The Lezíria Bridge case study

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BRISA

The Group

- One of the largest tolled motorway operators in the world

  Concessions in the US of America

  Operations in the Netherlands and India

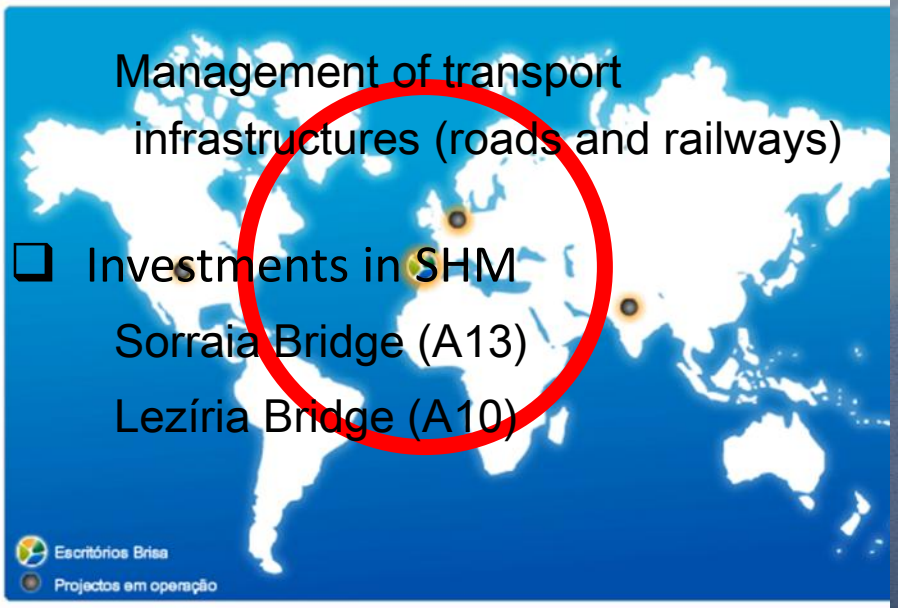
- The largest transport infrastructure group in Portugal

