

# Challenges With Risk and Vulnerability Analyses: Strategies For Integration In Risk and Crisis Management

Kirsti Russell Vastveit<sup>a\*</sup>, and Kerstin Eriksson<sup>b,c</sup>

<sup>a</sup>University of Stavanger, Stavanger, Norway

<sup>b</sup>Division of Risk Management and Societal Safety, Lund University, Lund, Sweden

<sup>c</sup>Lund University Centre for Risk Assessment and Management and  
Centre for Societal Resilience, Lund University, Sweden

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**Abstract:** Today risk analyses are commonly used by authorities at national, regional and municipal levels in their work to prevent and prepare for crises. The analyses provide information about types of incidents that can occur and the potential consequences of these events. In Sweden and Norway it is mandatory for local authorities to conduct risk and vulnerability analyses and use them as an input in their crisis management work. Research on public risk and vulnerability analyses often focuses on methodological issues and only to a limited extent on how findings are used by those who undertook or ordered the analysis. For the analyses to become inputs in work to improve societal safety and respond to crises it is important that findings are of sufficient quality and that they are applied or implemented. This paper focuses on strategies used by Norwegian and Swedish municipalities to integrate risk and vulnerability analyses in their current policy and planning processes. Examination of five Norwegian and four Swedish municipalities showed that municipalities vary in their focus on integration of risk and vulnerability analyses in long term planning processes, in their daily activities as well as in crisis management planning. They chose three main strategies to ensure integration of the analyses; some relied on formalized and highly structured procedures, whereas others emphasized that each leader and planner was responsible for taking risk and vulnerability analysis into consideration where necessary.

**Keywords:** Risk and vulnerability analysis, risk management, crisis management, integration, municipality

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## 1. INTRODUCTION

Risk and vulnerability analyses (RVAs) are used by governments at national, regional and local levels in societal safety and crisis preparedness planning. Their aim is to provide information about the types of incidents that can occur and the potential consequences of these events [1]. The end result of RVAs is a document that is described by Aven [2] as a risk picture, and by Braut, et al. [3] as a risk image that describes a current understanding of incident types that can occur, their likelihood and potential consequences. Their use as an input in crisis management processes is recognized by researchers as a way to pursue more accurate knowledge about the future [4,5].

Research on RVAs often focuses on methodological issues [1,6,7]. There is however an increasing focus on application of findings and their role in policy making [8,9]. In the risk governance literature there is an emphasis on the context and embedded nature of risk management and the role of analyses in decision and policy making. In addition, there is an advocacy for a wider and more holistic view of how actors can use the risk concept to improve safety [10].

Boholm, Corvellec, and Karlsson [8, p.14] argue that: “risk governance is a complex social activity historically, spatially, socially and institutionally situated.” Going from RVA findings and suggested measures to implementation through consideration in policy and planning processes that affect risk is far from simple. This paper is a part of a project funded by the Norwegian Directorate for Civil Protection and the Swedish Civil Contingencies Agency were the authors examined development and application of RVA findings in Norwegian and Swedish municipalities. During interviews respondents often explained that ensuring follow up and systematic application of findings was difficult. In the

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\* *kirsti.vastveit@uis.no*

crisis management literature there is also a discussion on the difficulties of integrating planning into institutional and policy documents [11]. Additionally, in the literature on risk management there is an emphasis on the importance of integrating risk analyses such as RVAs into existing initiatives.

In this paper we focus on one aspect of how municipalities in Norway and Sweden work with RVAs; how do they integrate them into policy making and planning processes? This is done by describing different strategies used by nine municipalities and discussing the reasoning behind these choices and the impact of these.

## **2. RISK MANAGEMENT AND RVA**

### **2.1. RVAs in Norwegian and Swedish municipalities**

Municipal RVAs are mandatory in Norway and Sweden. Their expressed purpose is to contribute to improved societal safety for municipal inhabitants through risk management processes. Neither country specifies requirements regarding the contents or methods of RVAs. Municipalities choose how they want to develop their RVAs, who to involve and what scenarios to consider. RVAs are usually done in a semi qualitative manner that relies on application of acceptance criteria and matrices that signal when an issue must be dealt with. Scenarios are analyzed using a set of predefined criteria such as impact on critical societal functions. The Norwegian and Swedish regulations focus on how RVAs are to be applied; in long term societal and area planning and in planning for how to manage crises should they occur. Findings from RVAs should also be developed into implementable measures.

