Improving Incident Reports in the Swedish Armed Forces

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To Isabel

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Summary

It is generally maintained that learning should be a part of the daily routines of many organizations; this is often referred to as *lesson learned* processes. The purpose of organizational learning is to foster improvements that seek to both reduce incidents and accidents and reduce their consequences when they nevertheless happen. Safety work is widespread among many organizations, e.g. aviation, hospitals, process industry, fire departments and several armed forces. A considerable part of safety work involves accident prevention, and aims to investigate *why* and *how* previous accidents and incidents happened, in order to learn how to avoid them, or minimize losses when they do occur.

The collection of information after incidents represents one of the first steps in a lessons learned process, and the result is crucial for further work. Unfortunately, incident reports often tend to be unfocused (they represent a very wide area of issues) and, for that reason, cannot be clustered. They also frequently lack by analysts required information. The overall research objective in this thesis was to develop a report structure that enables the individuals who participated in or observed an incident to provide more information that is relevant about that incident. The first research question seeks to identify whether the Swedish Armed Forces face the kinds of problems that have been identified in earlier research on attempts to learn from accidents and incidents. The second and third research questions aim to ascertain whether the scope and quality of collected information in incident reports can be improved and if the number of incident reports can be increased.

The results agree with earlier research and show that many of the problems that are common in other organizations (e.g. aviation, hospitals and the process industry) can also be observed and are a reality within the SwAF. In addition, the results showed that both scope and quality of collected information can be influenced. Group reporting using a consensus process neither had an appreciable effect on the quality of collected information, nor on the quantity of the reports. On the other hand, the new reporting form, which was based on interview and questionnaire methodology, and to some extent witness psychology, significantly improved the quality of the information collected after incidents. The new form proved to be superior, regardless of the character and context of the incidents. The information collected was also in accordance with what had actually happened and, finally, the form proved to be useful when various military “real world” incidents were reported.

Finally, the results also provide new insights into the problems and possibilities associated with acquiring useful incident reports. The problem seems not only to be that people may be unwilling to report incidents that they have participated in or witnessed; it is also that they may be unable to do so. Consequently, it may not be sufficient to change the culture of the organization into a learning culture to receive by analysts required information. It is also necessary to help people report what they actually know by means of an improved report structure.

Sammanfattning

Flertalet organisationer arbetar aktivt med lärande loopar, ofta refererade till som *lesson learnd* processer. Lärande sker bland annat i syfte att minimera antalet incidenter och olyckor, samt att begränsa skadorna när dessa väl sker. Olycksförebyggande arbete är vanligt förekommande inom flertalet organisationer, till exempel flygbolag, sjukvård, industri, brandförsvar och flertalet försvarsmakter. En aktningsvärd del i detta arbete består av att utreda vad och varför incidenter och olyckor har skett och utifrån dessa utredningar förebygga att liknande händelser upprepas och att skador minimeras ifall så är fallet.

I *lessons learned*-processer utgör insamlandet av information efter incidenter och olyckor ett av de första stegen och har en betydande roll för fortsatt arbete. Rapporter, manuellt eller digitalt skrivna, är därför värdefulla men innehåller sällan tillfredställande och av analytiker efterfrågad information. I denna avhandling undersöks om de problem som Svenska Försvarsmakten möter, avseende lärande från olyckor och incidenter, är de samma som identifierats i tidigare forskning inom andra organisationer. Vidare undersöks om det går att förbättra kvalitén på informationen i insamlade incidentrapporter och till viss del om antalet ifyllda incident rapporter kan ökas.

Resultaten visar att den Svenska Försvarsmakten inte skiljer sig påtagligt från andra organisationer när det kommer till lärande från olyckor och incidenter. De problem och svårigheter som förekommer när det gällande lärande efter incidenter inom Försvarsmakten, har också identifierats i andra organisationer. Därför kan organisationen ta del av tidigare forskning och dra nytta av andra organisationers erfarenheter av att minska antalet incidenter samt att minimera effekterna när de väl sker.

Vidare visar resultaten att informationens kvalitet i incidentrapporter kan påverkas. Consensus processer i gruppvis incident rapportering påverkade kvalitén något, dock inte tillräckligt, av insamlad information. Inte heller påverkades antalet rapporter.

Däremot förbättrades kvalitén i den insamlade informationen signifikant, genom nyttjandet av tidigare forskning inom dels minnespsykologi men också intervju- och frågeformulärskonstruktion i själva konstruktionen av incidentrapportens mall. Det nya formuläret visade sig samla högre kvalité på informationen oavsett incidentens karaktär eller i vilken kontext den utspelade sig, också i verkliga

militära sammanhang. Insamlad information visade sig också överensstämma med vad som verkligen hade hänt.

Slutligen, resultaten bidrar också med ny förståelse för vilka svårigheter samt möjligheter det finns att få tag på användbara incident rapporter. Det verkar finnas två uppenbara svårigheter; organisationens medlemmar *vill* inte rapporter vad de har upplevt eller tagit del av, de är heller inte förmögna att rapportera den efterfrågade informationen även om de skulle vilja. Utifrån de slutsatserna är det således inte tillräckligt att förbättra organisationens kultur för att medlemmarna ska våga/vilja rapportera, det krävs också mera arbete med att möjliggöra och stödja organisationens medlemmar så att de *kan* rapportera.

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Retrospect, about six years;

I told my superior, Lt Col X - *I would like to apply for the PhD program.*

He rapidly glanced at me and said - *Don't bother, you will never pass. It's impossible!*

First of all, I would like to thank, the Swedish Armed Forces for financing this project.

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Last but not least,

Hans and our precious Isabel, you are the joy in my life!

Ps. ... and to Lt Col X.

"All our dreams can come true if we have the courage to pursue them" (W. Disney)

List of Appended Papers

Paper I to V

Paper I Pettersson, U. (2009) "Success and Failure Factors for KM: The Utilization of Knowledge in the Swedish Armed Forces"
Journal of Universal Computer Science, Vol. 15, No. 8, pp. 1735-1743.

Paper II Pettersson, U. (2011) "Sharing Knowledge: How to Highlight Proven Experience in the Swedish Armed Forces"
Journal of Communication and Computer, Vol. 8, No. 5, pp. 410-414.

Paper III Pettersson, U. (2010) "Acquisition of Experience-based Knowledge from the Swedish Armed Forces International Missions; A Comparison between Groups and Individuals"
Proc to 7th International Conference on Intellectual Capital, Knowledge Management & Organisational Learning, November 11-12, Hong Kong, China.

Paper IV Pettersson, U. (2013) "A form to collect incident reports: Learning from Incidents in the Swedish Armed Forces".
Accepted for publication in *Electronic Journal of Knowledge Management.*

Paper V Pettersson, U. (2012) "A New Incident Report Form Leads to Improved Foundation for the Lessons Learned Cycle".
International Journal of Information Systems for Crisis Response and Management, Vol. 4, No. 3, pp. 14-22.

Related Paper

Pettersson, U. & Nyce, M. J. (2011) "Hierarchy and Tacit Knowledge in the Swedish Armed Forces; an Organisational Approach"
Proc to 3rd European Conference on Intellectual Capital, April 18-19, Nicosia, Cyprus.

Chapter One

Introduction

Due to international engagements in different parts of the world, the Swedish Armed Forces (SwAF) is frequently exposed to new tasks, geographical territories and environments. The rapid transformation and requirement to adjust to new and, perhaps unknown, tasks, give topical interest to lessons-learned[1] (LL) processes (Smith, 2007; Åkerman, Emanuelson & Ahlgren, 2007).

Accident prevention is, to a large extent, dependent on collected information e.g. that gained through incident[2] reports. Such reports are normally written by people who took part in, or observed, an occurrence, predominantly at the sharp end[3] of the organization. However, one serious problem is that many incidents[4] are poorly reported or not reported at all. Reports can significantly contribute to the SwAF's ability to make improvements in today's mission areas (Tillberg, Svartheden & Engstedt, 2007). Also Dekker (2007) and Reason (1997) stress that reports are

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[1] *Lessons learned, best practices* and *proven experience* are terms that can be found in literature concerning knowledge management and organizational learning. Best practices are often used in the medical domain and also by the UN, in reference to organizational improvements. The U.S. Marine Corps use both terms; best practices represents short-term improvements while LL represents long-term improvements. Among Swedish officers and researchers *proven experience* is sometimes used, and the term can also be found in Paper III. However, in this thesis I have chosen to use the term LL, which will represent an overall term to describe the process of defining shortcomings, analyzing the events and instilling changes that are capable of promoting organizational improvements. Irrespective of which term is used, learning is not complete until improvements have been instilled and a change has been realized in the organization.

[2] An event which is either unpleasant or unusual (Cambridge Dictionaries, 2012).

[3] The sharp end often represents the place/edge were the accident occurs, while the blunt end represents the organization and structure that supports activities at the sharp end.

[4] There is a diversity of definitions and classifications of "unwanted" events, e.g. *near-misses, incidents* and *accidents*. Near misses can be defined as "…something that could have resulted in some kind of injury or property damage, but which did not" (Hollnagel, 2004, p 21). A distinction usually made between more common, minor incidents and, not that frequently, major accidents is that accidents often receive the most medial and organizational attention and also the most thorough investigation. "The necessary conditions for an organisational accident is the rare conjunction of a set of holes in successive defences, allowing hazards to come into damaging contact with people and assets" (Reason, 1997, p 11).

vital in any learning organization. Incident reports generated in the SwAF are often incomplete and lack the required information, however it is important to maintain and improve the spontaneous bottom-up report structure (HQ, 2008; HQ, 2010). Information about where, when, in what environment and under what conditions, is frequently lacking in detail or omitted altogether. Jacobsson (2011) argues that a good and useful incident report should contain both scope and quality. *Scope* needs to describe e.g. the event, type of equipment/item involved, damages, date and time, location, direct cause and contributing cause, name of reporter etc. and *quality* represents the level of detail of the aspects reported under scope (Jacobsson, 2011). A report of good scope and quality will make it easier for analysts to build an understanding of what happened and to find the basic contributing factors and circumstances of the incidents (Jacobsson, 2011).

