Long-term monitoring system of the Lezíria Bridge

1) Brisa

2) University of Surrey

past experience

current status

future challenges

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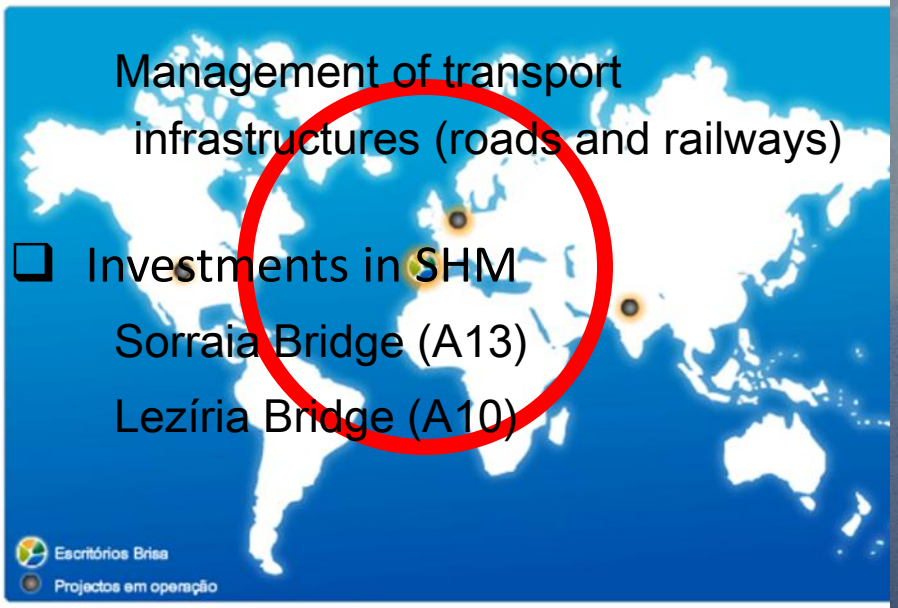
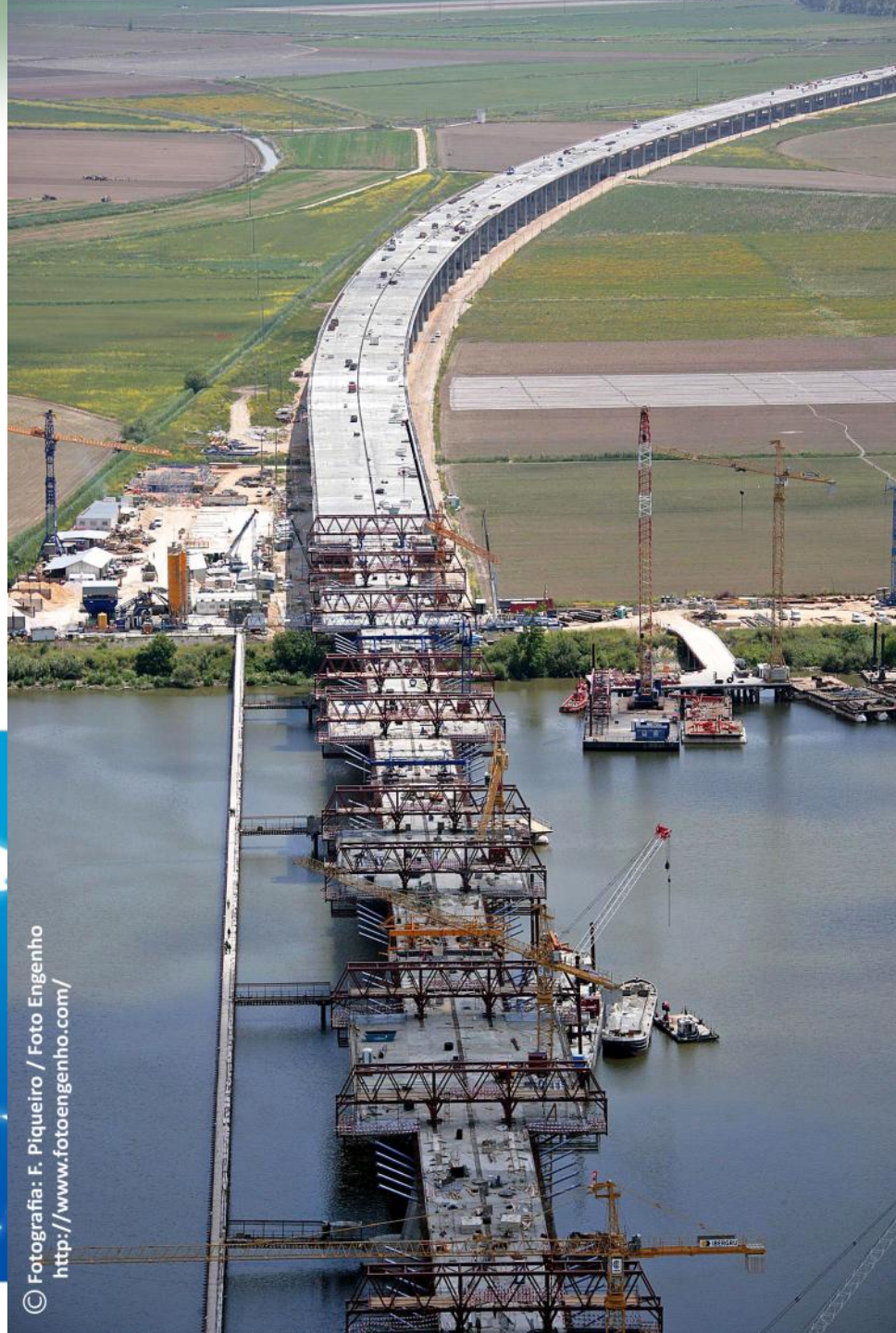
BRISA

