SeIsmic monitoring and vulneraBilitY framework for civiL protection

An overview of the SIBYL project

Prof. Dr. Stefano Parolai
Project coordinator

Why the SIBYL project?

Earthquakes often have the potential to cause serious damage to the build environment.

While they cannot be averted or predicted, their impact on societies be minimized by:

- Assessing the exposure and vulnerability of the built environment both before and following an event;
- This requires a cost-effective framework to allow appropriate activities to be undertaken.
- The resulting information would be very useful to ensure the most efficient actions by Civil Protection (CP) authorities.

The fundamental problem!

Seismic swarms and foreshocks require CP authorities to rapidly assess the vulnerability of an area's structures.

- Especially important for areas with little or no data about the vulnerability, seismic hazard, etc..

  (The case even for the most developed countries).

- Need for real-time information as the crises unfolds.
- Required for dynamic tagging of possibly unsafe structures.
- Such information will advise populations if they can return home, while helping plan emergency accommodation.

However, state-of-the-art data acquisition methods generally are costly and expertise intensive.

Aims of the SIBYL project

SIBYL is setting out to develop an operational framework for Civil Protection (CP) authorities to rapidly and cost-effectively assess the seismic vulnerability of the built environment.

This framework will advise CP authorities as to the most appropriate preventative actions for cases where:

- There is a need for short-notice vulnerability assessment in a pre-event situation.
- For the monitoring of the build environment's dynamic vulnerability during a seismic sequence.

The SIBYL Consortium

German Research Centre for Geosciences, Potsdam, Germany (coordinator)

AMRA S.c.a.r.l., Naples, Italy

Aristotle University of Thessaloniki, Thessaloniki, Greece

Technical University of Berlin, Berlin, Germany

Total budget: 637,848 EUR

EU requested contribution: 478,386 EUR (75%)

Civil Protection Authorities SIBYL has endeavored to interact with

Federal Agency for Technical Relief (Germany)

Federal Agency for Civil Protection and Disaster Assistance (Germany)

Bundesamt für Bevölkerungsschutz und Katastrophenhilfe

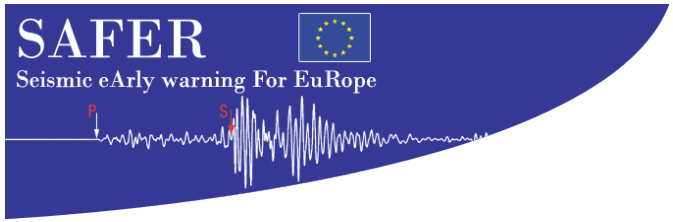
National Service of Civil Protection (Italy)

PROTEZIONE CIVILE
Presidenza del Consiglio dei Ministri
Dipartimento della Protezione Civile

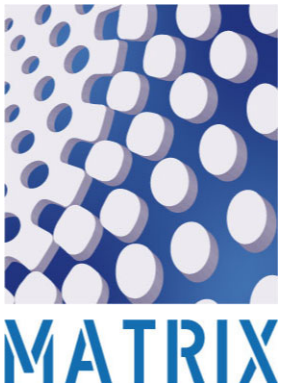
General Secretariat for Civil Protection (Greece)

Heritage of SIBYL

The many and varied aspects of SIBYL call upon the experience gained from a number of previous projects.



Earthquake early warning system development.



Temporal changes in vulnerability

Applying remote sensing and in situ imaging.

Structural vulnerability.

The SIBYL work flow and tasks

TASK A: Task management and reporting to the commission.

TASK B: Rapid data collection and integration

TASK C: Rapid and low cost in-situ building vulnerability assessment.

TASK D: Real-time monitoring during a seismic sequence.

TASK E: Training and capacity building

TASK F: Task publicity.

Project activities so far

- EC ECHO Kick-off-meeting (Brussels, Belgium, 20.01.2015).
- Preliminary planning and technical meeting (Potsdam, Germany, 28.01.2015).
- Website established.

  www.sibyl-project.eu

- First period report (Sep. 2015).

