



Co-funded by the Horizon 2020
Framework Programme
of the European Union



Praktijkervaring uit pilootprojecten BAMB

Reburg: the world's most circular city'

@ BUILDUP

GENT, 23 FEBUARI 2019



Wim Debacker | [VITO](#)



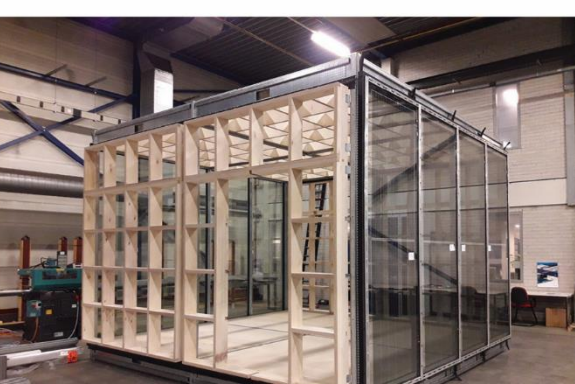
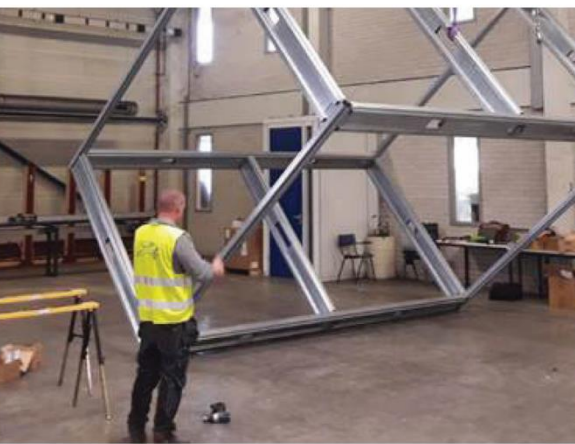
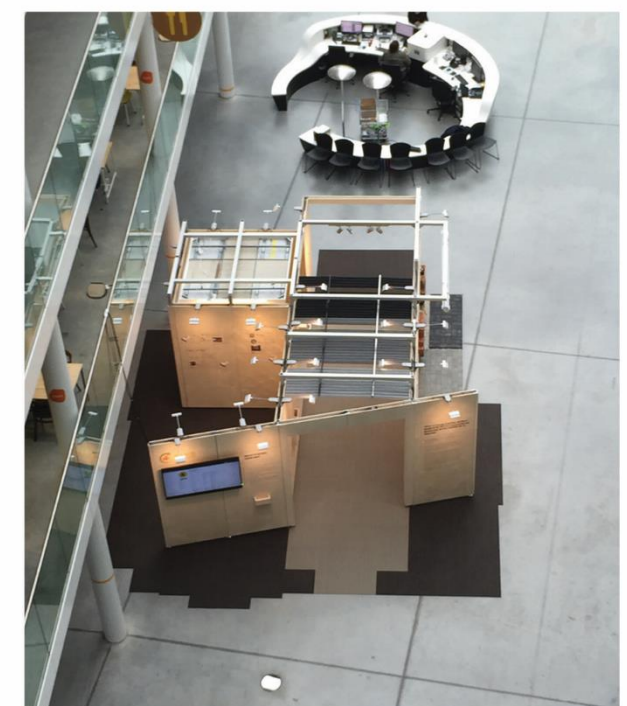
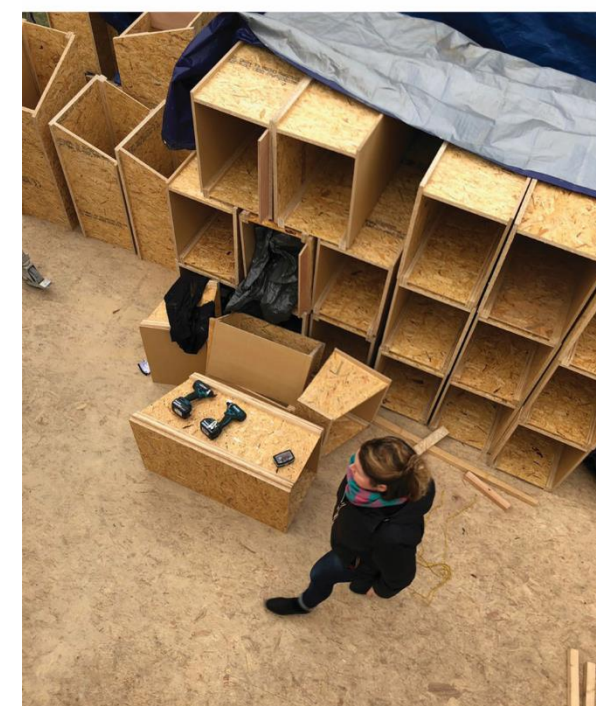
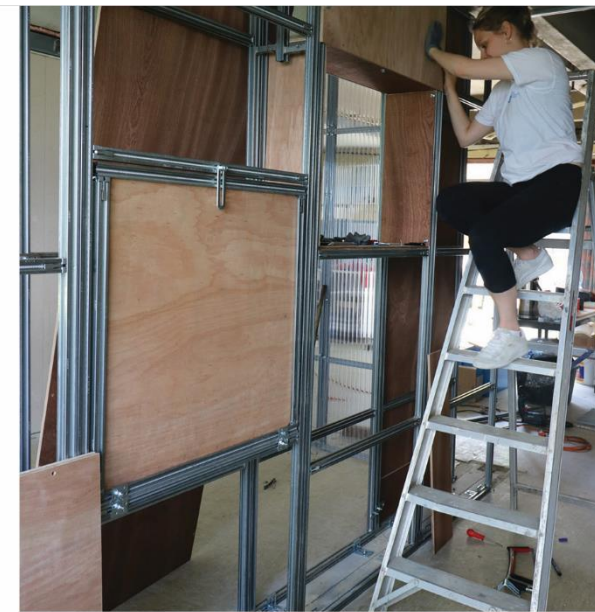
VLAANDEREN
CIRCULAIR





Lessen uit de toekomst

Lessen van vandaag





DRONE DELIVERY

GREEN TOWER

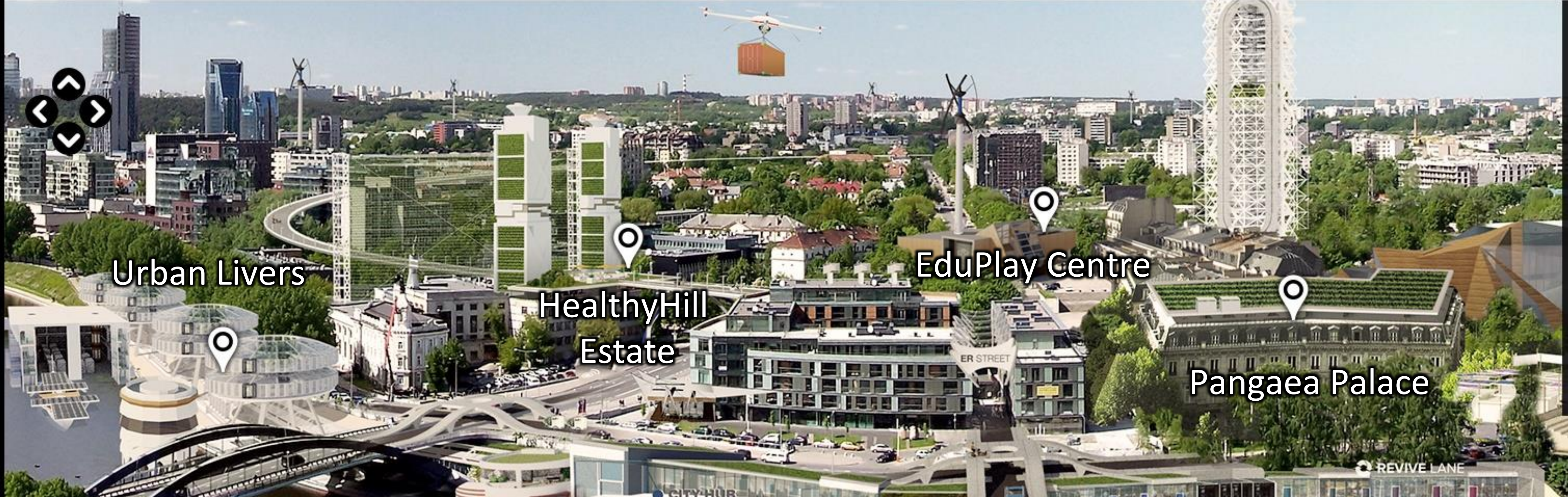
WATER TREATMENT PLANT

CITY HUB

ER STREET

REVIVE LANE

FAB CENTER



Urban Livers

HealthyHill Estate

EduPlay Centre

Pangaea Palace

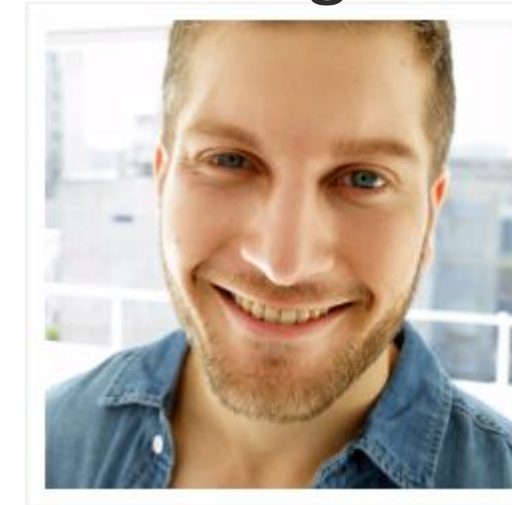
Erica Molano



Elma Hobbs

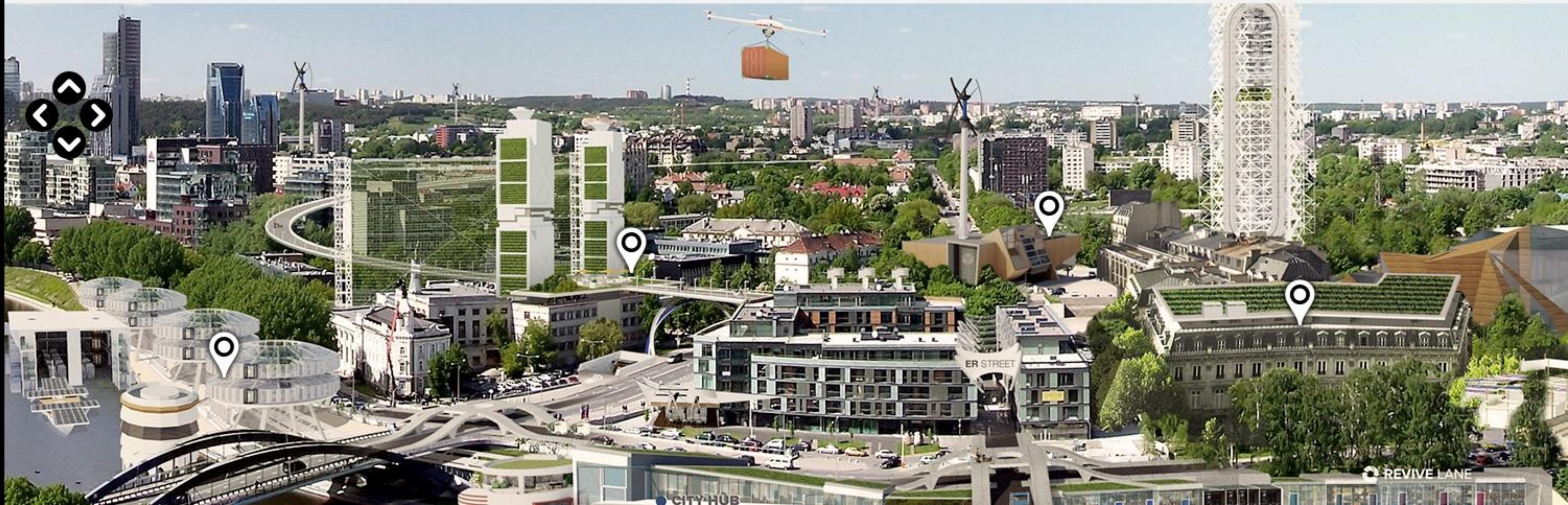
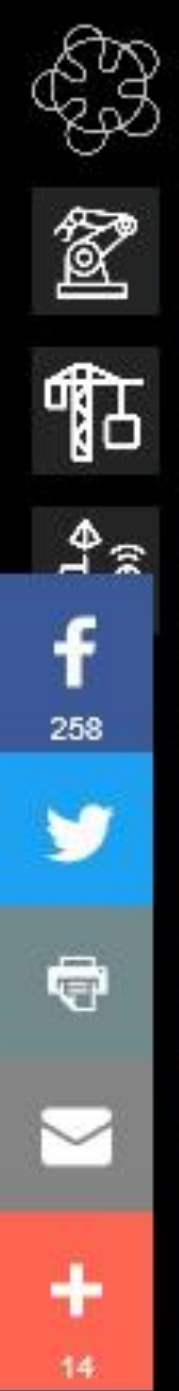


