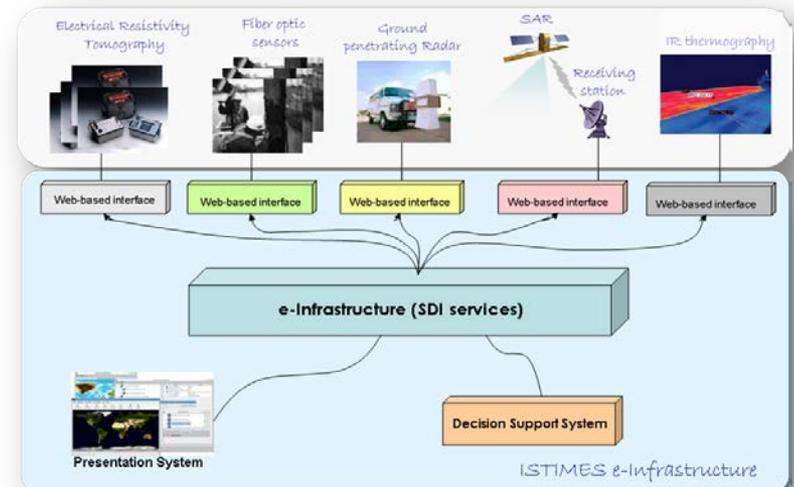
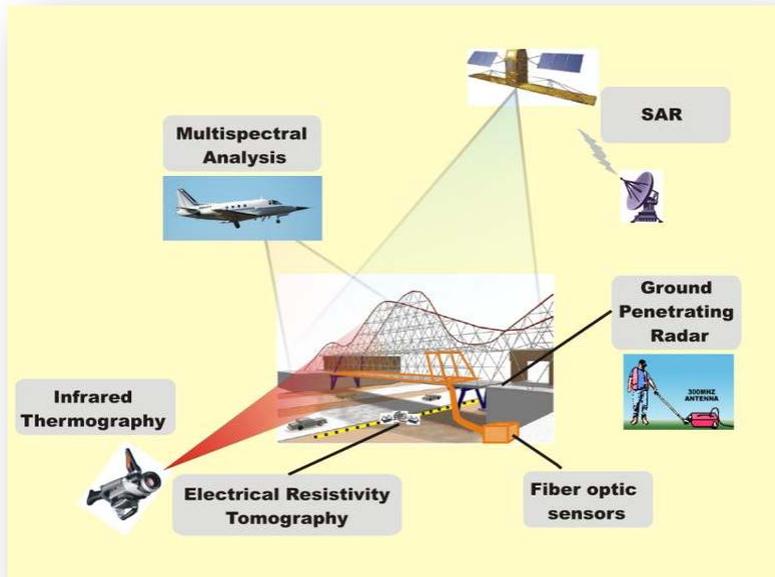


ISTIMES

Integrated System for Transport Infrastructures surveillance and Monitoring by Electromagnetic Sensing

Vincenzo Cuomo, Francesco Soldovieri

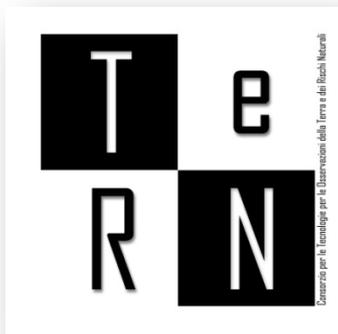
Consiglio Nazionale delle Ricerche





ISTMES CONSORTIUM

Joint Call FP7-ICT-SEC-2007-1



Nine partners from Italy, France, Switzerland, Norway, Israel, Sweden, Romania, with the coordination of TERN Consortium (Italy)

Project Manager
Prof. Vincenzo Cuomo

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Descrizione del progetto

- **ISTIMES project has designed, assessed and promoted a system, exploiting distributed and local sensors coupled with space observations for non-destructive electromagnetic monitoring of critical transport infrastructures.**
- **The integration of electromagnetic sensing technologies with new ICT tools enables remotely controlled monitoring and surveillance and real time data imaging of the infrastructures. The monitoring system allow get information about the state of the infrastructure detecting both slow and fast degradation (including ageing effects) and coupling current monitoring and quick damage assessment.**
- **The ICT architecture, which is fully federate and scalable, allows at adding new sensors or new measuring sites, to modify the monitoring strategy depending on the events and to provide alert to the stakeholders when anomalies occur.**
- **Protocols have been defined so that in situ techniques enter into the observational chain starting from the cheapest ones, depending on the status of the infrastructure. This approach allows support stakeholders both in defining ordinary/extraordinary maintenance strategies and in managing emergencies and disasters.**

Risultati principali

- Design, implementation and validation of a system able to couple long term monitoring and quick damage assessment for the critical transportation infrastructures.
- Design and implementation of a ICT system architecture for the control and data acquisition of a network (as well as network of networks) of heterogeneous sensors via WEB. The ICT system architecture is able to provide information via WEB to the stakeholders.
- Set-up and in laboratory assessment of several prototypes of instrumentations for non-invasive sensing and transition of sensing instrumentations from the laboratory conditions to on-field deployment.
- Development of data fusion/integration strategies for a synergic use of the different sensors.
- Demonstration of the effectiveness of the system via experiments both in controlled conditions, (but at real scale), and in really challenging test beds (directly on field).

Ricadute su mercati/prodotti

- The ISTIMES system has been validated at three challenging test beds as Sihlhochstrasse bridge in Zurich, Varco Izzo railway tunnels and Musmeci bridge in Potenza city area.
- The end-users directly involved in the project and dem activities were: Federal Road Office of Switzerland; Municipality of Potenza; Dipartimento di Protezione Civile, IFSTTAR
- The applicative success of the project is testified by the fact that end-users outside of the ISTIMES Consortium have requested specific monitoring services as:
 - Provincia di Potenza for the monitoring of the overall road network (2500 km long);
 - Ente per lo Sviluppo dell'Irrigazione e la Trasformazione Fondiaria in Puglia, Basilicata, Irpinia" (ESITF) for the monitoring of the Monte Cotugno dam on Sinni



The future developments aim both at further developing of ISTIMES and at deploying the ISTIMES system in operational conditions and developing user friendly outputs, which can improve the acceptance of this ISTIMES concept by the end-users.

Therefore, the main future actions are focussed on:

- ✓ The improvement of the system both improving the use of space data for the large scale awareness and positioning tools;
- ✓ A better interfacing of non-invasive electromagnetic technologies with civil engineering sensing technologies and modelling in order to get information about the vulnerability of the infrastructure;
- ✓ The translation of the technological indicators provided by the system in user friendly information for the stakeholders;
- ✓ The design and implementation of observation/sensing measurements protocols accounting for the specificity of the monitored infrastructure and the economic viability;
- ✓ The embedding of the system in a more general frame of the crisis management, thanks to the integration of ISTIMES ICT architecture with interoperable Spatial Data Infrastructures, so to activate information exchange with mobile devices and web (citizens as sensors, social network...);
- ✓ The set-up of the novel concept of the embedded security, where the sensors are explicitly considered as one of the key elements in the design of an infrastructure.