

SECOND ORDER RISK AND VULNERABILITY ANALYSES

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Abstract

The Swedish county council Västra Götalandsregionen is currently developing work processes for iterative risk and vulnerability analyses. Västra Götalandsregionen consists of some fifty administrative units. Each unit shall repeatedly analyze its major risks and vulnerabilities and report the results to a central unit within the county council organization responsible for safety and security issues. This unit in turn has three tasks: 1) Establish a summary of risks and vulnerabilities on the county level, 2) Send relevant information about the findings to national governmental agencies, and 3) Feed back relevant information to the administrative units. To get results that are useful for these tasks it is not enough to just add the reports from the different administrative units. There is a need to compare and merge the various analysis-results from lower levels. In this paper, based on the Västra Götalandsregionen case, we describe some critical aspects of the processing associated with such hierarchically organized systems of risk and vulnerability analyses, and briefly discuss possible solutions.

Introduction

Society should take actions to strengthen its ability to function during emergencies. This can be done in numerous ways. Analyses of risks and vulnerabilities have a given place at the core of such efforts. During the last years Sweden has introduced a national system for increased societal safety and security. By law (SFS 2006:544) all Swedish authorities shall repeatedly perform risk and vulnerability analyses. All authorities also have to define functions necessary for avoiding or managing emergencies within their area of responsibility (SFS 2006:942). Of special importance is the identification of functions that have to work in order to prevent serious emergencies or that are needed when responding to emergencies. The authority with responsibility for a particular activity is responsible for ensuring that there is a basic level of functionality, meaning that the activity is capable of withstanding and managing disruptions and emergencies.

The new Swedish legislation aims at increasing robustness and safeguarding society's functionality. The requirements apply to all levels of society, i.e. local (municipalities), regional (county councils and county administrative boards), and central authorities (e.g. governmental agencies). They are all obliged to perform risk and vulnerability analyses and to assess their emergency management capabilities. Furthermore, key personnel have to receive the emergency management training necessary for securing operations even under severe

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emergencies (SFS 2006:544). The whole system for increased societal safety and security is supervised by the Swedish Emergency Management Agency (SEMA).

The role of Swedish county councils is to arrange health care, public transportation, cultural activities and regional economical development programs. Västra Götaland is a region in the western parts of Sweden. It has just above 1.5 million inhabitants. The county council is called Västra Götalandsregionen, and has about 50 000 employees. The unit that directs the whole county council organization is called the 'Regional executive board'. Västra Götalandsregionen consists of some fifty administrative units, of which most in turn consist of a number of businesses. For example, there is one administrative unit organizing all the primary health care in the city of Gothenburg, with operations run by 26 healthcare centers (businesses).

Due to the above described system for increasing societal safety and security, Västra Götalandsregionen is currently developing work processes for their iterative risk and vulnerability analyses. In line with the new legislation Västra Götalandsregionen in its strategic safety-plan states that all its administrative units regularly shall perform risk and vulnerability analyses. Each administrative unit shall annually report the following to the regional executive board:

- A brief version of its current regulatory framework concerning safety
- A brief description of activities for and results of safety work
- A presentation of the more global and shared risks that need to be managed across borders between administrative units and businesses within Västra Götalandsregionen
- A brief summary of the present status of the organization's emergency management capability

The regional executive board shall then annually report to the national government what actions that have been taken in order to decrease risks and vulnerabilities. The reporting structure described above can be seen as a hierarchical system for risk and vulnerability analyses. With such a system follows some challenges deserving attention. In order for the system to function, the regional executive board has to perform analyses of the analysis results from the lower levels of the organization. This can be seen as 'second order analyses'. With 'first order analyses' we mean analyses for obtaining an overview of risks and vulnerabilities concerning one separate organizational unit and its area of operations. In the Västra Götalandsregionen system first order analyses function as input to the second order analyses.

Methods for different kinds of second order analyses have been extensively researched, e.g. concerning meta analyses of risk management or uncertainty analyses of more quantitative kinds. For example, much has been written on Bayesian updating (see for example Gärdenfors & Sahlin, 1988) and on quantitative risk assessment (QRA) (for an overview see Apostolakis, 2004).

