



FP7 Coordination and Support Action to fund 50 technology transfer projects (TTP) in computing systems. This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement n° 609491.

An Innovative Diffused Monitoring of Moisture and Health in Building Structures

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TTP Problem

Presence of moisture in building structure



- Risks for hygiene and health
- Risks for the health of the structures

Problems

- Moisture becomes apparent when the damage is already in progress and the repair intervention may be too late.
- State-of-the-art moisture monitoring relies on point-sensors (hundreds are needed to obtain the moisture profile of the structure).

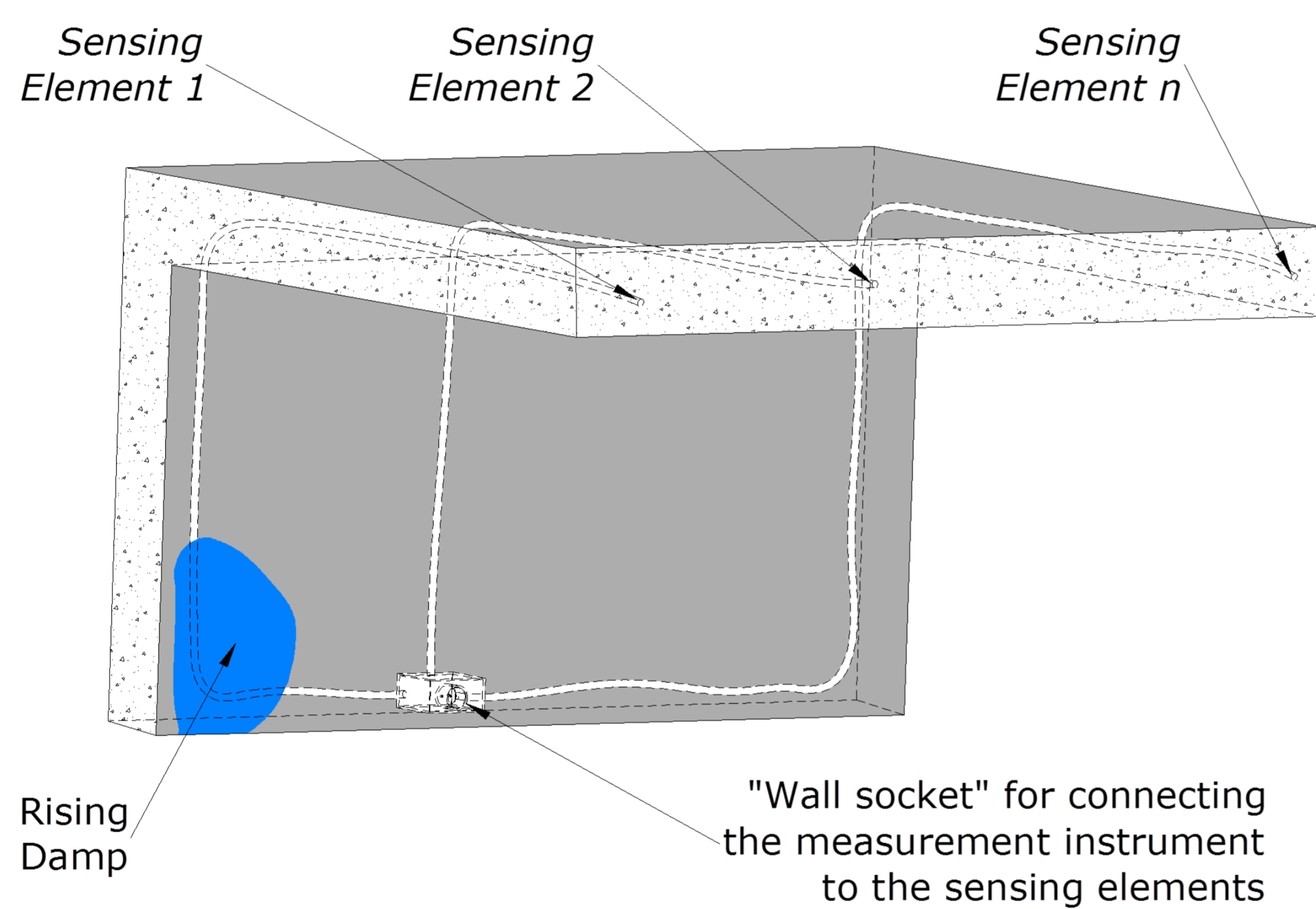
Requirements

System for a prompt and comprehensive diagnosis of the building structure



TTP Solution

Employment of diffused, wire-like, passive sensors embedded in the structure to be monitored



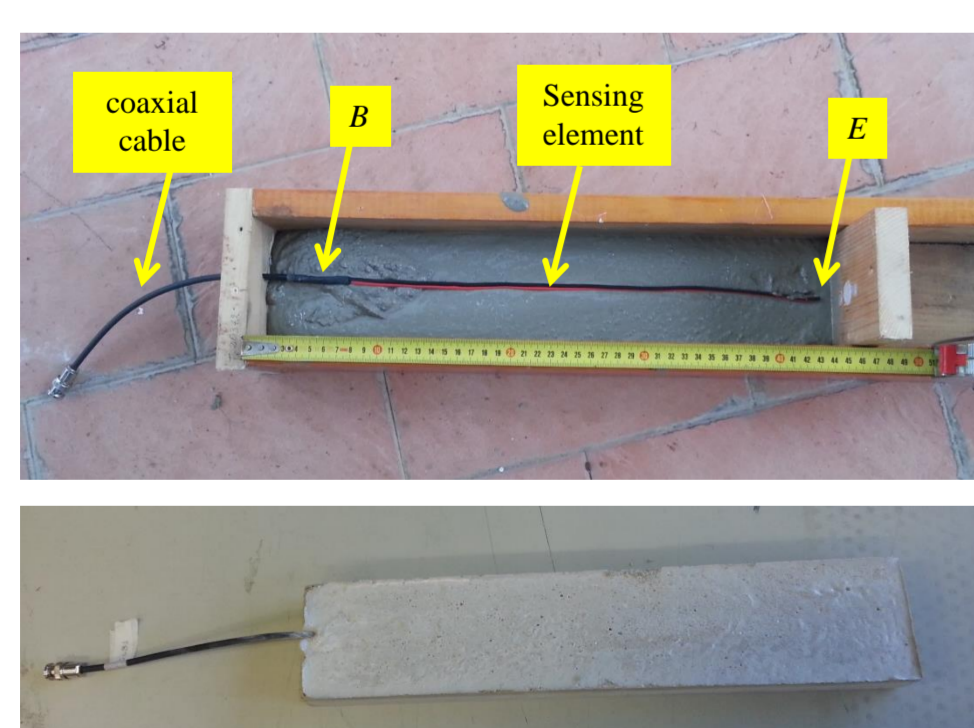
BRIEF DESCRIPTION OF THE "DIAGNOSIS" PROCEDURE

- A time domain reflectometer (equipped with the dedicated data-processing software) is connected to the sensing element.
- The connection to the embedded sensing element is obtained through a port, similarly to a traditional wall socket.
- The output is a "map" of the moisture condition of the structure all along the "path" of the sensing element.

