

CascEff /

Modelling of dependencies and cascading effects for emergency management in crisis situations



Information

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Project objectives

Modern socio-technical systems are increasingly characterised by high degrees of interdependencies. Whereas these interdependencies generally make systems more efficient under normal operations, they contribute to cascading effects in times of crises.

CascEff will improve our understanding of cascading effects in crisis situations through the identification of initiators, dependencies and key decision points. The main objectives of the CascEff project are to:

1. gain a better understanding of the cascading effect in crisis situations.
2. develop an "incident evolution tool" for predicting present and future crisis evolution leading to cascading effects.
3. identify human activities in the crisis.
4. improve incident management for present and future threats.

Description of the work

The experiences from past incidents and findings on initiators, dependencies and key decision points will be further developed in the methodological framework of the incident evolution tool. This will enable improved decision support, contributing to the reduction of collateral damages and other unfortunate consequences associated with large crises. Use of the tool will be validated through its integration into different incident management and training platforms representing different end users in the project (e.g. NoKeos, iCrisis, RIB, WIS and XVR).

The work with CascEff is divided into five research work packages:

WP1: Incident management. A methodology will be developed for incident management which integrates predictions of an incident's evolution as based on an improved understanding of cascading effects. The methodology will be developed on the basis of identified and elaborated scenarios, taking into account cascading effects and their effect on the evolution of scenarios.

WP2: Originators and dependencies. The WP aims to identify essential characteristics that are required for development of an incident evolution tool with the aim to manage cascading effects. This includes the development of a methodology for analysing previous incidents regarding their originators, dependencies, and consequences.

WP3: First responders tactics, human activities, interaction and behaviour. The aim is to identify which human activities need to be taken into account during key points in an incident's evolution where decisions need to be made. This work package will also develop a methodology for communication and coordination during crisis situations that reflects the respective roles of members of the public, media organisations, first responders and intervention commanders at different levels.

WP4: Incident Evolution Tool development and implementation in existing systems. The incident evolution methodology that will incorporate cascading effects will be implemented into incident management frameworks used by end users in Europe today. The tools will be developed in close cooperation with end users (first responders, emergency managers, decision makers, etc.).

WP5: Scenario development and simulated exercises.

Scenarios will be developed for testing the incident command methodology and tools. In addition there is one work package for dissemination of the results (WP6) and one for project management (WP7).

Expected results

The project will produce models of dependencies and effects in crisis situations (of both physical and human components) causing a cascading effect. It will also provide a methodology to create this model for future threats, and tools to foresee the evolution of an incident. These tools will be available on a real time basis as well as for planning and training purposes, in particular in cross border crisis situations.

This will lead to reduced direct and indirect consequences by:

- » Reducing the extent of crisis scenarios subject to cascading effects and the risk for cross border scenarios
Highlight the need for cross border collaboration in response to specific originators
- » Promote new response strategies and structures and methodologies
- » Include development of a cloud monitoring system for multi-hazard events
- » Improve both the evacuation of large areas in crisis situations and the use and role of the media in crisis situations

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