One of the issues repeatedly found in safety science concerns difficulties in acquiring sufficient information (e.g. useful reports) after incidents. This seems to be a general problem in many different types of organizations (CALL US Army, 2009; Dekker, 2007; Jacobsson, 2011; Reason, 1997, 2008). Problems due to insufficient and incomplete incident reports are emphasized in the author's dialogues with analysts, at the Joint Analysis & Lessons Learned Centre (JALLC), which supports NATO's role in global crisis response operations (NATO, 2011). This is also confirmed through searching and reading reports contained in JALLC's Lessons Learned Database, which contains incident reports from NATO's worldwide missions.

There seem to be at least two plausible explanations for the prevalence of weak reports. The first is that members of the organization do not *want* to report incidents. This possibility is a problem that is associated with organizational culture and it has received a great deal of attention in previous research into safety science. The second possibility is that the members of the organization may not be *able* to report incidents. Even though it is acknowledged that many reports are weak and that it is a serious problem, research on *how* to retrieve this highly valued information has attained modest attention, and the problem does not yet seem to have been fully solved anywhere. This is unfortunate. Jacobson (2011, p 21) argues ".. the ultimate learning will depend on how it is reported". This failure in the early step of a learning cycle has the unfortunate effect that analysts who normally did not participate in the incident, are left without substantial facts in their effort to build an understanding of what actually happened and why it happened. They experience difficulties identifying the basic contributing factors and circumstances and may fail to implement adequate improvements (CALL US Army, 2009; Koornneef, 2000; Reason, 1997; von Thaden & Wiegmann, 2004).

Organizational learning takes place through individual learning in the organization (Popper & Lipshitz 2000). Organizational learning is achieved through the

learning of its own members or through the incorporation of new members who can bring new knowledge into the organization (Simon, 1991). Simon (1991) also stresses that the organization itself, and its goals, may be the most important issue regarding organizational memory, since it "provides the basis for defining the roles of organisations member*"* (Simon, 1991, p 133). In military organizations, frequent staff turnover is a reality due to the specific combat or war fighting tasks that necessitate that each and every one of the personal/officers should be replaceable. The organization requires flexibility in the chain of command (Dandeker & Gow, 1999). In international missions in the SwAF, temporal units are normally deployed and rotated every six months. After deployment the unit will disband and its personnel will return to their previous positions or will be placed in new roles. In the nationally based organization, officers normally rotate and change positions in a three-year cycle. This means that it is important to collect and distribute individual's experiences in written form because one cannot always expect to have people with relevant experience on a mission.

The incident report form provides the foundation for analysis, which is all about understanding, for example a phenomenon, not about making judgments about the individual. If analysts were provided with improved foundations, it would presumably increase the chances that they would be able to build a better understanding of what happened and why the incident occurred. To decide what information is needed, analysts in each organization should be consulted, since they are the ones who will decide if the reports are utilizable. However, it would be most valuable to know *how* to (general methods) capture the information that analysts require.

It has proven especially difficult to obtain information about what happened directly before an incident from those who participated or observed an incident or accident (HQ, 2008; Jacobsson, 2011).

The contribution of this thesis is to ameliorate the problem described by providing a report structure that will increase the scope and quality of information collected after incidents.

The research is conducted within the context of the SwAF. This particular organization lacks a joint and widespread LL process (HQ, 2008; HQ, 2009). However, the Supreme Commander of the SwAF has now decided that a systematic learning process should be implemented (HQ, 2008; HQ, 2009; HQ, 2010; HQ MSD, 2011). The research reported here was undertaken to help meet the Supreme Commander's needs.

Background

There is need for adaptation and improvement. As mentioned in the introduction, the SwAF Supreme Command has now confirmed a need, and decided that a systematic LL process must be implemented (HQ, 2008; HQ, 2009; HQ MSD, 2011). However, no directive or guidance as to how such a process should be designed or executed is included in the orders.

The SwAF have been criticized for not using their previous experience to identify conditions that may pose risks to soldiers and civilians, and that they will become the victims of repetitive casualties (Tilllberg, Svartheden & Engstedt, 2007; Åkerman et al., 2007). The SwAF confirm that they lack a joint and widespread LL process within their organization (HQ, 2008; HQ, 2009). Simon (1991) argues that personnel turnover is *"...a great enemy of long-term organisational memory"* (Simon 1991, p 128). This could be illustrated by e.g. the frequent rotation of temporal units within armed forces. Further, he stresses that transmission of information between individuals or groups is especially important. In one of the last steps of the learning cycles (Fig 1), knowledge will be feed back into the organization. This can be compared with Popper's (1979) description of when knowledge is transferred from world II to world III. Knowledge must be transferred into world III into a form that can be shared by everyone in a community sharing the same tasks, experience and competences before it can provide a basis for learning (Brehmer & Bergström 2007, Brehmer 2011).

Figure 1. The place of Incident Reporting, the Thesis Focal Point of Research, in the Learning Cycle.

Incident reports from international missions that are forwarded for analysis are not of a sufficient quality. The reports fulfill neither demands for scope nor quality and therefore make both efficient analysis and implementation of improvements impossible (HQ, 2008).

The incident report procedures used in the SwAF are not unique to that organization, similar processes are to be found within a number of organizations, for example NASA, the United Nations, the US Marine Corps, nuclear and process-industry, traffic, medical services and aviation (Jacobsson, 2011; US MCCLL, 2010; Paxton, 2005; Weber & Aha, 2002; WGLL, 2008).

If an organization keeps track of what might go wrong, this information can be used to identify and address other threats (Flanegan, 1954; Vicente, 2006).

Nevertheless, the question of how information after incidents should be reported has attained modest attention in research.

A variety of learning and LL cycles have been presented in literature. They frequently describe an iterative process (Fig 1) that regularly starts with observation of an occurrence followed by *reporting, analysis, decision, implementation* and finally a *follow-up* step (Australia LL, 2012; French Air Force, 2008; HQ, 2008; NATO, 2011). Irrespective of which cycle one chooses, the first collection/report step is only one part in a complex process, but it provides

an important foundation for further work (Chua & Lam, 2005; Guptara, 1999; Lucier, 2003).

There are attempts to learn from experience in the SwAF. Members with mission experiences are, on some occasions, invited to lecture at SwAF schools. There are also meetings after every mission rotation, involving the individuals coming home and the ones going away. SwAF succeed in its scattered attempts to bring back and instill experience into the organization; however, such experience is often of an individual character and the retrieval process is not a systemized one. There is neither any over-arching analysis to decide what experience should be instilled, nor an assessment of the results. Within the current process, just a few experiences will be utilized (Pettersson, 2009;2011).

Information Collection

Incident reports are based on memories, and human memory has been subject to research for a long period of time. Research in eyewitness testimony (which is based on memory psychology) and interview and questionnaire methodologies represent areas where information collection has received a considerable amount of attention for long periods of time. Research results from those areas might have the potential to improve the collection of information after incidents.

Interviews and questionnaires are common methods for collecting information, in research as well as in other contexts. The information collected with such methods is, just as in the case of eyewitness statements, often dependent on recall of previous events. It is generally acknowledged that the quality of information obtained by these methods is dependent on the way they are designed and, as there is considerable experience with methods, one would expect that guidelines for questionnaires would provide important information about how data should be collected about accidents and incidents.

The central problem for this thesis is to find a way to improve the first step in the LL process, viz., the quality of incident reports.

Thesis Outline

Chapter Two clarifies the overall research objective and the three specific research questions. The theoretical framework of the thesis is presented in Chapter Three. Chapter Four contains research methods and ethical aspects. In Chapter Five research questions 1-3 are answered and the overall research objective is addressed. In Chapter Six the thesis is summarized; results are discussed and conclusions are drawn.

Chapter Two

Research Objective

As described in the introduction, this thesis is concerned with the problem of how to improve the quality of the information obtained by incident reports. This leads to the following overall research objective.

The overall research objective was to develop a report structure that enables the individuals who participated in or observed an incident to provide more information that is relevant about that incident for the purposes of analysis.

Many organizations use similar incident report forms, which often consist of just a few headings. As the reader will recall, research on how report forms should be designed to collect information after incidents is sparse. Jacobsson (2011) argues that a good and useful incident report should contain both scope and quality. *Scope* needs to describe, for example, the event, type of equipment/item involved, damages, date and time, location, direct cause and contributing cause, name of reporter etc. and *quality* represents the level of detail of the aspects reported under the scope (Jacobsson, 2011). A report of good scope and quality will make it easier for analysts to build an understanding of what happened and to identify the basic contributing factors and circumstances of the incidents (Jacobsson, 2011).

To achieve the overall research objective, three empirical research questions were formulated and follow below.

Research Question 1

As described above, there is a considerable amount of research in safety science on the problems facing organizations that attempt to learn from accident and incident investigations. This research has identified a number of factors that lead to failure in these attempts, as well as some ways and means to overcome these failures. In so far as the SwAF face the same kinds of problems that have been identified in previous research, the organization could presumably learn from what has proven to be successful in other contexts. The first research question was therefore formulated as follows.

