

# Process Structures in Crises Management

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## Abstract

Research project *InfoStrom* strives to foster the communication and collaboration among crisis management actors in case of a severe power blackout (*Schwarzfall*). Specific attention is devoted to the transparency of procedures amid counter measures that are initiated by different rescue organizations, e.g. fire brigades and maintenance teams of utility providers. Although a crisis squad coordinates procedures at a strategic level, procedures at the operational level of individual organizations are not always transparent to potentially affected organizations, e.g., once police forces close regional roads this information can affect maintenance troops in their approach, but they are not aware of this decision. Hence, better coordination of procedures with a cross-organizational impact is required. This calls for a process management methodology that supports the modeling of procedures for synchronization. To start with, our first task has been a thorough survey of the legal framework presented in crises management literature and regulations in order to identify process structures. Surprisingly, only rudimentary process structures have been unveiled. Check lists or task skeletons that are even sometimes distributed across organizations prevail. This paper will present our findings and reasons for this.

## 1 Introduction

For the social and economical life, reliability of power supply is one of the most critical infrastructure elements, specifically in this high-tech world implicating strong interdependencies with other critical infrastructures. Once hit by a breakdown of power supply, the implications are limited at first sight. However, problems become seriously compounded when the blackout lasts for longer periods of time, e.g. more than eight hours. Blackouts that last even longer cause serious implications for humanitarian inviolacy. During the Japanese earthquake and tsunami disaster everyone could witness how long-lasting power outages caused severe impacts, also due to cascade effects [1], [2].

But, the advanced planning of counter measures is rather complex, since local peculiarities and the large number of possible events hinder to detail concrete procedures *ex ante*. As a result, several documents specify counter measures in principle, but do not reflect rather specific events except for instance a breakdown of communication networks. As such, legal frameworks prescribe how to set up crisis squads (“Krisenstäbe”) for major crises (“Großschadenslage”) in Germany. However, the tasks of its members are only itemized, going not in much detail on how and when to do, and mostly being presented as mere checklists to follow. Hence, they govern actions to assure standard procedures while at the same time giving freedom for situational customization. Therefore,

no all-over plans rule the activities of the crises squad team, but individual expertise, experience, and ad-hoc decisions.

Project *InfoStrom* [3] aims to foster the communication and collaboration among crisis management actors. We participate in this project to leverage cross-organisational process awareness. Its first task has been to browse and unveil process structures in crises management literature and legal texts. Unfortunately, only rudimentary process chains have been found, check lists or task skeletons prevail.

## 2 Information Background

### 2.1 Public Regulations

In addition to interviews with experts from the emergency management domain (fire brigade, police, members of crises squads), a vast diversity of documents concerning crises management could be identified as relevant.

Most important regulations for public rescue organizations in North-Rhine-Westphalia and respective Counties are:

- DV 100, German regulation 100. Leadership and Command in Emergency Operations. Command and Control System (*Feuerwehrdienstvorschrift 100*)
- Ständige Konferenz der Innenminister und -senatoren der Länder (IMK), Arbeitskreis V

"Feuerwehrangelegenheiten, Rettungswesen, Katastrophenschutz und zivile Verteidigung", *Hinweise zur Bildung von Stäben der administrativ-organisatorischen Komponente (Verwaltungsstäbe VwS)*, Berlin 2003

- Ministerium für Inneres und Kommunales des Landes Nordrhein-Westfalen, *§1 Ordnungsbeförderungsgesetz NRW*, 1980
- as well as from the County of Siegen-Wittgenstein: *Führungsstrukturen zur Abwehr bei Großschadenslagen* and the *Dienstordnung für den Krisenstab*
- and from the County of Rhein-Erft: *Geschäftsordnung Bevölkerungsschutz*, Bergheim 2006.

They furnish the framework constraints each public organization has to obey for its operations.

