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The ReCreate project

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Leader of the ReCreate project

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ReCreate

Reusing **precast concrete** for a circular economy

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 958 200.

Duration: 2021–2025
EU funding: 12.5 M€
Total funding: 14.4 M€

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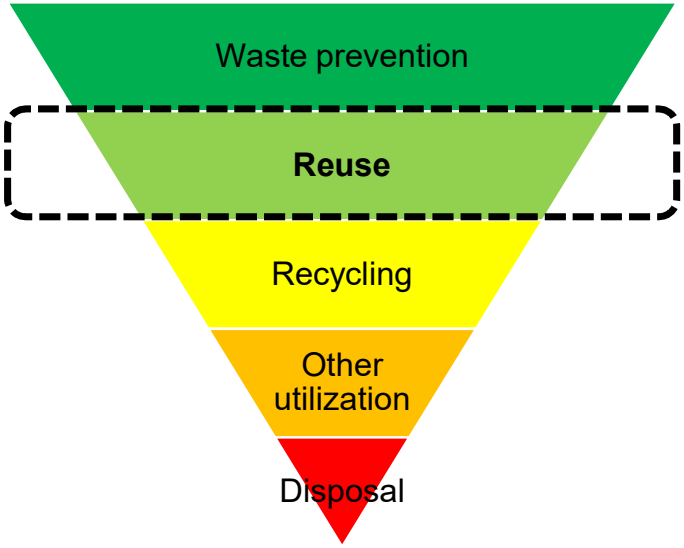
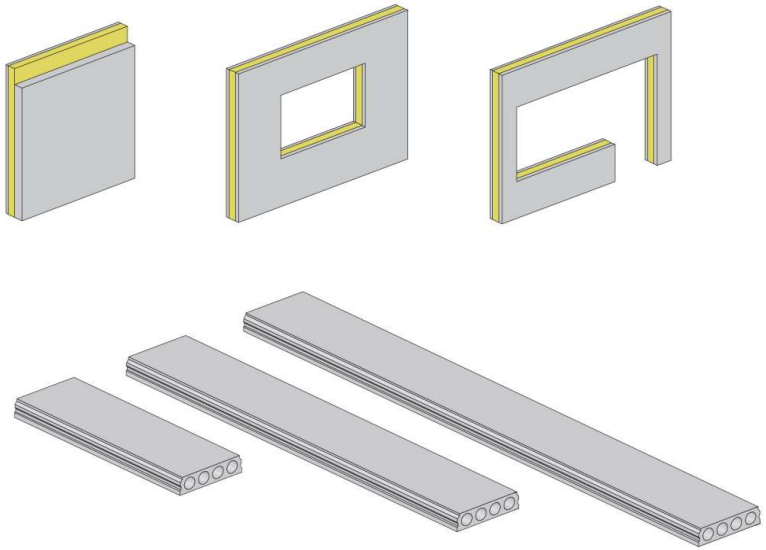
ReCreate studies the reuse of whole, deconstructed concrete elements





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JSP
SKANSKA
Vierailija
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Video © Satu Huuhka

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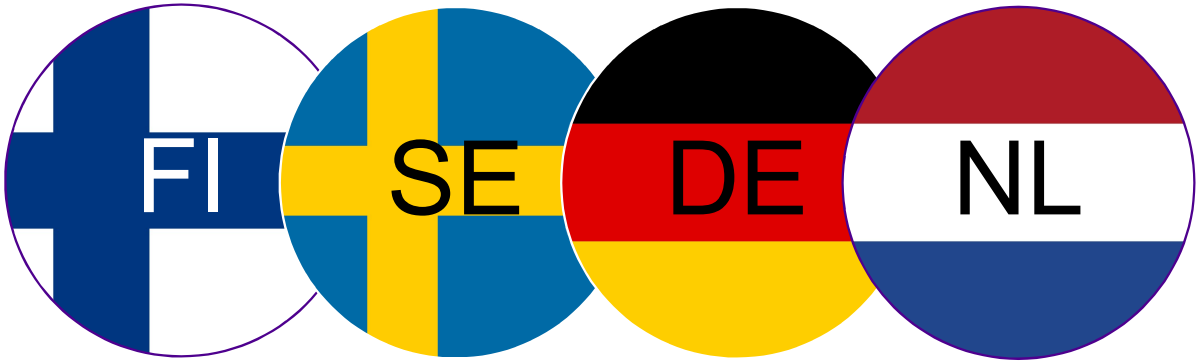
A European project