> *Do the SwAF face the kinds of problems that have been identified in earlier research on attempts to learn from accidents and incidents?*

Research Question 2

The efforts of consensus groups to discuss a topic deeply and seek consent of all participants, could possibly also improve the quality of the information collected after incidents. In the discussion, there is a possibility that more information is brought to the surface and reflected in reports with more scope and quality. The second research question (a, b) of this thesis concerns whether a consensus group will improve the quality of the information collected after incidents.

> *2 a) Do groups produce better reports with respect to scope and quality than individuals do?*
>
> *2 b) Do groups produce an increased number of reports?*

Research Question 3

To answer the third research question, a design science perspective (which is normative and aiming at producing knowledge, useful for practitioners) has been utilized.

As has been mentioned in the background section, research on information collection e.g. by means of interviews and questionnaires, suggests that results are closely linked to the design of the questions asked and the forms used to collect responses to these questions. This research is outlined under "Questionnaires and Interviews" in Chapter Three.

Research concerning information retrieval has been thoroughly studied within the domain of memory and witness psychology. Considerable research has been conducted on how a witness can be supported to retrieve, encode and store information (Anderson 2005; Christianson, 1997; Granhag, 2001). As outlined in Chapter Three under "Eyewitness Testimony and Memory Research", it seems likely these results could be used to improve incident reporting.

The third research question is concerned with whether the results from research on memory and eyewitness psychology, along with interview and questionnaire methodology, would lead to a better incident reporting form.

> *Does an incident report form designed to enable recall of information lead to better reports with respect to scope and quality?*

Chapter Three

Theoretical Framework

This chapter will provide a theoretical context for the work reported in this thesis. As should now be clear, the aim of this work is to improve incident reporting. We start with a discussion on why present-day incident reports do not yield the required information in terms of scope and quality, i.e., the information required, and constitutes the foundation (substantial facts) for analysts in their effort to build an understanding of what happened and why it happened. There seems to be at least two possible explanations for the prevalence of insufficient reports:

- Members of the organization do not *want* to report incidents.
- Members of the organization are not *able* to report incidents.

These two explanations provide guiding hypotheses for the research reported in this thesis. Previous research has mainly explained poor incident reports in terms of the first hypothesis, assuming that people do not want to report because the organizational culture does not support openness and they fear the consequences. This approach is outlined under "To Punish or Improve" in this Chapter.

The main focus in this thesis is on the second hypothesis, i.e., the possibility that people may not be able to report, even if they want to. We do not propose this as an alternative to the first hypothesis. There is enough evidence that the organizational culture is important, as we shall detail below. Instead, we propose the second hypothesis as a supplement to the first. That is, we propose that organizational culture does not provide the whole explanation for the poor reports. Consequently, after discussing the impact of organizational culture, we move on to consider factors that may enable respondents (who want to report) to improve the quality of their incident reports, and perhaps even write reports that are of a sufficient quality. These factors are currently not taken into account in the report structures that are used today.

We begin that section by considering the possibility of generating better reports through adopting a process of group reporting, rather than individual reporting. Finally, we consider the possibility of improving the quality of the reports by relying on research that is concerned with how the people that have witnessed or taken part in incidents can be asked to report their experience in a more effective way. The point of departure here is research on reports based on recall. We first

turn to results concerning how interviews and questionnaires should be formatted to provide information of good quality. Finally, we consider what can be learned from research on the very foundation for memory based reports, viz., research in witness psychology and its basis in research on human memory.

Design Science Perspective

To achieve the main focus in this thesis, which was to improve information collection after incident, a design science perspective has been used. An incident report form has been designed, that may plausibly provide analysts with information with increased scope and quality.

Design research is a relatively new research field which started to grow during the sixties (Cross, 1999). Production and creation is no longer just an 'art', since design research is focused on utilizing research knowledge to achieve useful solutions in the field (Buchanan, 2001). In 1969 Simon proposed a *science of design* (Simon, 1969 3rd ed). During the 1980's the first journal emerged and the Design Research Society initiated Design Studies (Cross, 2007).

The design science perspective differs from research in natural science. Design science approach is today used in several disciplines, It is normative and aims at producing knowledge, useful for practitioners who will use it to design solutions in their own fields. This can be compared to 'natural science' which is more theory driven and aiming at understanding the existing world, to the triplet describe, explain and perhaps predict (Brehmer, 2007; Denyer, Tranfield & van Aken 2008).

Simon (1969) argues that beside the natural physical world, there is also an artificial world with a great number of man-made artefacts. Further Simon (1969) stresses that adaptation to a goal include the relation between the character of the artefact, the purpose to achieve and the environment where it is suppose to perform.

Gregor and Jones (2007) have distinguished eight criteria's that gives explicit prescription on how to design an information system (artefact). These criteria are: 1. purpose and scope 2. constructs 3. principles of form and function 4. artefact mutability 5. testable propositions 6. justificatory knowledge 7. principles of implementation 8. an expository instantiation (Gregor & Jondes, 2007).

According to Brehmer (2007) e.g. a command and control-systems are human artifacts, including organization, methods, support systems, procedures and processes. The design process ought to start with the purpose of the artifact, and be built from criteria that support the purpose. For design to be satisfactory (evaluation) the designed 'system' needs to meet with criteria given before the

design process. Brehmer (forthcoming) suggests a design hierarchy in five levels, based on Rasmussen's well known abstraction hierarchy (Rasmussen, 1984).

Level 1. *Purpose* (why artifact exists and what it is supposed to achieve)

Level 2. *Design criteria* (represent how the artifact is supposed to attain the purpose)

Level 3. *Functions* (what the artifact must do to achieve the purpose)

Level 4. *General processes* (the foundation of previous research that can inspire on how to accomplish the functions)

Level 5. *Form* (how it achieves the functions)

This design hierarchy was used in the present thesis to arrive at the design proposition tested in the experiments in the present thesis.

To Punish or Improve

What determines the willingness of members of an organization to write reports after incidents?

After an incident, an organization often strives to collect as much information as possible about what happened in order to understand and act to prevent a similar incident from being repeated in the future. Observations are the basic building blocks of a LL process (NATO, 2011), and organizational learning demands involvement from all members of the organization. Unfortunately, this is not always the case (Reason, 1997). If employees are not willing to share accurate and timely information with the organization, they must be motivated to do so (Malhotra, 2007). Retrieving information concerning incidents and the possible mistakes that people have made, calls for an organizational culture that is built on trust, where staff feel that they can admit mistakes without being exposed to negative consequences (Ahrenfelt, 1995; Dekker, 2007; 2009; Lucier, 2003; Reason, 1997).

Rasmussen (1997) argues that the outcome reached by analysts may be influenced by their aim, be it to understand behavior, to punish, or to improve the system. Organizations should use reports to understand and improve, not to punish members. Searching for scapegoats and punishing staff for human error will not decrease errors, only the number of them that are reported (Dekker, 2009; Reason, 1997).

Since the early 1960s air traffic has made great progress with respect to accident investigation. From the start, investigation and change was mainly focused on "equipment failures," technical matters and hardware. During the 70s the focus

turned to “unsafe acts,” errors and violations and, finally, a few years later to “system and cultural issues” (Hollnagel, 2004; Reason, 2008). The Swedish Air Force is frequently pointed out as a good example, since they have managed to increase incident reports. However Carlemalm (2009), a pilot in the Swedish Air Force, stresses that the Swedish Air Force does suffer from unreported incidents, and that only 20% of incidents concerning *human and organizational factors* are forwarded, compared to civil air traffic and the US Air Force, which have a more than three times higher rate of human error reports (Carlemalm, 2009). He claims that the foremost reasons for this concern the organizational culture, the disciplinary system and the lack of protection of reported information (Carlemalm, 2009). Even if incident reports are not anonymous, it is essential that the information and colleagues are protected from disciplinary actions based on the reports (Reason, 2007).

NASA and the British Airways Safety Information System are two good examples where organizations have managed to build a reporting culture and considerably increased the number of reports, especially the ones concerning human and organizational considerations (Reason, 1997). Further, Reason argues that there are five keys that motivated the members of those organizations to write reports and, as a result of that, increase the number of reports: 1) Confidentiality and de-identification of reports. 2) Separation of the agency doing the analysis from those who have the authority to administer disciplinary actions. 3) Rapid feedback to the reporting community. 4) Easy reporting procedure. 5) Indemnity against disciplinary actions (Reason, 2007, p 197). Reason’s five keys are in line with what Argyris (1999) argues: if people do not have trust within the organization, reports will be selective.

Difficulties and Challenges in Incident Reporting

To improve the report structure, reports need to be accessible to all members in the organization, regardless of rank or position. Dekker (2007) argues that getting the members of the organization to report is about “maximizing accessibility and minimizing anxiety” (Dekker, 2007, p 43). According to NATO (2011) the methods used to collect observations should be as simple to use as possible. Forms should not be troublesome to complete or to forward (Dekker, 2007). Long forms are time consuming and respondents are less likely to complete the task (Reason, 1997). However, this seems not enough to enable respondents to write reports that are of a suitable quality.

Learning from incidents can be achieved through analysis from a single observation, or through clustering of multiple occurrences (Reason, 2008). In general, it takes multiple reports concerning similar issues before it is possible to understand and explain the problem and to suggest efficient changes that can avoid

incidents and improve the organization. It is therefore important to include all members in the report structure.

One difficulty concerning incident reports is that incidents are not always due to people violating security regulations or doing thoughtless things on purpose, those involved usually did what seemed to be a "good idea at the time" (Dekker, 2005). For instance, they may have been confronted with a completely new situation or task, in a context that current regulations did not cover. Consequently, it is sometimes rather difficult for them to realize that what they did was wrong and that it should be reported.

Another difficulty is that, when people do not know that something is about to happen or go wrong, they will not pay attention to what may be possible basic contributing factors and circumstances of the subsequent incident. This is due to a natural protection from information overload; humans do not encode and store "everything."