The dependencies of a power blackout on other infrastructure areas are described to a large extent in the federal documents:

- Bundesministerium des Innern, *Krisenkommunikation - Leitfaden für Behörden und Unternehmen*, 2008
- Bundesamt für Bevölkerungsschutz, *Nationales Krisenmanagement im Bevölkerungsschutz*, Bonn 2008
- Grambs, S., Schultmann F. and Thiede T., *Krisenmanagement Stromausfall Langfassung*. In Zusammenarbeit mit dem Innenministerium Baden-Württemberg (Hrsg.) und dem Bundesamt für Bevölkerungsschutz und Katastrophenhilfe, Heidelberg 2010

In Germany, hazard defense is based on four pillars: military forces, intelligence service, police and civil protection [1]. Thus, considering the case of a long power outage, our emergency management partners in project InfoStrom are well selected being police departments as well as members of civil protection organizations of the two counties. The consortium is complemented by a large electric power provider: in most countries and also in Germany, most, if not all, utility providers are from the private sector, which ought to cooperate in crises situations strongly with these public bodies.

We therefore expected an elaborated emergency strategy that is based on a detailed planning of concerted actions of public and private organizations well in advance [4]. Strangely enough, we did not find documents with harmonized procedures or emergency plans covering the cooperation and interconnections between these organizations.

The federal structure of Germany might be one reason for this, since State, Länder, and County specific regulations describe responsibilities and relations, but they do not go in clear details and often delegate tasks to secondary bodies (principle of subsidiarity).

Another reason could be that the awareness of the organizations comes up slowly. Thus, in the recent past, the local authorities led disaster control exercises concerning power blackouts. Not surprisingly, these have

shown that the dependency on electric current influences strongly the possibilities of communication [5]. These empirical values were a welcome addition to the other documents for us.

Published documents with protection concepts against power outage of the federal offices are recognized as expert reports, being not at all obligatory. On the other hand, different regional protection concepts came into effect and were implemented; but they are either kept vague serving more as a frame structure, or, in the opposite case, they are detailed and tailored to particular needs. Even worse and also as a consequence, they all are showing different granularities and terminologies. Thus, extracting common standard procedures is nearly impossible.

Concerning the problem of terminology, it has to be noted that both, police and fire brigade regulations, are historically based on the same military roots. However, a common "lingo" is not in place and dictionaries fail through different use, goals and ulterior commands. Thus, comparing regulations of different emergency management organizations is troublesome and may lead to wrong results.

A specific problem lies in different communal regulations. Although core structures and procedures are similar in Germany, they have to be adapted by law to local peculiarities [6, 7]. And exactly these adaptations lead to misunderstandings and collisions of activities hampering the inter-organizational cooperation [8].

To establish an information network for the different actors, we had to consider local- and federal regulations to identify common and different process structures or at least fragments for later completion.

## 2.2 Utility Providers' Planning

Looking at commercial utility providers we experienced that most of them already analyzed potential risks and developed specific counter action plans, because of public regulations forcing providers of critical infrastructures to establish and use risk management systems [9]. Most of them also established and train needs-based and company-specific counter action plans. Since the power supply industry mostly works supra-regional, these plans are often fine-grained and detailed. But they also miss details when it comes to information exchange with other rescue organizations and do not include updates of information or - in other words - courses of information exchange. Moreover, only "my" information push is contemplated, information pull services from and to others are currently neglected. There is no service in place that constantly informs information seekers about the current state of work. But we have learned from interviews that for a quick recreation of the electrical power supply an active and standardized exchange of information is important and desired.

### 3 Implementation / Technology

Several modelling endeavours in the emergency management domain have proven that process modelling provides added value for decision support [10]. But off-the-shelf tools turned out to be too complex and too inflexible to be utilised by crises managers, which complained about their lack of usability or their mandatory but inaccurate terminology. Therefore, we need less formal methods enabling domain experts to at least grasp or sketch their planned courses of action in a simplified way (means simple ordering of tasks, concentration on necessary and often used relations, dependencies and relationships, as well as resource tracks).

For the initial capture, we started with a semi-formal approach by employing MediaWiki [11] and its semantic extension by [12]. This editor is well known from Wikipedia, and allows one to edit and structure content with relatively simple means. We then created an Emergency Management Wiki, in which we collected all rules, regulations and process fragments concerning management of disasters that affect critical infrastructures.

