



AMANAC WORKSHOP

BRUSSELS, BELGIUM | 03.07.2019

WHAT KIND OF BUILT ENVIRONMENT FOR FUTURE GENERATIONS?

The perspectives of cement and concrete producers

Marco Francini
Buzzi Unicem



The projects have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760639 (EnDurCrete), 760824 (ReSHEALience) and 761072 (DACOMAT)

Performance vs. sustainability

CONCRETE PERFORMANCE push continuously upwards

C $\frac{130}{150}$
28 days

C $\frac{60}{75}$
24 hours

Mod
> 60 GPa

Ten
G Class

> 10 MPa

> 300 $\mu\epsilon$

< 5 mm

1 **Buzzi** **Unical**
"smarties"
performance pictograms

can we arrange these paths?

recycled

environmental friendly

easy to use

sustainable

long lasting

widespread adopted

money saving

SUSTAINABILITY GOALS are increasingly important

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endurcrete



RESHEALIENCE
Ultra-High Quality Concrete

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New properties and new constituents

We must add some NEW PROPERTIES to our concrete



can they be compatible with a widespread diffusion?



We can use many NEW ADVANCED COMPONENTS

Needs to get the performance

We usually resort to all OUR ALLIES to get high performance

very accurate measurements

highly qualified operators

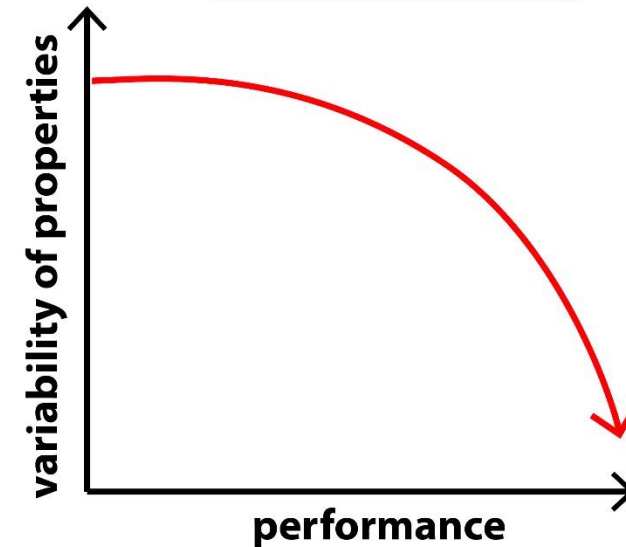
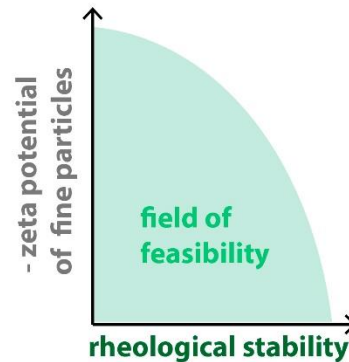
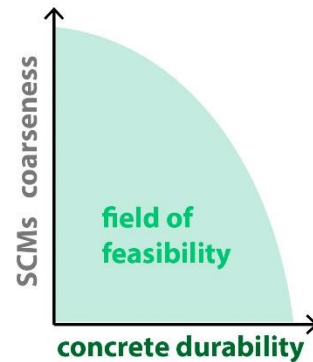
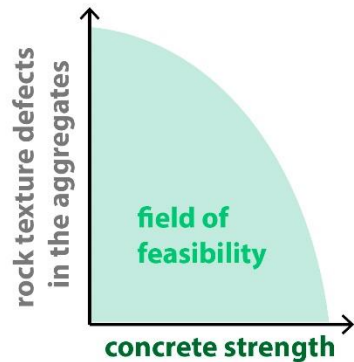
well characterized components

very controlled conditions

very precise dosages

constance

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

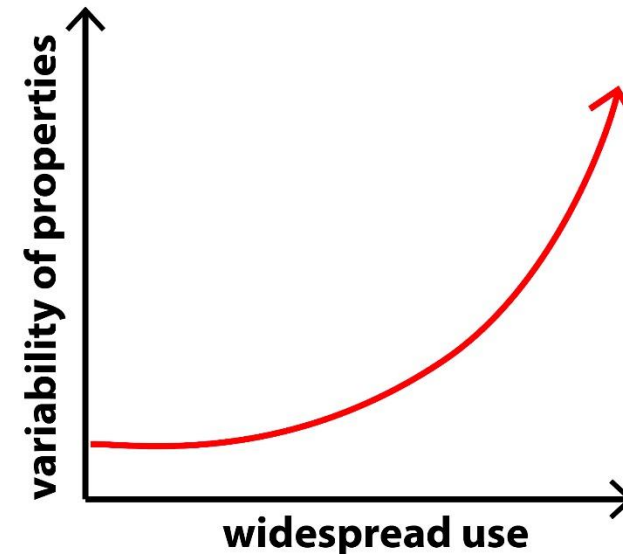
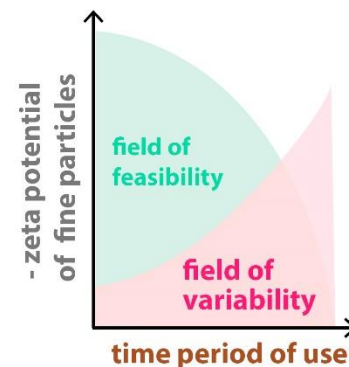
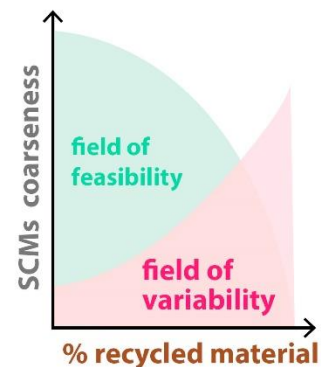
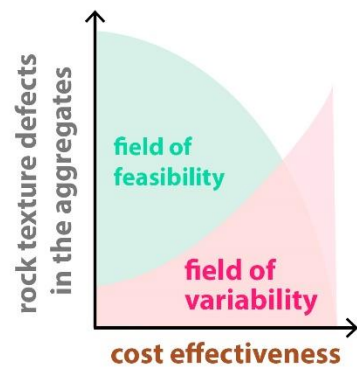
different plants

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

Marco Francini
Buzzi Unicem
mfranciini@buzziunicem.it



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