There is usually a tradeoff between how generic and how useful a method can be. All organizations need to find a format that suits not just their collection purpose but also the purposes of the respondents. This may require a certain amount of *trial and error* in developing the report structure. NATO recommends that organizations use the incident report form suggested in *ACO Directive 80-2 Lessons Learned*, since the form enters into NATOs LL database (NATO, 2011, p 19; NATO, 2009). The form (Appendix a) contains the following headings: *title, observation, discussion, conclusion* and *recommendation* (ODCR), with no additional space for comments. This means that the respondents are left with limited support to report what he/she observed. The SwAF uses the form recommended by NATO, as Sweden is a NATO "partnership for peace" country and thus follows the NATO standard (HQ, 2004; Sveriges Riksdag, 2008).

How to Retrieve the Required Information: Using Groups and Improving the Report Form

Even though reports are essential there is very little research on *how* to capture the required information, particularly in relation to the impact it might have on further steps in the learning cycle. Consequently, we will now focus on the second hypothesis, i.e., that people may not be able to report what they know and improve the quality and write reports with sufficient quality even if they want to. This will be achieved through a study of factors from previous research regarding consensus groups, interview and questionnaire methodologies, eyewitness and memory research. First, however, we need to consider what information is required for an incident report to be useful, since this will define what we are after.

What information is required?

As stated above, Jacobsson (2011) argues that both the scope and quality of the incident report are essential for later analysis. The form should be designed to help the reporter to provide information about relevant things (e.g. the event, type of equipment/item involved, damages, date and time, location, direct cause and contributing cause, name of reporter), sufficient details, a recommendation and, he further suggests, space for the reporter to leave additional information (Jacobsson, 2012).

The minimum information that US Army Centre for Lessons Learned (CALL) requests in a report is: contact information, operation and location and an observation title. Further, CALL needs background information (including relevant items) and insight into what happened, under what conditions, how the unit was affected and why, and, finally, what should be learned from the event (CALL US Army, 2009).

At JALLC one argues that quality of a report is dependent on whether it contains a cause (why) of the incident occurred, and if the explanation seems to be correct? Secondly, quality is distinguished by whether the report contains a recommendation (solution), and whether this recommendation seems to address the cause.

To summarize, the report should be credible, logically convincing and easy to read (NATO, 2010). Between Jacobsson, NATO and CALL there is difference in requirements as to how the quality of the information collected in reports should be measured. The issue seems to concern how vital *cause* and *recommendation* are and the question of whether those are expected to be a part of the report or if this is a task that should be limited to the analysis element of the procedure.

The information analysts require for further work, seems unfortunately seldom to be fulfilled in produced incident reports today.

Group Performance

When a group discusses an issue and seeks consent of all participants in the decision, it is often referred to as a consensus meeting: "The judgment arrived at by most of those concerned" (Merriam Webster, 2012). Consensus groups normally need to discuss a topic deeply before they can achieve the consent of all participants. This process might possibly also bring more information to the surface and reflect more scope and quality if the groups also produce incident reports.

The process in consensus groups is used in medicine, for example, to identify best practices. "The US Organ Donation Breakthrough Collaborative" has developed a unique method of dramatically increasing access to transplantable organs. "The collaborative process, bringing teams together over time to implement rapid change in healthcare organization, not only works, but should be seen as the way to bring about transformation throughout the healthcare system" (Shafer, Wagner, Chessare, Zampiello, McBride & Perdue, 2006 p 14). This effort has led not only to shaping an organization that is more focused on learning, but one that is also dedicated to saving many lives. Regarding productivity, prior research comparing groups and individual performances suggested that groups may lead to process gain (Erez & Somech, 1996). New creative possibilities may emerge when individuals start to share their observations or mental models and truly try to understand each other's different ways of viewing a situation (Espejo, Schuhmann, Schwninger & Bilello, 1996). This suggests that the process of reaching consensus may bring up facts and produce an understanding of the issue discussed that would not otherwise be achieved, and a report of an incident after reaching consensus about that incident may well exhibit better quality, both with respect to scope and detail.

In this thesis, consensus groups were therefore considered as one possible means of increasing the scope and quality of the incident reports produced. As we shall see, the results were somewhat disappointing and led us to consider other means of improving the incident reports.

Questionnaires and Interviews

Data collection can be accomplished through a number of different methods. When choosing a method, the *purpose* and *contexts* of where collection is carried out should be taken into consideration. Oppenheim (2005) stresses that surveys all too often are implemented with insufficient or no design at all. Before planning, for example, a questionnaire, one must carefully analyze what the questionnaire is

supposed to answer and what the researcher or analyst needs to know (Christensen, 2007). “A poorly designed survey will fail to provide accurate answers to the questions under investigation; it will leave too many loopholes in the conclusions; it will permit little generalization; and it will produce much irrelevant information, thereby wasting case material and resources” (Oppenheim, 2005, p 8).

Interview research can be divided into verbal interviews and written questionnaires (Andersson, 2007; Christensen, 2007). Interviews call for more resources, personal meetings, etc., but the method is useful when one wants to collect deeper knowledge and penetrate a certain topic. Questionnaires or forms can easily be distributed widely but do not ensure the same level of detailed knowledge. When using questionnaires, there will be no opportunity to explain the questions, nor to clarify the answers, and there will be no opportunity to add supplementary questions (Andersson, 2007), which is the case during verbal interviews (digital questionnaires manage to make predefined supplementary questions to some extent, however). One common criticism of questionnaires is their lack of ability to capture sufficiently detailed knowledge. Using open-ended answers, or at least providing ample space for supplementary information, might help to capture more detailed knowledge (Christensen, 2007). Verbal interviews permit pauses and encouragement; this is not practicable with questionnaires.

A rigid design and questions in fixed order is often called a structured interview and these are also characteristic of questionnaires. Interviews give an opportunity to be less structured e.g. allows adjustment of the questions (Andersson, 2007).

Interviews are called structured when the questions are highly concentrated around a specific narrow topic, while unstructured interviews cover a much wider topic (Trost, 1994). It is important that the location of all questions is carefully considered. If the form has an uncomplicated opening the respondent might feel more comfortable and there will be a higher chance that he or she will complete the entire form. Questions must be clear, easy to understand and possible to answer. Long questions might be off-putting. Leading questions should be avoided (Synodions, 2003).

A respondent’s interest seems to weaken after a certain time (Christensen, 2007; Trost, 1994). Questions should therefore be limited to what the respondents are expected to have knowledge of. To answer hypothetical questions or to predict the future is extremely difficult or impossible and such questions must be considered carefully (Synodions, 2003). Multiple-choice questions require respondents to choose from a limited number of alternative answers, while open-ended questions allow them to answer in a more self-selected/independent way (Christensen, 2007). Open-ended questions are normally more burdensome to analyze, although they might be preferred when one cannot define well-known variables beforehand.

One should not squeeze several questions into one. It is better to divide them into several sub-questions (Synodions, 2003; Trost 1994). Questions should flow logically, from more general to more specific, least sensitive to more sensitive (Synodions, 2003). Expression, vocabulary and phrases must be known to the respondent so there is no misunderstanding regarding the questions (Trost, 1994). However, Oppenheim (2005) argues: "We must always bear in mind that difficulties that respondents may have in understanding the question and in forming an 'inner picture' of their own answer or reaction..." [will affect the answer] (Oppenheim, 2005, p 121).

To lead the respondents, it can be useful to show them examples, but this should be considered carefully in each case (Andersson, 2007).

To summarize, it is important to clarify what the questionnaire is supposed to answer before starting the design. The form must not be off putting, it should be inviting, make respondents feel comfortable and enable them to answer all questions. Questionnaires were chosen for this research since incident reporting in forms is already a standard procedure that is used by the SwAF. However, a new form was designed that was based on the experiences, with respect to how such forms should be designed, that are discussed above. However, this was not considered sufficient, and results from research into eyewitness testimony and human memory were also used to improve the questions contained within the form.

Eyewitness Testimony and Memory Research

Witness psychology can be seen as a part of memory psychology. This has been a subject of research since the 1920s. Some of the results could conceivably also facilitate attempts to collect information after incidents. Especially research concerning recall seems a likely candidate for application when designing report forms that aim to enable respondents to report more comprehensibly on incidents.

Eyewitness memory is concerned with authenticity and completeness in witness' statements and there is extensive literature available in this area.

Giving eyewitness testimony can be described as recollecting an (unusual) event, in common parlance this is referred to as remembering. From a researcher's perspective, eyewitness testimony is concerned with the events surrounding a specific event, details about the people involved and the surroundings (Haberland, 1998).

Witnesses tend to remember emotion-provoking details, such as blood, weapons etc., in detail. This phenomenon is classified as *weapon focus* or *tunnel memory* (Baddeley, Eysenck & Anderson, 2009; Haberland, 1998). Studies have shown that witnesses of extreme crimes or tortures, e.g. those from concentration camps,

are capable of recollecting the events after very long periods of time, up to 40 years. Memories associated with unpleasant emotional occurrences (tunnel memories) also promote memories of central details (Christianson, 1997; Granhag, 2001). It seems, therefore, that the frightening and unpleasant character of many incidents should not act as an obstacle to producing good reports about the incident.

In contrast, memories of environment and surrounding context are poorer (Haberland, 1998). It seems that respondents do not naturally report those memories and that they would need support to do so. Anderson (2005) and Granhag (2001) argue that it is crucial to support eyewitnesses when they are trying to retrieve information from a specific event. It is recommended that one begins with free recall and avoids close-ended questions (Granhag, 2001). Open-ended questions lead to a lower percentage of incorrect information than closed-ended questions. It is also recommended that questions are repeated or similar questions are asked.