Rodrigo Madagani



Carmen Van Zandt





Erica
Molano



Resident at Pangaea Palace
President of the school council
Daughter of resident at Healthy Hill



Erica Molano



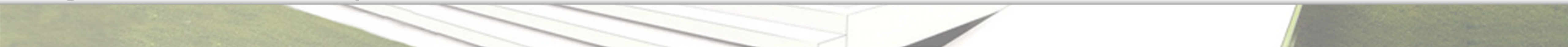
Resident at Pangaea Palace
President of the school council
Daughter of resident at Healthy Hill



Erica
Molano



Resident at Pangaea Palace
President of the school council
Daughter of resident at Healthy Hill





Elma Hobbs



building system developer
at Meccalegos Ltd

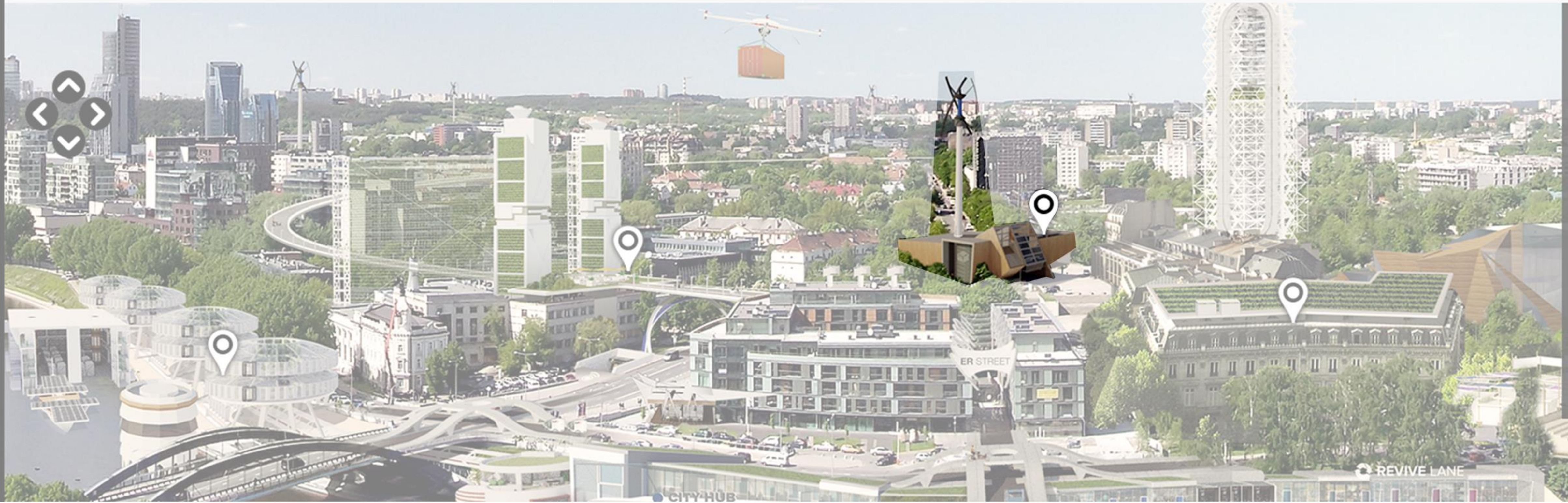
A vertical sidebar on the left side of the page. It contains several icons: a home icon, a magnifying glass for search, a social media icon, a printer icon, an envelope icon, and a plus sign. Below the plus sign is the number '14'. There are also four directional arrow icons (up, down, left, right) arranged in a circle.



Elma Hobbs



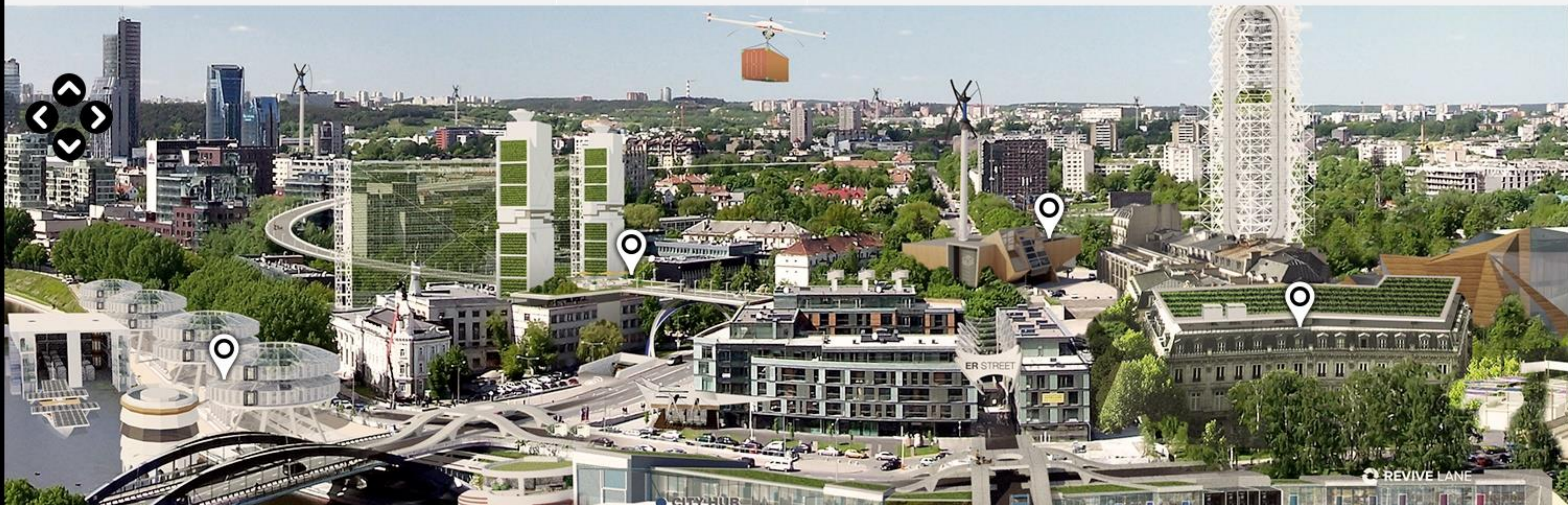
building system developer
at Meccalegos Ltd



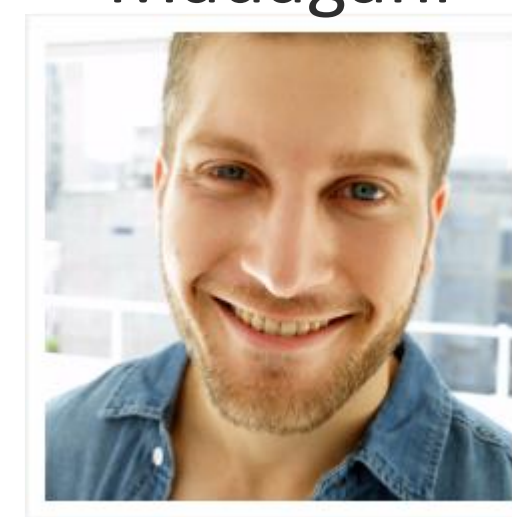
Elma Hobbs



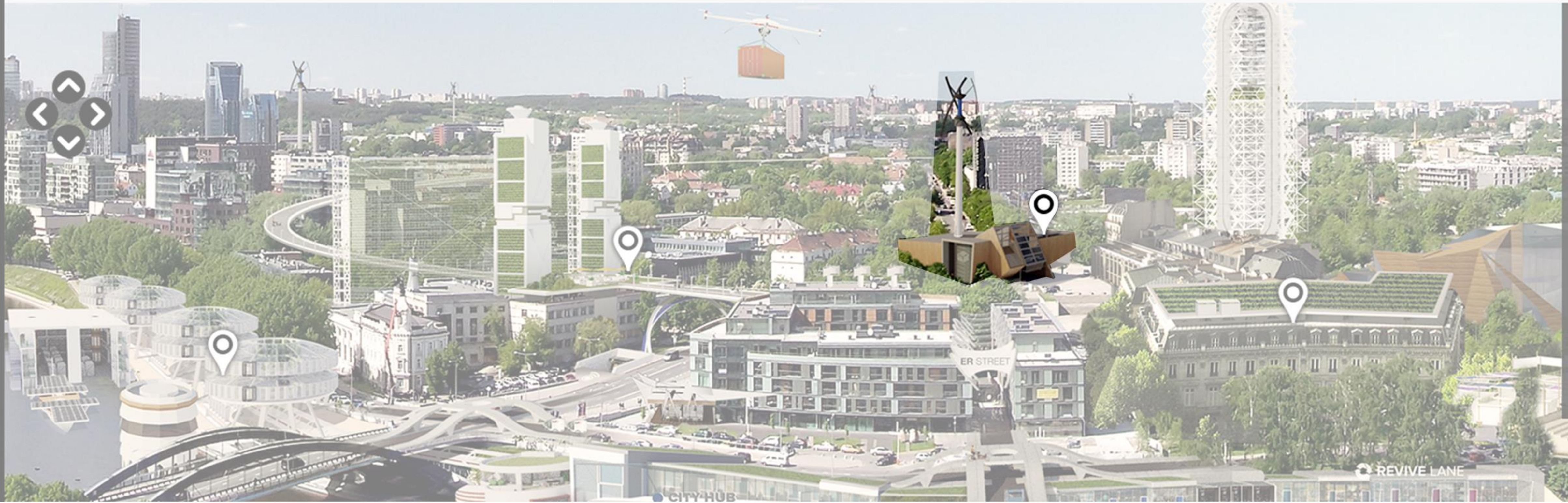
building system developer
at Meccalegos Ltd



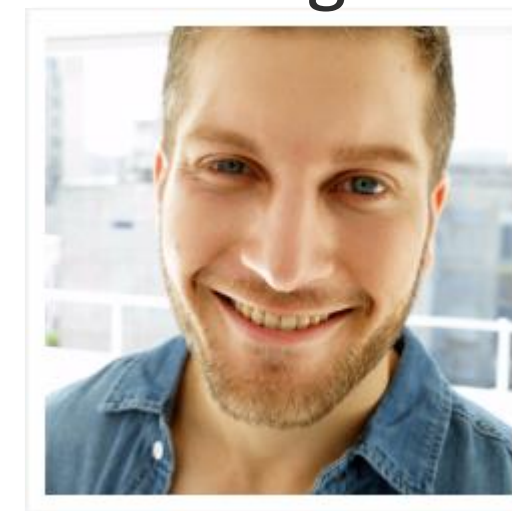
**Rodrigo
Madagani**



**building stock
manager at
Facilitoutatis**



**Rodrigo
Madagani**

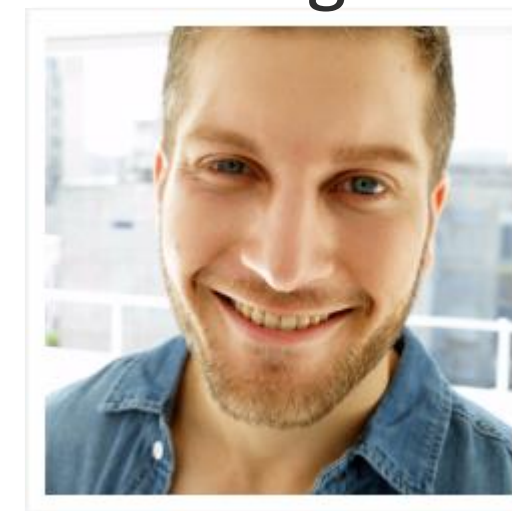


**building stock
manager at
Facilitoutatis**

A vertical sidebar on the left side of the page. It contains several icons: a home icon, a magnifying glass for search, a construction crane, a social media icon (Facebook), a Twitter icon, a printer icon, an envelope icon, and a plus sign for additional options. Below the social media icons are numerical counts: '258' for Facebook and '14' for the plus sign.



**Rodrigo
Madagani**



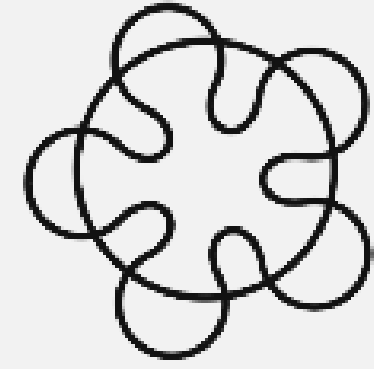
**building stock
manager at
Facilitoutatis**



Carmen Van Zandt



component wizard at Urban Metabolism Ltd



CITY OF
REBURG

WORLD'S MOST
CIRCULAR CITY

← Back

MATERIAL BANKS

In the beginning of the 21st century, Reburg, like many cities, suffered from wasteful construction and demolition works. More than 30% of all waste generated within Reburg originated from construction and demolition works. Nowadays, Reburg has adopted a circular building practice, which is aimed at getting resources back in such a way that they can be used again for other applications. Two strategies can be put forward to achieve this:

- **Urban Mining**, by recovering building materials and building components from existing buildings for low- or high value recycling/reuse, even though these buildings were initially not designed to be easily deconstructed.
- **Urban Metabolism**, by designing, installing and re-installing building components in such a way that they are used over and over again.

