Snowball

Lower the impact of aggravating factors in crisis situations thanks to adaptive foresight and decision-support tools

D6.3 : [Dashboard]

[Displays for crisis monitoring, probabilistic approach simulation results and decision-support]

For the attention of the Research Executive Agency

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Snowball aims at lowering the impact of aggravating factors in crisis situations thanks to adaptive foresight and decision-support tools.

The project runs from March 2014 to February 2017, it involves 11 partners and is coordinated by Gedicom.

More information on the project will soon be found at http://www.snowball-project.eu.

Abstract

A full overview of the situation and circumstances is essential in the context of crisis caused by natural hazards. In Snowball, the developed software tools provide means for being better prepared to crises. In this task, we develop a generic dashboard, which provides access to all Snowball functionalities. The generic dashboard integrates the software tools of each partner on one website, using widgets or tabs. The following Snowball elements and tools can therefore be accessed via the dashboard: display of manual inputs, post crisis report, action planning, decision support system, crisis editor (event tree builder), cascading effects simulator, and the TeleAlert. By using the dashboard, the user is able to assess different crises, perform what-if analysis and integrate outcomes of all the tools for his/her preparation plans.

Executive summary

In particular, for being prepared to crisis it is essential to have an overview of the circumstances in the possibly affected area and knowledge on possible consequences of natural hazards and cascading effects within and across supply networks. In Snowball, the developed software tool set provide means for preparation to crises. In this task, we developed a generic dashboard, which assembles and connects the Snowball tools on one place. The developed dashboard is accessible via the internet.

The purpose of the dashboard is to provide access to the software tools developed by each partner on a central place to use them as an assembly. The developed generic dashboard integrates the software tools of each partner at a single place to provide a workflow through the functionalities to the user. These software tools are integrated by the use of widgets and tabs. Widgets are small applications assimilable on a web-page. Tabs are similar to browser tabs and are integrated as a page on the dashboard. The end-user is able to make use of the display of manual inputs, post crisis report, action planning, simulation of cascading effects, decision support system and the TeleAlert system as well as the customization of personal additional (3rd party) widgets that might help to be prepared. The integrated tools provide a broad spectrum of functionalities for increase the preparedness to crises: E.g. the computer simulation CaESAR addresses the analysis of cascading effects within coupled grids, identify their weak points and get mitigation strategies for increasing the resilience to lower the impact of cascading failures. The post-crisis report provides a look back on past crises. Data collected during these past crises can be accessed through it, i.e. tweets, manual inputs, action plans and stakeholders' messages. The action planner, which is accessible via a tab on the dashboard, provides the possibility to trigger crisis management plans and to automatize the process. Three different plans are available: Evacuation, Mission, and Prevention. The decision support system is accessible via a dedicated tab within the dashboard. It supports the decision maker in the comparison of preparedness and mitigation strategies by evaluating different strategies computationally. TeleAlert is a system that allow users to send messages on population. The dashboard provides full access on these tools and hence also on the Snowball solution to the end-user. It serves as access point to the whole Snowball solution.

The dashboard admin can adjust the displayed widgets, remove and delete unused ones or add new ones. Beyond the Snowball tools, different external widgets can be added to the dashboard, e.g. weather widgets. Hence, the dashboard serves not only as access point to the snowball solution; it can also be adjusted to different areas and crises beyond the implemented toolset.

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ABBREVIATIONS

CaESAR

***Ca**scading **E**ffect **S**imulation in urban **A**reas to assess and increase **R**esilience*

DEFINITIONS

Crisis

A crisis is a set consisting of several crisis events. Can also consist of several independent events or of cascading events.

Crisis event

A crisis event is an event, which is part of a crisis. In this context, we consider a crisis event as a natural hazard, e.g. an earthquake in a specific location with a given strength.

Grid component

A grid component is an element of a supply grid, for example a power pole or a power line.

Natural cascading effect

A natural cascading effect is a natural hazard triggering another one, e.g. an earthquake as first crisis event could for example trigger a landslide as second one.

Tabs

Tabs on the dashboard are similar to browser tabs. Each tab can have another content.

Technical cascading effect

Failure propagating from one technical grid component to another one and especially across grid borders.

Widget

A widget is a part of the dashboard and is a small application. Within this application different types of functionalities can be implemented, e.g. the display of current weather conditions in a specific place.