To lead the witness to reinstate features present at the time of the event, one should ask them questions about what took place before the event, the time of the day, and the weather conditions. This process is assumed to facilitate the eyewitness's retrieval of the original encoding of the event (Geiselman & Fisher, 1997).

The recommendation in eyewitness's psychology to use free recall and open-ended questions and to request detailed information in order to help the respondent to remember a certain event, has shown to be helpful during the design of the new form. However, as we shall see below, when we consider the results from memory research, unsupported free recall may not be the best way to obtain the kind of information that has proven hard to obtain in incident reports.

Memory research might provide additional valuable guides. However, research in this area is extensive and it involves highly complex research, though in order to support eyewitnesses, some fundamentals of the memory process may be sufficient. It is "…established, that our memory store contains more information than we can access at any given moment" (Baddeley et al., 2009, p 165).

In a witness statement no less than three related steps (encoding, storing and retrieval) need to be considered.The first step is *encoding*, which represents the individual's observation and understanding of a certain occurrence. The item of interest is converted into a construct that can be stored in the person's sensory or short-term memory and can later be transferred into long-term memory (Anderson, 2005; Eysenck & Keane, 1995). If the association is personally meaningful for the person, or if it can be associated with previous knowledge, the encoding will be

enhanced. Recognizable information also seems to improve recall (Eysenck & Keane, 1995).

Secondly, *storing* can be referred to as the retention of information, this is the information that the person actually keeps in memory during the time period between encoding and retrieval (Anderson, 2005; Eysenck & Keane, 1995). People's senses are constantly overburdened with information, and most of it will not receive any attention (Eysenck & Keane, 1995). The three stages (sensory, short-term and long-term) of memory protect individuals from over load of information, thus acting more or less as a filter process (Anderson, 2005; Eysenck & Keane, 1995). Information is first held very briefly in the sensory stores, only some of it will be processed further to the short-term store and even less to the long-term store (Eysenck & Keane, 1995). Information that is repeated has an increased chance of being stored in the long-term memory.

Finally there is retrieval, which relates to the information people are able to re-access after a period of time (Anderson, 2005; Baddeley et al., 2009; Eysenck & Keane, 1995; Ganhag, 2001). The process is sort of a mirror image of the previous encoding process, now the memory is moved from the long-term memory to the short-term memory or sensory memory, where it can be accessed. All three processes interact; the capability to encode "…determines what and how the information is stored, which in turn will limit what can subsequently be retrieved" (Baddeley et al., 2009, p 5). The focus in this thesis is given to the third step, i.e. retrieval.

Recognition and recall are two of the main retrieval processes. "Recall involves a search of retrieval process, which is followed by a decision or recognition process based on the apparent appropriateness of the retrieved information" (Eysenck & Keane, 1995, p 140). Recognition, on the other hand, only involves the second stage and is therefore considered easier. "True or false" choice questions, are examples of recognition tasks.

Recall refers to the process people use when they are trying to remember; for example, attempting to bring to mind an event or an object. Recall can be divided into free, cued and serial recall. In this thesis we will focus on cued recall. In his study, Bahrick (1970) used words as cues, where he showed that cues were most useful when respondents had failed during free recall. Recall was most effective when words were already present during encoding. Weakly related cues were equally as good as strongly related words, if they were already present during encoding (Bahrick, 1970; Eysenck & Keane, 1995).

"The two-phase model of retrieval and recognition components can provide the basis for predicting prompted recall performance over a wide range of experimental conditions" (Bahrick, 1970, p 222). Cues are used as reminders or

guides; the cues do not have to be a part of the encoding process. Cues tend to help and remind people of things that they could not remember in free recall, and which were believed to be lost or forgotten.

In conclusion, then, the results from memory research suggest that unsupported free recall, the format used in earlier report forms, may not be the best way to obtain good incident reports. Instead, the results from memory research suggest that some form of cued recall may provide more effective reports. In short, the results from memory research support the second hypothesis that one explanation as to why incidents are poorly reported is because people cannot report what they actually know when they have to rely on the report format most often used today, which involves some form of free recall. To produce better reports, people need support during the recall process. Cued recall appears to be an effective method of doing this, and forms based on this method were therefore tried in this thesis as a means of improving the quality of incident reports.

Chapter Four

Research Process and Method

In the first step (Fig 2), the explorative study (Paper I) was conducted to identify failure factors when implementing knowledge management systems in the SwAF. The purpose was to evaluate whether the organization faced problems similar to those identified in previous research in safety science. If so, the SwAF could most likely learn from what has proven successful in other contexts. It turned out that the implementation of knowledge management databases was not systematic and the process suffered from a lack of interest from management. The organizational culture in the SwAF did not support learning and could most likely prevent individuals from reporting incidents. Incident reports have been found to be incomplete and not holding the required information (HQ, 2008). Since information collection is one essential input in a learning cycle and will have effect on all further steps, it was considered for further research. Incident reporting is already a procedure used in the SwAF, though it does not seem to work efficiently today.

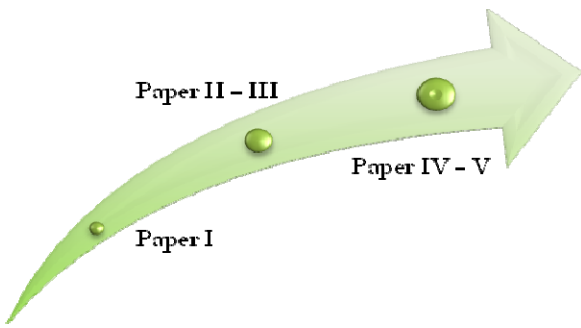

Figure 2. The research in this thesis was conducted in three stages

In the second step, Paper II was concerned with practitioners' efforts to share and utilize knowledge, and a method for obtaining proven experience was suggested. Paper III was concerned with the question of whether groups produced better reports than individuals. The method was based on consensus groups, and placed a particular emphasis on their effort to discuss an issue thoroughly. Since a consensus group discusses to seek consensus, they were expected to bring up more

information and information of higher quality in their attempts to reach consensus and, through that process, produce better reports. In Experiment 1 (Paper III) the quality of the incidence reports produced by the groups was evaluated. However, the results showed that scope and quality was generally low and did not meet the expectations of improved quality. Nevertheless, consensus groups did raise some interesting details regarding the incidents discussed, but unfortunately that information was not included in the final reports. This surprising fact led to the focus of the research shifting from group performance to report forms, and how respondents could be enabled to remember more scope and details and also provide information in report.

The third step includes two papers. A new incident report form was built from a design science perspective, and evaluated via a series of three experiments. The new form was based on interview and questionnaire methodology, and memory and eyewitness psychology, areas where information collection has been a subject of research for a long period of time. First the new form was evaluated in Experiments 2-3 (Paper IV), where film sequences were used to increase experimental control. The participants in this study were undergraduate students in political science at the Swedish National Defence College. Finally the new form was evaluated in Experiment 4 (Paper V), with officers from the SwAF who reported "real life" incidents from international missions (military context).

Experiment

Experiments are frequently used to show the relationship between cause/independent variables and effect/dependent variables (Klein, 2009). The thesis includes the results from four experiments (Experiments 1-4), presented in papers III, IV and V. The method was chosen since the aim expressed in research questions (RQ 2, RQ 3) could only be answered through a comparison of different conditions in controlled environments. Experiment 1 compared individual and group performance. In Experiments 2-4 two different incident report forms were compared.

The recruitment of participants to participate in experiments should be done with an awareness of representativeness. In Experiments 1 and 4 (Papers III and V) only officers were recruited, due to the specific task of describing incidents from the SwAF international missions. In Experiments 2-3 (Paper IV), representing people in general were recruited, since the task was to compare the two forms and no special education was required. Rather, the issue studied in these experiments concerned the nature of human recall processes, processes that are common to all people.

Unknown sources of variation and lack of control are the two most serious threats to internal validity, and can bias the study results. “Randomization is our most basic and single most important control procedure” (Graziano & Raulin, 2007, p 250). Random assignment of participants to conditions was used in all experiments. Both groups were treated in the same manner in all experiments (except for the differences relevant to the independent variable).

Research Ethics

Experiments 1-4 where designed with precaution regarding participants’ well-being (Petersson, 1994; VR, 2011). All participants took part in the experiments voluntarily. They signed informed consent forms, describing the task and their rights to interrupt before or during the actual experiment, without any consequences. Participants took part anonymously viz., it is not possible to identify which participants reported what.

The Design of a New Form

The aim to get better reports after incidents involves three vital functions. Respondents should; remember *what* happened, they should *want to* report and finally, they should be *able of* report. How to make respondents want to report incidents is well known from earlier research (e.g. results relating to organisational culture described above). The problem here is that what is known is not implemented. This problem is left out of this thesis. The focal point of the thesis is instead to enable respondents to remember and make it possible for them to report incidents.

Table 1. Design process to produce a new report form

Aim	Receive incident reports with the information that analysts require
Design Criteria	Increase Scope and Quality
	Increase the information NATO requires
	Increase the information CALL requires
Function	Remember what happened
	Able to report what happened
General Processes	Remember what happened
	memory psychology (cued recall)
	Able to report
	interview and questionnaire methodology
Form	Design propositions built on general processes
	The New Form

Brehmer's (forthcoming) design hierarchy (Tab 1) was used to build and evaluate the new form. To receive incident reports with the information that analysts require (Aim), three design criteria were defined: increased scope and quality, increased information required by NATO and increased information required by CALL. Two functions were defined: ability to remember and ability to report what is remembered. To develop the new form, I turned to what is known about how to improve what is remembered and about how to improve what is reported. Useful information concerning how achieve the first function was found in research on memory and eye witness testimony. Research on how to design interviews and questionnaires provided useful information for how to achieve the second function. To evaluate the form, a design proposition was constructed on the basis of this information.

