other locally anchored concrete initiatives. This while the agency focuses solely on the incident report as an organizational learning enabler.

Table II summarizes the organizational analysis relating both to the current state of the incident report and the actual and requested revisions/system measures expressed by the agency and the rescue services (end-users of the report), respectively. Since the report in its current state is not designed for learning it relies on quantitative and codified information. The actual agency revision work reflects a mere re-production and refinement of the very same information, related to statistics and superficial, single-loop learning and being but to practice by cosmetic changes to attributes in the current template. Meanwhile the rescue services' needs are strongly related to experience based depth, double-loop learning requiring entirely new knowledge formats and new processes for socialization and externalization of this knowledge. In the incident report system, corresponding entirely new functions and support processes are needed to put such learning into practice.

Discussion

Dekker and Jonsén (2007) studied the incident reporting system at three municipal rescue service units, with the aim of developing the system for learning purposes. Their major findings were that the most fundamental prerequisites for learning from experience were lacking in the rescue organizations. Above all, trust, mutual respect and a feeling of being allowed to participate were found missing in the studied services. The researchers concluded if the experiences are not taken further, all reports are of little use. In other contexts of incident learning systems Mahajan (2010) emphasizes the need for regular and detailed feedback to engage practitioners in the loop of reporting and learning from incidents. Cookea and Rohleder (2006) discuss

organizational barriers to report incidents and suggest training and reward systems to overcome them.

This study, to a large extent confirms the above findings. The current revision of the Swedish incident reporting system takes place in a rapidly changing organizational environment experiencing financial cutbacks, increased demands for efficiency and entirely new threats and requiring more flexible and sometimes smaller team constellations. It is evident the central agency level have some conflicting interests compared to the local firefighter services. Other identified to missing trust and an unwillingness to report things that did not go as planned, for fear of reprimands. A central idea behind the system revision was to extend the incident reporting system for dual use of incident reporting/documentation/statistics and organizational learning. In reality, it seems that the system will remain an incident documentation system if the migration process is not explicitly steered in another direction and embracing the perspectives of practitioners as described above. Introducing systemized feedback seems to play a central part in such steering.

The incident reporting system from an organizational learning theory perspective

In the study, different stakeholder perspectives related to learning types and content in the incident reporting system. While some areas such as automatized transfer of data, new technology and the development of evaluation criteria and tools are perceived as rather unproblematic, the double-loop long term learning objectives are much more complex. Within organizational theory, Senge (1997) claims that double-loop learning requires such things as systemic thinking, shared vision and team learning. The vision of an extended incident reporting system to be used as one basis for organizational efficiency improvements is a clear central organization-driven aim to achieve double-loop learning. However, in practice this process has been lost somewhere on the way. Similarly, the SECI knowledge transfer model developed by Nonaka and Takeuchi (1995) describing the interaction processes between tacit and explicit knowledge was later extended to embrace a third dimension described as Ba (Nonaka *et al.*, 2000). Ba is meant to represent the shared context without which shared knowledge cannot exist. In the current case, it is obvious that externalizing tacit knowledge – which is the fundament for far-reaching organizational learning – will not take place if development process does not take another direction. It is also evident that a lack of Ba, contributes to the preservation of status quo, as demonstrated by the system view conflicts between the central agency and the local rescue services. That different actors in an organization have different perceptions of what learning constitutes – even if their views not seem to differ when looking on the surface – is not unusual. On the contrary it has repeatedly been shown that knowledge is something that needs to be dialogized and translated among the different groups of actors (e.g. Rivera and Bueno Campos, 2001). The issue of responsibility is another central shared context conflict in which the central agency and the local rescue services' want each other to take overall responsibility for increased organizational learning. It is clear that this conflict needs to be settled and resources (existing or new) and responsibilities allocated, if long-term usability and learning stemming from the incident reporting system, shall actually take place.

While the learning processes in the Swedish rescue services in theory much revolve around the incident report systems, the results, interestingly enough, showed that this is by no means the only and perhaps not even the best way to go. The systemic conversation relating to the notion of the importance of systemic thinking above

(Senge, 1997) identified in relation to one of the in-depth investigations was actually the one found most useful in learning from experience. Here deep learning was enabled when parts of an operation were put together to understand the whole and transfer it to other real life operations. Systemic conversations exist in the Swedish Rescue Services today but they are not that common. Also, local learning initiatives were deemed by the rescue services as often more being fruitful than the formal incident reports. In conclusion, it seems necessary to complement the incident reports with a group perspective, providing the views and reasoning behind actions but by the entire team, as a basis for externalization and transfer of experience to other parts of the organization.

