

Deploying process management for emergency services Lessons learnt and research required

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Since 9/11, rescue organizations have intensified their efforts to prepare for major emergency events. Typically each preparation compasses a planning phase, a reconciliation phase among affected organizations and a training exercise for evaluation. The latter often causes a re-planning since bottlenecks of resources or coordination short-comings have been identified based on exercises in field trials. The designed operational process then builds the backbone for any operational reactions. In particular, the coordination of cross-organizational activities surfaces as crucial issue. Coordination processes have to be designed and established in order to start recovery actions effectively. This requires the specification of such processes as well as the design of appropriate interfaces while the latter in particular requires the abstraction from capabilities that are specific to certain rescue organization, e.g. the technical equipment of their vehicles or the capabilities of their personal. The preparation finally results in an operational concept or process landscape for recovery management processes.

Currently, this preparation process is dominated by the use of paper-based documents. Yet, knowledge represented in simple flowcharts and textual process descriptions is ambiguous and not formally processable.

Process management has proven to be instrumental for the engineering and assessment of courses of actions to meet specific objectives [2]. Starting with early work on process management for software projects, process management has been carried to an increasingly growing number of application domains. However, major application domains still include manufacturing and production industries that can be characterized by their well-defined processes. But, support of knowledge-intensive and complex processes is scarce.

One of the main objectives of process modeling is to facilitate human understanding and communication; process transparency helps people to communicate on the work to be done and to understand what part they play in the game [3]. Organizations affected by the emergency have diverse resources for handling the incident. As a consequence, the organizations have to agree upon standardized services [5]. Risk management organizations have to consider the communication and the distinctive delivery of services when preparing and planning operational processes for acting in emergency cases. Hence, measures, communication infrastructures, and logistics procedures have to be standardized as reference processes. Bürmann [1] also points out that the weak points discovered mostly in the cooperation and communication between the involved parties can be effectively solved through a process-oriented approach thus leading to an optimal overall performance.

In this presentation we want to give a summary of experiences made when introducing the concept of process management to the domain of emergency services in tight collaboration with rescue organisations.

We started to demonstrate the potential of process management for risk management by translating the ÜMANV operational concept [5] into a formal process model. The specification of this concept, in which 500-1200 injured persons have to be treated, was the starting point for the modeling. The concept description encloses a text document of approximately 45

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pages length, enriched by few graphics and visualization diagrams that already suggest a process-orientated view, however do not go beyond it in the direction of formalization. Objectives and requisites are mentioned in the specification although not explicitly exposed. The outcome of this research was a modeling methodology for emergency management processes, developed in collaboration with domain experts and comprising several modeling views that illustrate the strategic level of the operational concept together with separate views on the services and the organizations that deliver them. This methodology was illustrated with the ÜMANV which has been completely modeled. The resulting model promotes an analytical evaluation of the procedures, thus boosting a high professional precision.

