

RoMA: Resilience enhancement Of a Metropolitan Area

Alberto Tofani- ENEA

CRITIS 2017 – Project Dissemination Lucca, 10/10/2017



RoMA Project









- Reply



RESILIENCE ENHANCEMENT OF A METROPOLITAN AREA

- RoMA is an Italian project
 - Funded by MIUR (Ministry of Education, Universities and Research)
 - Call "Smart Cities and Communities and Social Innovation"
- Start date: November 2013
- Duration: 36 months
- Partners:11

RoMA Project





Data Ontology and Structure





The Metropolitan Area Security Centre (CSAM)



- CAT (Mobility Analysis Centre): analysis and security of transportation and public mobility
 - new tools for urban traffic analysis and forecast, for its management in critical situations (congestions due to incidents or complex meteorological conditions)
- CAPT (Territorial Protection and Analysis Centre): territorial/ environmental analysis and control, for a better protection of its integrity and of the contained assets
 - new methods and technological tools to analyse and control the territory, the cities and the Culture Heritage. The Project provided new analysis and monitoring systems to control: i) natural and semi-natural areas; ii) structural stability of relevant monuments; iii) strategic Critical Infrastructures (CI), whose disruption would produce large environmental damages.
- CSC (Centre for Citizens Safety): citizens safety and security for promoting a more efficient interaction with the Public Administration
- I-EISAC (European Infrastructure Simulation and Analysis Centre) : risk Analysis for Critical Infrastructures Protection against natural threats

The Metropolitan Area Security Centre (CSAM) -> I-EISAC



 Objective: to develop a Decision Support System for the analysis and the risk forecast of Critical Infrastructures, enabling to increase the <u>preparedness</u> and the <u>resilience</u> of the large technological systems which transport and distribute primary services to citizens. This tools, created in collaboration with a large EU project (CIPRNet) will improve capabilities of Public Administration and Infrastructures owners for emergency management, particularly by enhancing events prediction





I-EISAC: The CIPCast DSS





I-EISAC: CIPCast service example (1)



Implementation of the CIPCast prototype in use by Areti S.p.a (EDN utility) in Rome



I-EISAC: CIPCast service example (2)



Implementation of the CIPCast-ES (Earthquake Simulator)

Earthquake event: shake map





To evaluate the seismic vulnerability of structures, a detailed inventory of buildings (source: ISTAT Census dataset) and CI elements (source: CI operators) has been exploited. Vulnerability index (Iv) has been calculated by using the Lagomarsino and Giovinazzi (2006) approach[5].

Basic information available immediately after an earthquake: magnitude and epicentre.

Through geo-processing and visualization tools, shaking maps are overlaid with inventories of buildings and CI (e.g., power/telco network, gas pipelines, transportation, etc.) and vulnerable structures.

Considering the seismic characteristics and the vulnerability of an area, it is possible to simulate seismic scenarios (expected damages) in that area.





CAPT - Territorial Protection and Analysis Centre

- Activities
 - Environmental analysis
 - Environmental monitoring & planning
 - Urban transformation dynamics
 - Biodiversity risk assessment
 - Water resources management
 - Natural resources and agricultural production analysis (Management, Risk Assessment, etc.)
 - CI and Cultural heritage protection
 - Characterization and monitoring
 - Seismic Sensor networks (deployment, data mining, etc.)
 - GIS-based Decision Support System (DSS)
 - GIS & Remote Sensing
 - Risk analysis and mapping
 - Earth Observation techniques
 - Scenario analysis



PER LE NUOVE TECNOLOGIE, L'ENERGI E LO SVILUPPO ECONOMICO SOSTENIBILI

CAPT activities





CAT – Mobility Analysis Centre



- Sensors data integration for traffic analysis. Integration of mobile phone data to study traffic flows
- Modeling and analysis of traffic congestions and impact assessment



CSC- Centre for Citizens Safety

•



- Implementation of collaborative systems citizens-PA
 - MudAngel project: to improve the efficiency of the emergency deriving from major disasters trough the use of novel communication and coordination models for Community Response Grids management



Conclusion(1)

- AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE
- Data & functionalities of the CI Risk Assessment Workflow for Rome (running on an ENEA server)
- Upon completion the system will allow
 - 24/7 RA for all CI considering interdependencies phenomena
 - Synthetic natural events simulator (Earthquake, Heavy Rainfall)
 - Synthetic damage simulator
- Current implementation
 - 24/7 RA for the Rome electrical distribution grid (Areti network)
 - Heavy rainfall & Earthquake data flow
 - Electrical grid-SCADA dependencies module
 - We start the design of the interface between the CI Risk Assessment Module and the Areti information systems
- The module will be continuously updated as more CI operators (e.g. ACEA ATO2 S.p.a for the water domain) will be involved
- The module will be continuously updated as more external data will be available (e.g. Lightning data)

Conclusion



- Different services already implemented and operative
- A number of municipalities showed interest in the platform
- The services will be migrated on 24/7 operation center facility
- The RoMA project will continue the institutional design of I-EISAC by enhancing collaborations and commitment
- EISAC.IT will be the Italian node of the EU-wide Agency EISAC which will group all national EISAC.XX centers
- EISAC.IT will have a form of a Public Consortium equally shared by ENEA and INGV (Italian National Institute for Geophysics and Volcanology)
- Head-office in Roma, with a 24/7 operation center facility, connected with the National Earthquake Centre
- It will be established on 1Q2018 and will offer specific services to CI Operators and Public Administration

Thanks for the attention



- The ENEA Team
 - I-EISAC: Emanuela Caiaffa, Gregorio D'Agostino, Antonio Di Pietro, Luisa Lavalle, Luigi La Porta, Maurizio Pollino, Vittorio Rosato (Project Manager), Alberto Tofani
 - CAPT: Paola Carrabba, Gerardo De Canio, Laura Padovani, Maurizio Pollino
 - CSC: Carlo Liberto, Gabriella Messina, Gaetano valenti

