

COST TU1402: Quantifying the Value of Structural Health Monitoring

SELECTION OF DURABILITY INDICATORS FOR THE MONITORING OF STRUCTURAL DETERIORATION

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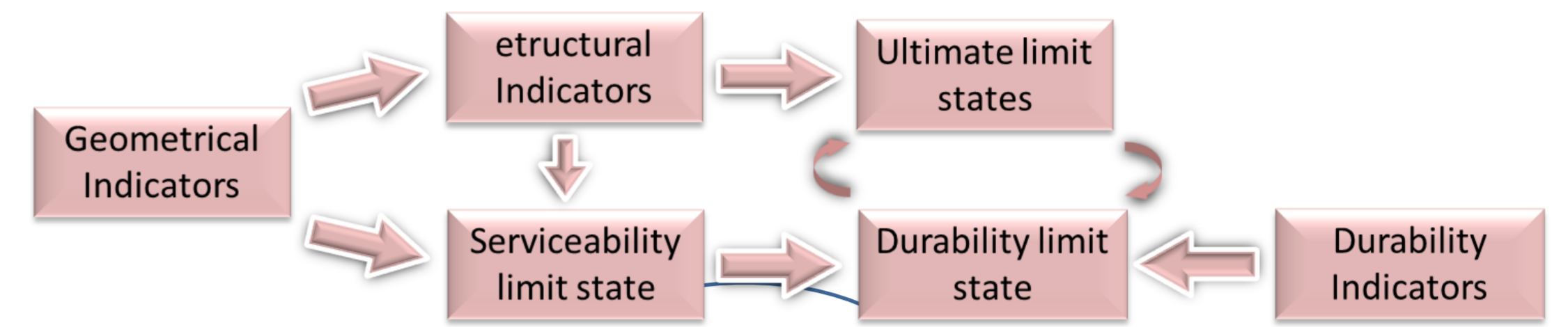


OBJETIVE

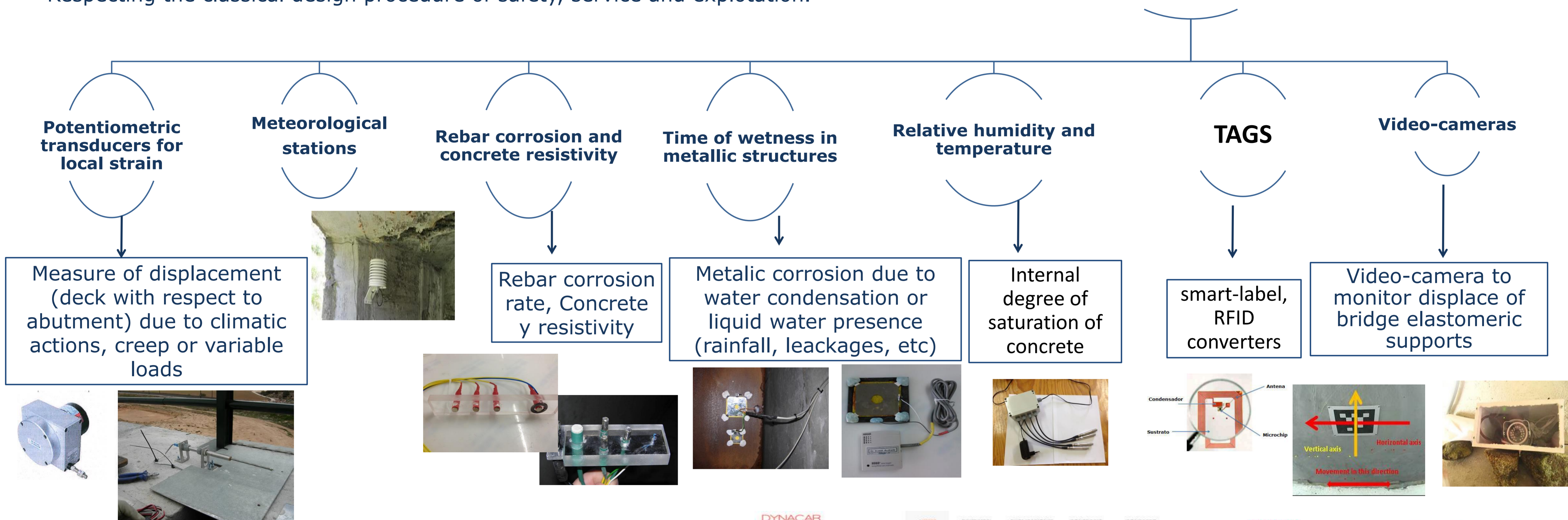
The concept of Performance Indicator has been used by the team in several national projects (DYNAPORT and DYNACAR) whose results are summarized in present work. The concept of performance Indicator is taken as the key properties which inform on the level of Safety or the degree of deterioration –durability- with the specific particularity that these properties should allow their monitoring by in-situ sensors. The results aimed into identifying that the Performance Indicators have to be selected in each structure in relation to their limit states and the functionality regarding the users. In present work some examples are presented applied to railway and road bridges.

