



European  
Commission

Horizon 2020  
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for Research & Innovation



**Rethinking coastal defence and Green-energy Service infrastructures  
through enHancEd-durAbiLity high-performance cement-based materials**

## **WP6. Modelling long-term durability of UHDC materials and structures**

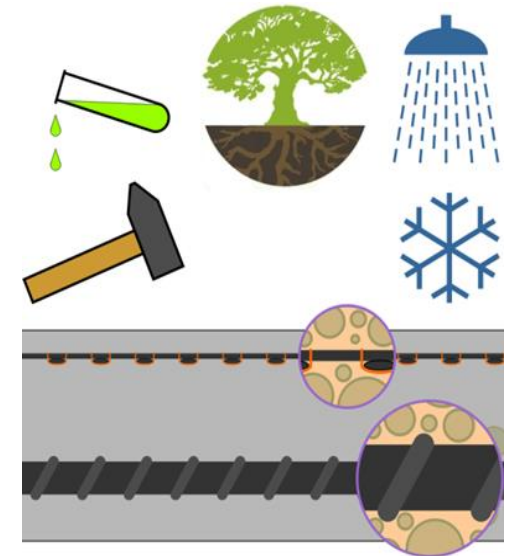
TUD (Leader)

Viktor Mechtcherine

Partners participating: POLIMI, STRESS, TUD, CSIC

# WP objectives

- Modelling the phenomena that drive the extension of service life of R/C structures through the use of UHDCs accordingly with the exposure scenarios addressed in ReSHEALience.
- Calibration and validation of long-term phenomenological models for each combination of UHDC and durability promoters.
- Models for durability performance will consider:
  - Aging phenomena of UHDC modified by functionalising constituents
  - Crack self-sealing/healing in UHDC
  - Life Cycle Assessment (LCA) of new UHDC materials and components



# WP objectives: Implementation strategy

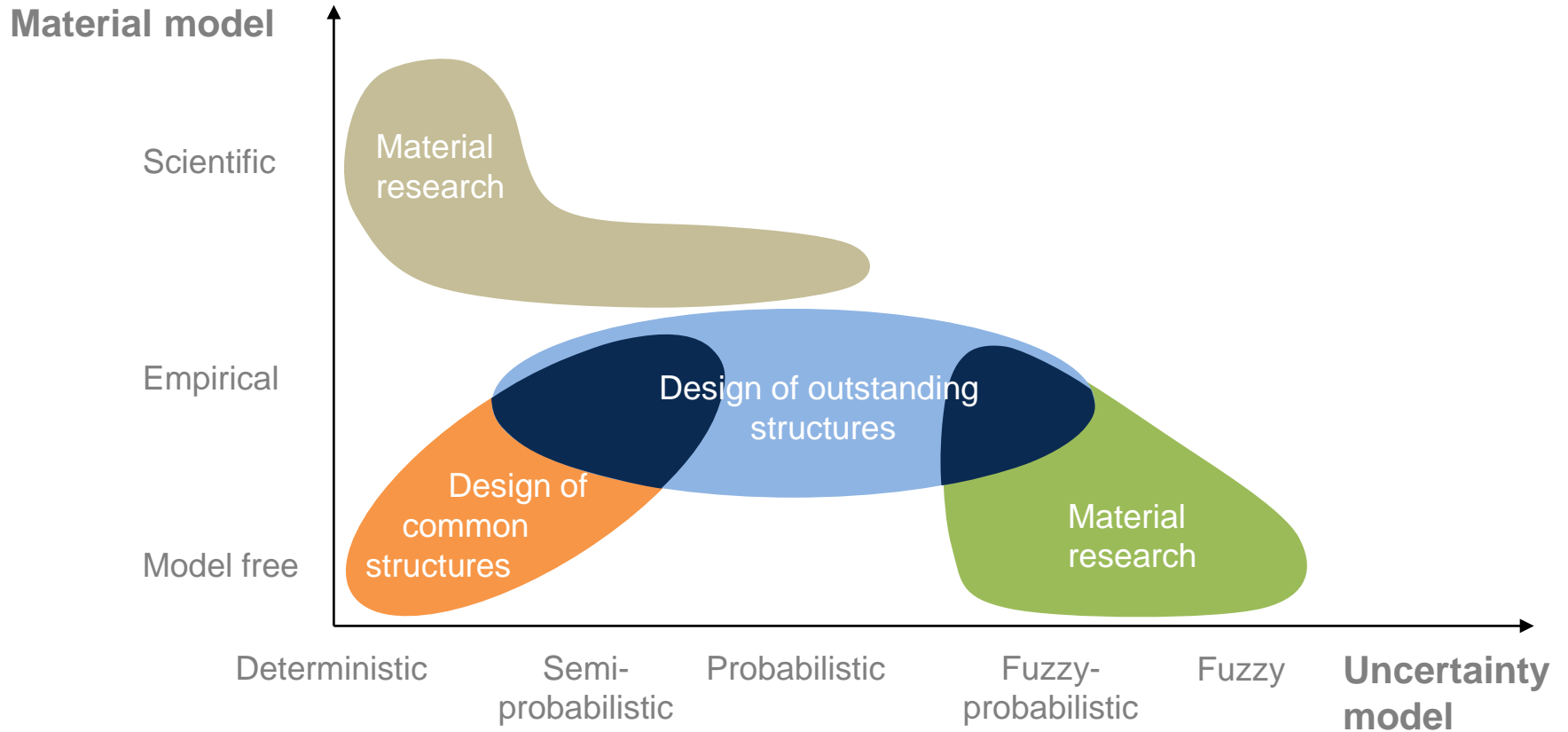
- Modelling set-up and strategies follow a **MODA template** (updated **MO**delling **DA**ta elements) as recommended by the **EMMC** (**E**uropean **M**aterials **M**odelling **C**ouncil)
- For the **LCA** the **ILCD** Handbook will be followed. The solutions with positive balance be selected.
- Primary data basis: Experimental results from **WP 5**
- Successive implementation of experimental results from **WP 8**
- Feed back and forth in **WP 3** and **WP 8** for updating and completing the **DAD** (**D**urability **A**ssessment **D**esign) concept



