



PERIODIC REPORT

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GRANT AGREEMENT NUMBER: 312632
PROJECT TYPE: FP7-SEC-2012.2.1-1 RESILIENCE OF LARGE SCALE URBAN BUILT
INFRASTRUCTURE – CAPABILITY PROJECT
PROJECT ACRONYM: ELASSTIC
PROJECT TITLE: ENHANCED LARGE SCALE ARCHITECTURE WITH SAFETY AND SECURITY
TECHNOLOGIES AND SPECIAL INFORMATION CAPABILITIES
PROJECT START DATE: 01/05/2013
PROJECT WEBSITE: WWW.ELASSTIC.EU
TECHNICAL COORDINATION: TNO (NL) (WWW.TNO.NL)
PROJECT MANAGEMENT: UNIRESEARCH (NL) (WWW.UNIRESEARCH.NL)

Publishable summary

Summary description

The overall objective of the ELASSTIC project is to improve the security and resilience of large scale multifunctional building complexes to natural and man-made disasters by providing a methodology and tools which enable to include security and resilience from the early design and planning phase of such projects.

The ELASSTIC concept proposed is based upon the following key features:

1. A comprehensive approach for designing safe, secure and resilient large scale built infrastructures
2. A set of tools to enable architects, structural engineers and building installation engineers to assess the safety, security and resilience of designs and to optimize the integral design
3. Coupling and integration of these tools into State of the Art Building Information Modelling (BIM) technology resulting in Extended BIM technology (BIM+)
4. Smart and reinforced building elements, to measure the actual building condition combined with an increased bearing capacity and resistance
5. Coupling and integration of BIM and BMS (Building Management System)
6. Real time information on the safety, security and resilience of infrastructure

Validation (Proof of Concept) of the approach and developed tools will be done by evaluating the design of a multifunctional, resilient, large scale urban complex (anno 2020), called the ELASSTIC complex. This fictitious complex will be designed in the project. This large multifunctional complex combines housing, shopping centre, transport node, business centre and entertainment centre. In this design, safety and security are integrated to make the complex resilient to natural and manmade threats.

The ELASSTIC complex will not only be secure and resilient to disasters, it will also be designed to ensure fast and efficient evacuation in case of a disaster. For a crowded complex comprising a large number of people, the design of a smart evacuation system should be included at the start of the complex design. Taking evacuation and safety installations into account in the design phase will increase safety and is less expensive compared to an evacuation system integrated after the complex is build or at the final design stage.

Status of the project

Good progress has been made in the project during the reporting period.

The initial phase (first half year) has been dedicated to further definition of the project and the ELASSTIC complex, based on inventory studies regarding the state-of-the-art in design processes and regarding trends in hazards and based on brainstorming regarding future requirements for large building complexes. It was found that the building information modelling (BIM) is the most promising way of designing these days, although it is not yet common practice all through Europe. The key value is information.

A list of relevant hazards and a list of future requirements for building complexes have been generated. A selection of these will be further considered in the showcase ELASSTIC.

The showcase ELASSTIC is in good progress. An initial framework (i.e. initial list of requirements, wishes, ideas and a selection of an interesting location (i.e. centre of The Hague) was defined by the consortium. The architects further explored the wishes and ideas, evaluated the selected location and generated in total 9 concepts, of which the so-called Ribbon has been selected for the showcase. The Ribbon has been modelled in BIM and in the next phase the structural design and the service installation design has been added to it by Arcadis. As a result, the 1st quantitative design is now available on the BIM-server for all project partners.

In the meantime, design and calculation tools and processes have been prepared for the subsequent steps of analysing the ELASSTIC complex. Within the project, we have selected to use and further develop BIM for the Building Information Model, Relatics for System Engineering, and MCA (Multi Criteria Analysis) as a decision tool in the assessment of the ELASSTIC complex. The development concerns (improved) procedures how to

use the tools, new features and a platform to link the different tools. Regarding these issues work is in progress. Options for links with calculation tools are also investigated, but the outlook is not so promising, due to too large gaps between the very special calculation tools and the other tools.

Resilience, safety and security is a key design requirement for the ELASSTIC complex. Apart from robustness of the complex and sufficient evacuation options, to be analysed by the different partners with their specific calculation tools, actual information in case of an incident can be life saving. For that purpose, the possibilities of sensors that can register the incident are studied and the possibilities of automatic links of the sensor to the Building Management System are inventoried. Appropriate sensors and concepts for wireless sensor network (WSN) have been identified based on functionality and robustness. As the first part of the wireless sensor network (WSN) a prototype for a master node has been built and demonstrated successfully.

Legal and ethical issues have been identified and are under study. The first issue already explored is protection of personal data. It is relevant for the dynamic information regarding occupation of the building in the Building Management System.



Expected final results and their impact

The targeted and expected project results are

1. A comprehensive/systematic approach and (concept) tools to design safe, secure and resilient large scale building complexes.
2. Benchmark for Extended BIM technology, i.e. link with supportive tools.
3. Smart and reinforced structural elements for the absorption of high loading energies
4. A concept or system for real-time resilience monitoring.
5. A smart evacuation system in BMS.
6. A demonstrator of the ELASSTIC design and design concept, i.e. the ELASSTIC-complex.
7. Recommendations for the regulatory framework regarding the design process.

The targeted results are tools and products enabling a systematic approach to incorporate safety and security from the starting point of the design leading to a more resilient urban infrastructure.

The expected impact is an improvement of design processes and the design of urban area and thus an increase of the security against and resilience to new threats. It is expected that the project will lead to a systematic approach to resilience enhancements for large urban built infrastructures.

Public website

www.ELASTIC.eu

Project partners

1. TNO (NL)
2. Fraunhofer Ernst Mach Institute (Ge)
3. Schüßler Plan (Ge)
4. Siemens AG (Ge)
5. Arcadis (NL)
6. Incode (Sp)
7. NXNW (Fr)
8. Uniresearch BV (NL)
9. JA Architects (NL)

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