### **2.2. Risk management and public policy**

The increasing importance of risk management in relation to development of public policy is evident in the literature on risk governance [12,13]. Risk governance, of which risk management is a part, is described by Renn et al. [14, p.231] as denoting "both the institutional structure and the policy process that guide and restrain collective activities of a group [...] to regulate, reduce or control risk problems." Public policies are "the output of the political system, the result of choices made by decision makers about whether and how public authority and resources will be used to address challenges" [15]. The activities carried out every day in a municipality are the end result of a policy process. Policy development consists of activities with different time frames that occur at different organizational levels, for example in municipalities. It occurs through long term as well as short term planning, and the operationalization and implementation of measures in the everyday life of an organization [16]. The purpose of municipal RVAs in Norway and Sweden is to contribute to the above mentioned policy related activities.

Societal safety is a policy goal that requires consideration of exposure of functions and infrastructures that are important to society, as well as their vulnerability [17]. It is a focus that must be built into a multitude of planning processes ranging from long term such as where to place a kindergarten to more immediate such as how should we handle electricity blackouts at a local hospital. Hence, RVA findings should be integrated in municipal planning and everyday activities. Development of guidelines and procedures that ensure integration of RVA recommendations and findings in plans can therefore be important to ensuring application of RVAs.

For RVAs to contribute to municipal risk management they must function as an input in a multitude of policy processes. Ensuring that a new input such as an RVA is integrated into existing and new policy processes is not an easy task. When discussing how risk analyses are used Renn [12, p.7] notes: "one must also consider the need for sufficient organizational capacity to create the necessary knowledge and to implement the required actions." The issue is also discussed by Aven [18]; who notes that for risk management to succeed it is important that organizations have the capacity to respond to inputs from risk analyses. Renn et al. [14] focus on the importance of integrative capacity in relation to risk governance. They [14, p.236] describe integrative capacity as consisting of "a broad array of structural and procedural means and mechanisms by which politics and society can handle collectively relevant

risk problems.” In the work presented we therefore consider the strategies municipalities choose to integrate RVAs and resulting risk images in existing policy processes that affected societal safety and crisis preparedness.