# WP tasks and partners

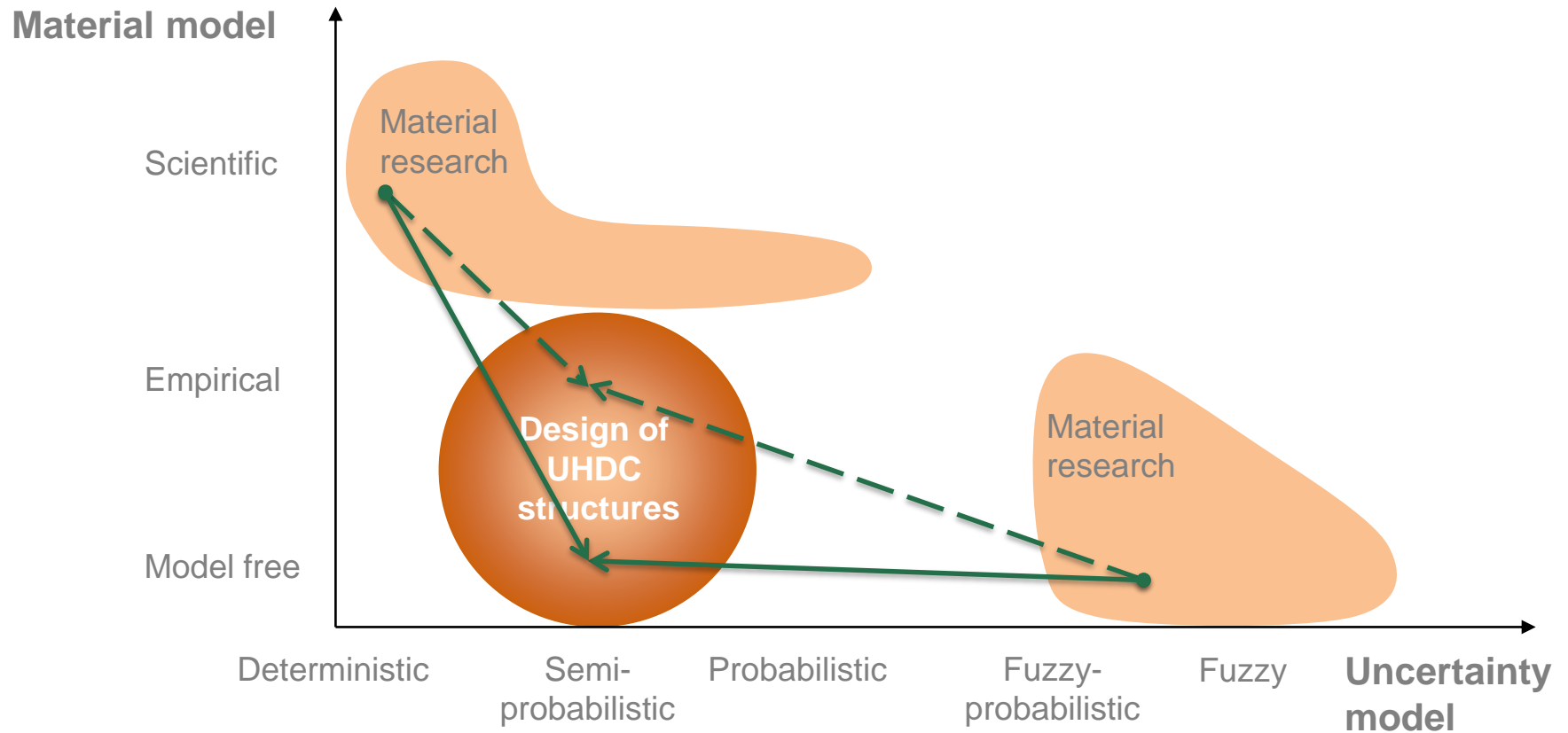
- Task 6.1 Concept of modified MODA template **M 7 – M 30**  
Lead: TUD, partner: POLIMI
- Task 6.2 LCA principles and implementation **M 12 – M 36**  
Lead: STRESS, partners: TUD, POLIMI, CSIC
- Task 6.3 Fuzzy-probabilistic data treatment,  
transfer in semi-probabilistic format **M 18 – M 42**  
Lead: TUD, partners: POLIMI, CSIC
- Task 6.4 Implementation of fuzzy-probabilistic and semi-  
probabilistic sets of data in modified MODA template  
and LCA formalism **M 18 – M 42**  
Lead: TUD, partner: POLIMI

