WHAT KIND OF BUILT ENVIRONMENT FOR FUTURE GENERATIONS?

The perspectives of cement and concrete producers

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Performance vs. sustainability

**CONCRETE PERFORMANCE push continuously upwards**

- **C130** 28 days
- **C60** 24 hours
- **Mod** > 60 GPa
- **Ten** > 10 MPa
- **G Class**
- **E Class** > 300 με
- **Cf** < 5 mm

**Performance vs. sustainability**

- **can we arrange these paths?**
  - recycled
  - enviromental friendly
  - easy to use
  - sustainable
  - long lasting
  - widespread adopted
  - money saving

**SUSTAINABILITY GOALS are increasingly important**

The projects have received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement N°760639, 760824 and 761072.

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New properties and new constituents

We must add some NEW PROPERTIES to our concrete

- **for durability**: XF5, XA4, hyperfrost, hyperchem, selfhealing
- **for the environment**: >50% recycle, >95% local, <200 kg CO₂
- **for the casting success**: thickening, low viscosity, thinning

**can they be compatible with a widespread diffusion?**

- **nanocement**, sulfoaluminate, microcement
- **metakaolin**, crystallizing, nanofiller
- **carbon**, alumina, cellulose

**special binders**, **special additions**, **special nanofibers**

**We can use many NEW ADVANCED COMPONENTS**

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Needs to get the performance

We usually resort to all OUR ALLIES to get high performance

- very accurate measurements
- highly qualified operators
- well characterized components
- very controlled conditions
- very precise dosages

performance is very fussy

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Obstacles to widespread use

We must consider all the obstacles on the road to WIDESPREAD USE

- local operating habits
- inhomogeneous standards
- different plants
- locally available aggregates
- recycled materials
- variability

Widespread sometimes means irregular

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Robustness against high variability

We need ROBUSTNESS to fight against variability

SINGLE PROJECT APPROACH

- repetition
- we need:
  - constant components
  - preset recipes
  - controlled conditions
  - meticulous operators
- we get:
  - QUITE IDENTICAL PRODUCTS
- passive robustness

WIDE INDUSTRIAL APPROACH

- replication
- we get:
  - QUITE IDENTICAL PERFORMANCES
- we need:
  - new test methods
  - new mix rules
  - changing recipes
  - skilled operators
- active robustness

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New challenges

This is therefore the most important QUESTION

Will scientific research help us get these ‘gadgets’ tomorrow?

- advanced test methods to evaluate all variable properties
- new mix design deductive rules to compensate for the variations
- AI predictive mix design software to manage many products

... to be able to face these new challenges:

- UHPCs and UHDCs in all our construction sites
- Industry 4.0 and SmartFactory in all our ready-mix concrete plants
- BIM characterization of UHPCs based only on performances

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Thank you for your attention

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