IDENTIFICATION OF SAFETY AND DURABILITY INDICATORS

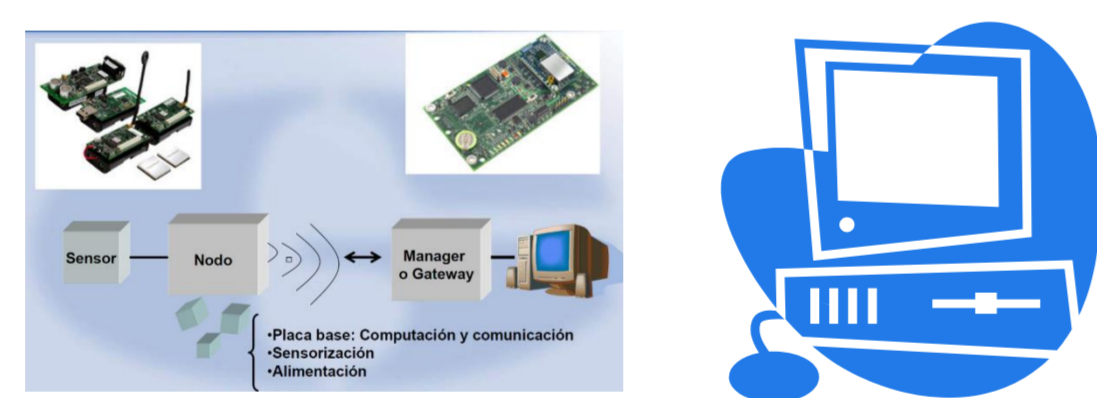
- Monitored through in-situ sensors
- Giving friendly-to-users information
- Informing on key properties related to fulfilling of structural requirements.
- Serving to check the complying of the material specifications
- With a reasonable range of sensitivity in the critical values
- Respecting the classical design procedure of safety, service and exploitation.