In this paper we aim to describe some critical aspects of the processing associated with second order risk and vulnerability analyses, concentrating on information flow and communication. We do this based on a study of the ongoing development project within Västra Götalandsregionen, concerning their work processes for mandatory risk and vulnerability analyses. Using a qualitative approach we also briefly discuss how to design effective and efficient work processes for hierarchically organized systems of risk and vulnerability analyses.

Method

We have cooperated with Västra Götalandsregionen in their development process for work processes for second order risk and vulnerability analyses. The empirical data were gathered through interviews and meetings with personnel from Västra Götalandsregionen responsible

for design and implementation of the work prescribed by the new legislation. We also studied documents, e.g. formal organizational structures and policies. Meetings and interviews were documented through notes and sometimes recorded. We gathered information about challenges and problems experienced by the organization concerning the design and performance of the intended system for second order analyses. Subsequently, in dialogue with our contact persons, we developed potential solutions.

Critical aspects that ought to be considered in second order analysis were identified through relating to the aims and goals of the system being developed. This means asking 'What can hinder or facilitate the achieving of these aims and goals?'. Some of the identified aspects are based on problems experienced and reported by persons working within the studied system, while others have been identified by the authors. This resulted in a preliminary list of critical aspects.

Results

The aim of this paper is to describe some critical aspects of the processing associated with hierarchically organized systems of risk and vulnerability analyses, and present possible solutions to potential problems. Here we present three of the more significant critical aspects that emerged during the cooperative development process.

Management system

One of the main risks expressed by the personnel from Västra Götalandsregionen is the possibility that efforts put into the safety and security work will not yield actual results. One hypothetical explanation to that, given by some informants, is that this might be due to a perception of the risk and vulnerability analyses and associated activities as a separate endeavor, not thoroughly integrated with everyday tasks.

Another potential problem identified is the possibility that it will be difficult to achieve sufficient commitment and resources to the risk and vulnerability analysis system. Informants have expressed that individuals working in the Västra Götalandsregionen organization might assign low priority to the risk and vulnerability analysis activities.

To meet these challenges one approach may be to create and implement a truly integrated management system, which means that different processes are deliberately interconnected. In such a system the output from risk and vulnerability analyses becomes input to the organization's main management process. For the achievement of true safety improvements, it is also necessary that the 'loop is closed', i.e. that information is processed and used for decisions, that in turn are implemented (Kjellén, 2000).

In addition, a sustainable process with committed participators also requires feedback to involved parties. This can be achieved through the inclusion of appropriate functions in the management system, which allow feedback of relevant information and thereby help to strengthen positive attitudes towards the risk and vulnerability analyses. For a functioning hierarchically organized risk and vulnerability analysis system, there is a need for a spirit of co-operation and shared ownership (Dixon, 1999; Kjellén, 2000).

Communication

Personnel from Västra Götalandsregionen expressed that they were unsure of how to interpret information in risk and vulnerability analysis reports. They pointed out that different persons express themselves differently about the same thing, and that subjectivity that might be coded into the risk and vulnerability analysis reports can distort communication. The possibility of distorted safety communication is also mentioned by Kjellén (2000, p. 7), expressing that "A problem in a large, hierarchical organization is that decision-makers often do not get in direct contact with the consequences of their decisions. Another concern is that information on accident risks is often collected by a different part of the organization than that responsible for using the information." Apparently there is a possibility for miscommunication.

Some informants also think that there is a possibility that organizational units might deliberately misuse the safety and security system for aims not in line with the purpose of risk and vulnerability management efforts, by shaping their risk and vulnerability analysis reports in attempts to gain attention and/or funds.