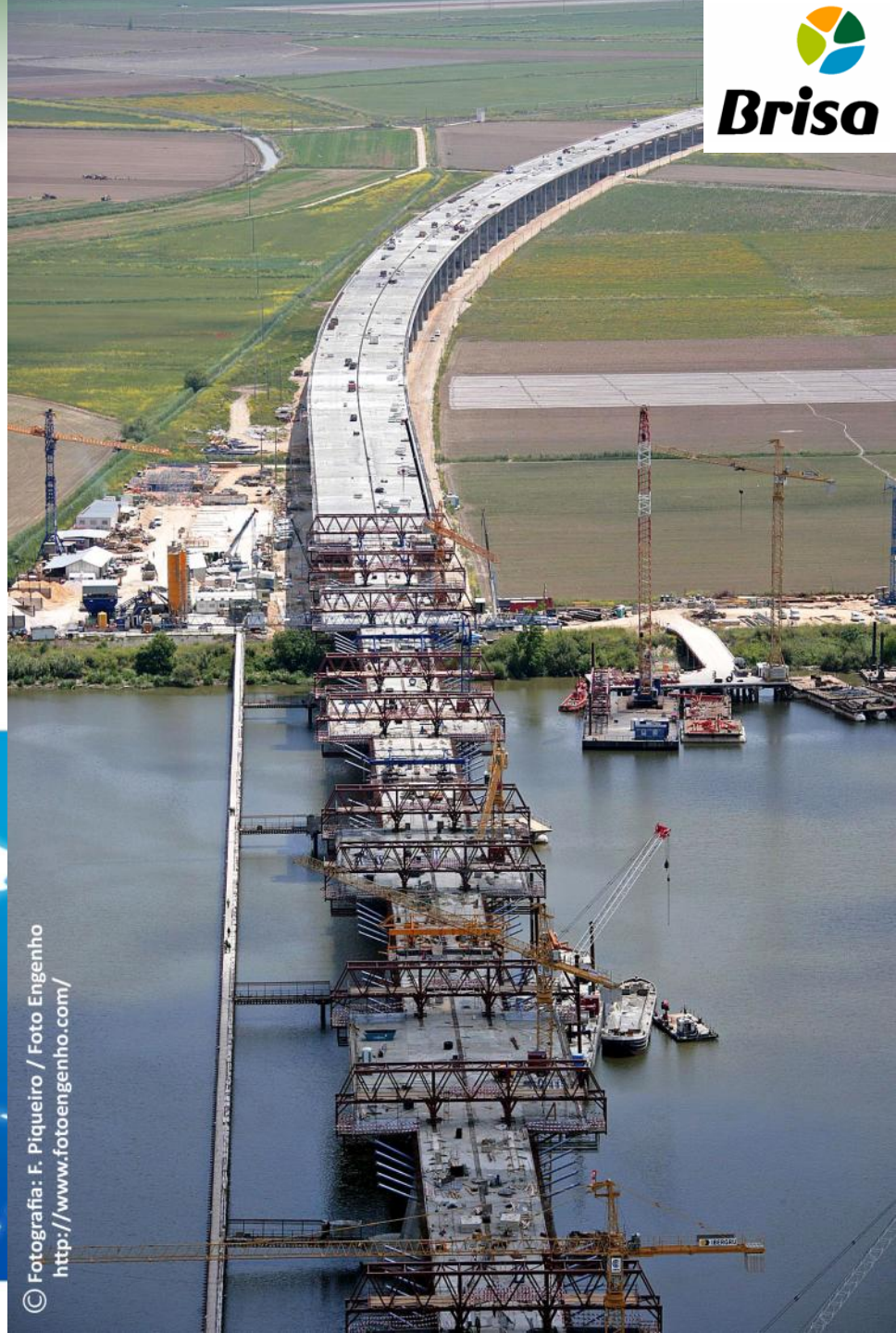
  Management of transport infrastructures (roads and railways)

- Investments in SHM

  Sorraia Bridge (A13)

  Lezíria Bridge (A10)