In both strategies, buildings are considered as materials banks, temporary repositories of valuable building products that can be recovered for other applications as well. Only a limited amount of primary resources have to be imported to keep the cycle running and only a limited amount of materials end up as waste that needs to be disposed.



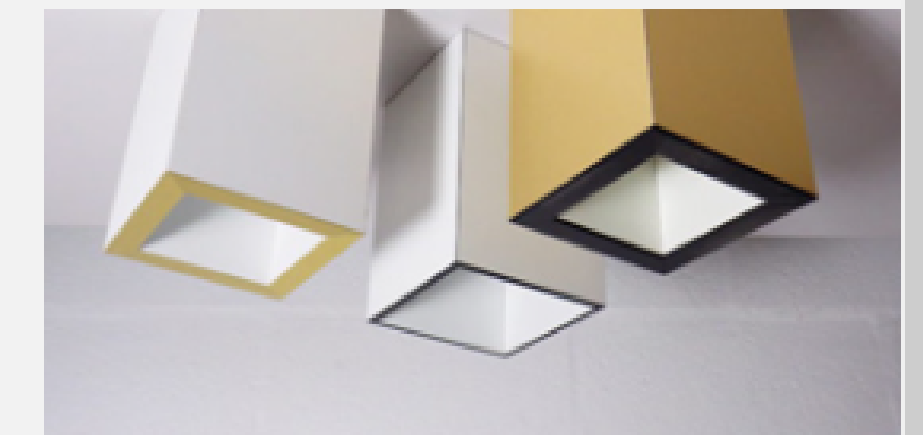
IT'S HAPPENING TODAY_

SIGNALS OF CHANGE



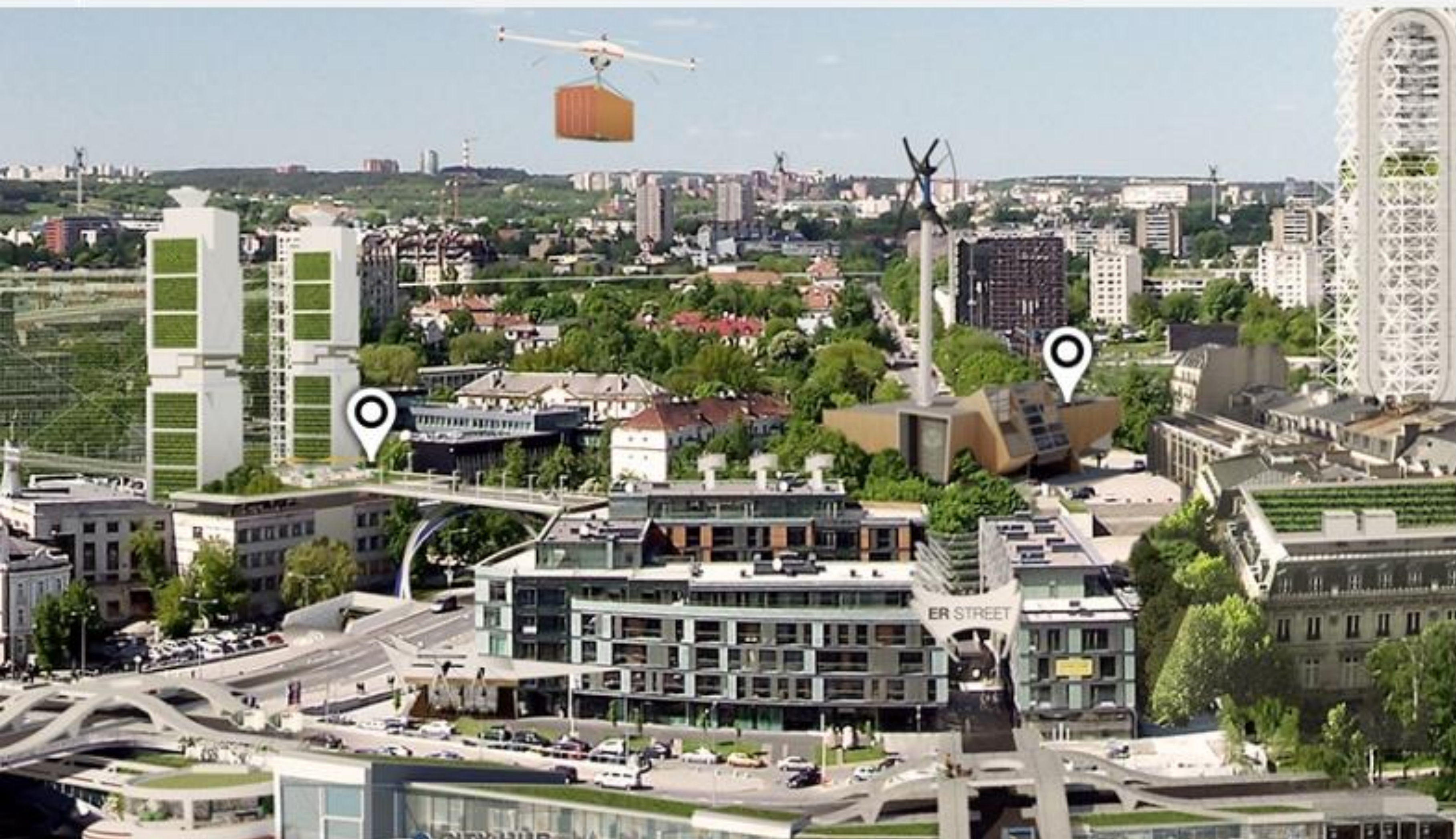
URBAN MINING COLLECTIVE

Urban mining as a thriving business




ROTOR DECONSTRUCTION

Pooling of reclaimed building components




CONSTRUCTION JOBS IN REBURG

 INDUSTRIES

 Building configurator


INTERMODULAR
CONSTRUCTION


 Building assembler


Facilitoutatis

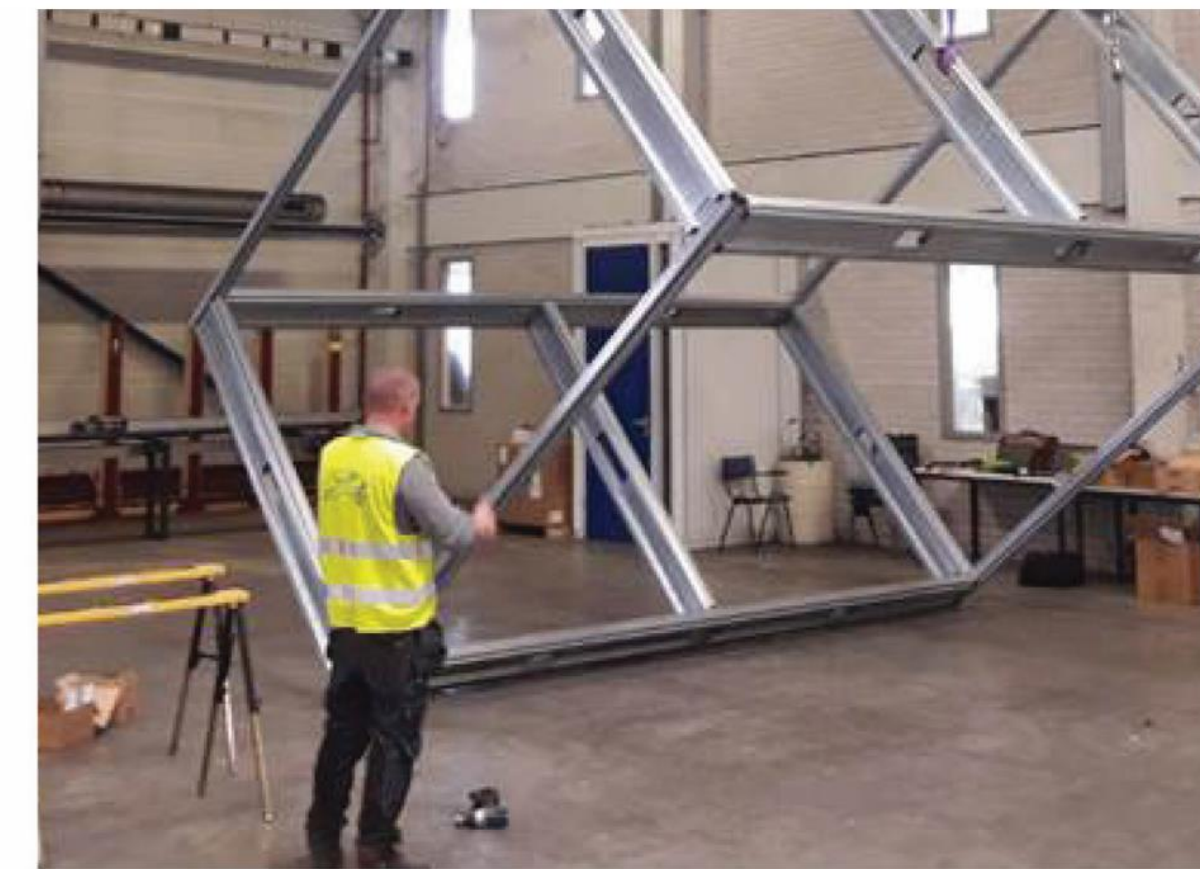
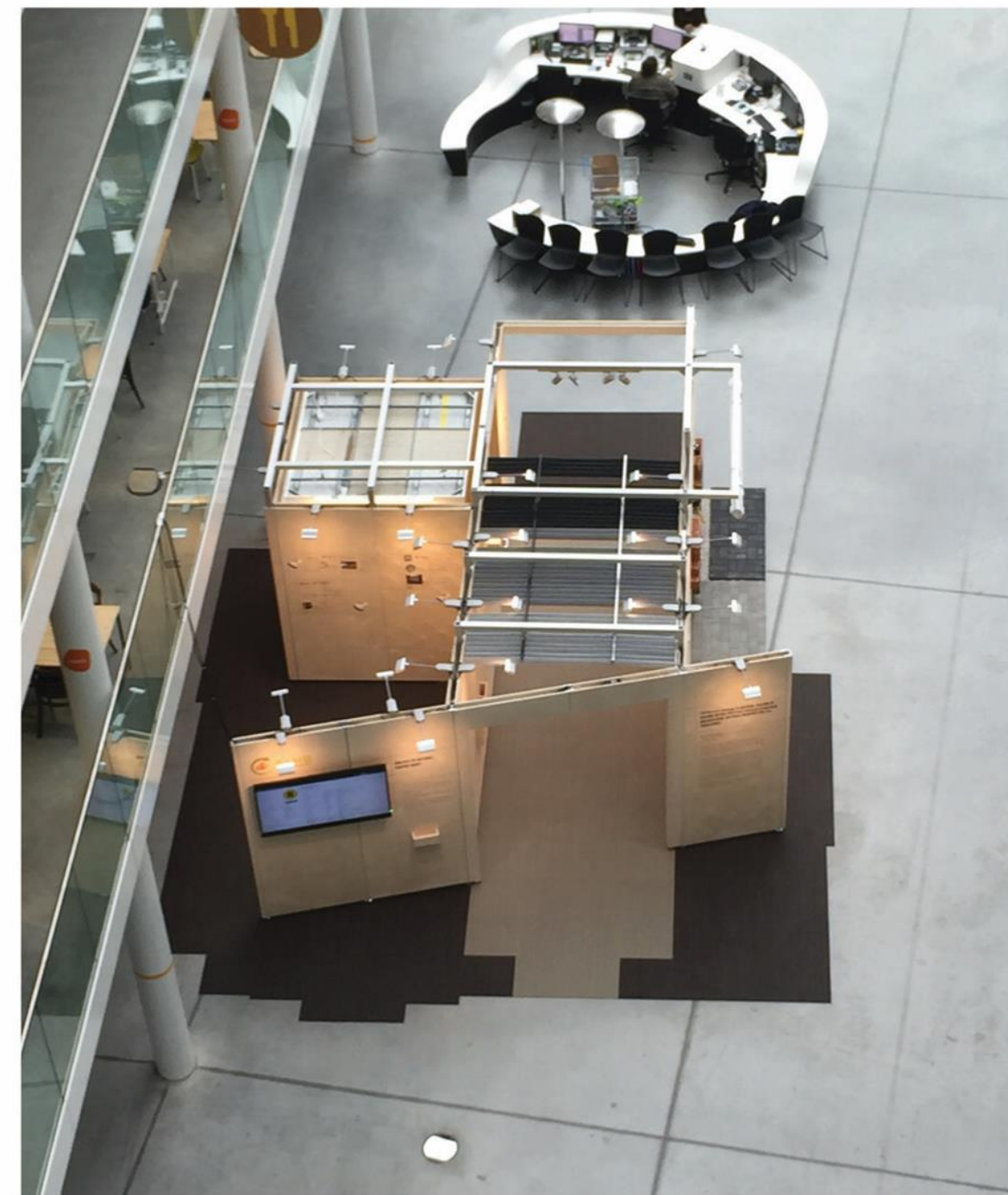
 Building stock manager