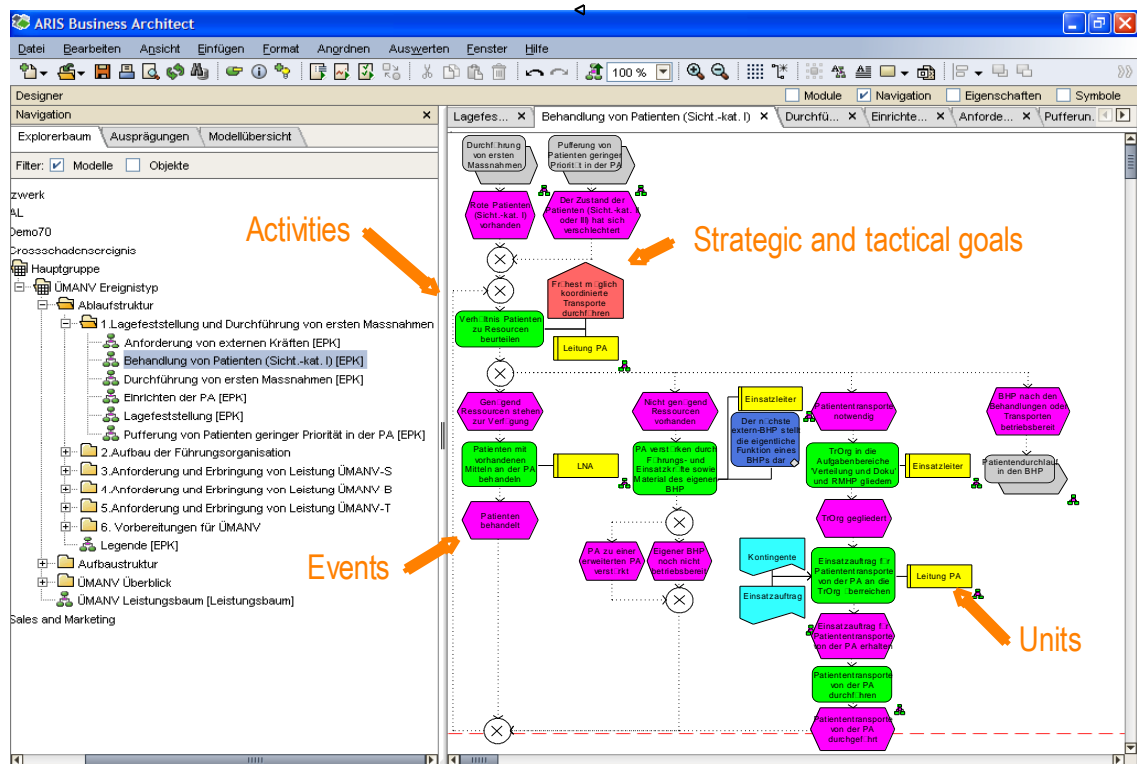


Figure 1: Model of the ÜMANV modelled in ARIS Business Architect with extended Event-driven Process Chains

We tried to answer the question whether emergency forces can benefit from the employment of process modelling approaches that have proven their potential for various application domains. We experienced that once formal models were in place, fire brigades were immediately in the position to capitalize on this approach due to the means for process analysis. Based on the different views generated from process models, various performance and completeness perspectives were studied. Respective analyses range from the mere evaluation of the sufficient availability of resources, over the adequate distribution of activities across organisational units, up-to a resilient workload for critical operational units. Hence, we can answer the question with yes.

But, in our process modelling endeavours we have identified major process modelling issues and research challenges:

1. Customisation of modelling language and environment

Emergency management processes have to be modelled according mindset and peculiarities of emergency services. Existing process modelling tools do not support the terminology of

the emergency domain. But, this is critical since the technical staff of fire brigades and similar organisations like police have to stick to their vocabulary due to their nearly military-oriented language and rules. Therefore, customisation of modelling language and environment to this terminology is essential. Otherwise, acceptance and also understanding of the users in charge are lacking.

2. Deliberation of design rationales of processes

Operations of rescue organisations are driven by tactical and operational goals. Hence, the design rationales of counter actions have to be exposed explicitly, rather than merely setting relationships among goals and activities as in prevailing process management tools. The strong goal-oriented lines of thinking (fulfilling of tactical and strategic goals is the main driver for fire brigades) is still perfunctory supported in particular concerning an analysis of fulfilment and alternative solutions.

3. Traceability of concepts

To prepare for large-scale disasters contributions from different organisations have to be merged. Thus, traceability of decisions – also for legal reasons – has to be provided. This is specifically important, when questions of responsibilities are raised after emergency procedures failed, like for example at the Love Parade Disaster in Duisburg. Mistakes in planning as well as problems in execution can be assessed only, if decisions can be traced back to reasons and of course persons in charge. Whether such an unveiling of plans might cause reluctance on the side of planners is a different question. But the risk of compensation of damages puts a strong pressure on emergency organisations to disclose their procedures.

4. Organisational model

Organisations have to be modelled rather detailed in order to assess feasibility of plans since capabilities and privileges of dynamic organisational units are decisive. In the emergency domain the focus lies on dynamic organisations instead of a fixed organisational structure. Resources like special rescue tools require related competencies of actors; therefore, competencies of roles are very important. In particular due to regulations: specific events and actions are only allowed to be managed by a competent position. Apparently, higher hierarchies cover competencies of lower levels, therefore positions often imply competences.

5. Informal representation of processes

Process modelling tools are often very complex and target workflow execution. This naturally dictates the methodology and such influences the level of detail in each modelling step. Simplifications or placeholders are mostly not allowed. We recommend employing informal representations such as Excel or drawings to capture the initial skeleton of the process envisioned. Once initially reconciled, formal representations can be expanded.

6. Workflow support

Our projects' experiences unveil a minor importance of direct workflow support, since most of the actions to be planned are currently not embedded in ICT environments. However, we faced an interesting research challenge with regard to control structures for simulation purposes. Processes can “escalate” means many processes are defined for different alarm levels. Higher level processes are more complex and need more activities and resources, but somehow cover processes of lower alarm levels or extend their attributes. Naturally, additional or follow-up events cannot be pre-modelled, and multi-event disasters are similarly difficult to plan due to the correlation of events.

We currently proceed in our research on solving these issues, for example in project InfoStrom [4], which will develop a “Security Arena”, a communication and information

platform that aims to continuously improve cooperation for electricity supply recovery between power suppliers, fire fighters, police, country administrations and citizens. Here, we contribute with the work on informal and formal process models depicting standard operating procedures of emergency parties involved.

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