Lezíria Bridge
SHM system

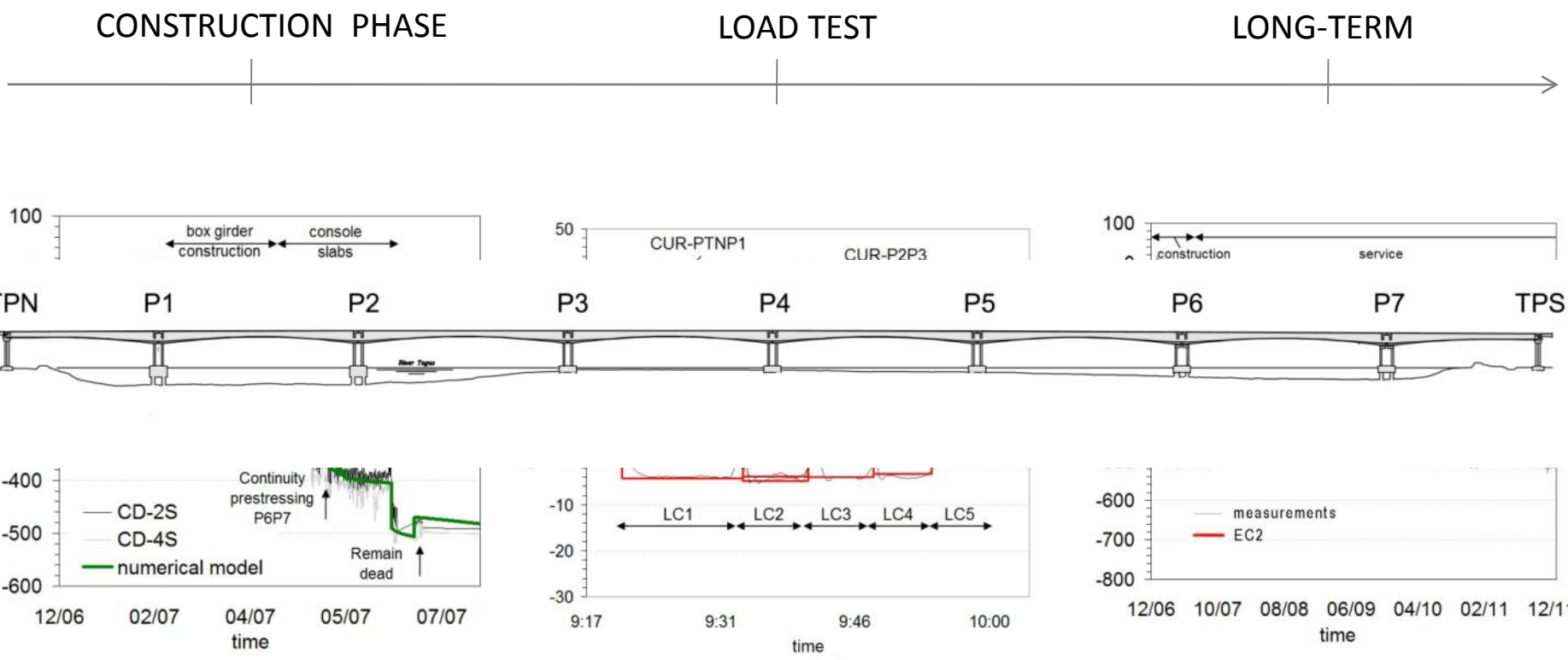
- Permanent monitoring system
  (construction + operational life)
- Monitoring project
  (as part of the bridge project)
- ≅ 400 sensors,
  (10 different type of sensors)
- 3 different acquisition systems
  (static, dynamic, optic)
- > 10km cable length
- sampling-rate up to 100 Hz
- ≅ 1 000 000 records / year
- Finite Element Model
  (virtual bridge)

