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Flexible Early Warning Systems with Workflows and Decision Tables

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An essential part of early warning systems and systems for crisis management are decision support systems that facilitate communication and collaboration. Often official policies specify how different organizations collaborate and what information is communicated to whom. For early warning systems it is crucial that information is exchanged dynamically in a timely manner and all participants get exactly the information they need to fulfil their role in the crisis management process. Information technology obviously lends itself to automate parts of the process. We have experienced however that in current operational systems the information logistics processes are hard-coded, even though they are subject to change. In addition, systems are tailored to the policies and requirements of a certain organization and changes can require major software refactoring. We seek to develop a system that can be deployed and adapted to multiple organizations with different dynamic runtime policies. A major requirement for such a system is that changes can be applied locally without affecting larger parts of the system. In addition to the flexibility regarding changes in policies and processes, the system needs to be able to evolve; when new information sources become available, it should be possible to integrate and use these in the decision process.

In general, this kind of flexibility comes with a significant increase in complexity. This implies that only IT professionals can maintain a system that can be reconfigured and adapted; end-users are unable to utilise the provided flexibility. In the business world similar problems arise and previous work suggested using business process management systems (BPMS) or workflow management systems (WfMS) to guide and automate early warning processes or crisis management plans.

However, the usability and flexibility of current WfMS are limited, because current notations and user interfaces are still not suitable for end-users, and workflows are usually only suited for rigid processes. We show how improvements can be achieved by using decision tables and rule-based adaptive workflows. Decision tables have been shown to be an intuitive tool that can be used by domain experts to express rule sets that can be interpreted automatically at runtime. Adaptive workflows use a rule-based approach to increase the flexibility of workflows by providing mechanisms to adapt workflows based on context changes, human intervention and availability of services. The combination of workflows, decision tables and rule-based adaption creates a framework that opens up new possibilities for flexible and adaptable workflows, especially, for use in early warning and crisis management systems.