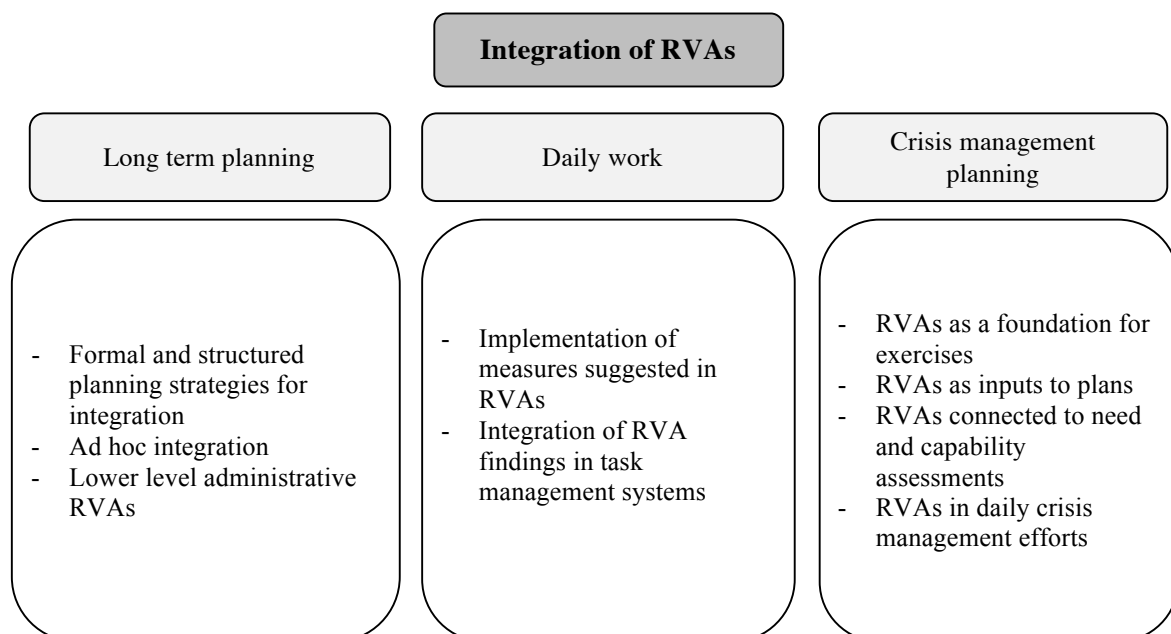
### 3. METHOD

In the study presented in this paper we examined strategies for integration of RVA findings in policy and planning processes in nine municipalities, four in Sweden and five in Norway. This is the first deliverable from an ongoing study that includes 45 municipalities all over Norway and Sweden. The two countries have very similar regulation regimes that mandate municipal RVAs as part of efforts to improve societal safety and crisis preparedness. For this paper, in each country, we chose municipalities that are cities as well as rural and remote. Municipal preparedness planners were interviewed about the development and use of the municipal RVAs. Where possible other municipal actors such as leaders of technical, planning or health services were also interviewed. In total interviews with 24 respondents were conducted for this paper. Interviews in both countries were done using the same semi structured interview guide and were recorded. The interviews focused on how municipalities developed RVAs and how they use the findings. In addition, documents such as the RVAs and other municipal documents that described procedures for use of findings were collected. These were used to confirm statements made by respondents regarding formal structures for integration of RVAs. The analysis of the interviews and documents focused on identifying examples of integration strategies used by municipalities. These were developed into a simple framework focusing on strategies that belonged to three categories; long term, daily use and crisis management.

### 4. RESULTS: INTEGRATION OF RVAS IN NORWEGIAN AND SWEDISH MUNICIPALITIES

Integration of RVAs in policy and planning processes occurs in a variety of ways in Norwegian and Swedish municipalities. It was described by a respondent as being difficult and time-consuming process, but also a worthwhile endeavor because integration was important to ensure that findings were applied, which in turn could contribute to a safer society and surroundings for municipal inhabitants. Integration of RVAs was described as occurring through three main processes; long term planning, daily work and crisis management planning. These are illustrated in figure 1, which shows the structure of the categories that were developed, and also the organization of the results section.

**Figure 1: Approaches to integrating RVAs in planning and policy making**



## **4.1. Long term planning**

Societal planning; where to build schools, locations of industrial areas and development of technical infrastructure all affect societal safety. Risk management must therefore be built into the fabric of local communities through community planning [19] and it should be continuous [4,20]. Respondents in Norwegian and Swedish municipalities expressed similar sentiments. Ideally, long term planning allows municipalities to build safety considerations into the physical layout and policies that they design. In Norway the regulations pertaining to RVAs state that municipalities are to use RVAs as an input in long term planning. In Sweden this is not stated in the RVA legislation, which focuses mainly on crisis management, but it is discussed as desirable in guidelines to the regulation.

### 4.1.1. Formal and structured planning strategies for integration

The Norwegian and Swedish municipalities chose a variety of approaches to integrating RVAs in long term planning processes. Half of the studied municipalities had to some extent taken a deliberate approach to integration by formalizing the role of RVAs. For example a small Norwegian municipality had chosen to create a planning strategy where the role of RVAs in all planning processes was specified. The planning strategy was a formal document that described how all municipal plans were to be created. The municipal RVA was therefore included in area, economy and societal plans. One respondent described this as being important because plans were described as often being developed based on immediate needs and in isolation from each other in different sectors. By formalizing the role of the RVA as a planning input they found that planners in different departments were utilizing the RVA as an input to a greater extent and in a more systematic manner. A respondent in the Norwegian municipality that had included the RVA in their planning strategy described how he had been involved in creating a sports and outdoor activities plan for the municipality. During the process the RVA had been used as an input when considering locations for sports facilities. One Norwegian municipality had also formalized the role of the RVA in its planning hierarchy by designing the RVA process as a plan development process for which there are specific regulations about follow up of findings. The municipal crisis preparedness planner explained that this was particularly important because the municipality was a large city where a multitude of actors were responsible for issues, hence there was a need for a structured follow up process of suggested measures from the RVA.