Global Snowball Glossary for further definitions:

https://docs.google.com/document/d/1K-xcUdWPen7GQ1OhQfWVdJ0DhZgJCrf21v-bMh5ihWA/edit

INTRODUCTION

In particular, for being prepared to crisis it is essential to have an overview of the (relevant) circumstances in the area possibly affected by natural hazards and knowledge on possible consequences of natural hazards and cascading effects within and across supply networks as well as organizational possibilities. In Snowball, the developed software tools provide means to be better prepared to a crises. In this task, we develop a generic web-based dashboard that allows access to all software elements developed in Snowball. Via the dashboard, the user is able to benefit from the assembly of all Snowball solutions in order to be prepared to a crisis. Besides the provision of all Snowball solutions, different additional services can be added to the dashboard, e.g. prediction of weather conditions, news or flight radar to be aware of typical states of the airspace.

The dashboard give access to the display of manual inputs (see D4.3), post crisis report (see D6.7), action planning (see D6.4), decision support system (see D6.2), CaESAR (D5.5) and the TeleAlert system. The post crisis report enables decision makers to invesitage past crises. It gives access to data collected during past crises, i.e. Tweets, data from the manual crisis input, action plans and stakeholders' messages through the action planning module. The action planner allows the decision makers to trigger plans and to automatize the process. The aim of the Decision Algorithm is to support the decision maker in the comparison of preparedness and mitigation strategies. TeleAlert is a system that allow users to send messages on population. A display for the results of CaESAR, which provides a computer simulation of the technical cascading effects within supply grids, is developed and integrated in the dashboard. The results are visualized on a map. Using the map and the grid description, different layers are added for the visualization, which are: a layer for representation of the grids (see D5.1), one for representation of the human behavior (see D5.2), a further layer for the results of damages and cascading effects within and across grids (see D5.3 and D5.4) and result layers for the vulnerability assessment and resilience assessment (D5.5).

The Snowball dashboard can be adjusted to different spatial areas and scenarios. Furthermore, it is able to assess different crises. However, the dashboard provides a Snowball toolkit to the user for increasing the preparedness to crises.

This deliverable is organized as follows: Chapter 1 describes the dashboard, its technology and how the different toolkit components are integrated. In chapter 2, the Snowball toolkit is described. This toolkit consists of several components divided in scenario analysis (Crisis Builder, CaESAR, Precomputed Simulation, Decision Support), TeleAlertSystem and past crisis analysis (Manual Input, Action Planner, Social Network Analysis, Post Crisis Report). Each component and its integration in the Snowball toolkit is described.

1 SNOWBALL DASHBOARD

This section gives a brief overview of the Snowball Dashboard web application developed by FHG. The Snowball Dashboard is a web application that provides access to all Snowball tools. By means of the Snowball Dashboard the user is able to make inputs to all Snowball tools, receiving results from them and process them in other Snowball tools further also via the Snowball Dashboard. In short: A full workflow path for reaching preparedness for a crisis is provided by the Snowball Dashboard.

Figure 1 shows the three main pillars of the snowball toolkit that support the preparedness for crisis scenarios, which are described in the following: Two types of analyses are implemented within the framework: scenario analyses and past crisis analyses. The third element to be better prepared to crisis is the TeleAlert system, which can be taken into account as one means for sending messages to the population.

With the scenario analysis, different scenarios can be defined for the computer simulation and the decision support to evaluate different mitigation strategies as preparation for crises. The scenarios are built within the crisis builder (visualized as event tree). In this way, some (possible) crisis scenarios serve as input for the computer simulations. Afterwards, the results for these scenarios can be compared. In this way, different mitigation strategies for future crises could be evaluated and tested. The past crisis analyses comprises different types of data, e.g. twitter, crisis management plans and manual inputs. Based on these data, different aspects of past crises can be analyzed. The developed dashboard is not designed for the management of crisis situations, but to provide means to be better prepared for such disruptive events. In particular to provide information about expected cascading effects following an event.

Figure 1: Overview on possible workflows within the Snowball solution. With the tool set, different aspects of past crises can be analyzed. Beyond this analyses, different scenarios can be defined for the computer simulation and the decision support to evaluate different mitigation strategies for crises.

A non-exhaustive selection of main inputs the user shall provide to the Dashboard is:

- Area that is possibly affected by a natural hazard
- Formalized description of natural hazard
- Scenario description
- Data on past crises
- Twitter data (automated, not by user)

The main outputs the user gets via the Dashboard are:

- List of elements directly damaged by natural hazards