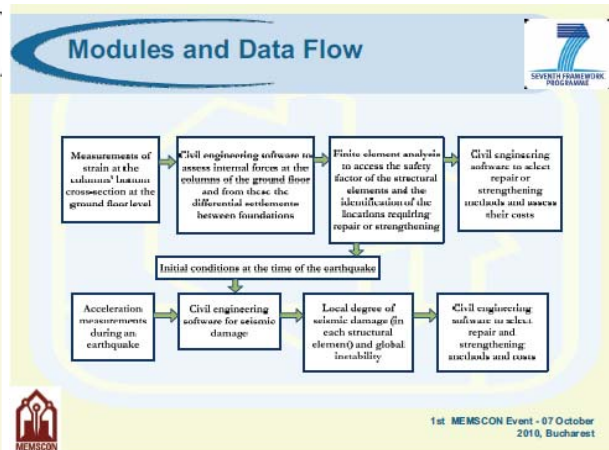


Decision-Support-System for the Rehabilitation of Buildings: The MEMSCON Project

RISA Sicherheitsanalysen GmbH
Berlin

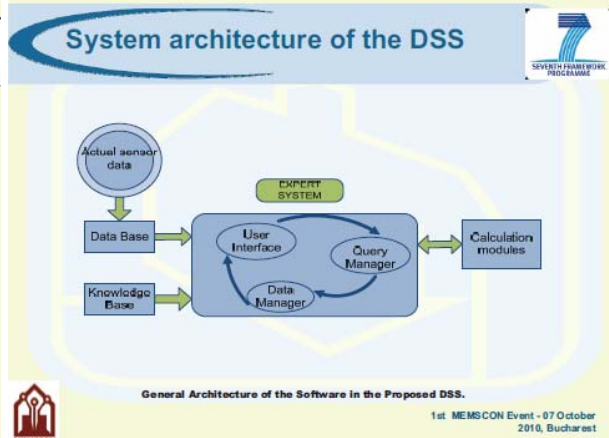
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Objectives

- To assess structural damage in a monitored reinforced concrete building after an earthquake and to select the best repair method and determine its cost.
- To assess structural deterioration in a monitored reinforced concrete building because of differential settlement between foundations and to select the best repair or strengthening method and determine its cost.

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DSS

- Definition of DSS**
An integrated software package to support decision makers (managers) by providing accurate and fast information as a base for a decision.
 - Explains the solution and rationale
 - The assimilation and filtering of data
 - Assists with problem recognition
 - Assists with problem solving
 - Presents the results into a cohesive package

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Expert System

- The expert system acts and behaves like a human expert in the field of Structural Monitoring
- It acts as intelligent intermediary that handles the system resources in order to respond effectively to the user queries
- Ensures the successful integration and coordination of all individual modules.
- Self-contained black-box modules can be plugged in and out with minimal overall system modifications.

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Expert System

The expert system consists of a collection of integrated and related components, including

- User Interface:** provides visualization of the results calculated by other modules in a textual and graphical manner
- Query Manager:** schedules proper sub-query processing actions, interacts with the data manager, translates the user request to appropriate subroutine calls
- Data Manager:** provides suitable data to caller modules, according to the module's particular view

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Developed DSS 2/3

- ✓ Common interface with Sap2000 and ETABS.
- ✓ Establish a connection to the ETABS DB and create a robust data management application.
- ✓ Retrieve data concerning the structural elements (columns, beams) of any building in use.
- ✓ Update or add data to structure

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Knowledge base and Database

- The knowledge base assembles the knowledge of multiple human experts.

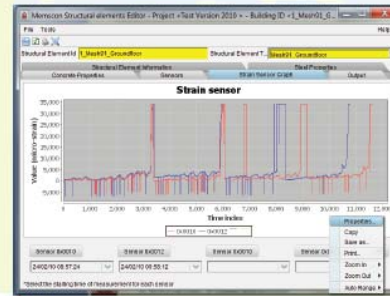


- The Database stores all relevant information, data (structural element information and sensor measurements), rules, cases, and relationships used by the expert system.



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Developed DSS 3/3



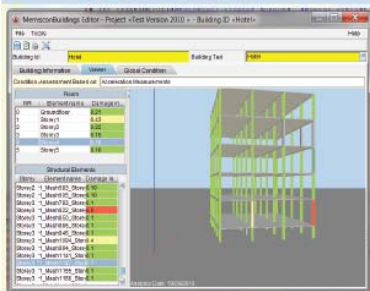
- ✓ Graphic representation of data retrieved from the Sensor DB is supported, according to the context in which they are requested
- ✓ Mechanism for simulation of earthquakes



Strain sensor measurements viewer

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Developed DSS 1/2



The Graphical User Interface:
 ✓ provides the graphical environment with which the end-user will retrieve current and historical data from the DB
 ✓ provides real-time alerts and warnings in case of abnormal situations
 ✓ allows the end-user to examine different scenarios for hypothetical situations



Building status Viewer

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Conclusions

- So far, the results show that DSS corresponds to engineers' needs
- The main advantage seems to be the integration of several expert opinions and cutting-edge methodologies
- The approach has potential applications to other engineering tasks (bridges)



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Thank you for your attention



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