One large and one medium sized Swedish municipality integrated the RVA in work on an overall municipal strategic safety plans. In one of these municipalities the RVA was described as a foundation for the strategic policy documents concerning safety issues. This document was supposed to be the foundation for work with all safety related issues throughout the municipal organization. The above mentioned large municipality with an overall municipal safety strategy also integrated the RVA in their continuity planning efforts. This was also the case for a second large Swedish municipality. Continuity planning involves identifying municipal commitments, such as at home health care services to elders, and creating continuity plans to maintain these. The municipalities had created procedures for use of RVA as an input in these processes. In addition follow up of goals and actions that had been set in continuity plans was mandated.

### 4.1.2. Ad hoc integration

The other half of the municipalities had a more ad hoc approach to use of RVAs in long term planning. In addition, nearly all of the municipalities that described some type of formal and structured planning strategies for integration also described aspects of integration that were ad hoc. For integration in theme plans (for issues such as traffic safety and water treatment) as well as yearly and bi yearly economy plans many municipalities relied on leaders and planners to include the RVA as an input. They emphasized that it was the responsibility of each leader to include relevant inputs. Several respondents found that RVAs were an input to some theme plans, but that this was not systematic across the municipal planning process.

Individuals in charge of developing RVAs often did not have a mandate to ensure that decision makers used the RVA in further planning in the municipality. In small municipalities it was common for the role as crisis preparedness planner to only be a part time position; hence these individuals had many other tasks in the municipal organization as well.

In two of the Norwegian municipalities planners and leaders were expected to use the RVA in planning simply on the basis that it had been discussed and voted on as an information matter in municipal councils. This was particularly the case in smaller municipalities where planners and leaders were assumed to have a relatively good overview of existing inputs, such as RVAs. The integration of the RVA was therefore assumed to be knowledge about the report and findings themselves. In a large Swedish municipality the preparedness planner argued that even if they did not have a formal structure for taking care of the findings from the RVA, issues that were brought up in the RVA document written in 2011, such as how to manage societal risks as well as natural disasters were things that the municipality worked with today. He noted “If you go out and ask, I do not think they will say that this has been found in the risk and vulnerability analysis, I more think that it gives some kind of awareness among the decision makers that were involved in the process”. This was the case in several of the Norwegian and Swedish municipalities. Hence, even if issues mentioned in the RVAs were addressed, this admittedly did not mean that RVAs were integrated in planning and policy making, but that they had an influence in a more indirect manner.

#### 4.1.3. Lower administrative level RVAs

Both Norwegian and Swedish municipalities used RVAs in municipal departments such as health and care, education and technical services. The municipalities differed in terms of how they structured the relationship between the municipal RVA and the lower level departmental RVAs (such as for water safety and retirement homes). In the large municipalities we examined in Sweden lower level RVAs were used as an input to municipal RVAs. In one of the large municipalities they were also working on a structure that ensured that if the municipality started a new project, for example building new IT systems, a specific RVA had to be developed. In the smaller Swedish municipalities we examined the overall RVA consisted of RVAs created together with the different departments. The preparedness planner in one small municipality described that they did not have any lower level RVAs and argued that there was a connection between the overall RVA and municipal departments because individuals from these were involved in the development of the municipal RVA. However, neither form of integration ensured that departments integrated suggested measures from RVAs into their own plans.

### **4.2. Daily work**

#### 4.2.1. Implementation of measures

In many municipalities respondents focused more on how findings from RVAs were recognizable in everyday work rather than in plans. They were carrying out measures that were mentioned in RVAs (that they themselves had proposed). For example emergency power generators were purchased, sidewalks were added along heavily trafficked roads, equipment was installed to ensure clean water and cooperation agreements were signed to ensure ferry transport in lieu of closed undersea tunnels from an island municipality. These more concrete descriptions of the result of the RVAs were more common in smaller municipalities. In the above mentioned cases respondents emphasized the role of the RVA in developing new knowledge, or ensuring that knowledge was spread to the necessary actors in the municipality. Rather than focus on integration in plans, what was important was implementation of suggestions from RVAs. Instead of using a specific follow up structure there was an assumption that individuals who were responsible for measures would identify these themselves during the process of developing or reading the RVA report and carry them out. In several municipalities integration of findings was considered to be a part of the line responsibility in the organization, and not one that required further facilitation. Also, in smaller municipalities in both countries respondents emphasized that they had close contact with other departments and knew what they were working on.