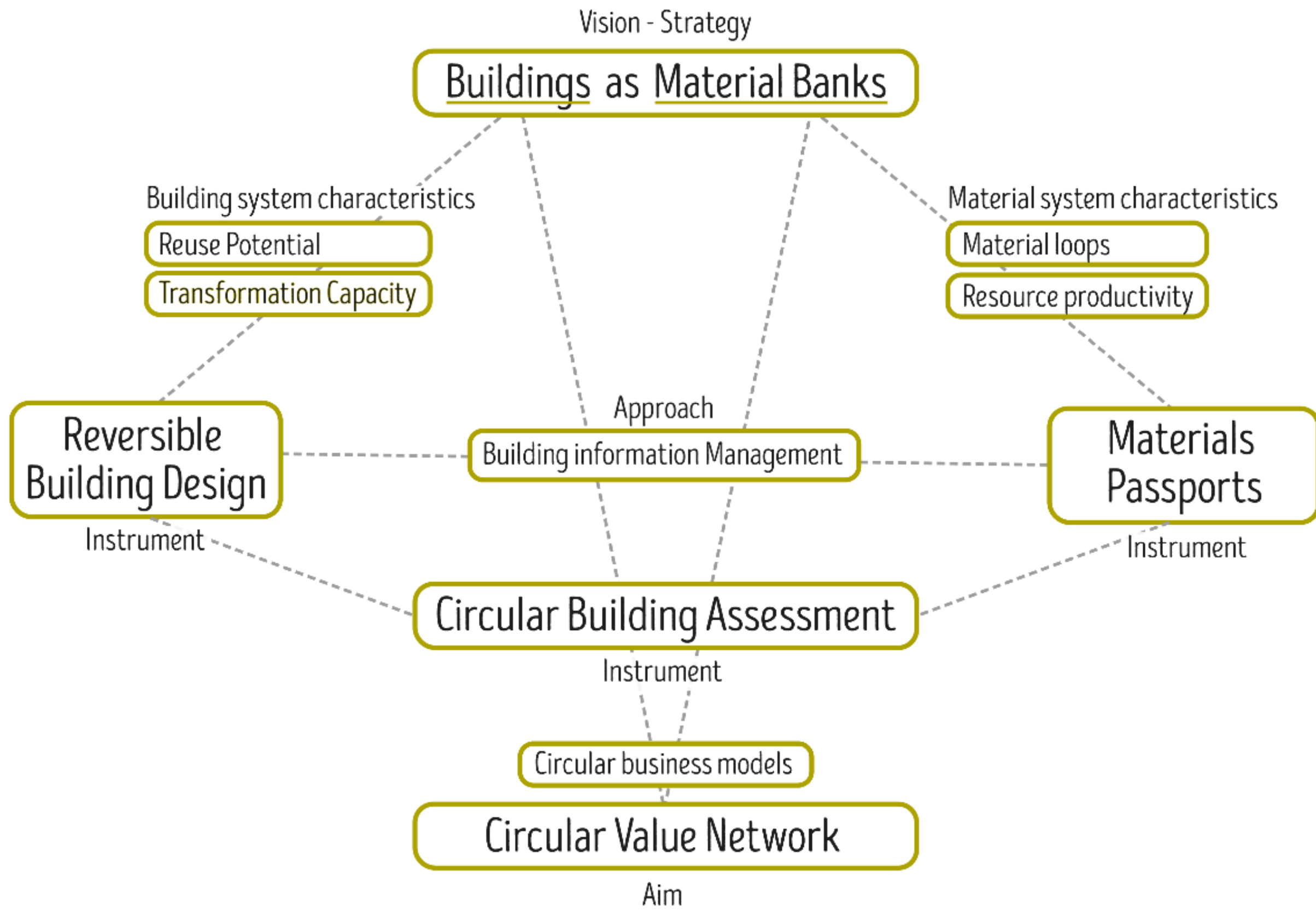
Digital Brick

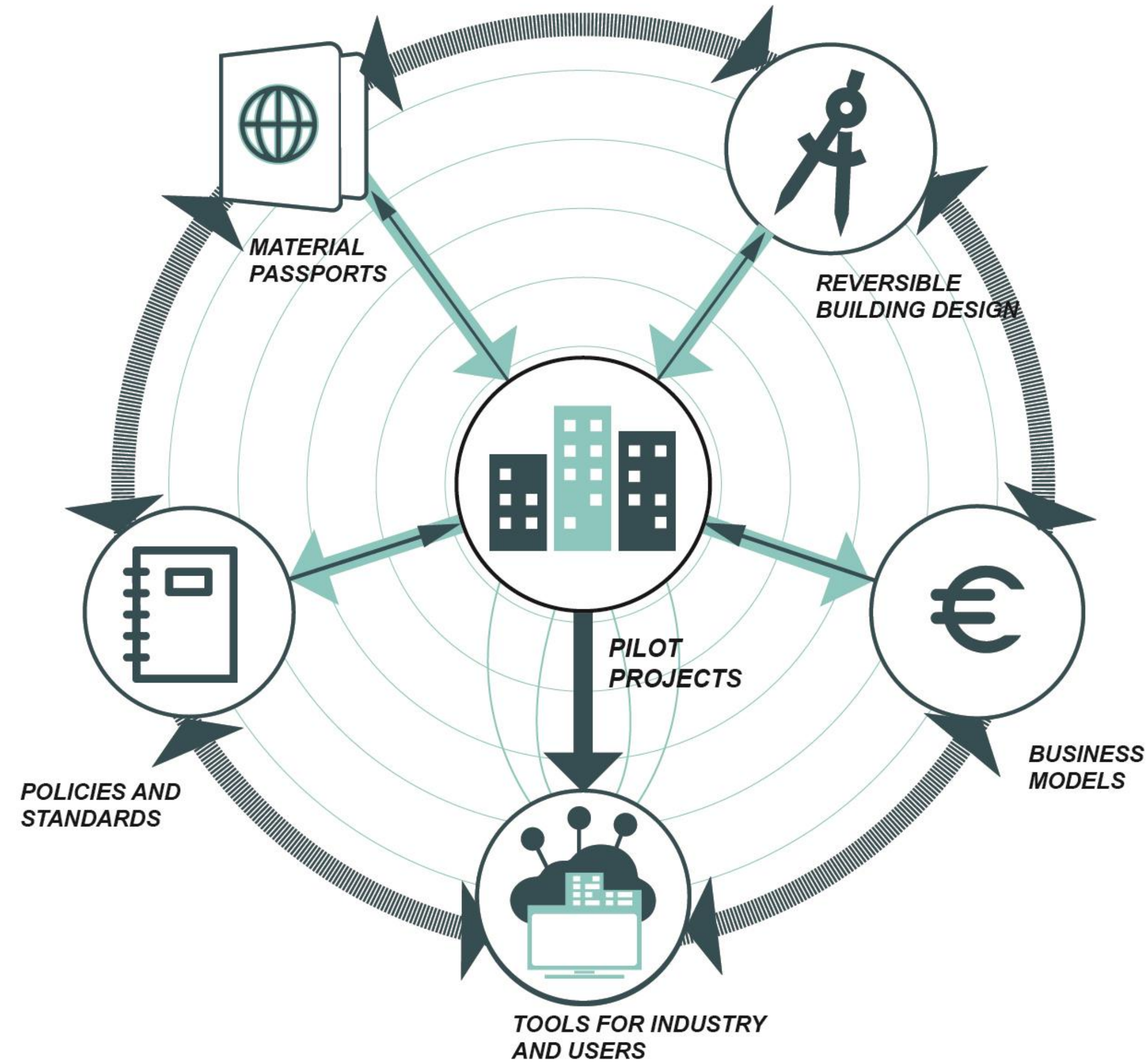
 Building system developer

 EduPlay Centre

 Urban Livers

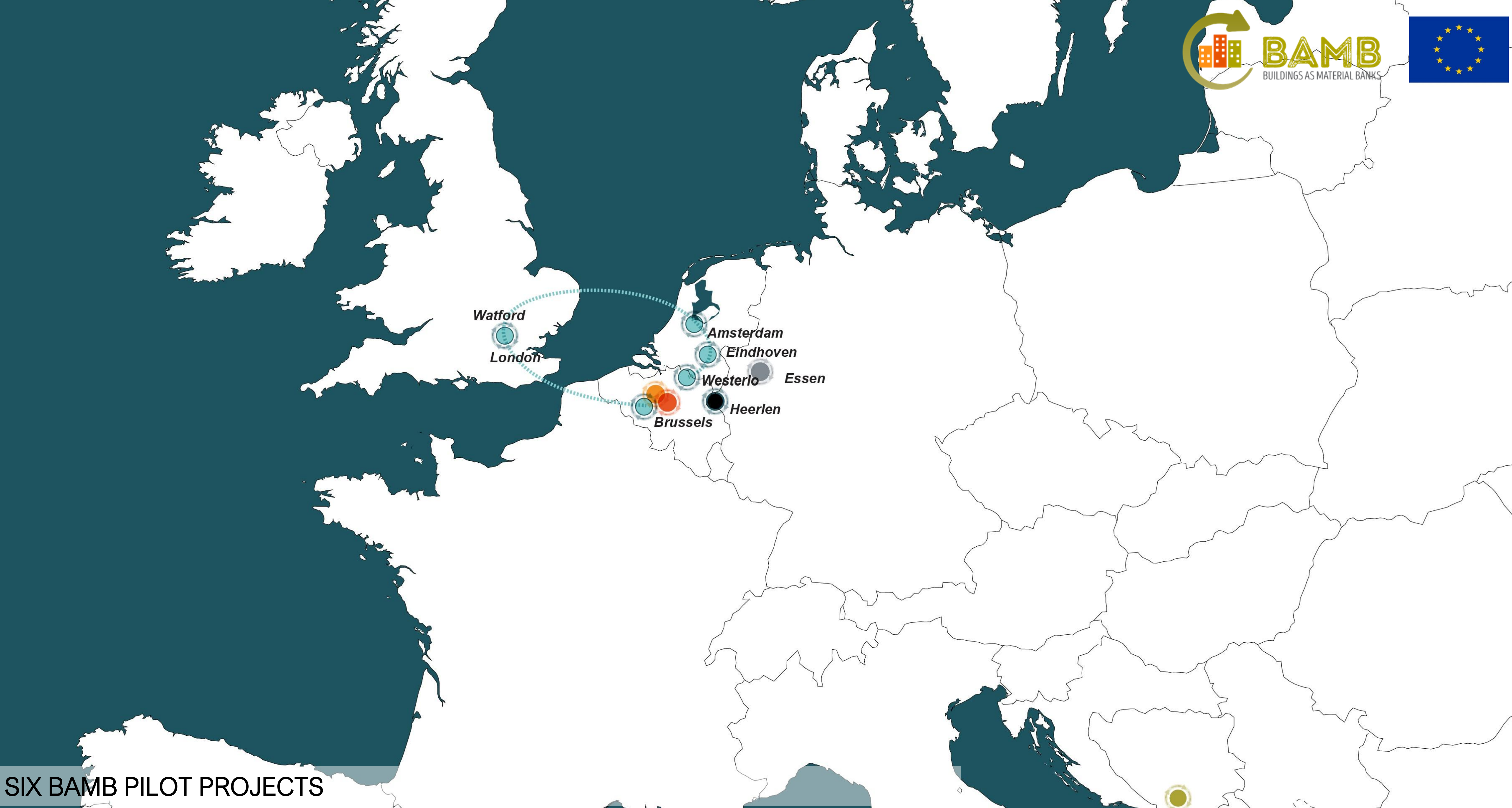






BUILDINGS AS MATERIAL BANKS – PILOT PROJECTS

TOWARDS A CIRCULAR CONSTRUCTION ECOSYSTEM



SIX BAMB PILOT PROJECTS

FOUR COUNTRIES



BUILD REVERSIBLE IN CONCEPTION (**BRIC**) BRUSSELS, BE



NEW OFFICE, (**CRL**) GERMANY



CIRCULAR RETROFIT LAB (**CRL**) BRUSSELS, BE



REVERSIBLE EXPERIENCE MODULES (**REMs**) TRAVELLING EU

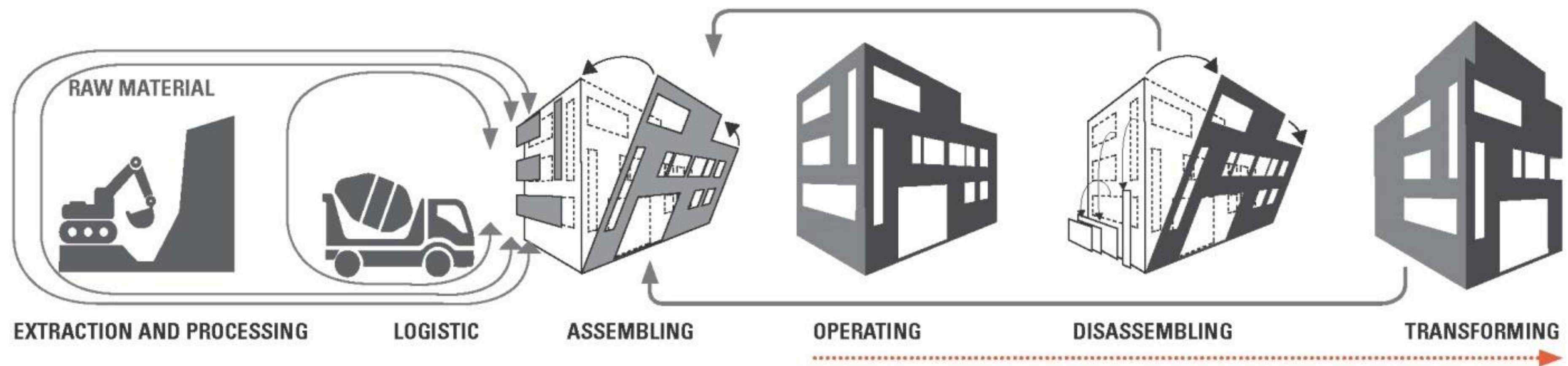


GREEN TRANSFORMABLE BUILDING LAB (**GTB LAB**) HEERLEN, NL



GREEN DESIGN CENTRE (**GDC**) BOSNIA HERZEGOVINA







95% OF MATERIALS ARE REUSABLE

41,770 kg CO₂eq

50%

SAVINGS COMPARED TO vs BRIC Non-Circular Design (2 transformations)