Witness psychology suggests that it is essential to support and lead the respondents when they are retrieving and communicating what they have been involved in or observed, i.e., results relevant to both functions as do interview and questionnaire methodologies which provide a number of guidelines concerning how to collect information. In addition, research in memory psychology and eyewitness testimony offer a number of suggestions as to how people should be interrogated. Cued recall, in particular, was carefully considered during the design of the new report form (Paper IV). It was established that the human memory often contains more information than is possible to access at a certain time (Baddeley et al., 2009). The new form was designed to support respondents as they try to retrieve and report information from a specific event.

The new form is designed to be rather general, to fit a wide range of incidents, yet to aid the respondents to provide reports with greater scope and quality. The form has an uncomplicated opening, it flows logically from more general to more specific questions on purpose to give the respondent an uncomplicated start that makes them feel comfortable; this might increase the chance that he or she completes the entire form as suggested by Synodions (2003) and Granhag (2001). According to Christensen (2007), the use of open-ended questions and space to provide supplementary information might help to capture more detailed knowledge. Both recommendations were followed in the design of the form.

- The heading *Observation* was increased with a request to describe the incident in as much detail as possible.

Under every heading (except for Topic) there are one to four sub-questions. Andersson (2007) argued that it can be useful to give respondents examples. Cues have previously been shown to help and remind people of things that they could not remember during free recall, memories that were previously thought to have been lost or forgotten (Bahrick, 1970; Eysenck & Keane, 1995). Cues do not have

to be a part of the encoding process and were therefore considered to be useful on the form. They were used in the form of examples, to guide respondents to recall and report the type of information that has proven difficult during free recall.

- The heading Discussion was changed to Facts, since the word *Discussion* did not seem to give respondents any clue of what to discuses. In addition three sub questions were asked, with proposals (cues) on potential answers:
    1. Who where the main actors/components? (describe them in detail)
    2. In what context did the incident occur? (e.g. environment, climate, weather, °F/°C)
    3. When did the incident occur? (e.g. dd/mm/yyyy, hh:mm)

Furthermore, the form had an uncomplicated layout and included less than half a page, 21*29 cm of questions, since respondent's interest seems to weaken after a certain time (Christensen, 2007; Trost, 1994). In addition, Synodions (2003) stresses that questions must be clear and easy to understand and not too long, which might be off putting. Simple terminology that the average respondent could understand was therefore chosen. Questions were also divided into several sub-questions and not squeezed into one, as suggested by Synodions (2003) and Trost (1994). The questions in the form were based upon analysis of what information Jacobsson (2011), NATO and CALL believe is important after an incident.

- The heading Complementary information was added. In addition two sub questions were asked.
    1. Were there any previous areas/issues that might have affected the incident?
    2. Are there other vital areas/issues of interest or uncertainty related to this observation?

Evaluation of the Incident Reports Produced

So as to achieve an independent evaluation, without influence of the researcher, the evaluation of the answers given by the participants was performed by two independent reviewers for all four experiments.

The foundation for evaluation in Experiment 1 was based upon the requirements that JALLC argues that the quality of a report is dependent on whether it contains a cause (why) of the incident occurred, and if this explanation seems to be correct. Secondly, quality is also distinguished by whether the report contains a recommendation (solution), and whether this recommendation seems to address the cause (NATO 2010). All reports were scored using a scale from 1 (very weak)

to 4 (clearly described) for each category. Consequently the maximum score for each report was 24 points.

Table 2. Evaluation criteria for Experiment 1

Evaluation Criteria	**Points**
Relevance: Is the experience relevant for the SwAF?	1-4 p
Logical convincing: Is the report logically convincing, no contradiction.	1-4 p
Context: Is the vital context described?	1-4 p
Overall recommendation: Is the root-cause identified?	1-4 p
Originality: Is the experience earlier unknown to the SwAF?	1-4 p
Readability: Is the report comprehensible?	1-4 p

At the time when Experiment 2-4 was conducted, more literature had been studied and a more comprehensive foundation for evaluation was designed, based on the design criteria in (Table 1), described in Chapter Three. Especially Jacobsson's (2011) suggestions concerning Scope: the event, type of equipment/item involved, damages, date and time, location, direct cause and contributing cause, name of reporter proved useful and was used when constructing the evaluation of the new form. As well as his suggestions concerning Quality: as scope in sufficient details. Finally, questions concerning recommendations to avoid similar incidents in the future and free space for additional information (Jacobsson, 2012) were included. In addition, the minimum required information stressed by CALL US ARMY (2009), i.e., contact information, operation and location and a title. Further they require background information (including relevant items) and insight into what happened, under what conditions, how the unit was affected and why, and finally, what should be learned from the event (CALL US Army, 2009) were considered. Finally, JALLC arguements that quality of a report is dependent on whether it contains a cause (why) of the incident occurred, and if the explanation seems to be correct as well as the argument that quality is distinguished also by whether the report contains a recommendation (solution), and whether this recommendation seems to address the cause (NATO 2010) were taken into account in the evaluation.

From those requirements (design criteria in Tab 1) eight categories were created. All reports were scored using a scale from 1 through 6 for each category. Consequently the maximum score for each report was 48 points.

Table 3. The evaluation for Experiment 2-4 is based on the design criteria in Table 1.

Evaluation	**Points**
The report describes:	
o the *incident*.	1-6 p
The report gives a clear picture of:	
o the main *actors/components* in the incident.	1-6 p
o *where* the incident occurred.	1-6 p
o *when* the incident occurred.	1-6 p
o the *context/environment*	1-6 p
o *why* the incident occurred	1-6 p
The report contains information about previous issues/matters that may have affected the incident. (In time previous issues that might have lead up to the incident)	1-6 p
The report describes a useful/reasonable recommendation as to how to avoid a similar incident in the future.	1-6 p

Chapter Five

Research Contribution

In this chapter the research contributions and main results will be presented. The chapter starts with a table that clarifies relations between the research questions and the appended papers. In the following section the three research questions are answered with the help of results from appended papers and literature. In the last part of the chapter the research questions are answered and the overall research objective is addressed.

Table 4. Relations between research questions 1-3 and Papers I-V.

Paper no.	Title	RQ 1	RQ 2 a & b	RQ 3
I	Success and Failure Factors for KM: The Utilization of Knowledge in the Swedish Armed Forces	X		
II	Sharing Knowledge: How to Highlight Proven Experience in the Swedish Armed Forces		X	
III	Acquisition of Experience-based Knowledge from the Swedish Armed Forces International Missions; A Comparison between Groups and Individuals		X	
IV	A Form to Collect Incident Reports: Learning from Incidents in the Swedish Armed Forces			X
V	A new Incident Report Form Leads to Improved Foundation for the Lessons Learned Cycle			X

Answering the Research Questions

The purpose of this section is to answer research questions 1-3. This aim will be accomplished by connecting results from each paper to the specific research question (Tab 4). Full text versions of all five papers can be found in the Appendixes.

Research Question 1

If the SwAF meet with problems similar to those that have earlier been recognized in safety science, the organization could, in all probability, learn from what has proven to be successful in other contexts previously.

> *Does the SwAF face the kinds of problems that have been identified in earlier research on attempts to learn from accidents and incidents?*

The first paper of the thesis highlights failure and success factors in the implementation of knowledge management systems in the SwAF. The paper describes why implementation of technical support systems for LL tends to end unsuccessfully and fail to achieve widespread use in the organization. An exploratory study was conducted that covered four technical support systems designed to store experiences within the SwAF. *Chua and Lam´s model for unsuccessful knowledge management implementation* (2005) was applied to the four systems.

Common problems can be illustrated by the following;

- the content of information is meaningless and difficult to understand for users and does not meet their needs (Chua & Lam, 2005).
- there are too few opportunities to exchange knowledge between employees (Waltz, 2003).
- there is a fear of reporting mistakes that could damage one's career (Carlemalm, 2009; Dekker, 2007; Lucier, 2003; Pettersson & Nyce 2011; Waltz, 2003).
- there is blind faith in technical solutions (with poor usability and connectivity problems) during the implementation of LL systems (Chua & Lam, 2005).
- there is lack of management commitment or withdrawal of commitments during the LL processes (Chua & Lam, 2005).
- there is no ready-made plan for project evaluation, to track and measure achievement in the projects (Chua & Lam, 2005; Jacobsson, 2011).

Results from the study in Paper I, revealed that the SwAF are aware of the importance of incident reporting. There have been several attempts to implement LL systems within the organization in the shape of various forms of databases that can store experiences. However, in most cases, the projects have not achieved widespread use and some of the technical tools that were developed to support learning are no longer in use. Attempts to implement LL processes in the SwAF were insufficient and may well be improved. For instance, information in LL databases did not meet the user's needs as a result of the organization's extensive

information security rules. Secondly, all four cases showed that organizational culture did not support learning. This will probably also prevent individuals from reporting incidents, a problem that needs to be resolved in all learning organizations (Dekker, 2007; 2009; Lucier, 2003; Reason, 1997; Waltz, 2003). Thirdly, implementation of knowledge management systems is neither systematic nor well documented, and causes problems when employees are frequently relocated. Finally, the whole process suffers from a lack of interest from the SwAF management and is not centrally managed. Management interest is the most important success factor in all organizations (Dekker, 2007; Pettersson & Nyce 2011; Reason, 1997).

Table 5. Common failure factors in Safety Science and Knowledge Management and the ones found in the SwAF.