  Second period report in progress.
- Mid-term project meeting (Thessaloniki, Greece).
- Field work undertaken in Thessaloniki (Greece) and Cologne (Germany).

Field activities

- Field work in Thessaloniki, Greece (Sep./Oct. 2015).
  Inspection and monitoring of the administration and Faculty of Philosophy buildings of AUTH, 2D array measurements and maintenance of the network in the AHEPA hospital.

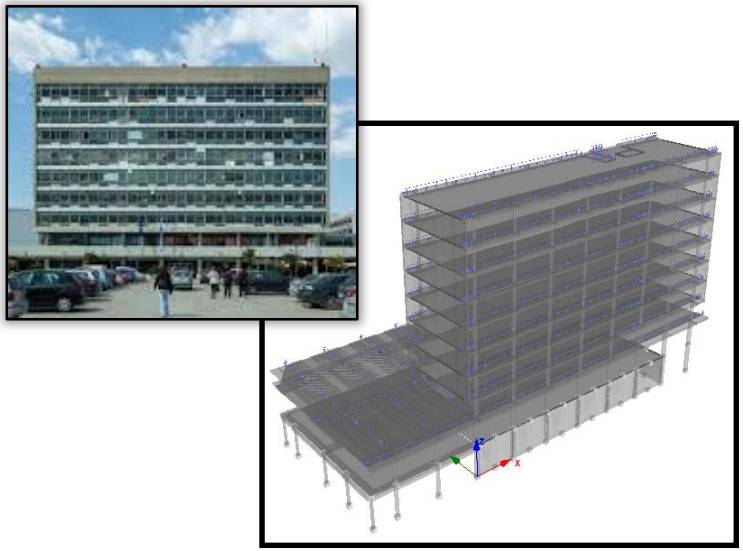
- Field work in Cologne, Germany (Dec. 2015).
  Inspection and monitoring of selected school buildings in the area, and undertaking 2D array measurements in the vicinity.

Some detailed activities

- Development of an interface between the SISM (simplified integral structural model) and conventional vulnerability models.
- Structural model validation and verification by the use of operational modal analysis e.g., the instrumented AUTH buildings (Administration, Faculty of Philosophy building) using ambient noise measurements.
- Numerical modeling of the buildings based on available documentation plans and in-situ measurements.
- Finite element model updating to match the numerical with the experimental results through sensitivity modal analysis.
- Site characterization of the foundation soil.
- Installation and data dissemination of the SOSEWIN stations in the hospital in Thessaloniki
- Platform for real-time in situ analysis of data

Methodology and tool development (1)

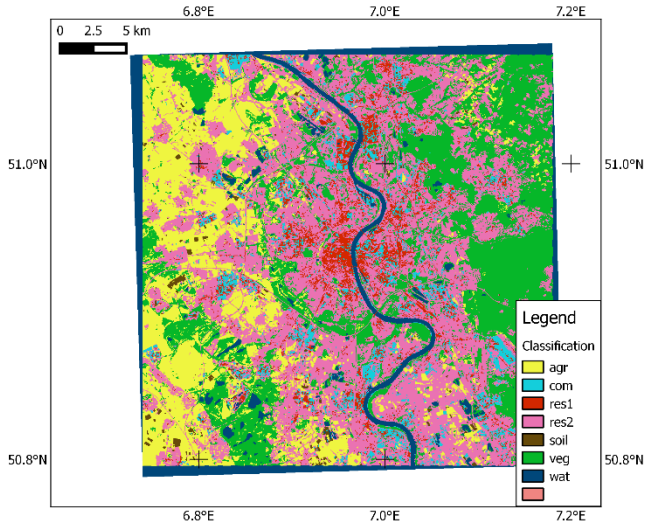
- Numerical analysis tools exploiting finite element modelling and operational modal analysis (i.e., the use of ambient noise).



- SIBYL Toolbox for real-time ESAC array processing and building monitoring. Makes us for the MP-Wise and allows analysis in real time.

