

The challenge

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. Therefore, challenges for emergency preparedness and response are growing significantly - challenges which are more and more relevant to both natural and man-made emergencies and are reinforced by the risks for cascading effects in complex emergency management environments. In particular complex environments which lack adequate resilience to certain initiators will be prone to cascading effects. An escalating incident in such an environment can lead to severe cascading effects and quickly become extremely difficult for emergency services to handle. The incident can ultimately have enormous consequences with respect to life, property and the environment and for both infrastructure and the general public. These consequences can in many situations have both direct and indirect effects, not only in the immediate surrounding geographical area but also across very large areas, potentially extending across borders.

Project Objectives

1. Better understanding of the cascading effect in crisis situations.
2. Develop an Incident Evolution Tool for predicting past, present and future crisis evolution leading to cascading effects.
3. Identification of human activities in the crisis.
4. Improved incident management for present and future threats.

Methodology

Casceff will improve our understanding of cascading effects in crisis situations through the identification of initiators, dependencies and key decision points. These will be developed in the methodological framework of an Incident Evolution Tool which will enable improved decision support, contributing to the reduction of collateral damages and other unfortunate consequences associated with large crises. Use of the Incident Evolution Tool will be validated through its implementation into different incident management and training platforms representing different end users in the project (e.g. NoKeos, iCrisis, RIB, WIS and XVR). A roadmap for similar implementation in other incident management and training platforms throughout Europe will be defined to allow broad acceptance of the Incident Evolution Tool.



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, based on the physical properties, properties of critical infrastructures and risks, human behaviour, the decisions taken and their timing. These tool(s) will be available on a real time basis as well as for planning and training purposes, in particular in cross border crisis situations.

The proposed models of dependencies and effects in crisis situations will elaborate on the extent of the risk for crisis situations. Impact will be felt not only to natural, but also to man-made emergencies where the risks for cascading effects in particular in complex emergency management environments is high.

Ultimately, this will lead to reduced consequences, both direct and indirect. This will:

- Reduce the extent of crisis scenarios subject to cascading effects
- Reduce 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
- Help identify roles and responsibilities of the various stakeholders

Additional impacts are

- Improved understanding of cascading effects
- Development of a cloud monitoring system for multi-hazard events
- Improved understanding of evacuation of large areas in crisis situations
- Improved understanding of the use and role of the media in crisis situations
- Development of an open source tool which may be used to model crisis and emergency requirements in the future for improved safety of European citizens when, for example, planning infrastructure investment.



Participants at the Casceff kick-off meeting at SP.

Project Partners

SP Technical Research Institute of Sweden, Sweden
Lund University, Sweden
Swedish Civil Contingencies Agency (MSB), Sweden
Ghent University, Belgium
INERIS, France
Ministry of internal affairs (KCCE), Belgium
Safety Centre Europe (SCE), Belgium
University of Lorraine, France
University of Sheffield, UK
Northamptonshire Fire and Rescue Service, UK
E-SEMBLE, The Netherlands
Campus Vesta, Belgium

At a glance

Title

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

Instrument

FP7 – Collaborative project
SEC-2013.4.1-2

Total Budget

4,626,904.00 €

EC Contribution

3,594,937.80 €

Duration

36 months

Start Date

1 April 2014

Consortium

12 partners from 5 countries

Project Coordinator

Prof. Anders Lönnermark, SP Technical Research Institute of Sweden

Project Web Site

www.casceff.eu

Key Words

Cascading effects, incident management, incident evolution, rescue services, foresight tools, preparedness, response, simulation of physical effects, role of media in crises, first responder tactics.