REDUCE WASTE GENERATION BY **75%-90%**

OPTIMISE CHOICES through Life Cycle Assessment (LCA) LIFE CYCLE COST (LCC)

REDUCE WASTE GENERATION BY **99%**

DEVELOPMENT OF MATERIALS PASSPORTS PLATFORM

REDUCE WASTE GENERATION BY **98%** BY DESIGN AND PRODUCTION

BENEFITS OF REUSE FOR HIGH IMPACT MATERIALS

BAMB SYSTEMIC SHIFT

SOME RESULTS



**INCREASE AND
EXTEND VALUE
OF MATERIALS**



**RESHAPE
THE DESIGN
APPROACH**



**REDISTRIBUTION
OF ROLES**



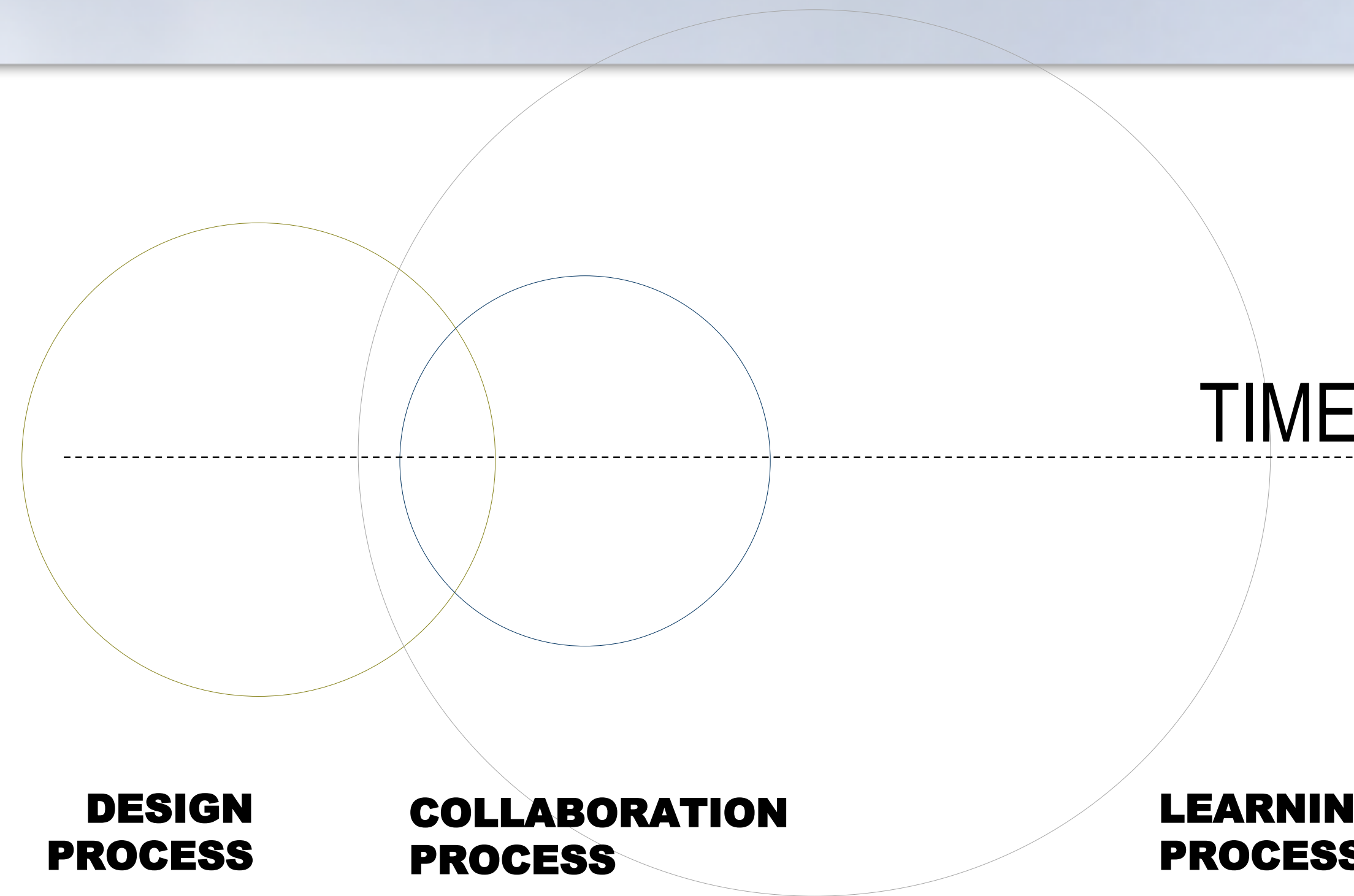
**SHARE
INFORMATION
ACROSS PROCESSES,
TIME**



**GATHER
INFORMATION
FOR FUTURE
ASSESSMENT
TOOL**

BAMB SYSTEM SHIFT

PILOTS PROVED THE IMPORTANCE OF THE PROCESSES

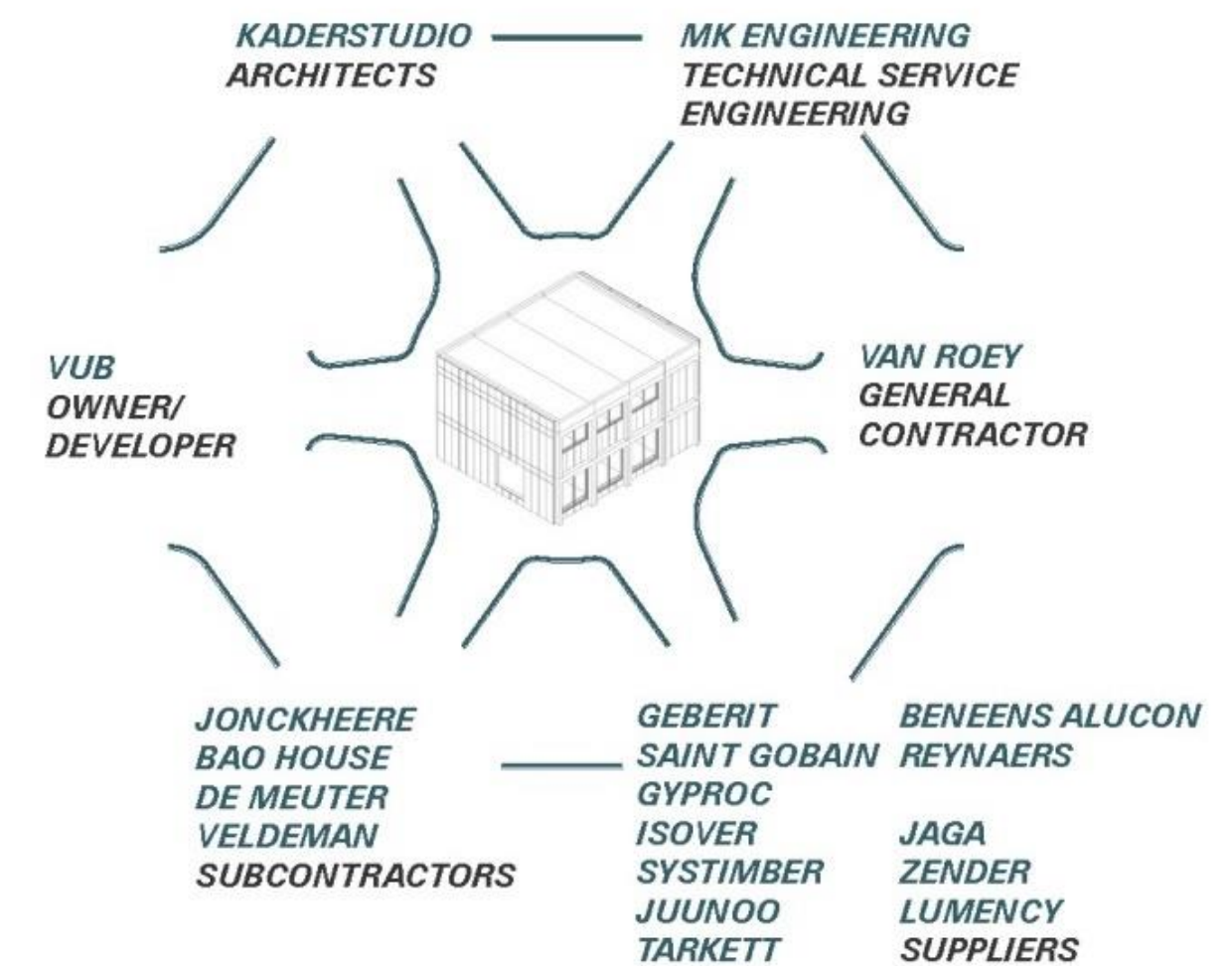
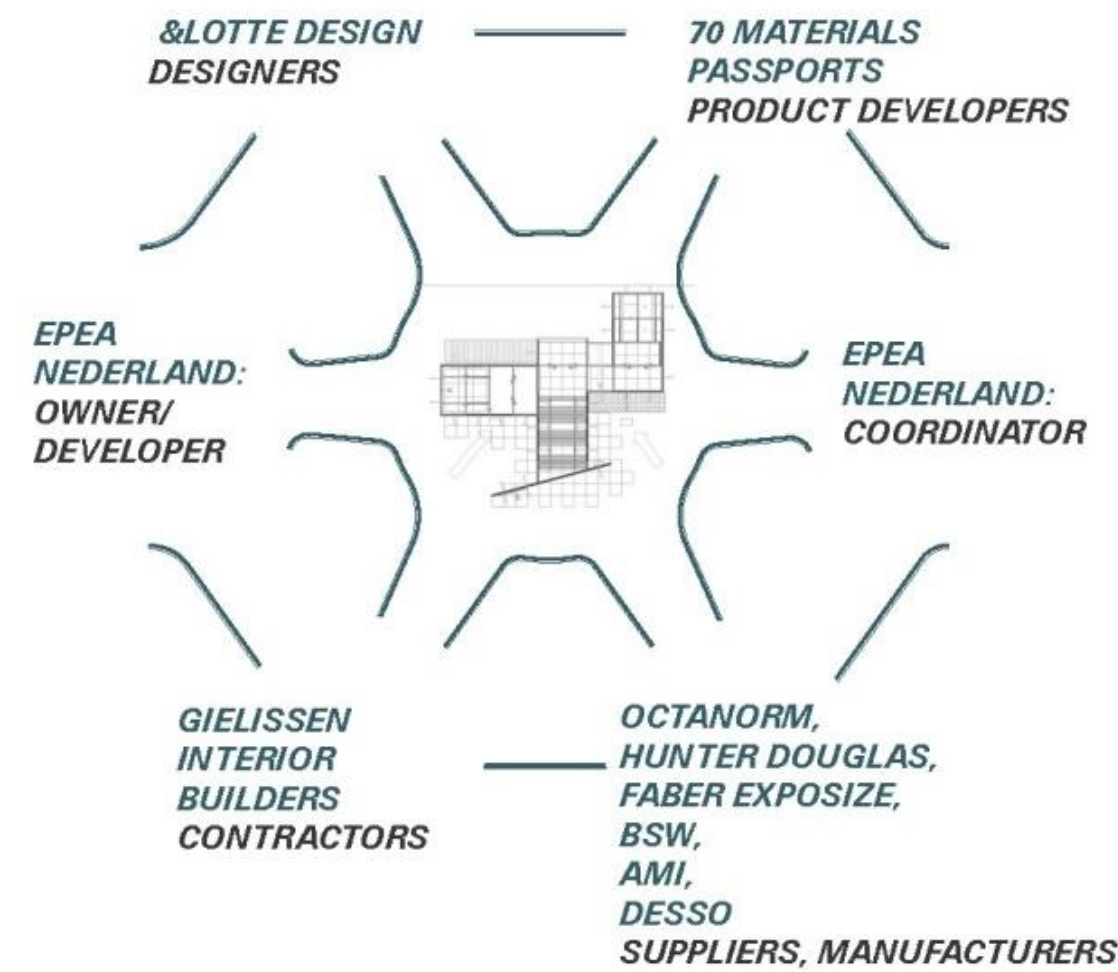
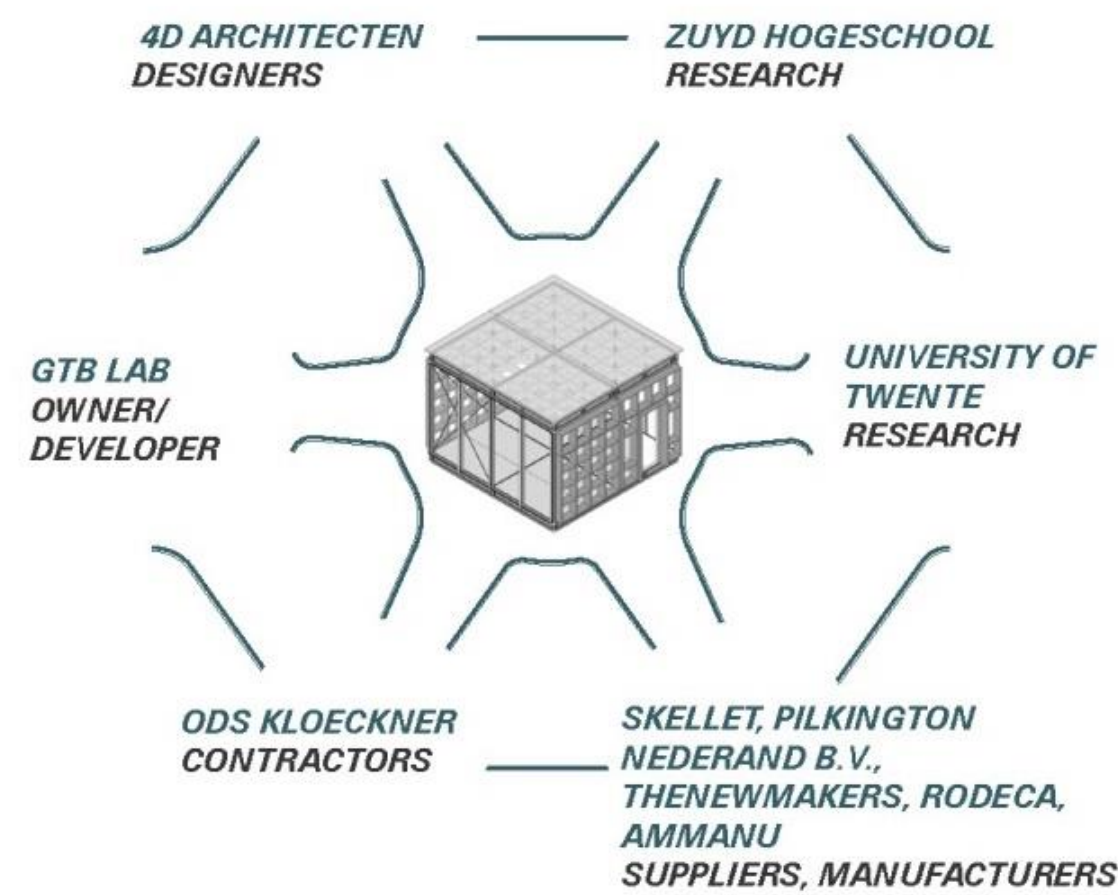
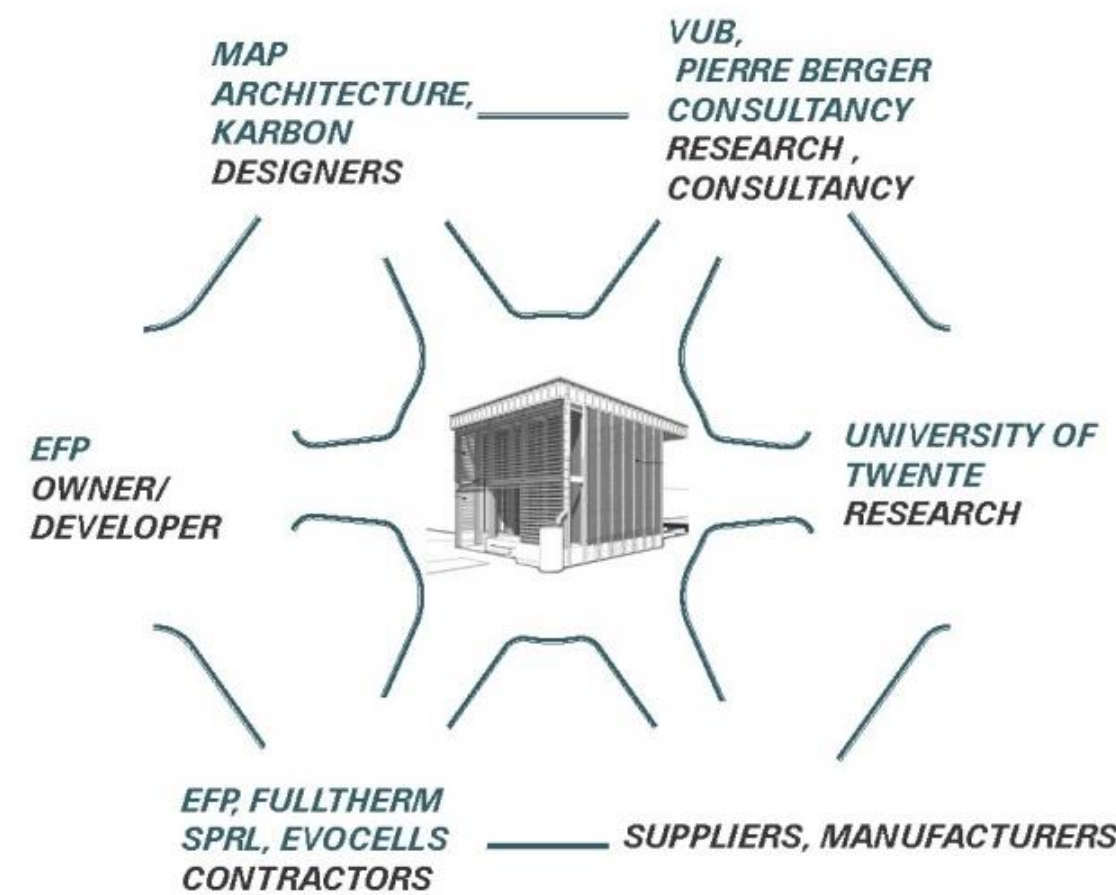


- VERSATILE PLAN LAY-OUT
- ADAPTABLE & UPGRADABLE
- DEMOUNTABLE & REUSABLE BUILDING KITS
- INDUSTRIAL PARTNERSHIPS
- LCA / LCC