Methodology and tool development (2)

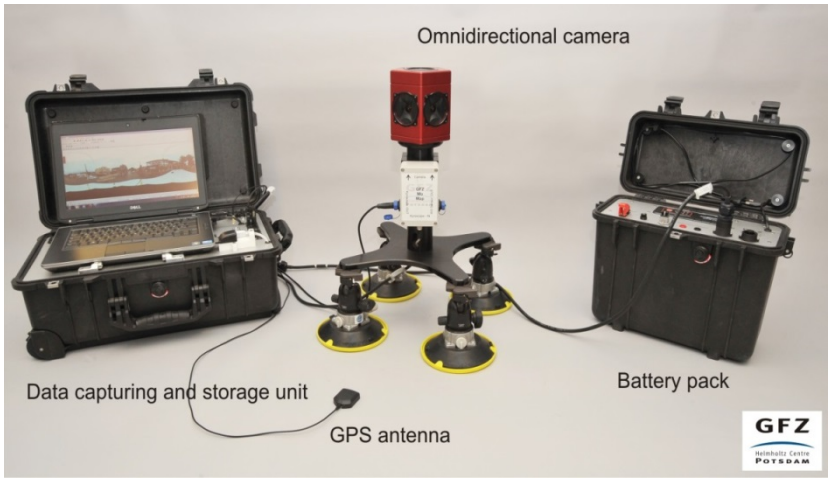
- A plugin for QGIS, SATEX, has been developed for processing Landsat and land use characterization.
- Routing tools for the planning of optimal in-situ omni-directional camera surveys.



- MP-Wise (Multi-Parameter – wireless sensing system) which will have multiple uses in natural hazard risk mitigation, including in-situ array measurements and building monitoring.

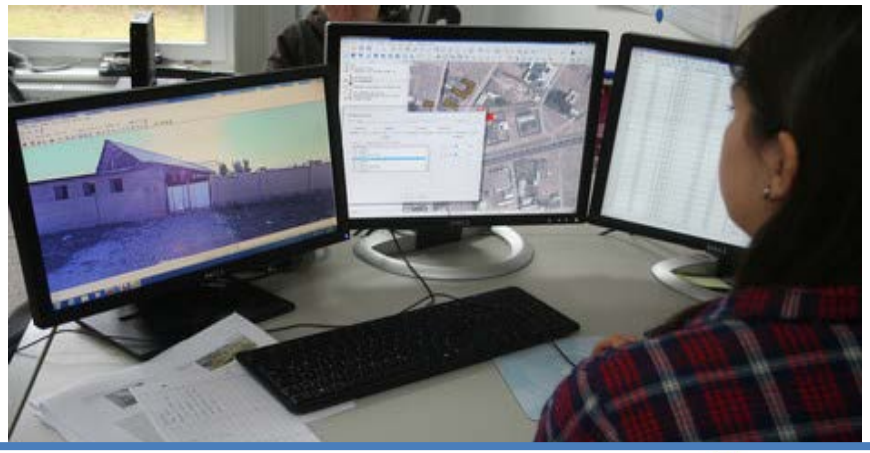
Methodology and tool development (3)

The R.E.M. (rapid environmental mapping) system, made up of two parts:



GFZ-MOMA – MObile MApping system - vehicle-mounted omni-directional camera.

RRVS – Remote Rapid Visual Scanning – takes the images acquired by the GFZ-MOMA and allows a practicioner to classify a structure and assess damage.



Aims of this workshop

- The presentation of the project's aims, current status, and tools so far developed to potential end-users.
- Discussion about the developed framework and analysis methodologies.
- Demonstration of the tools and training of CP personal.
- Listening to the response of attending CP representatives.

THIS IS CRITICIAL TO ENSURE THE RELEVANCE AND LEGACY OF THE SUBYL PROJECT.

Thank you for attending this workshop and we look forward to your input.

Further information may be found from:

Prof. Dr. Stefano Parolai (Centre head)
parolai@gfz-potsdam.de

Dr. Kevin Fleming (Project manager/senior researcher)
kevin@gfz-potsdam.de