# Example Task 6.3



Source: Altmann, Mechtcherine, CCR 54 (2013)

# Example Task 6.3



Source: TU Dresden, IfB

# WP tasks and partners

- Task 6.5 Extended formulation of DAD concept, verification and proof of performance **M 13 – M 46**  
Lead: POLIMI, partners: TUD, STRESS
- Task 6.6 Delivery to practitioners **M 31 – M 46**  
Lead: POLIMI, partners: TUD, STRESS



# Expected interactions within WPs

## Input:

- Identification and “importance weighing” of physical and chemical degradation processes from successive outcomes of **WP 5** by fuzzy-probabilistic approach
- Processing successive data from **WP 8**

## Output:

- LCA results feed LCC and SLCA in **WP 8**
- Feed-back and forth with DAD development of **WP 3**

# WP milestones

- MS 7 Concepts for LCA and DAD based on modified MODA template developed as the starting point to implement experimental results of UHDCs exposed to EAEs XA and XS from **WP 4** and **WP 5**  
Month 40
- MS 8 LCA and DAD based on outcomes of **WP 4** and **WP 5**, transition to verification and proof of performance through experimental results from **WP 8**  
Month 46 → **SO 2** and **SO 3**

- D 6.1 Consolidated modified MODA template and LCA formalism – **STRESS**: M 30, updates M 37 and M 42
- D 6.2 Theoretical model to evaluate aging and degradation of UHDC in EAE, and extending the modelling to understand and predict how these actions will affect the service life of structures – **TUD**: M 42 → **SO 2**
- D 6.3 New UHDC-tailored DAD concept assessing structure durability and LCA  
**POLIMI** and **TUD**: M 46 → **SO 3**

# Coordination in WP 6

- Mailing list with all task leaders and partners
- Coordination meeting to start activities at M 7
- **Task Leaders:** T 6.1 (TUD), T 6.2 (TUD), T 6.3 (STRESS), T 6.4 (POLIMI), T 6.5 (POLIMI)
- **Skype meetings every month:** Progress work review and contingencies with respect to interconnected WPs

# WP6. Modelling long-term durability of UHDC materials and structures

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