Lezíria Bridge

Assessment of the structural performance

Lezíria Bridge

Assessment of the structural performance



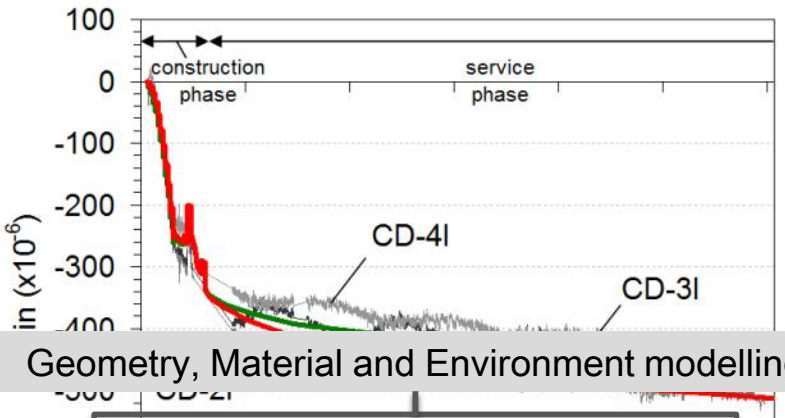
TOP

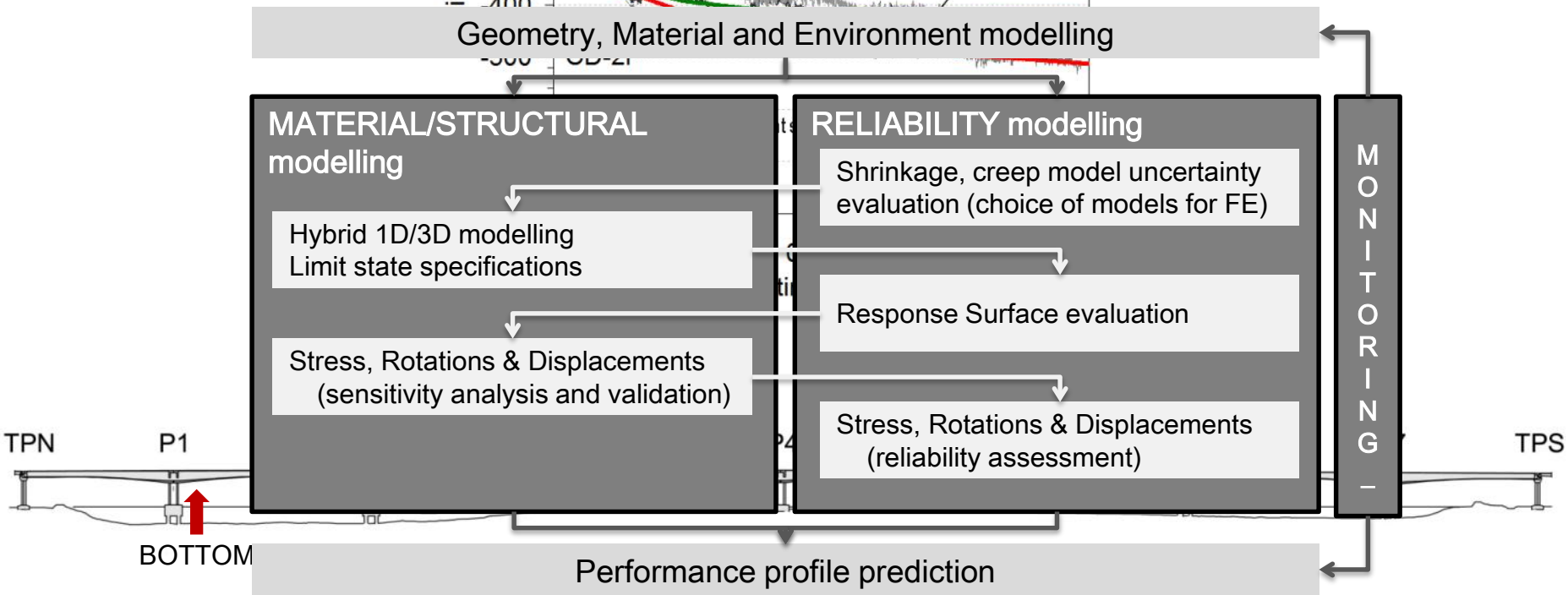
BOTTOM

Current steps towards efficient asset management

Consistent treatment of uncertainties

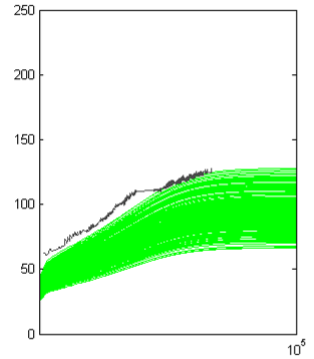
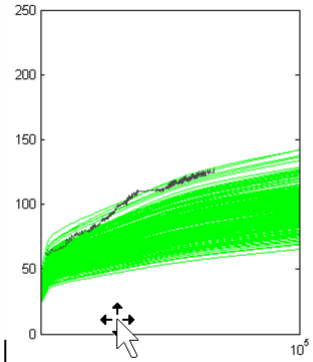
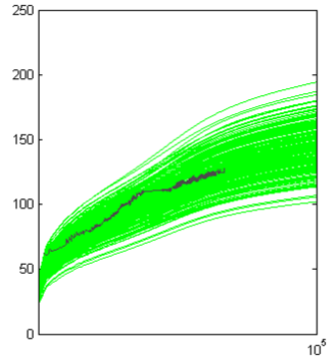
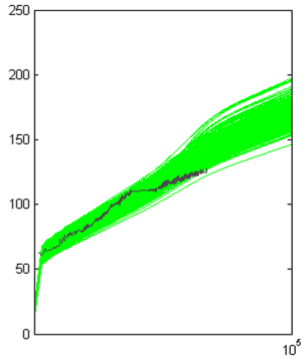
- ❑ Limitations
  - poor material models (creep & shrinkage)
  - rates of shrin[illegible]der cross-sections
  - numerical m[illegible]
  - absence of r[illegible]'creep deformations
  - lack of consis[illegible]ther uncertainty sources
- ❑ A risk-based m[illegible]