Piloting countries
(= Countries with prior pilot projects)



Project countries

Communication
& dissemination
target countries

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Country clusters: unis and companies

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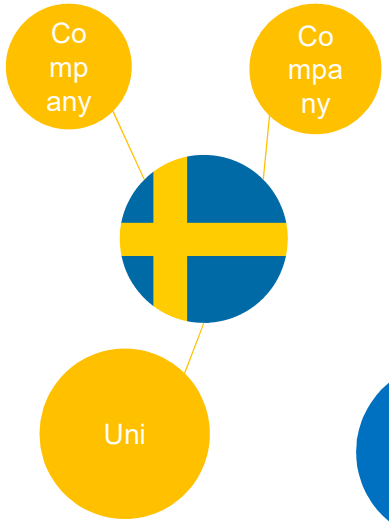

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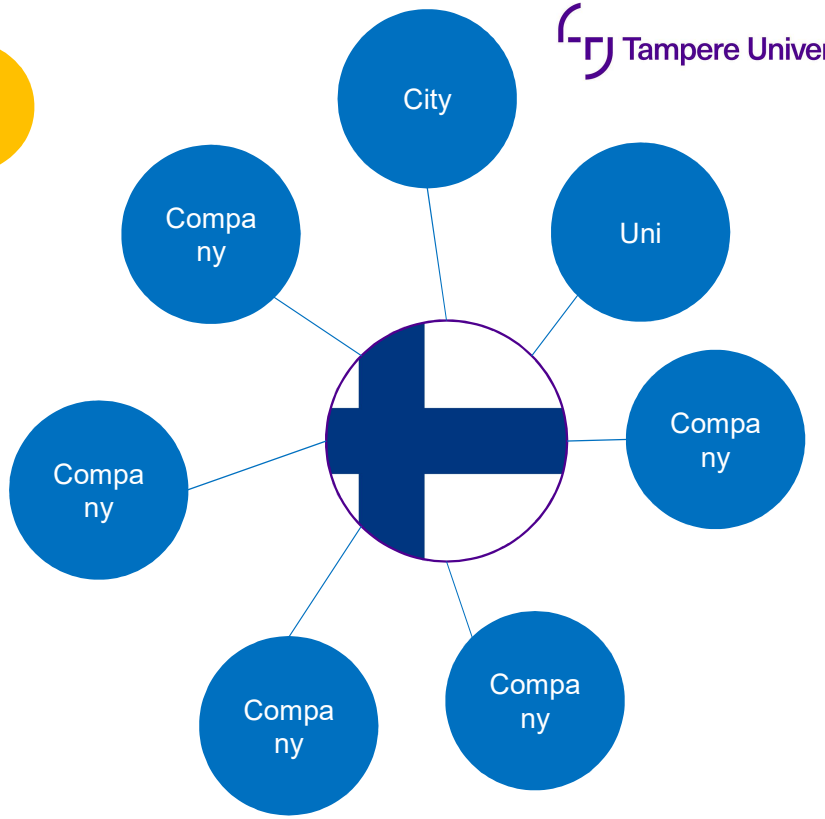
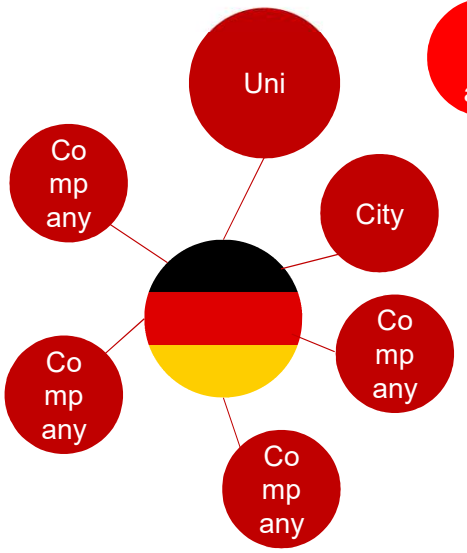
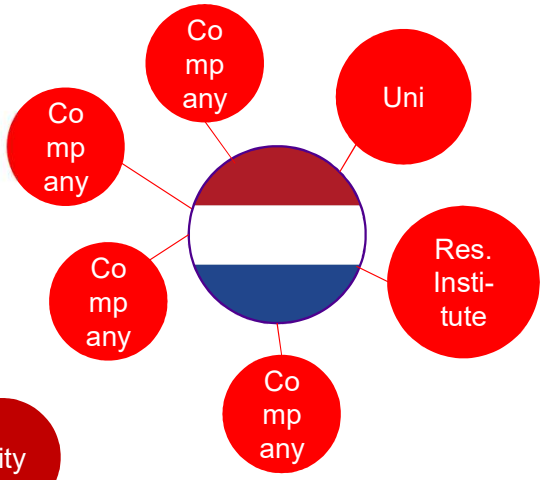