- INVOLVE INDUSTRY
- INVOLVE ALL STAKEHOLDERS IN THE CONCEPTION PHASE

- PROTOTYPING
- WORKSHOPS
- TESTLAB

Getting aligned with stakeholders



STAKEHOLDER ECOSYSTEM

CO_CREATIVE VALUE NETWORK



■ GEBERIT

MK Engineering

VAN ROEY

SYSTIMBER
massieve houtbouwkits

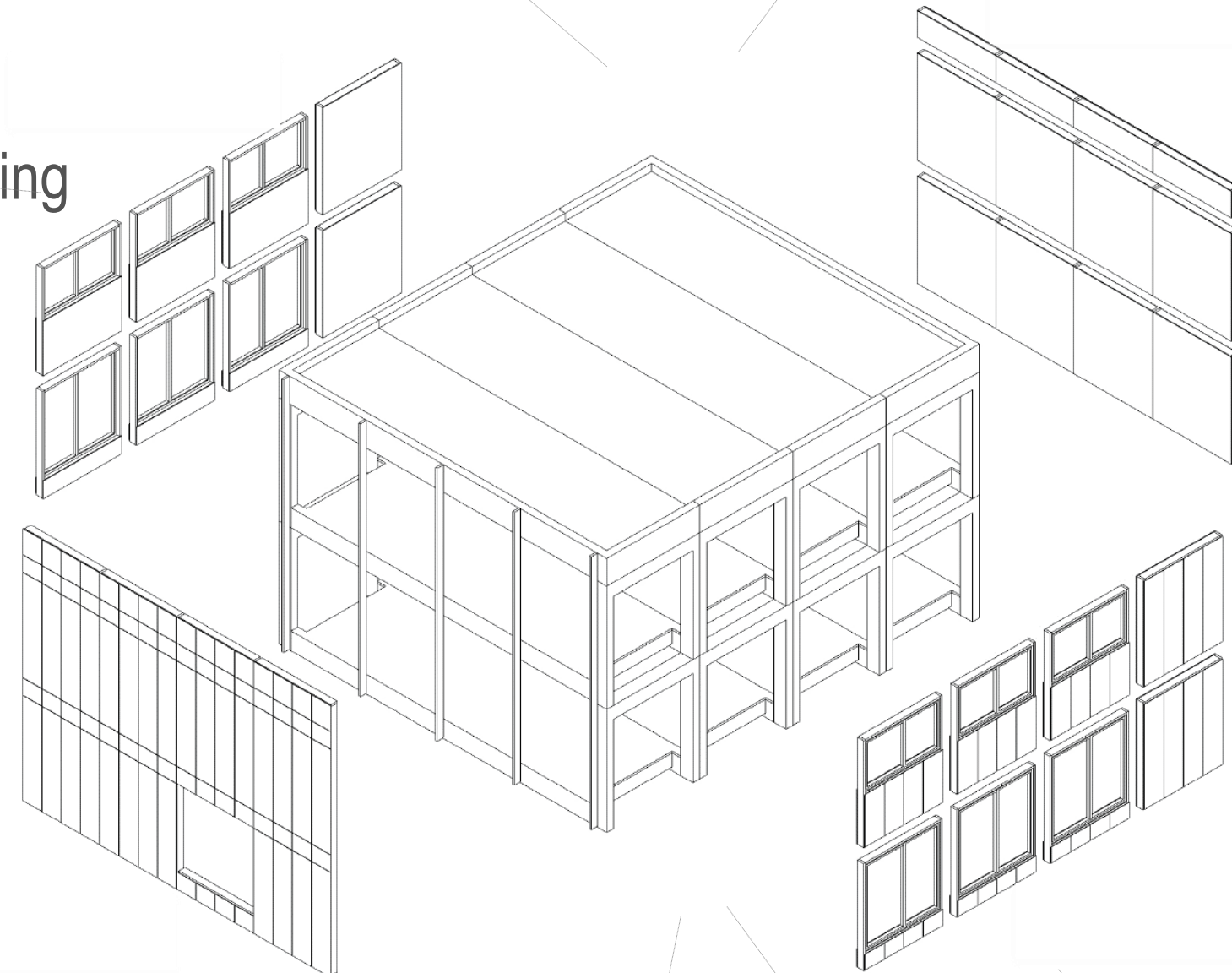
JuuNoo.com

KADERSTUDIO
architectural strategies bvba

Tarkett

REYNAERS
aluminium

Beneens
Alucon



jaga
CLIMATE DESIGNERS

Bao
Living

Jonckheere Projects
building a future in wood today

SAINT-GOBAIN

zehnder

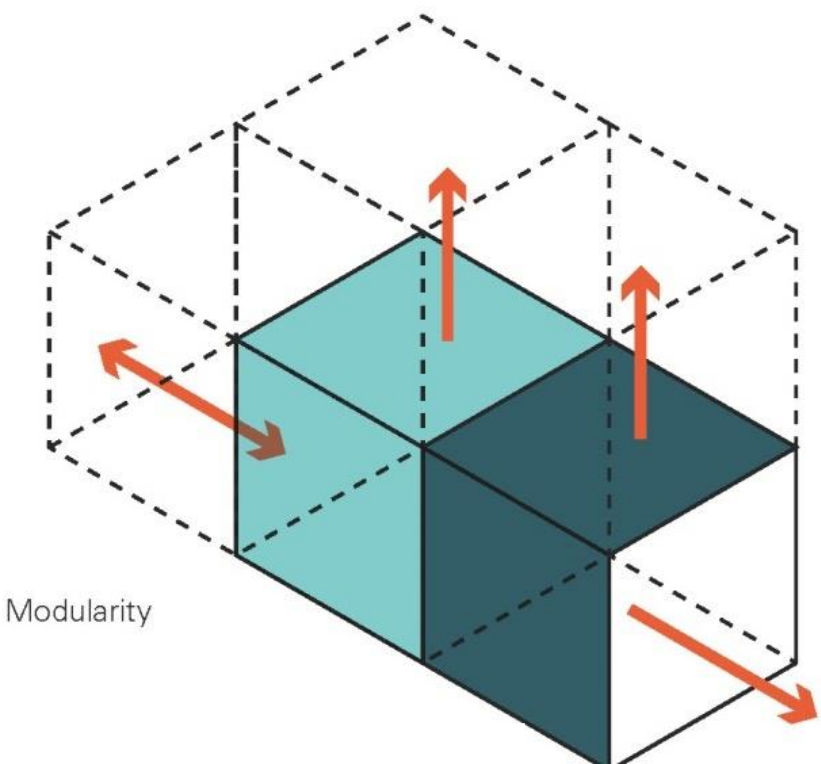
ISOVER
SAINT-GOBAIN

Gyproc
SAINT-GOBAIN

Lumency