The company

- One of the largest tolled motorway operators in the world
  - Concessions in the US of America
  - Operations in the Netherlands and India
- The largest transport infrastructure group in Portugal
  - Management of transport infrastructures (roads and railways)
- Investments in SHM
  - Sorraia Bridge (A13)
  - Lezíria Bridge (A10)





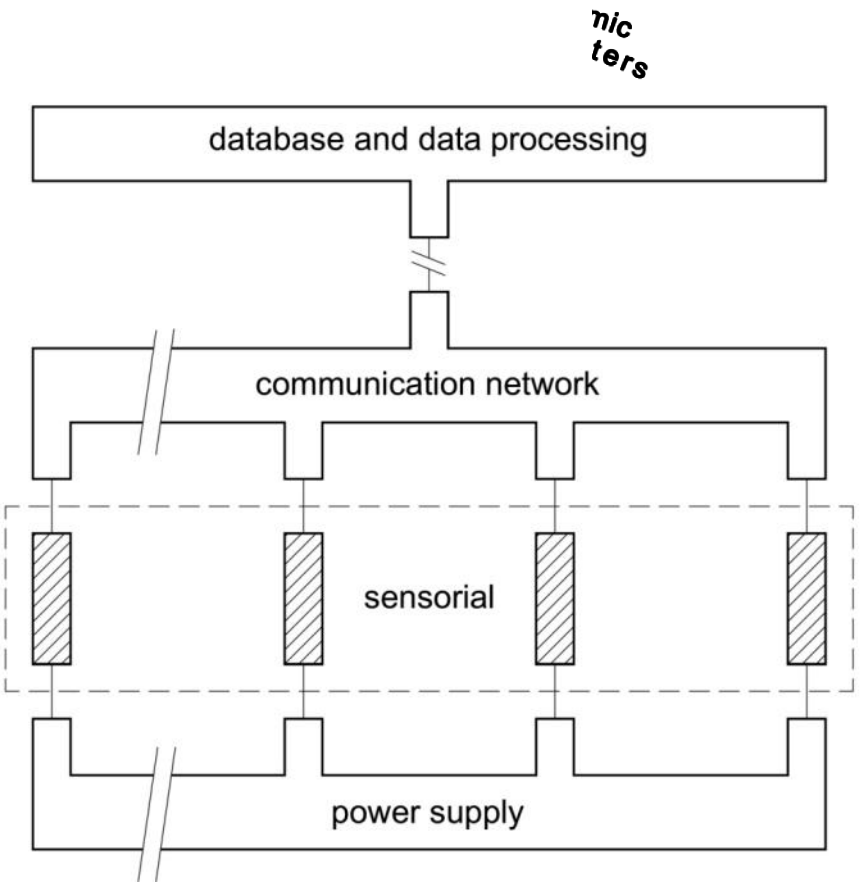
Long-term monitoring system of the Lezíria Bridge

The structure

Long-term monitoring system of the Lezíria Bridge

The architecture of the monitoring system

- **Static acquisition system**:
  Time dependent properties of concrete and prestressing steel relaxation, soil-structure interaction, environmental effects.
- **Dynamic acquisition system**:
  Impact of boats and earthquakes.
- **Optical acquisition system**:
  Comparative evaluation with the electric system, dynamic acquisition of measurements concerning concrete deformations.
- **Communication and database system**:
  Operation Central at BRISA with remote database access.