USED SENSORS



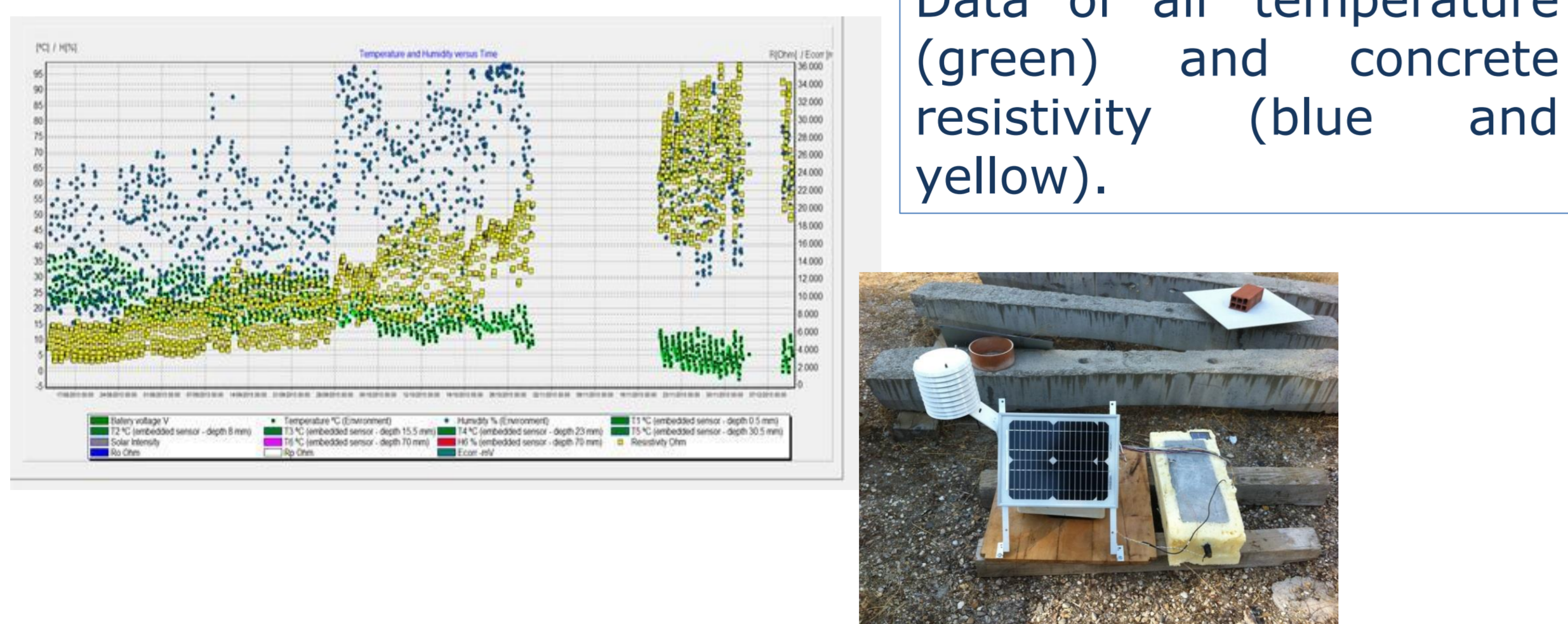
WIRELESS/ WIRE TRANSMISSION TO CENTRALIZED "COMPUTATIONAL PLATFORM"



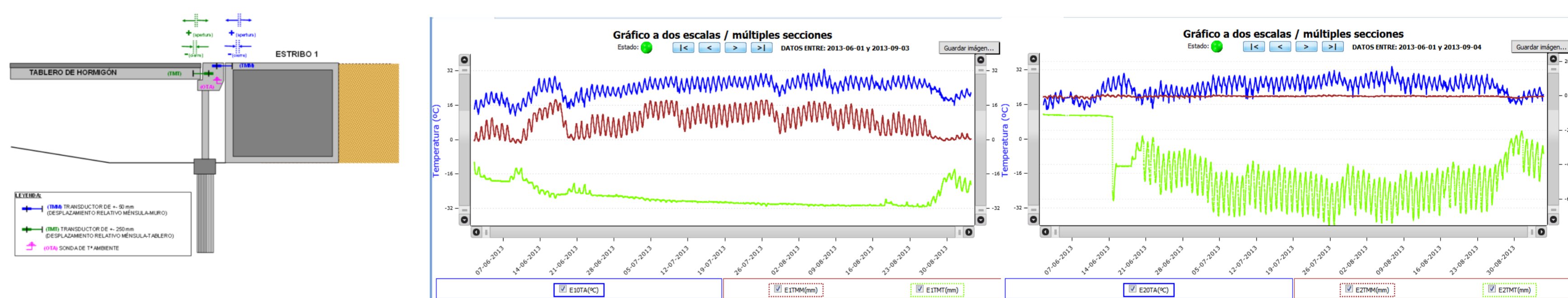
Graphic representation

RESULTS – SOME EXAMPLES OF MONITORED STRUCTURES

1) **Pilot demonstrator** placed at the garden of the IETcc in order to calibrate and verify the systems.