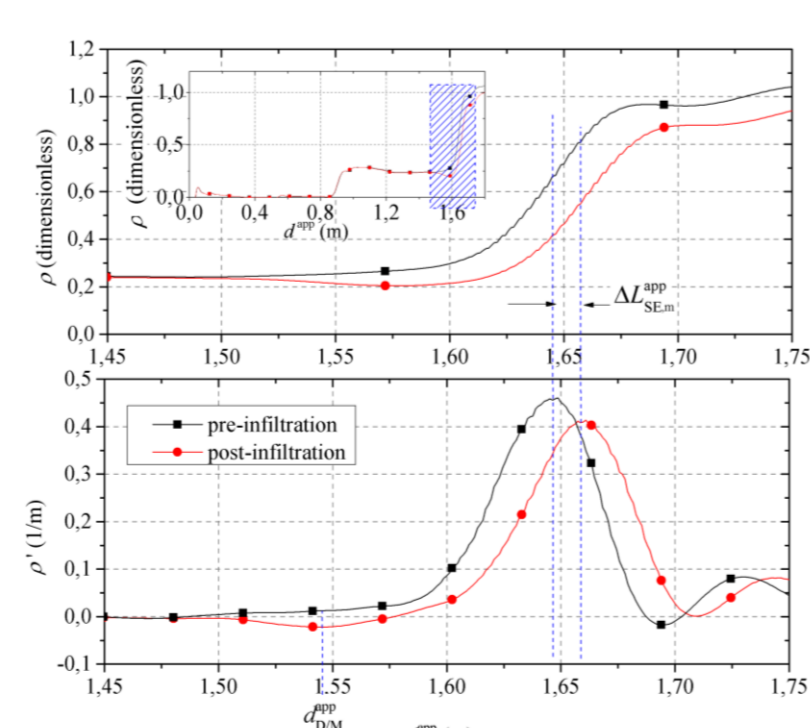
- Possibility of detecting incipient moisture ✓
- Real-time response of the measurement ✓
- Easiness to be installed ✓
- Maintenance free ✓
- Optimal spatial resolution ✓
- Possibility of detecting other defects (e.g. cracks) ✓

TTP Impact

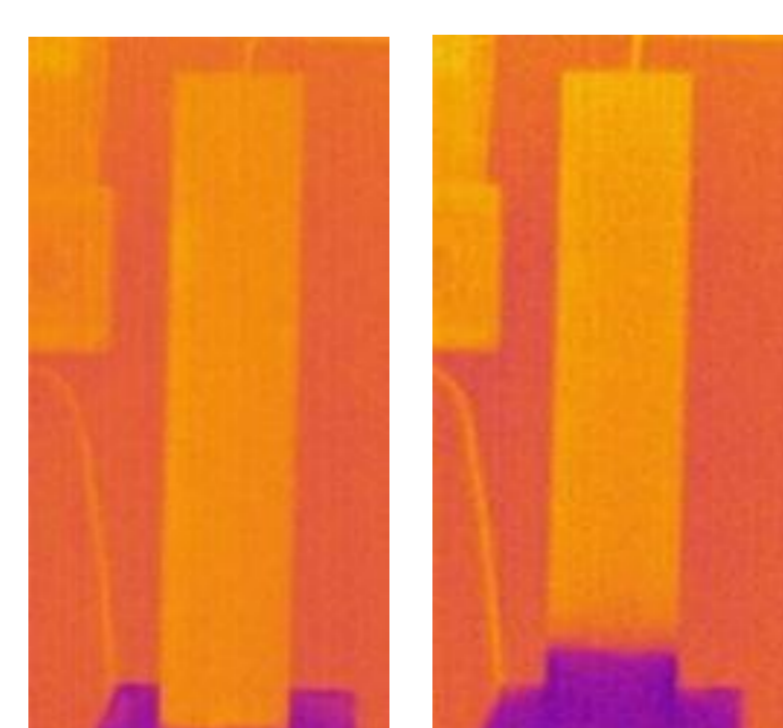
Laboratory-scale implementation



Embedding of the sensing element in a cement-based structure



Measurement output with and without the effect of the rising damp



For comparison only: Infrared camera images (before and after rising damp)

Operational implementation



Implementation of the monitoring system in realistic environment

Extension to historical buildings



Embedding of the sensing element during the restoration

TTP Facts

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TETRACOM contribution: 40,000 EUR
Duration: 01/09/2014-28/02/2015



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