b-tu Brandenburgische Technische Universität Cottbus - Senftenberg





Communications by

CROATIA GREEN BUILDING COUNCIL
CLIMATE | ENERGY | MOBILITY

ReCreate partners

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umacon

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TAMPERE (City)

CONSOLIS STRÄNGBETONG

HELSINGBORGS HEM

P. Jähne Ingenieurbüro GmbH

ECOSOIL

Ost GmbH

Lohmann & Robinski

Hohenmölsen City

CONSOLIS VBI

IMd Raadgevende Ingenieurs

TNO

LAGEMAAT

CIRCULAR STRUCTURAL DESIGN

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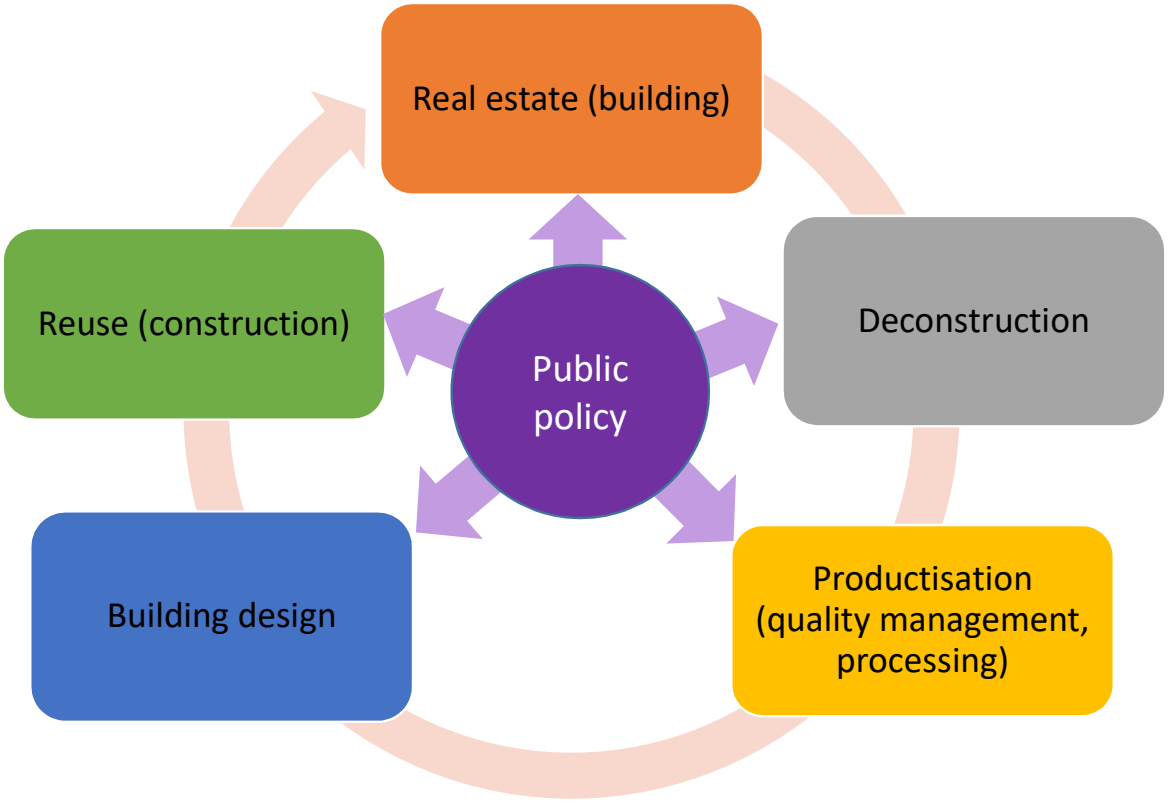
A circular whole value chain approach