Failure factors	**Common Organizational Failure Factors**	**SwAF Failure Factors**
An organizational culture that focuses more on punishment than learning	X (Dekker, 2007; Lucier, 2003; Waltz, 2003).	X (Carlemalm, 2009; Pettersson, 2009; Pettersson & Nyce 2011)
Unstructured and undocumented LL processes	X (Chua & Lam, 2005)	X (Pettersson, 2009; Åkerman et al., 2007)
Management lack of interest and commitment and no ready-made plan for project evaluation that can track and measure achievement in the projects	X (Chua & Lam, 2005; Jacobsson 2011)	X (Pettersson & Nyce 2011; Åkerman et al., 2007)
Blind faith in technical solutions	X (Chua & Lam, 2005)	X (Pettersson, 2009)

The most common problems, or "failure factors," associated with incident reporting and learning cycles, for example those identified in aviation, hospitals and the process industry can also be observed within the SwAF. The organization could therefore gain a lot from the use of the previous research that has been performed in other areas. Literature in safety science and knowledge management argues that the first collection/report step provides an important foundation for further work in a LL process (Carlemalm, 2009; Chua & Lam, 2005; Guptara, 1999; Lucier, 2003). It is thereby considered important and there is much to be gained from the improvement of reports.

Research Question 2

The second paper was concerned with practitioners' efforts to share and utilize knowledge in order to improve their professional competence. The challenge was to propose a method that would transform experience from SwAF international missions into "proven experience." Through the search of databases the paper's theoretical foundation was found in the medical sector. Previous research on consensus processes and group performance was studied and this generated a method that was built upon joint effort. According to the proposed method, groups were suggested to discuss a number of areas; for example, What is the problem or experience?, What can be learned from it?, What alternatives are there for improving? and What difficulties (such as doctrines, laws, security management) exist? The contribution of the second paper is a proposed method as to how proven experience could be obtained.

The aim of the third paper was to compare the performance of groups and individuals in order to determine if groups produce better reports than individuals. If so, would the number of incident reports also be increased? Consensus groups' efforts to discuss a topic profoundly and seek the consent of all participants could possibly also facilitate collection of information after incidents. However, in the thesis, the focus was not so much on the consensus process as such, but on whether this process would lead to better incident reports as a result of a group reaching consensus. Thus, the second research questions of the thesis were formulated in the following way:

> *2 a) Do groups produce better reports with respect to scope and quality than individuals do?*
>
> *2 b) Do groups produce an increased number of reports?*

Experiment 1 was designed to include two conditions; one condition where individuals worked on their own, and one other condition where they had the opportunity to generate thoughts and participate in critical discussions. Both groups reported incidents from international missions on the old form used in the SwAF and by NATO. Thirty male officers in the SwAF volunteered to participate, and where randomly assigned into the two conditions.

To motivate the group members and facilitate discussion, the groups were asked to work as consensus groups, and agree on and describe incidents that were brought up in the group. The question for Experiment 1 then, was: Could consensus groups achieve more than consensus, e.g. produce better reports? Their performance was not evaluated in consensus terms but in terms of the quality of the incident reports they generated as a result of their discussion.

The results of Experiment 1 (Paper III) showed that groups that worked together to reach consensus about what incidents they should report and also how to report them produced better reports than individuals operating alone. However, the quality of the reports did not meet expectations in terms of improved quality (and the attained result was considered too low to be of practical importance for analysts).

Despite having discussed the incident they actually agreed to report on in some detail, their reports were no more detailed than those of the participants who had worked alone. One possible explanation for this is that there is a problem with the report itself, and that the form does not help the participants to report what they may actually know. However, as the consensus process did not seem to produce substantially better reports it hardly seemed worthwhile to continue efforts to develop this aspect of the work. Instead, it seemed more worthwhile to concentrate on improving the reports. The next step in the research process therefore, was to test this conjecture by designing and testing an improved report form.

The results also showed that consensus groups did not produce more reports than individuals.

Research Question 3

The third research question addressed the importance of the report form for the retrieval of information after incidents.

> *Does an incident report form designed to enable recall of information lead to better reports with respect to scope and quality?*

The fourth paper was concerned with the collection of information after incidents. The aim was to improve the incident reporting form and thereby increase the scope and quality of the information collected. A new report form (Appendix b) was built with guidance from the: *aim, design criteria, function* and *general processes* described in the design hierarchy (Tab 1), presented in Chapter Four.

In Experiments 2 and 3 the new form was evaluated according to the *design criteria* described in the design hierarchy. The new form was compared to the old form that is currently used in the SwAF and NATO. A total of 40 voluntary participants, undergraduate students in social science from the Swedish National Defence College were recruited. In Experiment 2, 20 participants were randomly assigned to two conditions with 10 participants in each condition. All 20 watched the same film sequence, containing one incident. Afterwards they reported the incident on the forms provided, 10 of them on the old form (which is currently used by SwAF and NATO) and the other 10 on the new form. In Experiment 3, 20 participants were randomly assigned to two conditions, with 10 participants in

each condition. In this case 10 different film sequences, containing 10 different incidents was used in each group, one for each participant. Afterwards they reported the incident on the forms provided, one condition on the old form and the other condition on the new form.

In Experiment 2 (Paper IV), the new form was evaluated through the use of one film, which showed one incident. The results showed significantly improved scores with respect to the description of where and when the incident occurred, and also of the context of the incidents. In addition, all the other variables were somewhat improved.

The results of Experiment 3 (Paper IV), where ten different films were used, confirmed the generality of the results obtained in the first experiment. Despite variation of the character and context in which the incidents occurred, all significant results in Experiment 2 were replicated. In addition, descriptions of previous issues that might have lead up to the incident were significantly improved. All the other variables were somewhat improved.

In contrast to what is possible with reports obtained from real incidents, the validity of the reports obtained in the second and third experiments (Paper IV) using films could be assessed since we know the incident that the participants reported about, and was valid in both conditions.

Paper V investigates if the results concerning scope and quality of information in Paper IV could be replicated, also when officers in the SwAF reported authentic incidents from international missions. In Experiment 4 the old form, at present used by SwAF and NATO and the new form (previously designed in Paper IV) were compared. Thirty male officers in the SwAF volunteered to participate, and where randomly assigned into the two conditions. All participants reported incidents they had been exposed to during their deployment. All of them wrote an incident report in one of the two different forms, dependent on condition.

In Experiment 4 (Paper V), where officers reported incidents from real mission environments, the significant results in Experiment 2 were replicated. In addition, the two variables: a clear picture of the incident and description of the main actors/components, were significantly improved. Moreover, all the other variables were somewhat improved except that concerning a useful recommendation, which was not improved.

In summary, the results from Experiment 2 turned out to generalize, since results were consistent regardless of the character and context of the incidents in Experiment 3. Finally the form was shown to be useful in “real life” situations in a military context in Experiment 4. The results show that the new form led to reports with better scope and quality in the incident reports produced. The results

(Experiments 2-4) are aligned with previous research into memory and eyewitness psychology.

Addressing the Overall Research Objective: Implications for Improved Incident Reports.

The overall research objective was to develop a report structure that enables the individuals who participated in or observed an incident to provide more information that is relevant about that incident for the purposes of analysis.

The results from Experiments 2-4 indicate that the objective was met.

This is an important result. The current report structure in the SwAF, which is similar to that in use in many other organizations, leads to incidents being poorly reported, or not reported at all (HQ, 2008). This is unfortunate since the first information collection/report step constitutes the very foundation for further work in the LL cycle (Chua & Lam, 2005; Guptara, 1999; Lucier, 2003). Analysts who are provided with insufficient information (incident reports), are left without the facts they need in their efforts to build an understanding of what actually happened and why it happened. As a result they will experience difficulties when attempting to identify the basic contributing factors and circumstances and they might therefore fail to implement much-needed improvements (CALL US Army, 2009; Jacobsson, 2011; Koornneef, 2000; Reason, 1997; von Thaden & Wiegmann, 2004). The current results suggest that it is possible to remedy this situation by simply changing the format of the forms used to report incidents.

Specifically, the results presented in this thesis show that that the new form significantly improves the collected information and leads to reports with better scope and quality. When using the new form, respondents did not only report more information, they also reported more of the information that is requested by analysts -Information that Jacobsson, CALL and NATO consider to be relevant.

This suggests that the information obtained using the new form will increase the possibility that analysts will be able to identify the basic contributing factors and circumstances, suggest adequate improvements and enable learning in the organization (Dekker, 2007; Jacobsson, 2011; Reason, 1997;2008; CALL US Army, 2009).

However, a new report form is not the only result of the work presented in this thesis. A more import result is that the form has a firm foundation in earlier research in memory psychology and that it thus provides a theoretical foundation for why the new report form gives more information that is relevant. Specifically,

it has its basis in research on cued recall. The thesis thus gives guidance on how respondents can be encouraged to retrieve and report acquired information.

Since we have a theoretical understanding at why the new form collects more of the required information, it is also possible to develop a hypothesis of what information is possible to collect and what cannot be collected. Moreover, these results are not limited to incident reporting within the SwAF, but can be used in other contexts as well.

The results give us a new understanding of the problems and possibilities of getting useful incident reports. The problem is not only that people may be unwilling to report incidents that they have participated in or witnessed, it is also that they may be unable to do so. Consequently, it may not be sufficient to change the culture of the organization into a learning culture. It may also be necessary to help people report what they actually know by means of an improved report structure.

In short, the results imply that it is no less important to enable people to report *(make them capable of reporting)* than it is to create a culture in which they do not fear the consequences of reporting *(make them want to report)*.

Chapter Six

Discussion and Conclusions

The aim in this thesis was to find a way to improve the quality of the information collected through incident reports. This is important since, as noted above, incidents are often poorly reported or not reported at all in the SwAF. Difficulties in attaining useful reports after incidents is not a problem that is unique to the SwAF, it is a well known problem that affects many different kinds of organizations (Dekker, 2007; Jacobsson, 2011; Reason, 1997; 2008; CALL US Army, 2009).

