

Fusing Digital Information towards Vulnerability Assessment and Rectification in Buildings for Supporting First Responders in Emergencies

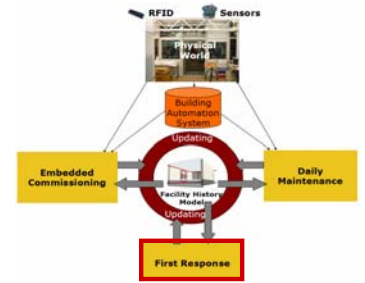
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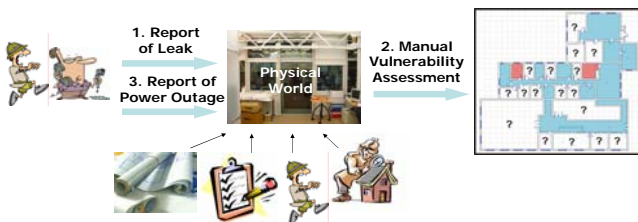


Main Research Objective

To support the decision making process of first responders in building emergencies, by providing a new framework for first responders, based on digital information. The envisioned approach is based on building information models (BIM) augmented with information needed by first responders in building emergencies. This integrated source of information will save first responders time in accessing information as well as in vulnerability assessment, which currently is done manually (e.g. vulnerability search and identification of rectification opportunities).

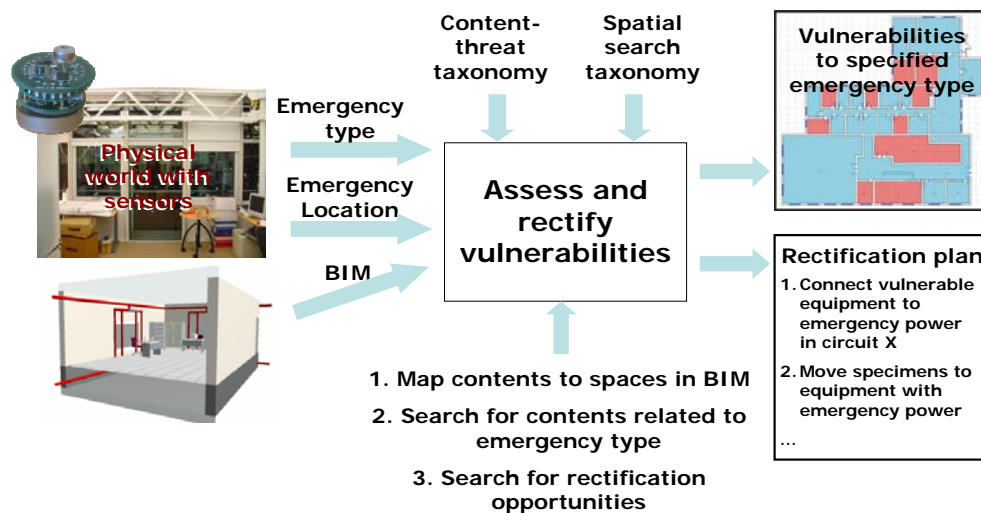


Limitations of Current Approach



- Three case studies showed that this manual approach is cumbersome, time-consuming and not thorough. Initial response efforts in the case studies took, respectively, 6, 8 and 4 hours.
- Information is spread out in different sources, resulting in time spent gathering needed information
- Actors manually assessed vulnerabilities in building. This process is currently error prone and cumbersome
- Actors did not have access to formalized information to identify rectification opportunities during the incidents

Envisioned Approach



Objectives

- Enable actors to build content-threat relationships for an organization
- Manage contents in a building information model based on building codes
- Enable actors to search for vulnerabilities and rectification opportunities in the model, based on different spatial search types

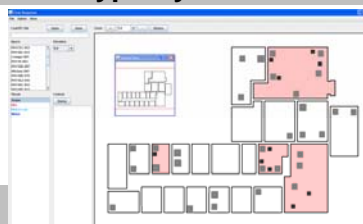
Publications to date

LEITE, F.; AKINCI, B.; AKIN, O.; GARRETT, J. (2008) "Supporting the Decision-making Process of First Responders in Building Emergencies: the Need for a Vulnerability Representation". In: Proceedings of the 15th Annual European Group Intelligent Computing in Engineering Conference (EG-ICE). Plymouth, UK: University of Plymouth.

Main functions of SIEM:

- Mapping categories of contents to categories of threats,
- Managing building content,
- Searching for vulnerabilities and
- Searching for rectification opportunities.

Prototype System GUI:



Contributions

- A semi-automated approach to support the decision making process of first responders in building emergencies, by enabling actors to augment the building information models with contents and threats, based on a content-threat ontology the International Building Code.
- Development of a content-threat ontology and corresponding reasoning mechanisms.
- Generating views of based on vulnerabilities and spatial search types.