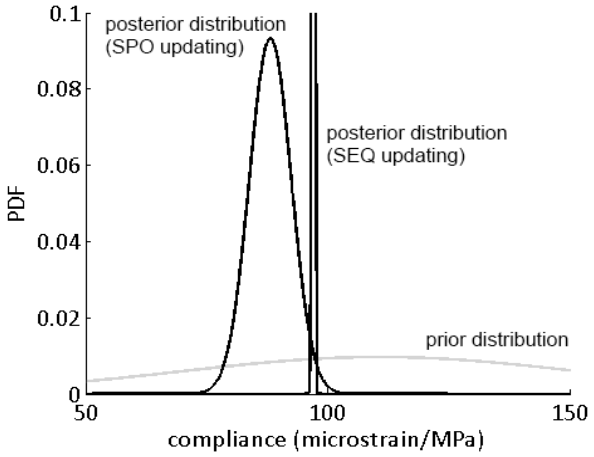




Current steps towards efficient asset management

Material modelling – Creep and shrinkage

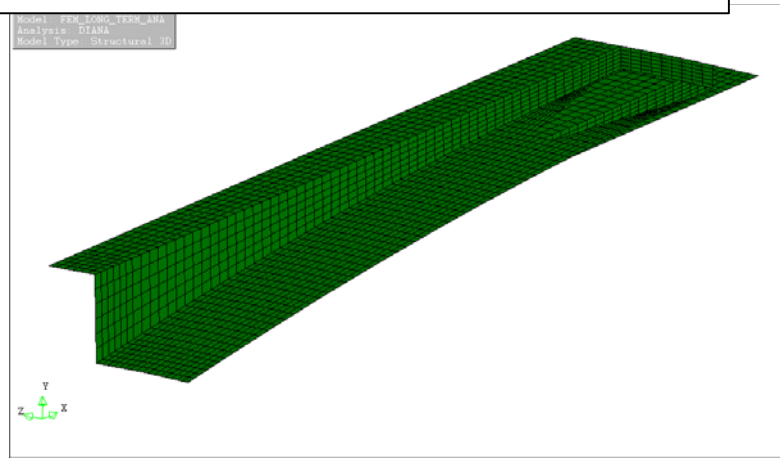
	EC2	MC2010	GL2000	B3
Lezíria Bridge				
	$CoV\,(t=10^2)=13.9\,\%$ $CoV\,(t=10^5)=14.5\,\%$	$CoV\,(t=10^2)=14.4\,\%$ $CoV\,(t=10^5)=14.9\,\%$	$CoV\,(t=10^2)=12.1\,\%$ $CoV\,(t=10^5)=12.4\,\%$	$CoV\,(t=10^2)=4.5\,\%$ $CoV\,(t=10^5)=6.3\,\%$



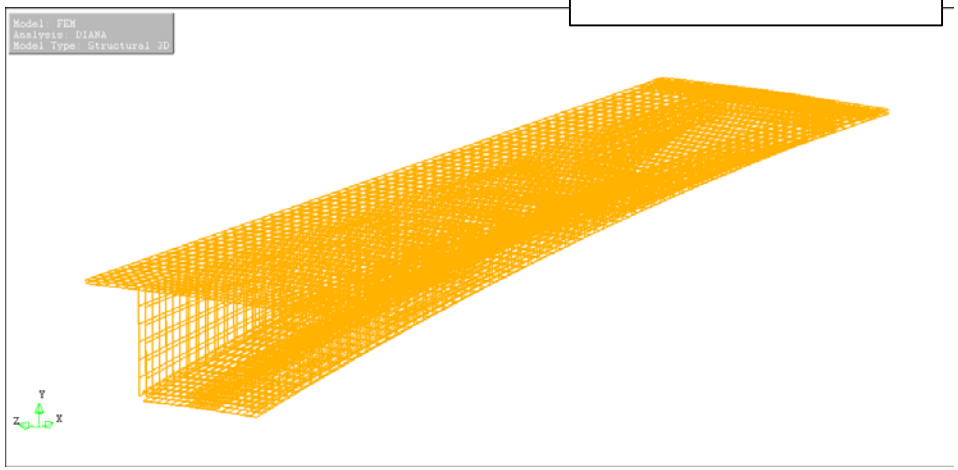
Current steps towards efficient asset management