As mentioned earlier, the main problem is that incident reports are deficient both with respect to scope and quality. No organization seems to have solved the problem.

By means of the results from research in interview and questionnaire methodology along with eyewitness and memory psychology, respondents could receive guidance in their effort to remember and report incidents. Interview and questionnaire methodology can provide guidelines as to how a form should be designed to collect information about incidents. However, this is not enough if respondents do not recall what happened. But even if they are unable to recall when traditional methods are used, it does not mean that they totally lack memory of the incident, as is shown by the results from research in eyewitness testimony and memory psychology. This result was used here to develop a method that is capable of helping respondents to retrieve information from their memory. One should, however, not expect recall to be perfect. It may, for example, be difficult or even impossible for respondents to retrieve information from just before an incident. In order to protect oneself from information overload, humans purposely do not encode and store "everything;" as such, there may not be a memory to retrieve in some circumstances. In this thesis (Experiments 2-4) cues have been used as reminders or guides that can help respondents to retrieve things from their memory while writing incident reports.

Results in the first paper together with Tillberg et al. (2007), Åkerman et al. (2007), HQ (2008), Carlemalm (2009) and Pettersson and Nyce (2011) showed that, with regards to incident reporting and LL systems, the SwAF struggles with the very same kinds of problems as other organizations, e.g. aviation, hospitals and

process industry. Examples of common problems (Tab 5) are described earlier in Chapter Five under research Question 1.

The SwAF can be described by certain characteristics. It is a hierarchical organization with operational presence in several parts of the world. They have specific war and military operations tasks. Security regarding classified information is divided into five levels: unclassified, restricted, confidential, secret and top secret. Frequently deployed and rotated staff is standard. Most reporting, including incidents, is done in the chain of command. Personnel management can, when warranted, administer disciplinary actions that range from a warning to discharge. Security regulations may not be found to the very same extent as in those deployed in the armed forces, though business confidential/secrets can be quite rigorous. Nevertheless, most of these characteristics can also be identified in other organizations and we believe that the things that do differ would not affect incident reporting. As a result, what has proven successful regarding incident reporting in other organizations could most likely be applied in the SwAF. Consequently, the SwAF could gain from the experience of other organizations regarding learning cycles, especially in the realm of incident reporting.

In Experiment 1 groups and individuals were given the task to report an incident that they had observed or taken part in during international missions. Groups worked to reach consensus while individuals carried out the task in isolation from each other. The results showed that, in comparison to working alone, to some extent groups produced better reports than individuals. Still, the quality of the reports did not meet the expectations of improved quality. Group effort did not lead to more reports.

An interesting observation when watching the groups perform their task was that the group members seemed to remind one another of different aspects of what happed but that were not included in their reports. This suggests that there may be a problem with the procedure used to collect the reports, i.e., with the report form used and the research focus was therefore changed to the procedure used to collect the reports. A new form was constructed from a design science perspective and evaluated in three experiments.

Results from Experiments 2-4 showed that, regardless of the character or context of the incidents, the new form significantly improved descriptions of where, when, as well as the context, of incidents. In some, but not all, experiments the description of previous issues, description of the incident and description of the main actors/components, were significantly improved. Respondents did not only report more information, but also information that was relevant for later analysis. In summary, the results show that the new form led to reports that had a better scope and quality.

Both conditions received identical instructions and were treated in the same way. What, in fact, did differ between the groups were the two forms (independent variable). Increased scope and quality (dependent variable) could subsequently be directly connected to the new form.

Results in (Experiments 2-4) were aligned with earlier findings in memory research and eyewitness psychology. First of all, cued recall enabled respondents to retrieve and report relevant information; as such, the scope and quality were improved. Secondly, it seemed to be difficult for respondents to retrieve detailed information from just before an incident. This may be because respondents do not register and store information about what happens just prior to the incident, simply because they did not know that something was about to occur. When information is not properly registered (encoded), it is not possible to remember (retrieve) at a later date (Baddeley, Eysenck & Anderson, 2009). However, no cues were given to enable respondents to recall this information and that might have affected the results. It is also recognized that forward associations in general is recognized more accurately and more quickly, than backward associations, (Yang, Zhao, Zhu, Mecklinger, Fang & Li, 2012).

In many incident reports, respondents are expected to draw conclusions and leave a recommendation as to how a similar incident can be avoided in the future. It has showed that to answer why something happened and also leave a recommendation is difficult for respondents; as such, we suggest that those two issues should be passed on to analysts, who might have additional information and who are trained to perform such analysis.

The interpretation of results shows that the new form designed with eyewitness psychology and questionnaire methodology (concentrated around a specific narrow topic) seems to help respondents to report (Christensen, 2007; Oppenheim, 2005; Synodions, 2003; Trost, 1994). Further, previous research regarding memory psychology, especially the use of cues, was also considered in the design (Bahrick, 1970; Baddele et al., 2009; Eysenck & Keane, 1995).

The central differences between the two forms were as follows:

- Free space gave them room to insert supplementary information.
- Questions flowed from more general to more specific queries and sub-questions were used to avoid several questions being squeezed into one.
- Expression, vocabulary and phrases were carefully chosen to avoid misunderstanding.
- Cues were used as reminders in the form.

Cues were given in the form of examples (e.g. environment, climate, weather, °F/°C), reminding the respondents of what they should report. Cues were not leading since no answers were suggested.

According to the results in Experiments 2-4, respondents managed to report an increased amount of information. Moreover, with the new form they reported the information that was asked for and this meant that the scope and quality was improved. The results indicate that the new structure of the form assists respondents in their attempts to report. Where cues were given, information was also increased; this implies that cues seem to have reminded respondents and helped them to report the information required.

Whenever measure is a rating or judgment done by independent observers, inter-rater reliability should be calculated. In Experiments 1-4 reliability was assessed by examining the extent to which two graders judged the answers given by the participants in the same way, i.e., inter-rater reliability (Graziano & Raulin, 2007). In all four experiments, two independent graders with qualifications relevant to the experiments (officer, intelligence analysts, or LL trained persons) were recruited. All reports were scored independently by two graders, they were blind to each other's ratings as well as to which condition (which form) the results was collected on (Graziano & Raulin, 2007). Inter-rater reliability was calculated in the experiment series, on variable total and turned out to be "strong," as assessed by Pearson's r correlation (Borg & Westerlund, 2006). However, all eight variables did not reach the same high inter-rater reliability. It was a connection between low inter-rater reliability and non significant results among a few variables. This suggests that some variables could still be improved on the form.

With regards to the external validity of the results obtained, the new form showed good generality. In Experiment 2, where one film sequence was used, the new form improved the quality of information collected. The same results were generated in Experiment 3, despite the fact that ten different film sequences were used. Thus, the results of Experiment 2 were replicated regardless of the character of the reported incidents or the context within which they had occurred. In the final Experiment 4, results where replicated once again, despite the fact the participants were now officers reporting about real incidents from SwAF missions. In contrast to Experiments 2-3, where reports were written shortly after the respondents had witnessed the incident, reports in Experiment 4 were written after the respondents had returned from deployment, with a fairly wide range of delay in time between the incident and the reporting. The limited time between watching the incident and the report in Experiments 2 and 3 did not seem to influence the result and the new form still produced better reports.

The results suggest that the new form could be a useful method and should be considered for routine application in the SwAF. Before this can be accomplished,

one needs to establish if the analysis, the next step in the LL cycle, will benefit from the information collected through the new form. However, to reap the full benefits, management of the SwAF also need to create and maintain a learning-oriented culture that encourages its members to report mistakes and blunders without fear of the consequences. The organization also needs to consider if reports should be sent and evaluated under confidential circumstances.

Conclusions

In conclusion the results presented in this thesis:

- Show that the new form significantly improves the quality of the information collected and leads to reports with better scope and quality.
- Provide guidance with respect to *how* one could enable respondents to retrieve and report more of the required information, viz., by using cued recall.
- Give an understanding of *what* kind of information may be possible to collect and what cannot be collected.
- Imply that it is not less important to enable employees to report incidents *(capable of)*, than it is to create a culture in which they dare to report *(want to)*.

Appendix a. the Old form

A replication of JALLC
Observation Collection Form[5]

INCIDENT REPORT

Topic:

_____

Observation:

_____

Discussion:

_____

Conclusion:

_____

Recommendation:

_____

[5] "The template for a lesson suggested in ACO Directive 80-1 Lessons Learned (Reference D) contains five fields: Title, Observation, Discussion, Conclusion, and Recommendation (ODCR). This is the format that entries into the NATO LLDb must take in accordance with Bi-SC Lessons Learned Directive 80-6 (Reference C) and therefore it is recommended that you collect observations in this template from the start" (NATO, 2010 p 11). "When capturing observations, all the five fields of the ODCR template need not be used. Only the observation field is mandatory. However, observation originators should be actively encouraged to enter additional information and supporting evidence in the discussion field" (NATO, 2010 p 38).

Appendix b. the New form

INCIDENT DESCRIPEION

Topic:

Observation:

What happened? (describe your observation as detailed as possible)

Facts:

Who where the main actors/components? (describe them in detail)

Where did the incident occur? (e.g. country, city, area/region, organization)

In what context did the incident occur? (e.g. environment, climate, weather, °F/°C)

When did the incident occur? (e.g. dd/mm/yyyy, hh:mm)

Conclusion:

What could be possible reasons for this incident?

Recommendation:

What should be done to avoid/decrees, this kind of incident in the future?

Complementary information:

Where there any previous areas/issues, that might have affected the incident?

Are there other vital areas/issues of interest or uncertainty, relation to this observation?

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