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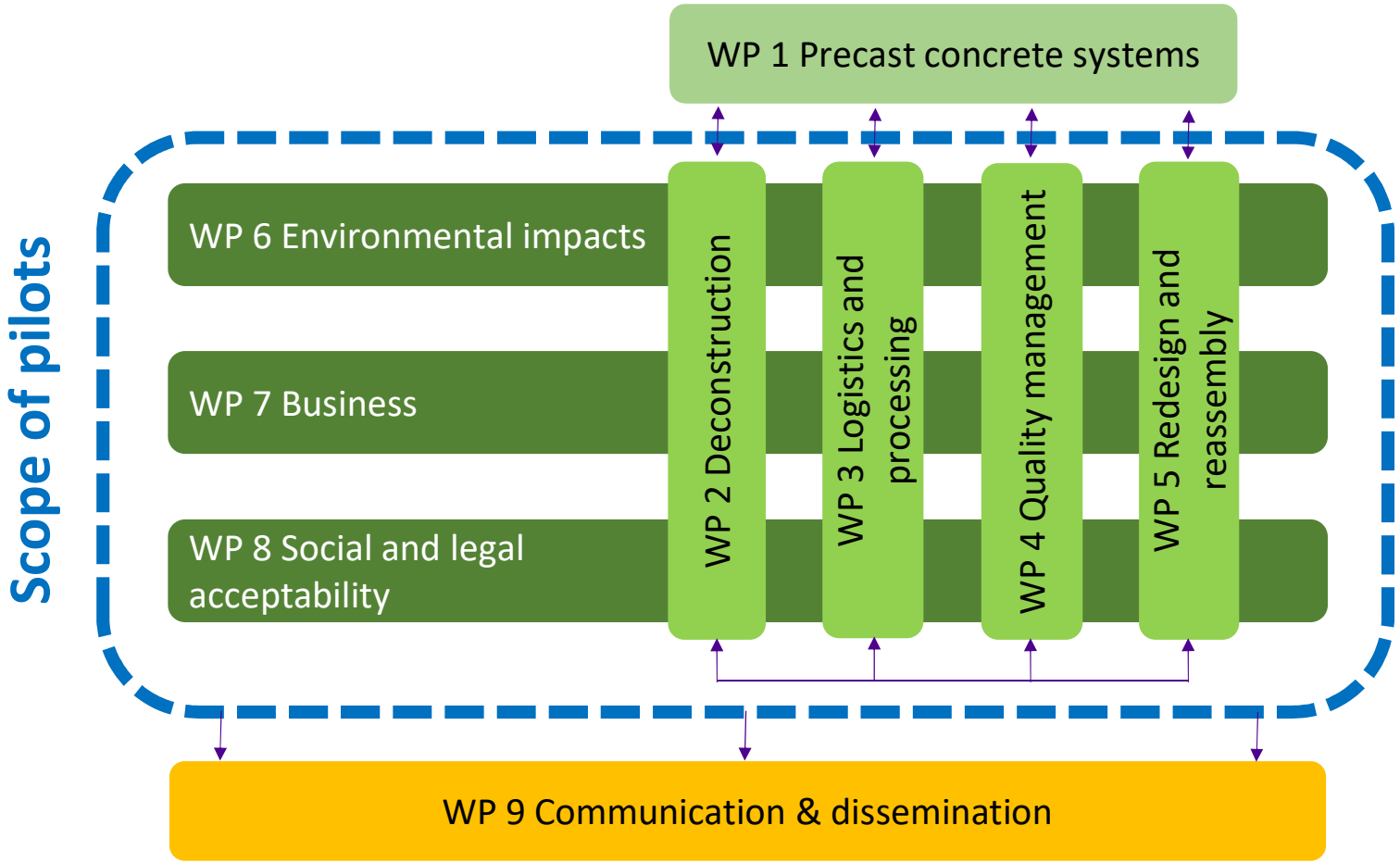
Core substance & work structure