Conclusion and future work

In this study, central organization initiated re-development of an incident reporting system into an incident learning system has been explored. The study demonstrated conflicting interests between the central agency leading the re-development work and the end-user fire fighter representatives. While the former focused on refining template attributes, quantifiable data and statistics the latter expressed entirely new needs, system functionalities and supportive organizational processes. In terms of organizational learning this can be related to a similar conflicting learning perspective; single-loop, superficial learning based on existing and standardized data items using known methods vs double-loop, deep learning based on cases, experience, lessons learned and new methods and supportive processes.

It is believed that for organizational learning to actually take place in the Swedish Rescue Services, a re-direction of system revision work and complementary approaches such as systemic thinking, and agreement among actors as what constitutes the essence of learning from rescue operations is necessary. This can be achieved by consciously creating a community of practice (Lave and Wenger, 1991) where agency, union organizations, state and local rescue services participate in order to actively work towards a common ground which all actors can accept and put into practice. As an example, also the agency could participate in systemic conversations, first as an observer, in order to create mutual understanding on learning from rescue operations.

The basic content and goals of performing rescue operations – to save lives and minimize human and material damage – do not differ among rescue services and many other response organizations world-wide, even if they work within different legal, organizational, national and institutional frameworks. The results from this study should therefore, to a large extent, be applicable to any rescue services wishing to develop efforts for increased organizational learning from rescue operations, and for research and practice related to first response in general. In the current project, the rescue services' identified needs and suggestions for change were documented as a needs/requirements specification with a complementary supportive process, all which have been suggested to the agency.

Notes

1. The incident commander (Swedish: Rådningsledare), appointed at each emergency by the Chief Fire Officer.
2. <https://msb.se/sv/Produkter--tjanster/Inrapportering/Raddningstjanstens-insatser/Nytt-inrapporteringssystem/>

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Further reading

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About the authors

Dr Sofie Pilemalm is an Associate Professor in Informatics, Senior Lecturer in Response Systems and the Director of Centre for Advanced Research of Emergency Response (CARER),

residing at the Linköping university, Sweden. She received her PhD in 2002 and has since worked as Researcher and Consultant for the Swedish Defence Research Agency before returning to the university in 2011. She is currently working with establishing a new research environment in terms of new actors, new collaboration forms, new structures and new information systems support in emergency management. Sofie Pilemalm has many years of experience in user-centred systems development and has led several systems development projects and design groups in such areas as non-profit organizations, the Swedish Defence, crisis management and response systems. She is an active researcher in the security arena both at national and international level and has a number of publications and review assignments in related scientific journals and conferences. She has hosted tracks on emergency management, e.g. at the International Conference for Information Systems in Crisis Management (ISCRAM). Dr Sofie Pilemalm is the corresponding author and can be contacted at: sofie.pilemalm@liu.se

Dennis Andersson is a Researcher at the Swedish Defense Research Agency (FOI), Department of Information Systems. He holds a master in Computer Science at the Linköping University, where he is also an associated PhD student in Information Science. His research interests embrace computer supported organizational learning with a focus on mission experience both in military organizations and in emergency management. He has lead several projects in these areas and is co-developer of the multimedia tool F-REX, used to capture and model experience from large tactical distributed operations, and which are applied, e.g. in the Swedish Rescue Services. He has produced several scientific publications in the area, in journals such as *Journal of Emergency Management* and in conferences such as the International Conference for Information Systems in Crisis Management (ISCRAM).

Kayvan Yousefi Mojir is a PhD student in Information Systems Development at the Department of Management and Engineering, Information Systems division at the Linköping University in Sweden. His master degree is in Engineering and Management of Information Systems and his bachelor degree is in Computer Engineering-majoring Software. He started his PhD studies in 2012. At this point in time, he is researching in the field of information systems and emergency response systems. His current subject is about involving new actors within emergency response systems and analysing new forms of collaboration between actors in these kinds of systems. He has several scientific publications in this area and has presented his results, e.g. at the International Conference for Information Systems in Crisis Management (ISCRAM).