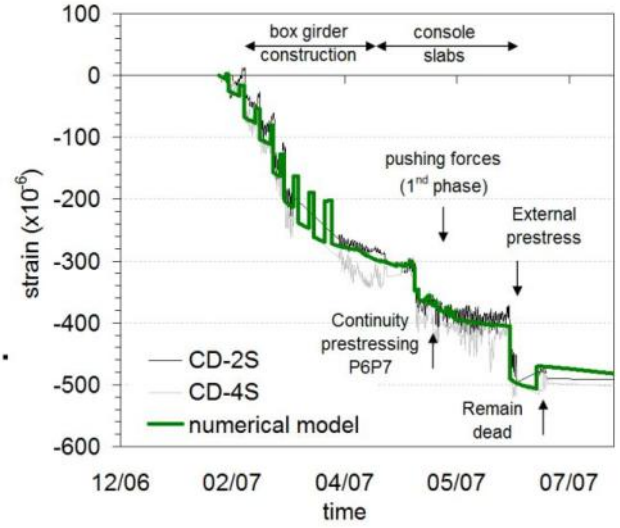
Long-term monitoring system of the Lezíria Bridge

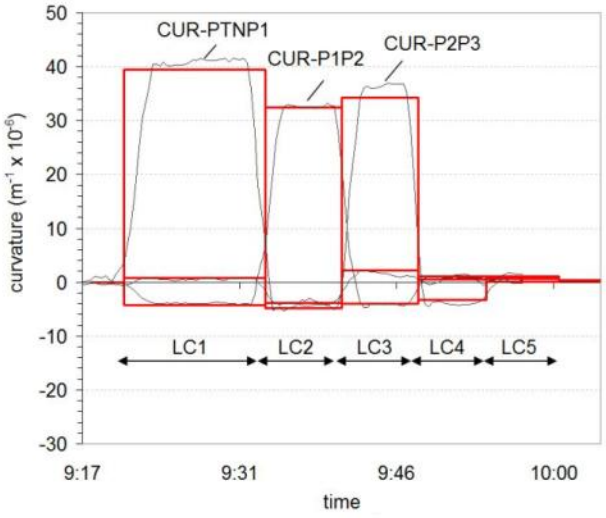
Assessment of the structural performance

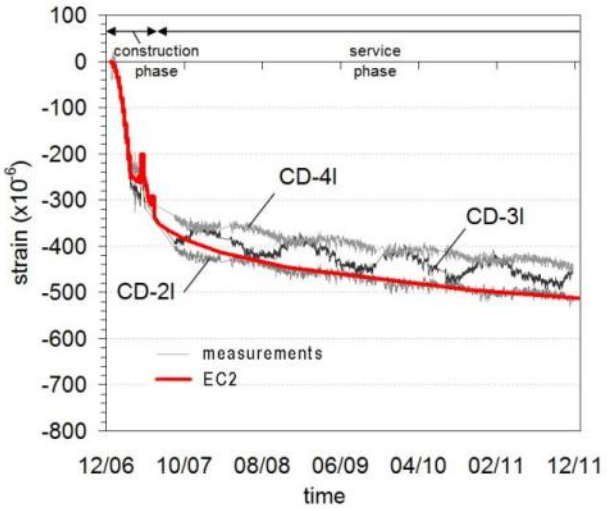
Long-term monitoring system of the Lezíria Bridge

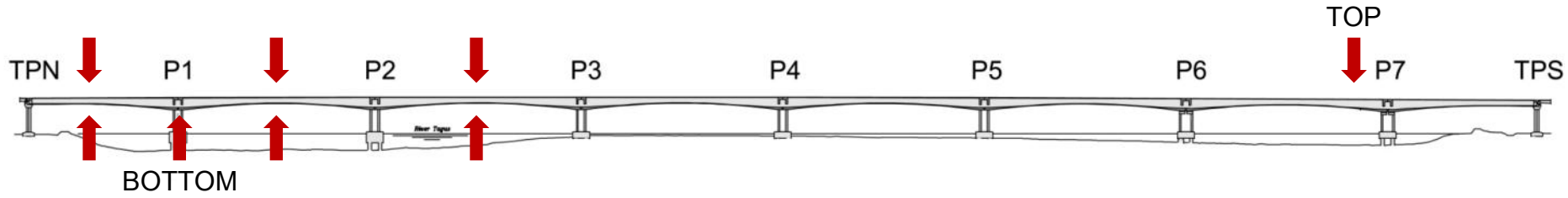
Assessment of the structural performance