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The ReCreate approach to warranty and liability

Finnish pilot as an example

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WP4 Quality management, leadership

Leader

Adjunct prof.
Jukka Lahdensivu
Tampere Unversity

Vice lead

Doctoral student
Aapo Räsänen
Tampere University

The rest of the presentation is based on their material.

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Quality management process

Pre-deconstruction audit
- **Number of reusable elements and the type of different structures.**

Structural condition investigation
- Material properties
- Hazardous substances
- Cracking, deterioration

Deconstruction
- Design
- Visual inspection

Demands from new building design
- Eurocodes and standards

Product approval and authorisation

Original structural design documents
- Age
- Type of elements
- Dimensions, holes, etc.
- Connections
- Exposure class
- Design values
- Reinforcement

Visual inspection

Condition investigation
- Structural behaviour
- Sampling

Visual inspection
- Visible damage

Asbestos and hazardous substances
- Sampling

Design
- Lifting equipment
- Support equipment
- Transport and storage

Visual inspection after deconstruction
- Visible cracks and damage
- Damage in connections
- Prestressed steels

Redesign
- Eurocodes
- Structural behaviour
- Fire safety
- Acoustic performance

Full-scale tests
- Beams
- Hollow-core slabs

New connections
- Testing if needed

Documentation of previous stages

No CE mark required

Site-specific approval

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Structural condition investigation

- Indirect tests
  - Rebound hammer for compressive strength and its variability
  - Ultrasonic pulse velocity for concrete quality
  - Concrete cover depth measurements from each reinforcement type
- Core samples
  - Compressive strength
  - Carbonation depth

- 1:1 loading tests for beams and hollow-core slabs in a laboratory
  - Additionally deviation and variability of a individual structure will be studied with non-destructive test methods before and core tests after the load test

→ The aim is to find out the minimum required test methods and sample sizes for testing concrete elements for reuse (scientific paper presently under review)

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Hazardous substances

- The presence of hazardous substances in the building were studied before the deconstruction according to Finnish national guideline (RT 103501)
  - Asbestos, PAH, PCB, lead, oil-hydrocarbon
  - Found in supplementary materials, not in the concrete itself
- In addition, the presence of volatile combounds TVOC and 2-Ethylhexanol in the floor structures were studied
  - High values were obtained from the screed

→No harmful substances in the concrete elements themselves

→All materials containing harmful substances were removed as the first stage of the deconstruction

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Warranty and liability

- The EU commission has stated that deconstructed building materials and elements fall, as a rule, under national regulation.
- They are products which have entered the EU market before the CE mark regulation has come into force, therefore the CE mark is not required if the products are **reused** and not **remanufactured**.

- In Finland, such products are approved for use in a '**site-specific approval**' process.
- The **construction company** using the products takes the responsibility towards the client, **in a similar fashion as for in-situ cast structures**.
- However, as a result of the ReCreate quality management process, the characteristics of the reused elements are **known better** than those of in-situ cast structures.

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Thank you!

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