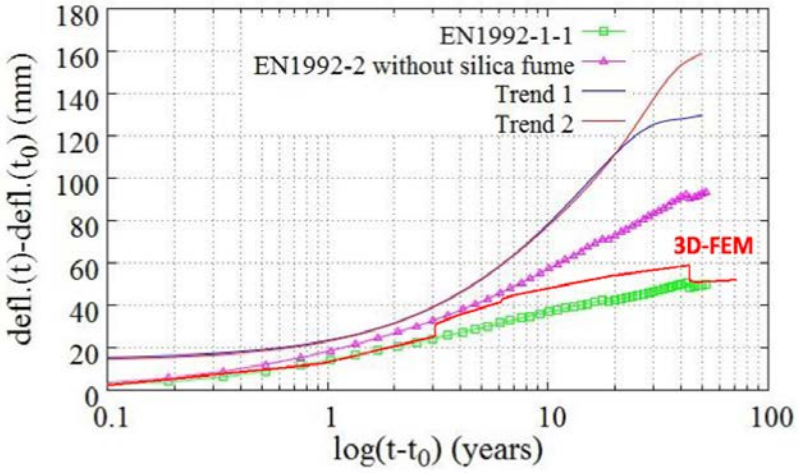
FE modelling – 1D vs. 3D modelling approach

Mesh (shell elements of 8 nodes)