CONSTRUCTION PHASE — LOAD TEST — LONG-TERM





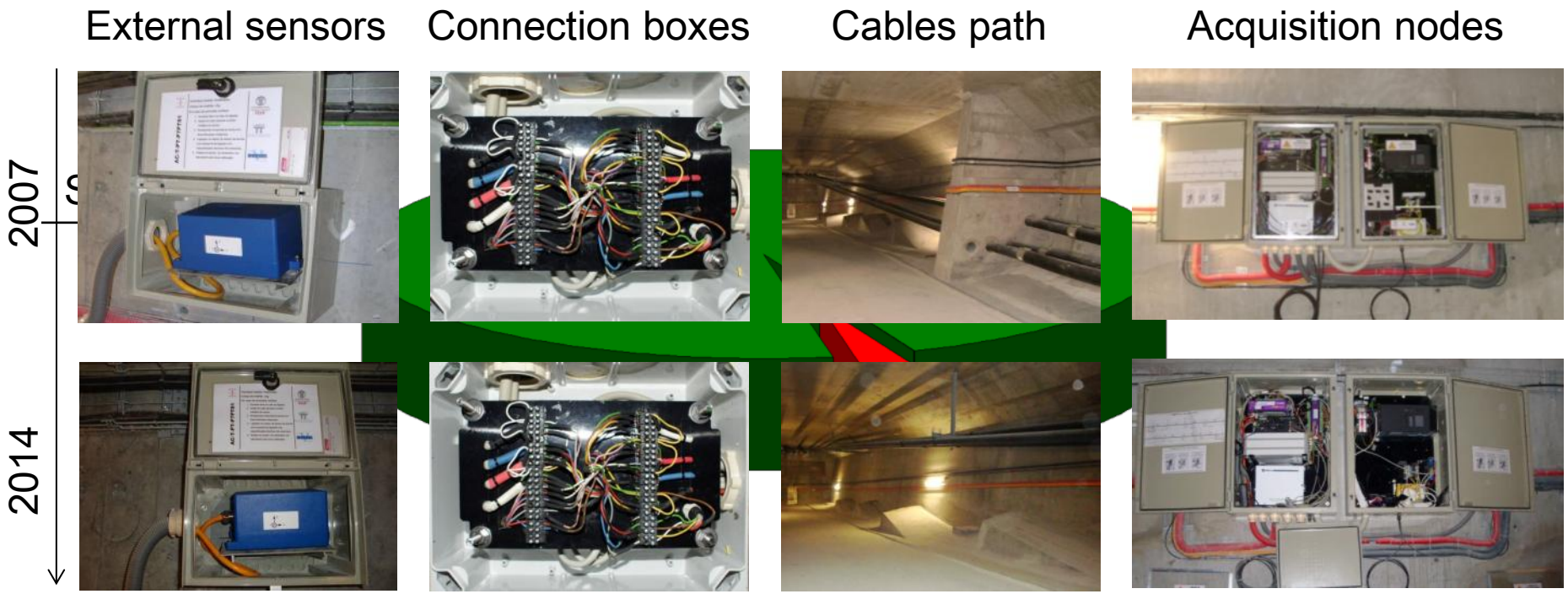




Long-term monitoring system of the Lezíria Bridge

Sensorial subsystem

- Good condition after 9 years of operation and without signs of vandalism
- Overall, 93 % of the embedded sensors are operational
- Quality of the collected measurements vs. required maintenance



Steps towards a more efficient asset management

Maintenance actions

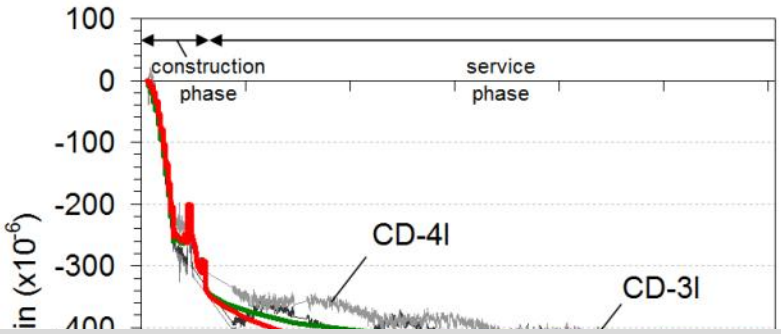
Steps towards a more efficient asset management