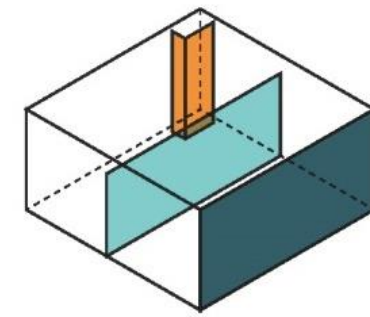


BUILDING

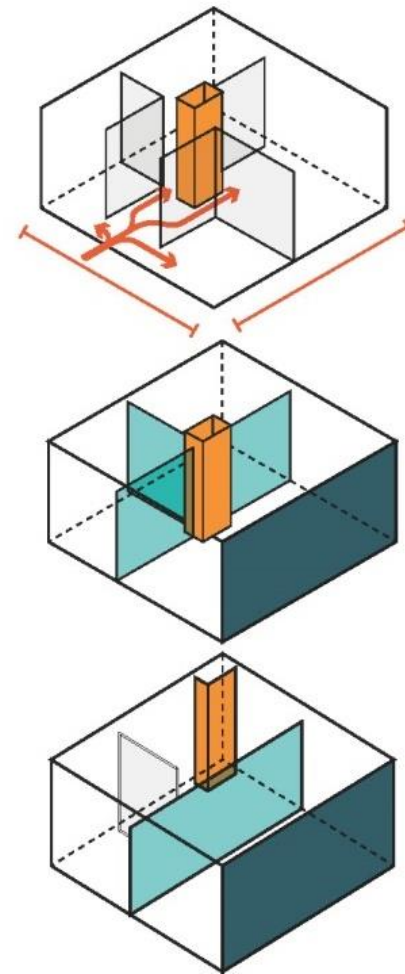


SPACE

Dimensions
Functional interdependence
Position of core elements



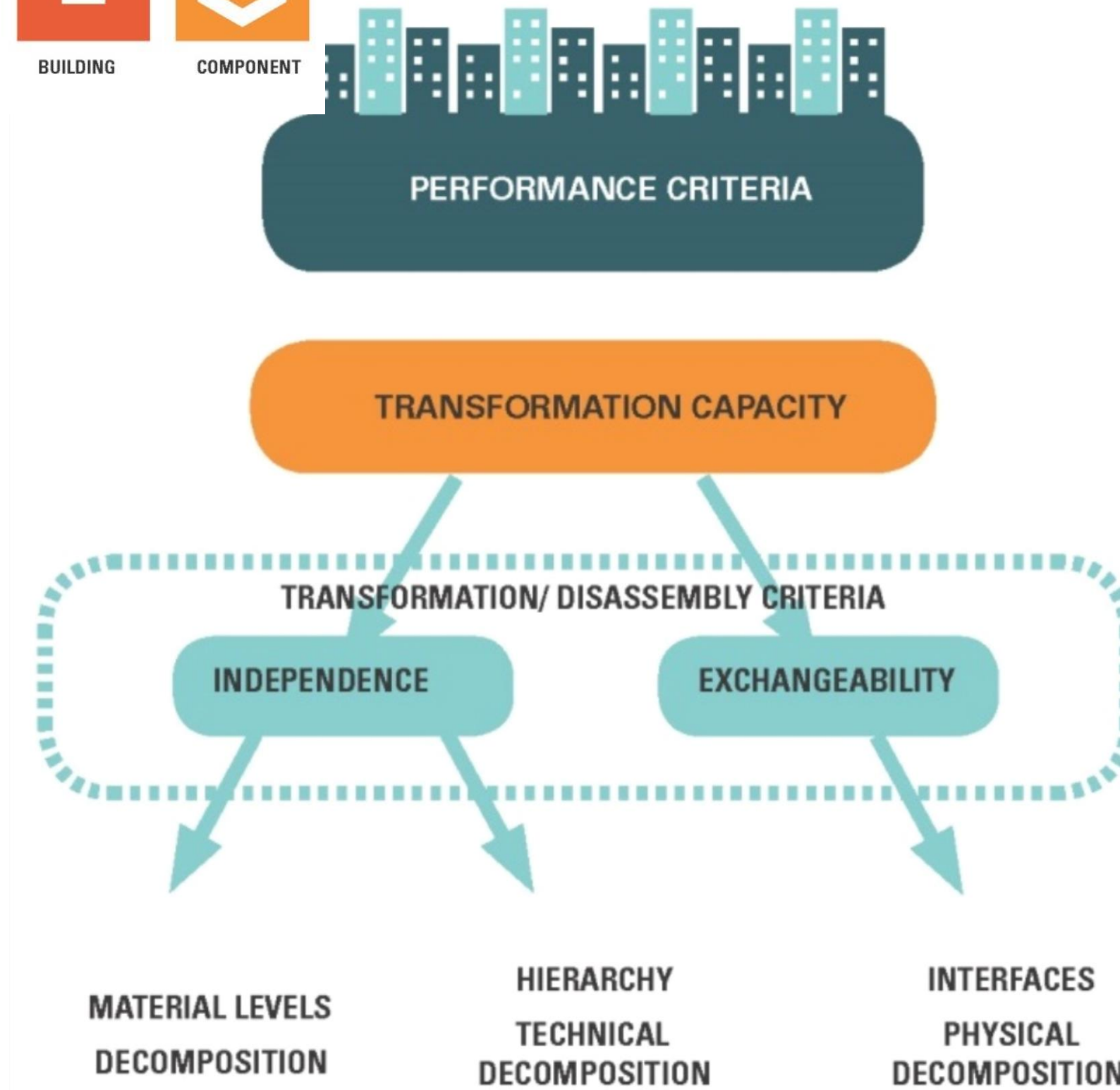
Scenario thinking
█ Technical services
█ Unit separations
█ Internal partition
█ Envelop



BUILDING



COMPONENT



MATERIAL



NEW MATERIAL



PROCESSED MATERIAL



BIO-BASED MATERIAL



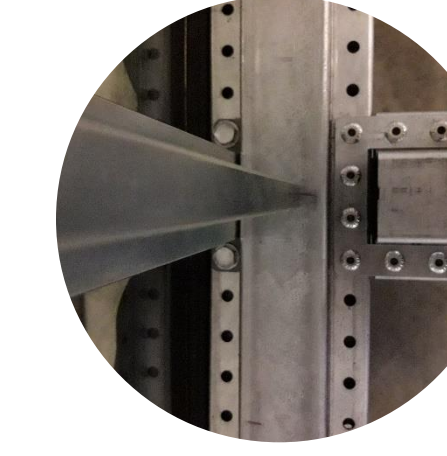
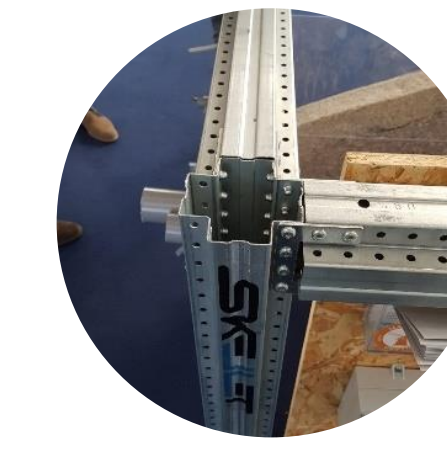
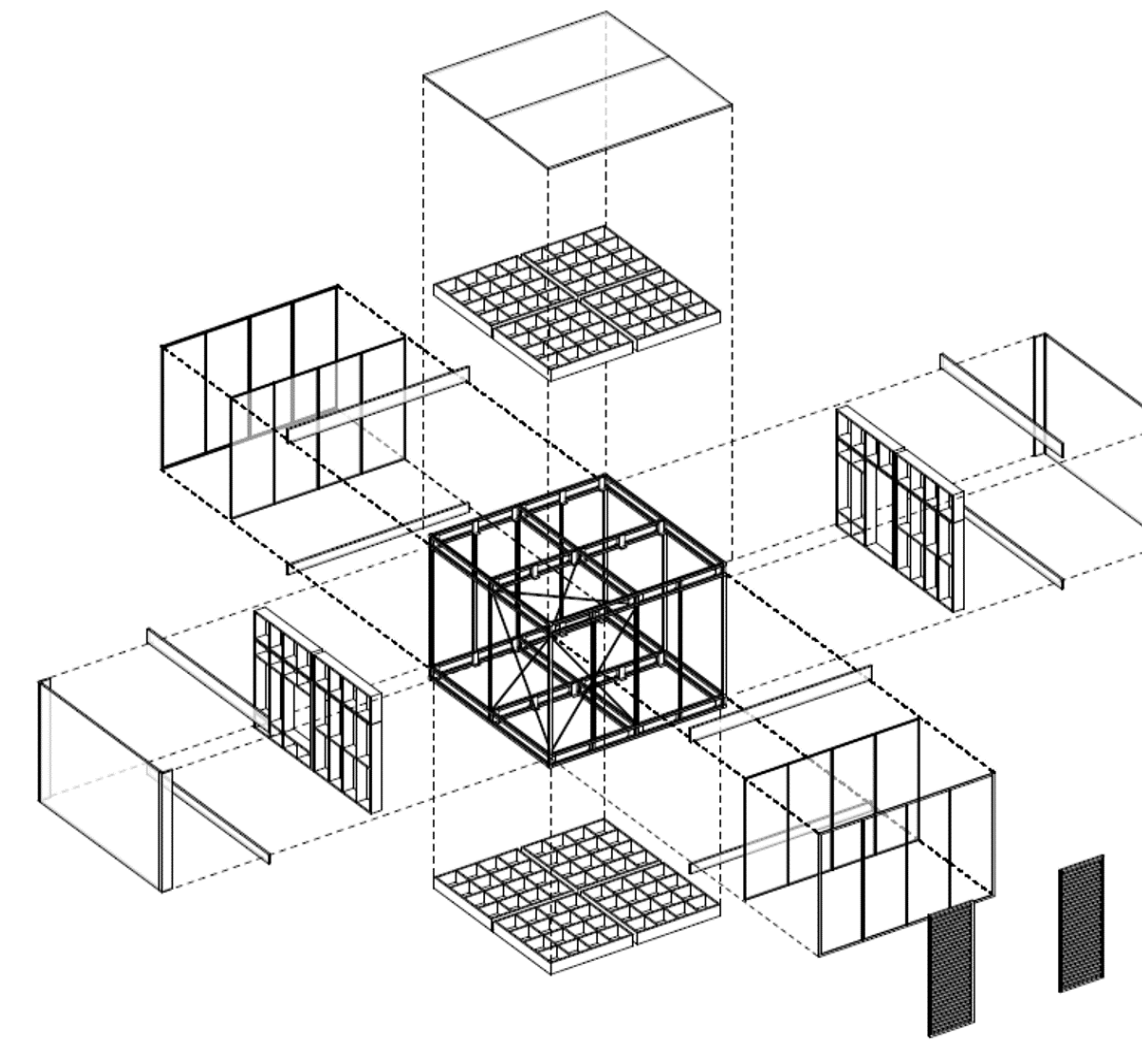
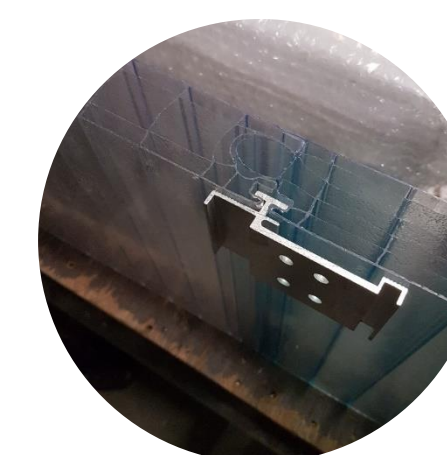
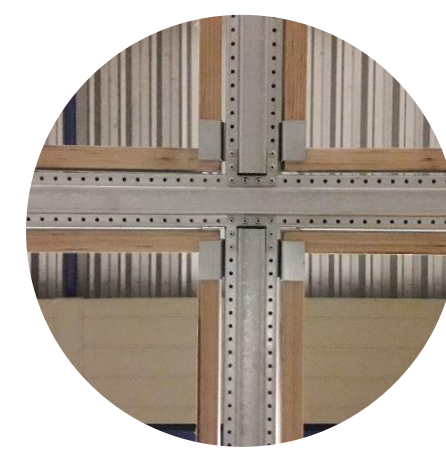
RECLAIMED MATERIAL

