



**H.F.R.I.**  
Hellenic Foundation for  
Research & Innovation

**Description of the funded research project**  
**2nd Call for H.F.R.I. Research Projects**  
**to Support Post-Doctoral Researchers**

**Title of the research project:** Advanced Information Modelling for Safer Structures



**Principal Investigator:** Chara Mitropoulou

**Reader-friendly title:** IMSAFER

**Scientific Area:** Engineering Sciences & Technology

**Institution and Country:** NTUA, Greece

**Host Institution:** NTUA

**Collaborating Institution(s):** Ministry of Shipping and Island Policy - Directorate of Port & Building Infrastructure, European Council of Civil Engineers, OASP.

**Project webpage:** <http://imsafer.ntua.gr/>



**Budget:** 197,000 Euros

**Duration:** 3 Years

## Research Project Synopsis

The main objectives for the project is the development of innovative software components for building and infrastructure design, assessment and management against MMH. These components will collaborate with each other under a Building Information Modelling (BIM)-based computing protocol and will be integrated to an existing structural analysis and design software. IMSAFER software aims to unite different aspects of the built environment under a common platform. Multi-disciplinary BIM of structural, mechanical, electrical and plumbing (SMEP) systems is the first component that can provide a unified platform for assessing manmade hazards and guide the design process. In order to maximize the impact of countermeasures that will be implemented in the design stage or later during operation, functional and architectural aspects should be taken into account. The second component will assist in performing quick manmade hazard risk assessment in critical infrastructures and urban soft targets by coupling state of the art computational models for blast/impact/fire simulation, existing regulation standards for human life protection and functional characteristic of the built environment at hand.

## Project originality

The innovative character of the project is first evidenced by the limited number of publications on the proposed topics. Moreover, the absence -or severe limitations- of commercial software, used by engineers, to perform assessment studies in terms of performance against MMH, based also on a BIM framework, consists a complementary argument for the pioneering character of the project. IMSAFER project aims at proposing a radically different approach, where components related to the structural integrity under extreme loading events, progressive collapse assessment, smart buildings' fire-safety and modelling human behavior in stressful situations will be integrated under the umbrella of BIM technology. Thus, the proposed research and innovation project is multidisciplinary by nature.

## Expected results & Research Project Impact

Chances for terrorism attacks by incoming extremist are increasing in the present years. The majority of the existing building structures in the EU continent (federal buildings, social buildings, etc.) are not built to withstand MMH. PI strongly believes that critical infrastructures in cities across Europe should be upgraded towards resiliency and safety towards MMH while all designs for future structures must follow such design criteria. By developing IMSAFER, a software aiming at increasing the safety of existing buildings and the design of new ones will be made available for exploitation and use by governmental services, research institutes, civil engineering firms, etc. Safety level of infrastructures in cities worldwide will increase with the use of a tool like IMSAFER.

## The importance of this funding

The new knowledge concerning the building and infrastructure design, assessment and management against MMH under a Building Information Modelling (BIM)-based computing protocol is expected to help PI to diversify her current profile allowing her to further enhance her career as civil engineer within the construction industry sector and research. The project will enable her to improve her inter-disciplinary communication skills providing her also the opportunity to adopt additional skills by collaborating with a range of researchers with different backgrounds and expertise. In addition, she will be required to (i) manage, coordinate and cooperate with a number of researchers, (ii) to supervise of the day to day development of the project and (iii) make decisions concerning its progress. This will allow her to gain experience in managing research projects with specific and well-defined goals, resources and timescales.



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