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SYNER-G consortium

14 participants from 11 countries

- GRE
- AUS
- FRA
- BEL
- NOR
- ITA
- TUR
- GER
- UK
- USA
- JAP

Duration: 36 + 5 months

AUTH
VCE
BRGM
JRC
NGI
UPAV
UROMA

METU
AMRA
KIT
UPAT
WILLIS
UILLINOIS
UKOBE
SYNER-G concept and goals

- Hazard Event
- Physical Damage
- Assessment of Impact
- Social and Economic Consequences

Systemic Vulnerability

- Critical Facilities
- Transportation Systems
- Utility and Infrastructure Systems

Social and Economic Vulnerability

- Short Term
  - Housing: Emergency Shelter, Temporary Housing
  - Economic Loss: Direct Damage, Price Increases, Business Interruption, Supply Disruption
- Long Term
  - Housing: Relocation, Displacement
  - Economic Loss: Fiscal Impacts, Business Failure, Job Loss, Reconstruction
  - Health: Psychological Distress, Chronic Injury
  - Social Disruption: Family Stress, Neighborhood Disruption

Assessment of Impact

- Physical Damage
- Social and Economic Consequences

- Building Stock
- Transportation Systems
- Utility and Infrastructure Systems
Main Achievements

• Review of the available know-how on the subject

• Taxonomy/Typology for all components and systems

• Fragility functions and methods to assess the physical and societal-economic vulnerability for all elements of risk, considering European distinctive features

• Development of an interactive tool to store, visualize and manage large number of fragility functions sets

• Seismic hazard and seismic scenarios at system level

• Development of a methodology and tool to generate spatially correlated and cross-correlated fields for ground motion intensity measures
Main Achievements

• Development of a comprehensive methodology to assess vulnerability and estimate the performance at system level considering intra-dependencies between components and interdependencies between systems

• Development of software and tools for systemic vulnerability risk and loss assessment

• Validation of the effectiveness of the methodology and tools through specific case studies at different scales (Italy, Greece, Austria)

• Reference reports and other dissemination schemes at European and International level
Future needs and developments

- Treatment of aleatory and epistemic uncertainties:
  - seismic hazard, including spatial variability of ground motion
  - risk and loss models (including monetary issues)
  - fragility curves
  - performance indicators

- Extend taxonomy-typology to cover all possible elements at risk, aggregates and systems

- Extend fragility toolbox for all components
Future needs and developments

- Improve the IT/software part:
  - Computing performance (now it is practically impossible to run the whole city with all lifelines)
  - Improve pre and post processing
  - Make the software really a robust and users’ friendly open source tool with multiple facilities and interfaces (not a simple black box)
  - Various modules extensions (i.e. flow analysis for complex networks …)
Future needs and developments

- New techniques to collect and archive data (satellite imaging etc)
- Complex industrial facilities/ networks
- Validation exercises through several applications in Europe and worldwide with more active participation of stakeholders and end-users (civil protection authorities etc)
- Link with worldwide initiatives (i.e. GEM), ongoing EU research projects (SHARE, REAKT, MATRIX....), the insurance industry etc.