#### 4.2.2. Integration in task management systems

One municipality used their task management system to ensure that measures were implemented. Here corrective measures could be traced, findings could be followed up using specific deadlines and they could be assigned to specific individuals. Other municipalities had found it difficult to ensure that the measures from their RVAs were followed up in a structured manner. The regulation that mandates RVAs does not prescribe how follow up of measures should be done. In many cases this led to a lack of follow up. Several respondents therefore emphasized the importance of integrating findings from RVAs into plans, because this would also trigger development of action plans and funding. In Sweden municipalities have to report to regional authorities on a yearly basis about work on RVAs. In one municipality this was considered to be a process that helped them structure their work with the RVA. For others, this requirement did not have the same effect.

#### **4.3. Crisis management planning**

In addition to functioning as input to plans that indirectly contribute to risk management, risk analyses can also contribute directly to crisis management planning [4,5]. RVA findings were integrated in crisis management planning to varying extents in the studied municipalities. Both Norwegian and Swedish regulations specify that RVAs are to be used to improve crisis preparedness, among other by contributing to crisis management plans and design of exercises. The municipalities differed in terms of how they integrated the RVA into crisis management planning. One Norwegian municipality did a separate assessment of their crisis management needs and capacities following the RVA. This was a way of giving structure to the input to the actual plan for how incidents should be managed and also to plans regarding updating organizational capacities and physical equipment. As a part of the RVA in Sweden all municipalities must examine their capability to respond to future crises. Respondents in some of the Swedish municipalities argued that capability is a useful concept while others argued that a capability assessment is too subjective. Municipalities in Norway and Sweden explained that the RVA had been important for the development of their crisis management plans, but found it difficult to specify the exact nature of the input. They emphasized that the demands in the regulation for specific inputs were an important guideline. Lastly, several municipalities found that there was no link between their crisis management plans and the RVA. In some cases this occurred because crisis management plans had not been updated since the RVA was developed. Municipalities therefore differed in relation to whether they used RVAs in their crisis management planning, and as to whether they chose to use formal structures, or relied on initiatives of individual leaders and planners.

One Norwegian municipality also emphasized that they integrated findings from RVAs in daily crisis management efforts. They had chosen to integrate the RVA into the crisis management software package that they used. This was meant to contribute to operationalization of findings, and to reduce the distance between RVA and crisis management. The measures that were entered in the system for follow up were however not given specific dates by which they were to be completed.

### **5. DISCUSSION**

Our description of how nine municipalities in Norway and Sweden choose to integrate their RVAs in policy making through long term and crisis management planning as well as daily activities shows a selection of strategies and procedures that can facilitate use of findings from the RVAs. During interviews respondents made comments about whether they had carried out activities to integrate findings from RVAs in policy and planning processes. Based on their descriptions it is however not possible to provide answers as to how well the solutions chosen by the municipalities work over time. This will require follow up of the same municipalities over several years.

We found that municipalities vary in their focus on use of RVAs, as evidenced by their varying emphasis on how they integrate RVAs into planning processes and daily activities. The municipalities chose mixes of strategies for integration; no municipality used the exact same solutions. Several

municipalities emphasized the importance of creating procedures and systems so that the RVA report and in particular suggested measures were taken into account during planning processes. Others did not focus on systems, but rather on how each individual who worked on issues related to societal safety was responsible for using the RVA in a suitable manner. The variation between the municipalities was larger than the variation between countries. In addition, it was not possible to see any differences in how strategies were chosen between larger and smaller municipalities.