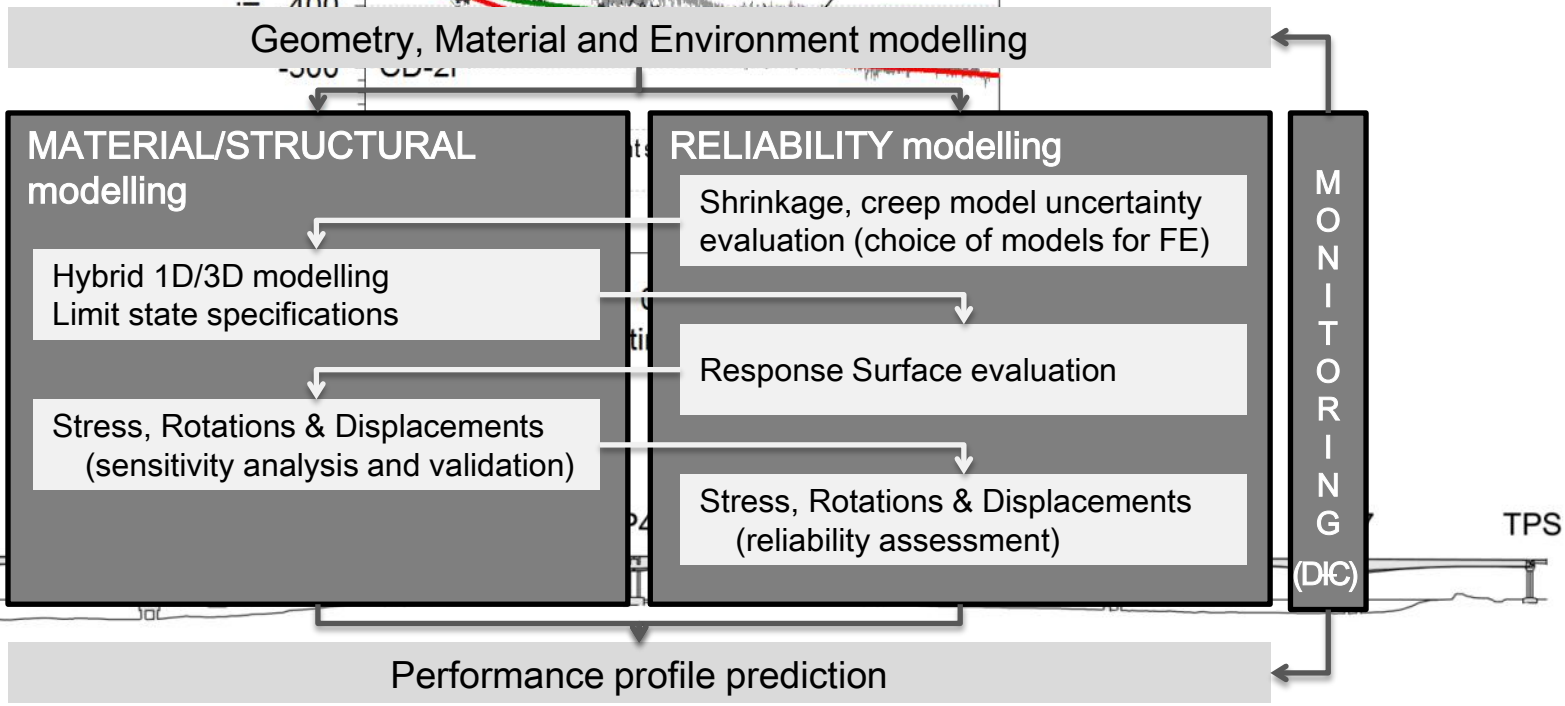
Consistent treatment of uncertainties

- Limitations
  - poor material models (creep & shrinkage)
  - rates of shrinkage and creep deformations in box girder cross-sections
  - numerical m
  - absence of r
  - lack of consis
- A risk-based m

'creep deformations

ther uncertainty sources





Conclusions

- For the providers of SHM systems

- For the bridge owners and maintaining agents

- For the research community (WG2 of the COST Action TU1402)

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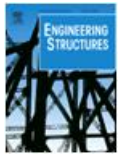

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Thank you for your attention

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