

## Benefits to urban planning - briefly:

- Greater awareness of security and safety issues
- More consistent approach to consider security and safety
- More transparency to the decision process
- Improved policy decisions and accountability
- More robust and resilient urban areas, less prone to and affected by terrorist attacks, general crime and social instability.
- Improved quality of life in urban areas.



## Partners:

- Fraunhofer Institute for High-Speed Dynamics, Ernst-Mach-Institut, EMI (Germany)
- Crabbe Consulting Ltd (United Kingdom)
- Province of Bologna (Italy)
- West Yorkshire Police Authority (United Kingdom)
- Schübler-Plan Ingenieurgesellschaft mbH (Germany)
- DISSING+WEITLING architecture (Denmark)
- Netherlands Organization for Applied Scientific Research, TNO (Netherlands)
- Future Analytics Consulting (Ireland)
- Sigmund Freud Private University Vienna, CEUSS Center for European Security Studies (Austria)
- Decisio BV (Netherlands)
- Thales Communications & Security SA (France)
- London Borough of Southwark (United Kingdom)

## CONTACT

Prof. Dr.-Ing. Werner Riedel  
Fraunhofer Institute for High-Speed Dynamics,  
Erns-Mach-Institut, EMI  
Tel: +49 7628 9050 692  
werner.riedel@emi.fraunhofer.de

Stephen Crabbe  
Crabbe Consulting Ltd  
Tel: +49 361 644 8842  
stephen.crabbe@crabbe-consulting.com



[www.vitruv-project.eu/index.html](http://www.vitruv-project.eu/index.html)



# VITRUV

Vulnerability Identification Tools for Resilience  
Enhancements of Urban Environments



## Citizens' urban security: a complex and increasing challenge:

Citizen urban security and safety is of paramount importance and a growing concern. Half of the world's population already live in urban centres and this figure is projected to rise to two thirds by 2050. Safer cities are better cities with increased life quality. Urban planning needs the tools to incorporate systematic, comprehensive, transparent and proactive approaches to identify actual or potential vulnerable areas and to increase urban resilience for threats such as terrorism, general crime and social instability. The tools are needed for both existing areas and those to be planned in the future.

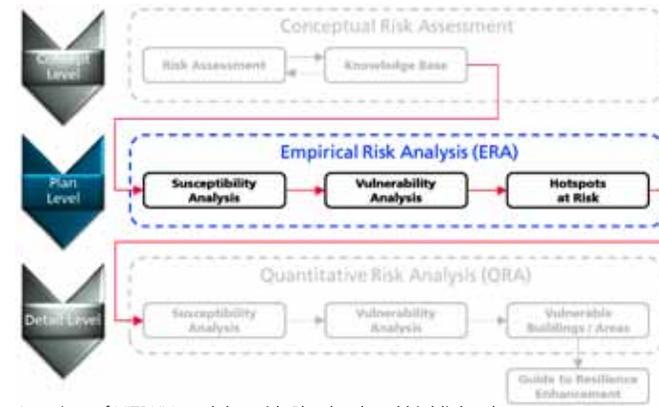
## Europe unites to develop tools for urban planners:

The Fraunhofer Ernst-Mach-Institute (EMI) is leading the development of an innovative system for increased integration of security considerations within urban planning: VITRUV - Vulnerability Identification Tools for Resilience Enhancements of Urban Environments. The project started in 2011 and is co-funded by the EU under the Seventh Framework Programme. EMI has teamed-up with eleven urban planning, security and technology specialists from across Europe, including relevant potential end users such as the London Borough of Southwark, the Province of Bologna and the West Yorkshire Police Authority.

The EU backed project is creating intuitive internet compatible tools for use by urban planners and their advisers in their assessment of urban projects' concepts, detailed plans and finally detailed designs. The aim is to assess urban security vulnerabilities and to consider risk mitigation strategies, including resilience enhancements, during the complete urban planning process for urban areas. Citizens' perceptions of security are an important element of the assessment.

In analysing urban areas at the conceptual level a broad approach will be followed to identify urban security risks generally but also comprehensively. Security related issues will be placed in relationship with the other aspects within urban planners' decision spaces, such as economic, ethical, social, safety and mobility dimensions. Following the identification of risks, mitigation strategies will be presented, including for example which tools, methods or best practices to consider introducing before a further conceptual assessment or during the development of plans and in the detailed design stages.

At the plan and detail level specific algorithms will be applied to identify specific urban security vulnerabilities and to consider specific mitigation options, focussed on at least threats from the use of explosives or biological and chemical agents.



Overview of VITRUV modules with Plan level tool highlighted.

## How VITRUV will work:

### Concept level tool:

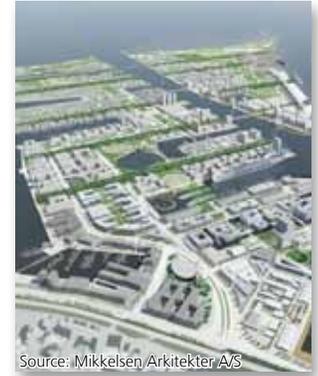
- **Risk-assessment:** allowing urban planners to make a quick assessment of the security issues most relevant to a project
- **Knowledge base:** showing the relevance of these issues and placing them in the context of the urban planners' mental world
- **Recommendations:** for further analysis of specific risks.

### Plan level tool:

- **Susceptibility analysis:** infrastructure and areas that have a higher probability of an event occurring based on the knowledge of previous terrorist attacks in the world are identified considering a specific threat e.g. a car bomb attack
- **Vulnerability Analysis:** based on the results of the susceptibility analysis, consequences that could be observed in the past following such an event are assessed
- **Hotspots-at-Risk Identification:** combining the result of the empirical susceptibility and vulnerability analysis hotspots at risk, dependent on different criteria e.g. rebuilding costs or traffic line interruption, can be determined.

### Detail level tool:

- **Susceptibility Analysis:** takes into account properties such as the inaccessibility of streets with specific vehicles that prevent specific events at specific locations and therefore limit the number of scenarios
- **Vulnerability Analysis:** based on the results of the susceptibility analysis, a hazard and damage analysis is performed to quantify potential damage to buildings and humans at specific locations and disruption to traffic. In this step various terrorist actions will be considered such as different types of bomb attacks and/or chemical and biological agent propagation



- **Identification of Vulnerable Areas/ Buildings:** the multiple analysis of potential events in different areas will facilitate planners in identifying the most vulnerable areas
- **Guide to Resilience Enhancement:** a list of resilience enhancement methods is offered to replace or enhance specific infrastructure components. A recalculation of the multiple threats can be performed to "benchmark" the impact of specific security measures.