Respondents in both small and large municipalities emphasized the benefits they saw from integrating RVAs into municipal planning. One of the challenges faced by most municipalities though, was that some plans are only rotated every four or even eight years. It was also challenging to raise the interest of decision makers. Many of them had not been able to integrate findings from RVAs into all relevant municipal plans. Even if they had not emphasized integrating RVAs in planning processes respondents focused on how they still made use of findings and integrated them into the daily activities of the municipalities. They found that risk management was a part of their daily work. This sentiment is echoed by Corvellec [21, p.285] who argues that “risk management practices do not need to be explicit, but can be embedded in the managerial tactics.” If one focuses on the more tacit approaches to risk management, the way one goes about embedding RVAs in the managerial practices of municipal leaders would be an interesting research topic. Additionally it is also interesting to ask, to what extent has the risk management concept become a part of the way municipalities are run? Saying that risk is managed through daily activities does not necessarily mean that it occurs in the best possible way or in a systematic manner.

The suitability of the two approaches – structured and formal integration vs. more responsibility for individual employees may vary depending on how well employees understand the RVA, the size of municipalities and how work to improve societal safety and crisis management is organized in municipalities. In addition the extent to which municipalities focus on using RVAs often seemed to be dependent on the individuals who were in charge of crisis planning and coordination. Though their title indicates a focus on crisis management, they are also often tasked with responsibility for a process and document that focuses equally on preventing and mitigating crises. This highlights the importance of ensuring that leaders of municipal departments as well as planners understand what RVAs are and what they can contribute to the work of different departments.

It is important to emphasize that developing procedures for integration in policy processes such as planning will not ensure successful implementation of findings from RVAs alone. Based on our interviews it appears that integration can facilitate this, but that there are many other important factors too such as availability of funding, rotation time for plans and how well planners and employees in municipal departments understand *how* RVAs should be used. The diversity of approaches to integration, even among the municipalities in each country also showed that municipalities themselves had to determine what the best solutions would be. Guidance on best practices, especially for smaller municipalities with crisis coordinators who only work with the issues as a part time position appears necessary. In both countries regional authorities have an oversight role with regard to municipal RVAs. Both regional authorities and the responsible regulatory agencies should focus on the extent to which RVAs are integrated in policymaking and planning and the extent to which they are actually used, because the existence of an RVA does not guarantee that this will take place.

RVAs are one tool that municipalities can use to improve their risk management efforts. It is however important to realize that they play a role in conjunction with many other inputs. RVAs and integration of RVAs in planning processes is not the only answer to municipal crisis management. In this paper we discuss RVAs as a separate activity but in reality the safety work in a municipality consists of much more than the just an RVA process. What we call risk management in municipalities is often not labeled risk management by those who execute it. Risk governance and management are not isolated processes. Boholm et al. [8, p.16] describe this by arguing; “Embedded in all kinds of organizational routines, the governance of risk does not stand out as an activity in and of itself. It instead appears to be interwoven with the full scope of organizational activities from budgeting or managing operations, through strategizing or branding the organization, to individual and organizational learning.” Hence

risk management in municipalities builds on several other activities such as networking as well as experience and evaluations of occurred incidents [22]. It is therefore important to remember that RVAs are situated in a context, and that many factors influence the final result, not just the method or integration of findings in plans or even the RVA in itself. Boholm et al. [8] and Corvellec [21] show the importance, not only of integration in processes and structures, but also of individuals and how risk management is understood. Procedures for integration are therefore not enough to ensure application of findings from RVAs, because employees in municipalities must also understand the content and meaning of what they are working with.

## 6. CONCLUSIONS

Risk and vulnerability analyses are one contribution to risk and crisis management work in Norwegian and Swedish municipalities. This paper describes three overall processes for integrating RVAs; long term planning, crisis management planning and everyday activities. We found that the nine municipalities we examined in Norway and Sweden varied in their focus on, and approaches to integrating RVAs in the above-mentioned processes. For some creating structures and procedures to ensure integration was found to be helpful, others argued that formalized structures were not necessary because risk management was part of their daily practice. Ensuring that the RVA and its findings were taken into consideration was however more difficult under such circumstances. Integration itself was found to be challenging because someone had to take responsibility for and lead this process and rotation time for plans was often lengthy. Another challenge was that there are no prescribed solutions, municipalities must figure out on their own how they should integrate RVAs in planning and policy making, which is in contrast to the plentiful guidance that is available for the actual development of analyses.

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