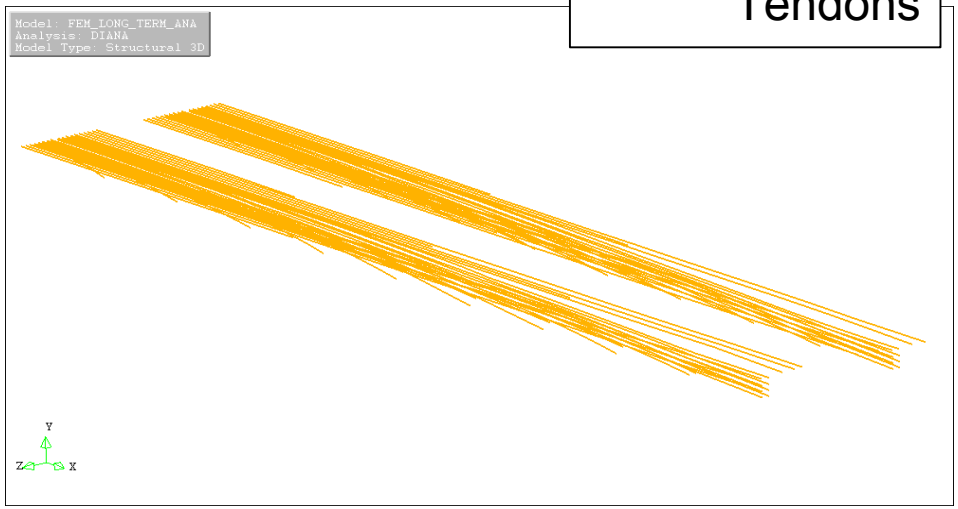


Reinforcement

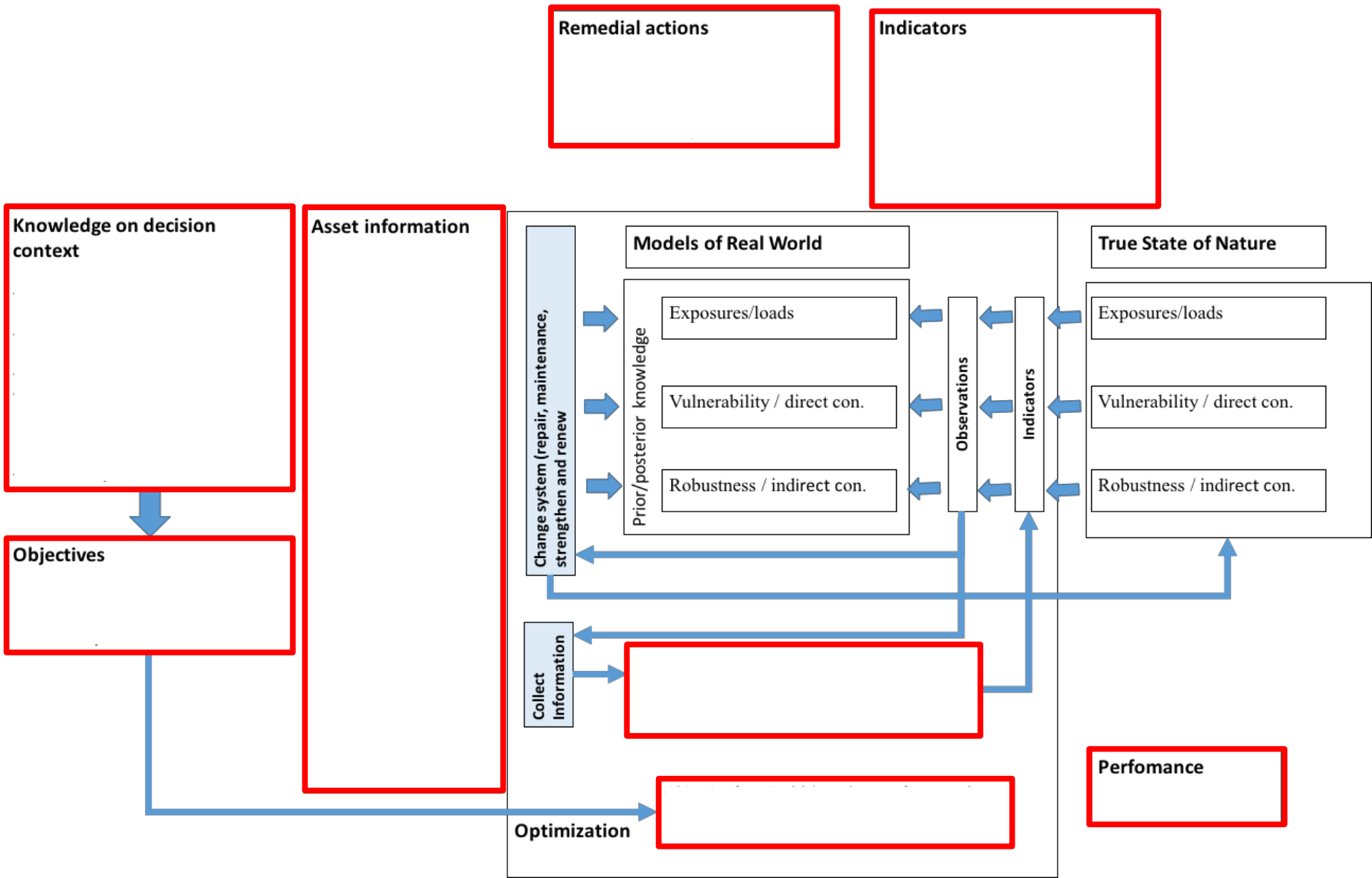




Tendons



Application of the integrated VoI analysis flow chart



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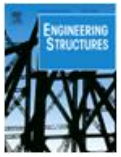

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Thank you for your attention

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