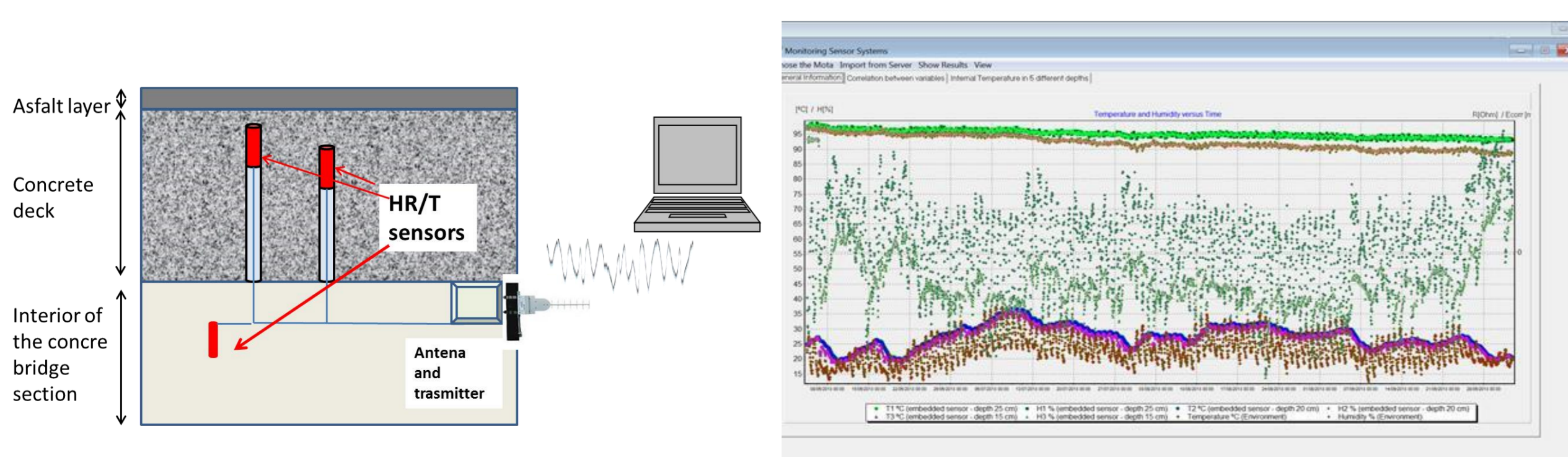


2) Displacements deck-abutment in **railway bridge**



Data of temperature (blue), displacement bracket-abutment (red) and bracket-deck (green).

3) Leakings monitoring in the deck of a **road viaduct**



Sensors of RH/T are placed in the interior of the concrete deck at different distances from the concrete-asphalt interface to detect through concrete saturation degree possible leaks from the upper part of the road

CONCLUSIONS

"Performance indicators" are defined those key parameters which can inform best on the degree of damage or anomalous behavior which can impact in the structural performance and safety. The Indicators have the property of being monitored through cheap and simple sensors placed on the structure in order that these measurements could replace the need of visual periodic inspections.

In the several case studies in railway and road bridges tested in DYNACAR project, it was clearly identified the key performance to be monitored related to user needs. In the application of Indicators monitoring, it resulted critical the selection of the places where placing the probes in order to save resources and being economical. Friendly interpretation of results should be developed for the maintenance team and defined actions have to be previously planned when the alert level of an Indicator is reached.