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Influence Factors for Innovation in Digital Self-Preparedness Services and Tools

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ABSTRACT

IT support for crisis and continuity management covers all stages from prevention through preparedness to response and recovery. The application of innovative technologies often implies the need for structural and procedural changes for users and reliable assessment of future business opportunities for service and tool providers. Scenario-technique is a methodology to systematically assess possible future developments to derive conclusions for strategic planning. This methodology is adapted to the domain of self-preparedness and self-protection. This article contributes domain-specific influence factors which are identified by literature research and reflecting interview with all stakeholder groups. For each influence factor, projections are derived using different types of trend analysis and forecasting methods. Influence factors and projections build a knowledge-base which enables generation of scenarios as a fundament for strategic decisions to support crisis and continuity management.

KEYWORDS

Continuity Management, *Crisis management*, *Data Management*, *High-Impact Weather Event*, *Influence Factor*, *Product Development*, *Scenario-Technique*, *Self-Preparedness*, *Strategic Planning*

1. INTRODUCTION

High-impact weather events and natural disasters are characterized by a broad impact on the public. Public protection and disaster relief organizations (PPDR) take over responsibilities in preparedness and response. The availability of new data platforms carries significant potential to support these tasks. Platforms are continuously advanced and provided with free access for PPDR (for instance, European Forest Fire Information System/EFFIS, European Drought Observatory/EDO and European Flood Awareness System/EFAS) or as paid software packages deployed in control centers on various levels of subsidiary systems. Research topics can be differentiated with regard to three levels of the system architecture:

1. Forecasting and nowcasting models of weather and climate on the one hand and hazards like flooding, storms, forest fires and droughts on the other hand
2. Impact assessment capabilities transferring forecasting and nowcasting into actionable knowledge by integrating models of potentially affected items like hospitals, schools, transportation networks and power plants
3. Functionalities in situation awareness and decision support tools aggregating impact assessment and task models of PPDR organizations

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Within the Project "ANYWHERE", all aforementioned levels are integrated into a Pan-European resource[1]. Besides PPDR, both citizens and enterprises need to involve themselves in preparing for and responding to high-impact weather events due to legal obligations (Kuipers, 2015) and clear interests in terms of health resp. business continuity (Reuter, 2015). In the US, the "…national preparedness is the shared responsibility of all levels of government, the private and nonprofit sectors, and individual citizens…" (Presidential Policy Directive-8, 2011). Following this definition, self-preparedness and self-protection are understood as activities performed with the primary aim to prepare for or to protect one's own safety and security. In preparedness phase, PPDR are acting in supporting roles, while in response phases, communication is required to achieve the most effective fit of practitioner and private measures.

Implementation of new data platforms alone is not sufficient to support enhancement of self-preparedness and self-protection. The security market (Gummer, Skrzypietz, & Stuchtey, 2014) is characterized by aforementioned actors: PPDR have to follow regulated procedures to procure data and software systems. Private actors are potential customers for free or commercially available systems. These perspectives are drivers for the market of data platforms and corresponding information systems. At the same time, available market opportunities push developments of new products.

Inventions become innovations, if they are launched on the market at the right time, and become profitable there (Schumpeter, 1997). This point of time is characterized by a strategic gap in the interface of technology, market and competition. A particularly suitable method to identify strategic gaps is scenario-technique (Reibnitz, 1992). Compared to classical quantitative forecasting methods or portfolio analyses, scenario-technique also takes qualitative aspects and cause-effect-relations into account. Furthermore, scenario-technique demonstrates its strengths in system dynamics as well as the consideration of disruptions. Application of scenario- technique with regard to self-preparedness and self-protection services and tools depends on domain-specific knowledge about technologies, structures and procedures as well as societal issues. Therefore, the paper is motivated by the research question: Which factors influence the successful implementation of digital services and tools for self-preparedness, specifically with regard to high-impact weather events? These factors are entitled 'influence factors' according to the terminology of scenario-technique (Reibnitz, 1992). The research question is focused on domain-specific aspects relevant for innovation in both crisis and continuity management.

The paper presents influence factors validated based on literature and reflections in case studies. Applicability of influence factors is analyzed using an innovative process and data model for strategic planning. In section 2, state of the art of related research and technologies is presented. Research gap and methodology are presented in section 3. In section 4, an introduction into the process and data model for strategic planning to support innovation enhancing self-preparedness and self-protection is given. Both process and data models are determining the frame to specify and utilize influence factors for services and tools in crisis and continuity management in general resp. self-preparedness and self-protection. Based on literature studies, results were derived and enriched by case studies with stakeholders, subsuming PPDR organizations, enterprises representing end users and providers of services and tools in this domain (section 5). Conclusions and future research demands are outlined in section 6.

2. STATE OF THE ART

The state of the art concerning scenario-technique is presented in subsection 2.1. In scenario-technique, a scenario is defined as the description of a potential future state or situation an enterprise has to cope with in a medium- or long-term perspective (Reibnitz, 1992). In the following section 2.2, an outline about existing data models and software tools supporting the scenario process is given. Related work is presented regarding generic and specific influence factors for the development of self-preparedness and self-protection services and tools.