The advantages of this method are:

- Common web based access to crisis management procedures with discussion and versioning features;
- Familiar user interface thanks to Wikipedia, users are less adverse to this media;
- Capability of referencing and such archiving reference documents to trace decision making;
- Macro-structure by concepts (i.e., pages) and page outline;

- Annotations by elements like category, attributes, and data types (see box named “Facts about...” in figure 2).

Thus, domain experts can now subsequently review, edit, and change the domain knowledge gathered. We are currently in the process of reviewing, correcting and completing these results. Then we will proceed by transferring these processes in a further semi-formal process editor. From there it will be used as navigation tree for searching and collecting crises information in a so called SecurityArena.

### 4 Experiences Made

We have experienced that in official documents process know-how is somehow hidden in the description of tasks, responsibilities, and measures (which can be all perceived as processes or activities). But they are not detailed enough to formalize them, and - much less - put in temporal or logical order. Thus, applying here process modelling means results in plain lists and the prospects of control structures remain mostly unused.

It is obvious that the stated activities bear relations and imply meta-knowledge of the actors involved. Unfortunately, this information is not disclosed due to the claimed unpredictability of disasters and also due to the non-acquaintance of actors with formal planning approaches. And thus, a description of intersections with other organizations is also missing. Since these intersections bear the most critical problems [13], it is important to answer: which actor has to communicate when, how, with whom and about what.

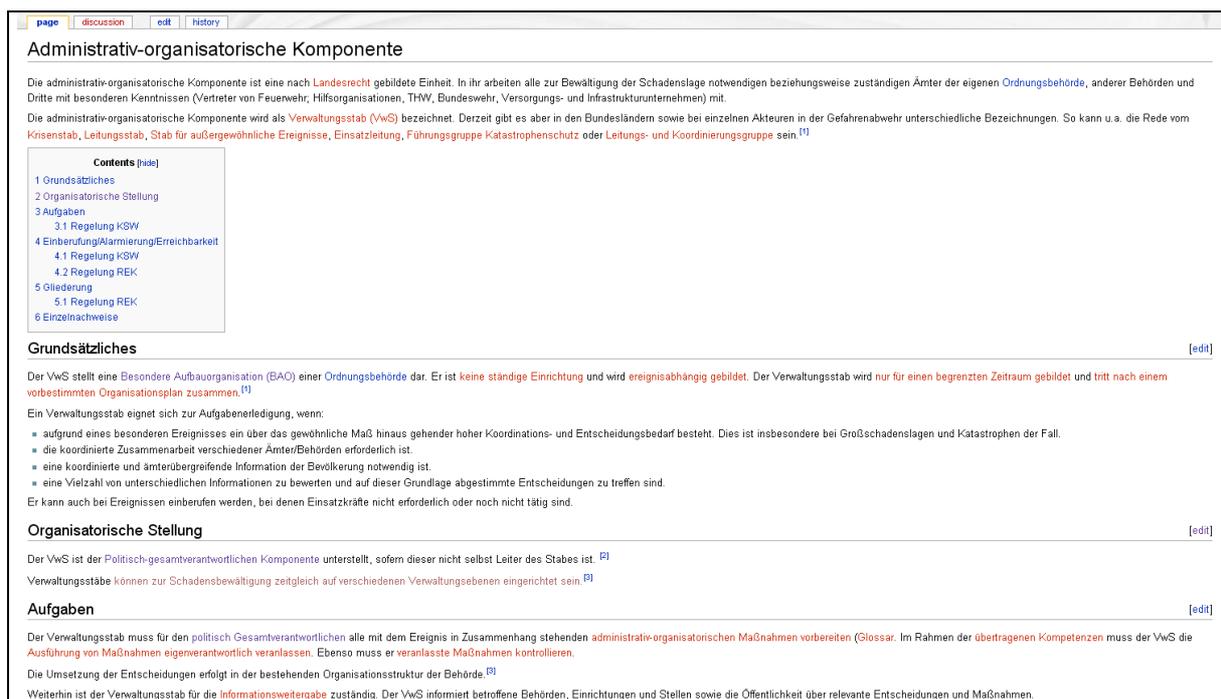


Figure 1 Modelling Crises Management Concepts with MediaWiki

To summarize our findings:

- Most emergency plans found are concentrating on inner processes, while external connections and relationships are somehow neglected or only superficially mentioned. A clear “when what who with whom with which means” is missing.
- Thus, process structures are rarely found in public documents. Described activities are somehow hidden behind terms like “responsibilities” and “tasks”, which we believe could not be translated to processes one-to-one.
- If activities have been found, they are mostly not described in temporal or logical order.
- Also, operating procedures are mostly generally described and not adapted to specific disasters.

The screenshot shows a MediaWiki page for 'Führungssystem nach FwDV 100'. The page content includes:

- Navigation: page, discussion, edit, history, Log in / create account
- Section: Führungssystem nach FwDV 100
- Text: Zur Erfüllung von Führungsaufgaben ist die Anwendung eines Führungssystems notwendig, es besteht aus:<sup>[1]</sup>
- Bulleted list:
  - Führungsorganisation (Aufbau)
  - Führungsvorgang (Ablauf)
  - Führungsmittel (Ausstattung)
- Text: Zur Erfüllung von Führungsaufgaben gelten folgende Führungsgrundsätze:<sup>[1]</sup>
- Bulleted list:
  - Aufgaben, Befugnisse und Mittel müssen aufeinander abgestimmt sein.
  - Aufgabenbereichen müssen überschaubar und klar abgegrenzt sein.
  - Klare Festlegung von Unterstellungsverhältnis und Weisungsrecht.
  - Zusammenarbeit mit nicht unterstellten Kräften und Stellen muss gewährleistet sein.
  - Fürsorgepflicht zur Erhaltung der Leistungsfähigkeit gegenüber den Einsatzkräften.
  - Auch im kooperativen Führungsstil liegt die Gesamtverantwortung beim Einsatzleiter.
- Section: Einzelnachweise [edit]
- Footnote: 1. ↑ 10 11 Ministerium für Inneres und Kommunales des Landes Nordrhein-Westfalen, FwDV 100 B, S.8, abgerufen am 12. Januar 2011
- Section: Facts about Führungssystem nach FwDV 100 [edit]
  - Abgrenzung von Aufgabenbereichen
  - Abstimmung von Aufgaben, Befugnisse, and Mittel
  - Besteht aus Führungsorganisation (Aufbau), Führungsvorgang (Ablauf), and Führungsmittel (Ausstattung)
  - Festlegung von Unterstellungsverhältnis, and Weisungsrecht
  - Zusammenarbeit mit Nicht unterstellten Kräften und Stellen
- Footer: diffed on 2 March 2011, at 15:14. This page has been accessed 111 times. Privacy policy About 1000 Promoted by MediaWiki

Figure 2 Modelling Crises Management Concepts with MediaWiki and Semantic Annotation

## 5 Outlook & Summary

Rescue organizations have to prepare for an increasing number of disasters as history shows. Because the size of some incidents might exceed the capabilities of a single organization, several rescue organizations have to cooperate. Hence, a corporate planning process is required to prepare for such an event. Moreover, thinking about a large scale power outage with numerous cascade effects.

Process management appears as natural candidate for cooperative planning since each planning revolves around activities that have to be conducted and monitored, and information exchanged [14].

In project InfoStrom the said SecurityArena will be implemented providing means to disclose, describe, and activate such crisis communication.

Our process management work for the SecurityArena is to provide a tool for modelling, activating, updating and navigating in cooperative processes, means to help rescue organisations and authorities before, during and after an event. And our first step was to find out whether processes oriented thinking can be found in the emergency management literature. This paper described our findings namely that regulations, documents and information from interviews show only first attempts of process management means. For the project, we as process specialists extracted these fragments, completed where possible, and now have to discuss with emergency managers, where bottlenecks exist. We are already sensing that the vast amount of sorties during a power outage will lead to have a careful selection of processes to observe.

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