That the receiver of a message understands what the sender intends to transmit is usually considered the goal of communication (Davenport & Prusak, 2000). Some kind of overlap between different steps of the overall process might reduce the risks of unintended as well as deliberate distortion of information when communicated. This can for example be realized through actual personal meetings during handing over of reports. Another approach to more accurate communication is to provide senders and receivers with a “common language” (Davenport & Prusak, 2000), which also can be achieved through extensive collaboration. A third way to strengthen communication and decrease message distortion is to use narratives in constructing messages (Weick, 1995). For example risk and vulnerability reports can contain richer “stories” than what is usually the case. That might help to increase communicative accuracy and thus improve a system for second order risk and vulnerability analyses.

Hierarchical organization

Distances that are inherent in large, hierarchical organizations can bring many challenges to coordinated performance. Kjellén (2000 p. 7) states that “...information on accident risks is often collected by a different part of the organization than that responsible for using the information.” In Västra Götalandsregionen there is not yet any solution for how to identify such risks and vulnerabilities that are relevant on the level of the whole county council. In tentative plans it is stated that all administrative units shall report global and shared risks that need to be managed across borders between administrative units and businesses, but there is no prescription on how to identify them. This is problematic, since something identified as a critical function or process on the level of an individual business is not necessarily critical on the level of the whole county council (i.e. the societal level). This is due to redundancy – many kinds of activities are performed in parallel in several different businesses.

Due to these characteristics of hierarchical organizations it is necessary to perform new analyses at higher organizational levels, and not simply add reports from the different businesses and administrative units. Rather, it is necessary to compare and analyze the various analysis results, as well as to perform first order risk and vulnerability analyses on any operational activities specific to the specific organizational level. If no new analyses are performed on higher levels in the organization, there is also a risk of missing operational activities that pertain to levels above businesses, e.g. management activities on the intermediate level of administrative units. Such actions or processes should be subject to first order risk and vulnerability analyses.

Discussion

Above we have presented some critical aspects of the processing associated with second order risk and vulnerability analyses. We have also briefly discussed possible approaches to managing the critical aspects. Considering the critical aspects presented in this paper when designing systems for second order risk and vulnerability analyses might help in constructing effective and efficient systems. Our suggestions are:

- Perform second order analyses, and additional first order analyses, on all higher levels in the hierarchy
- Design and implement an integrated management system, with ‘closed loops’ and opportunities for commitment-strengthening feedback
- Strive to establish a ‘common language’ and use narratives in communication

We believe this might help in the creation of more suitable organizational learning processes which can lead to increasing safety. Obviously there are other critical aspects to the

processing associated with second order risk and vulnerability analyses than the ones we have discussed in this paper. Here we have limited the presentation to three themes that were salient in the Västra Götalandsregionen case.

In this paper we have focused on such issues as the design of work processes and human influence on communication. We believe there is a need for more research on the more qualitative sides of second order analysis, compared to the rather extensively researched quantitatively oriented sides. One central idea that we want to promote is the need to acknowledge that humans always strive for meaning. In the study reported here we have seen a true concern about risks associated with miscommunication, e.g. potential problems stemming from human interpretation into meaningful representations. Any system for risk and vulnerability analysis needs to consider these aspects. Furthermore, we strongly believe that it is most important with a comprehensible and coherent system of work processes. However, we do not want to undervalue quantitative approaches. In stead we wish for an integration of quantitatively and qualitatively oriented approaches to risk and vulnerability analyses and safety management.

The possibility for different meanings associated with one expression and vice versa is not necessarily a problem. There can also be great advantages from inter-individual differences in formulation and interpretation. If captured constructively such differences might contribute to a positive diversity in ideas. This in turn might boost organizational creativity and help identifying e.g. possible risk scenarios that would have remained unnoticed in a more homogeneously thinking organization. Used in the right way this can become an asset in stead of a threat.

The findings reported in this paper are only tentative. Their preliminary nature means that they should be considered hypothetical until further examinations have taken place. The development project studied is scheduled to be finished in 2008, with a test run during 2008 and 2009 before full implementation. Since the empirical data behind this paper stem from just one case the validity of the theoretical ideas when applied to other cases remains unclear. We plan to continue studying Västra Götalandsregionen as well as others cases, aiming to further develop the ideas for improving processes for second order analyses.

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