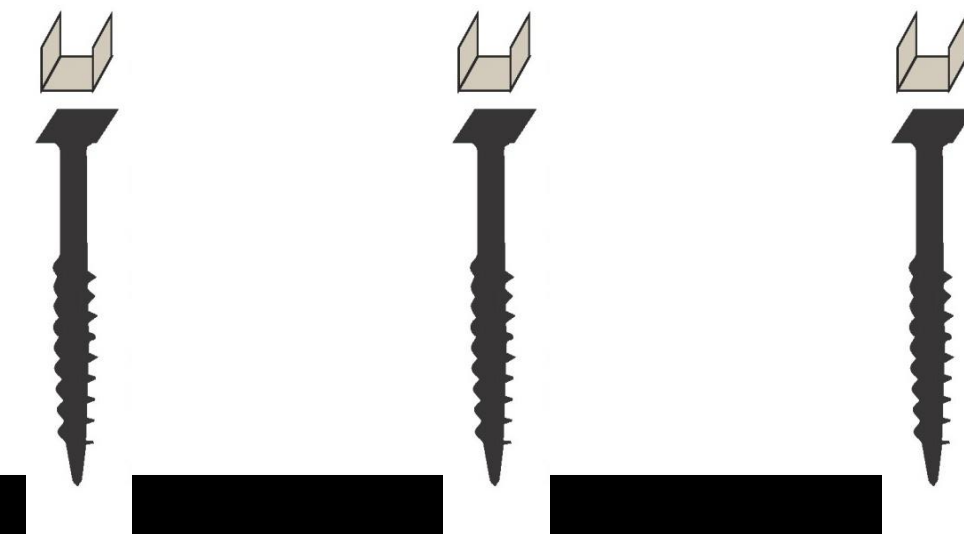
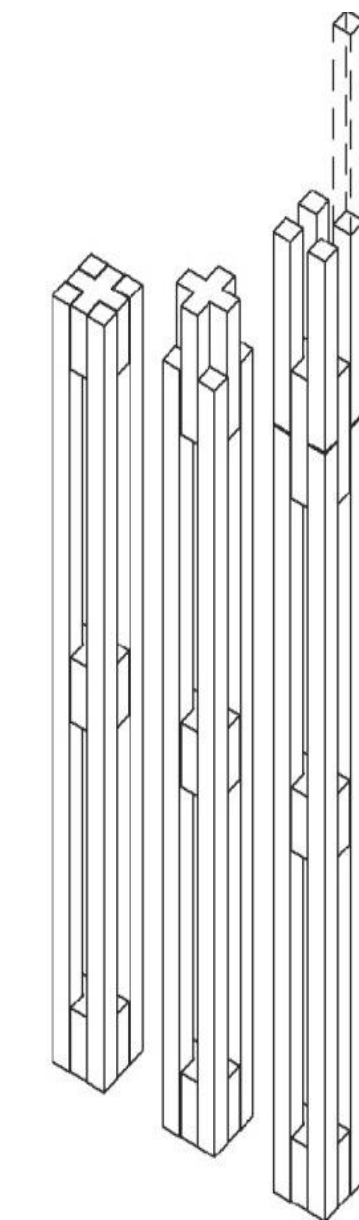
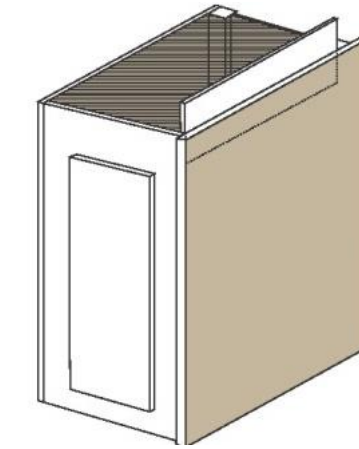
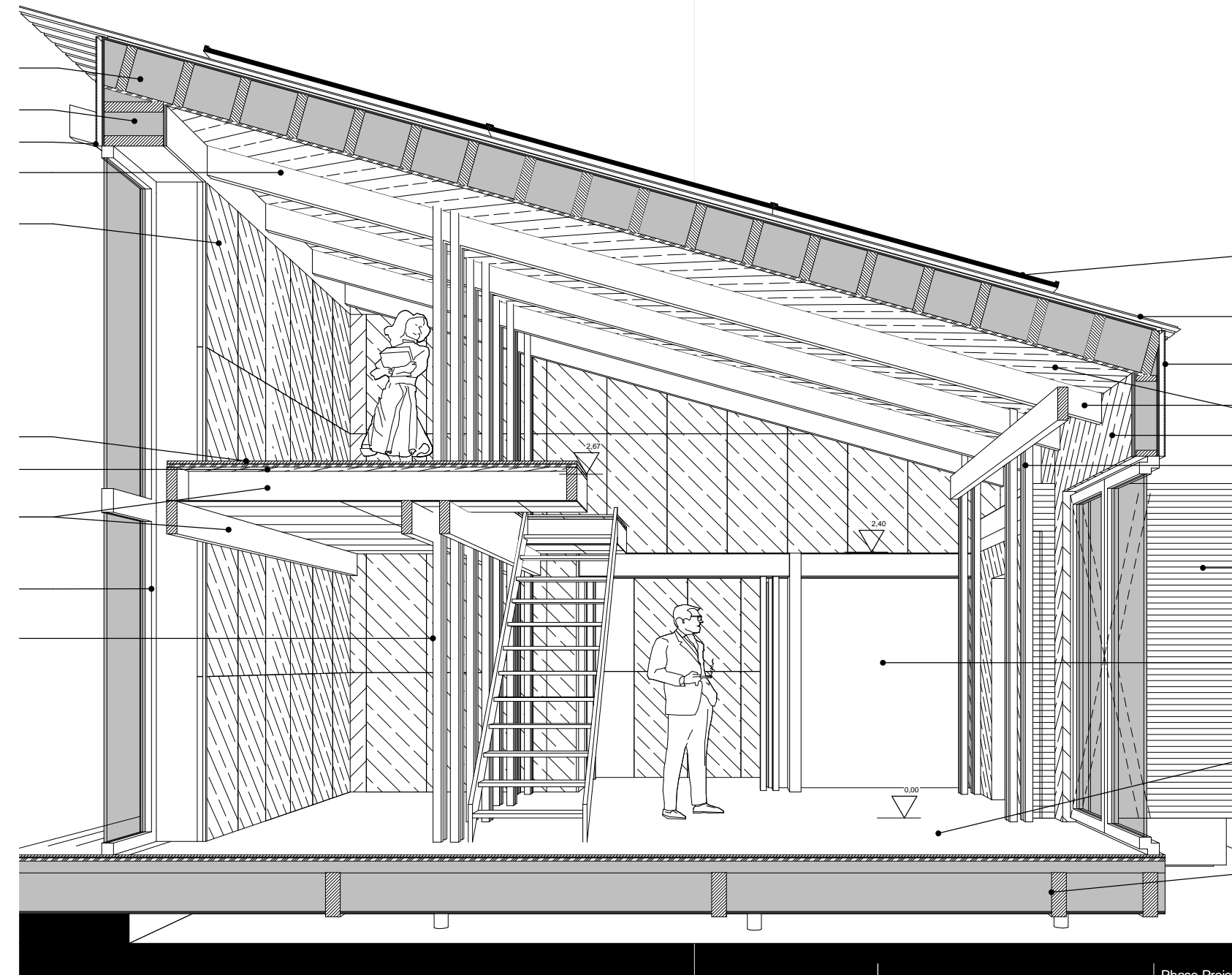


RECYCLED MATERIAL



RECYCLABLE MATERIAL





BIO-BASED MATERIAL



RECYCLABLE MATERIAL



RECYCLED MATERIAL



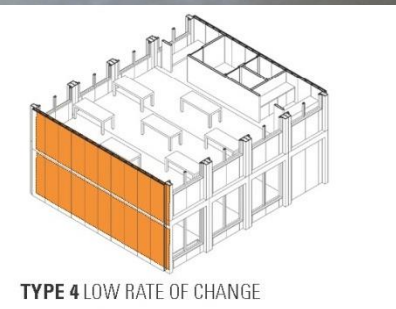
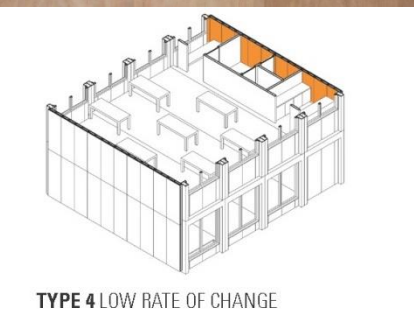
RECLAIMED MATERIAL



GEBERIT GIS PROTOTYPING



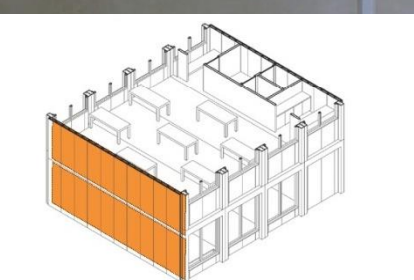
SAINT-GOBAIN TYPE 1 PROTOTYPING



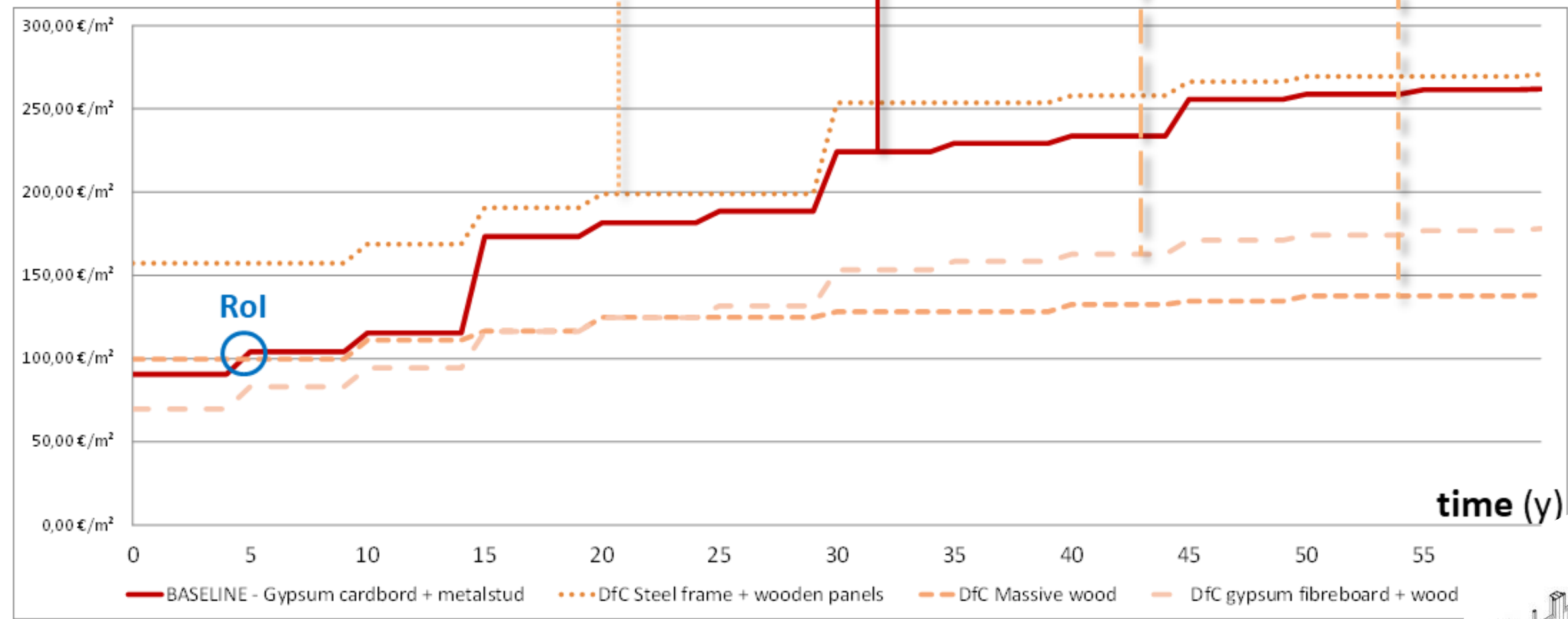
SAINT-GOBAIN TYPE 2 PROTOTYPING



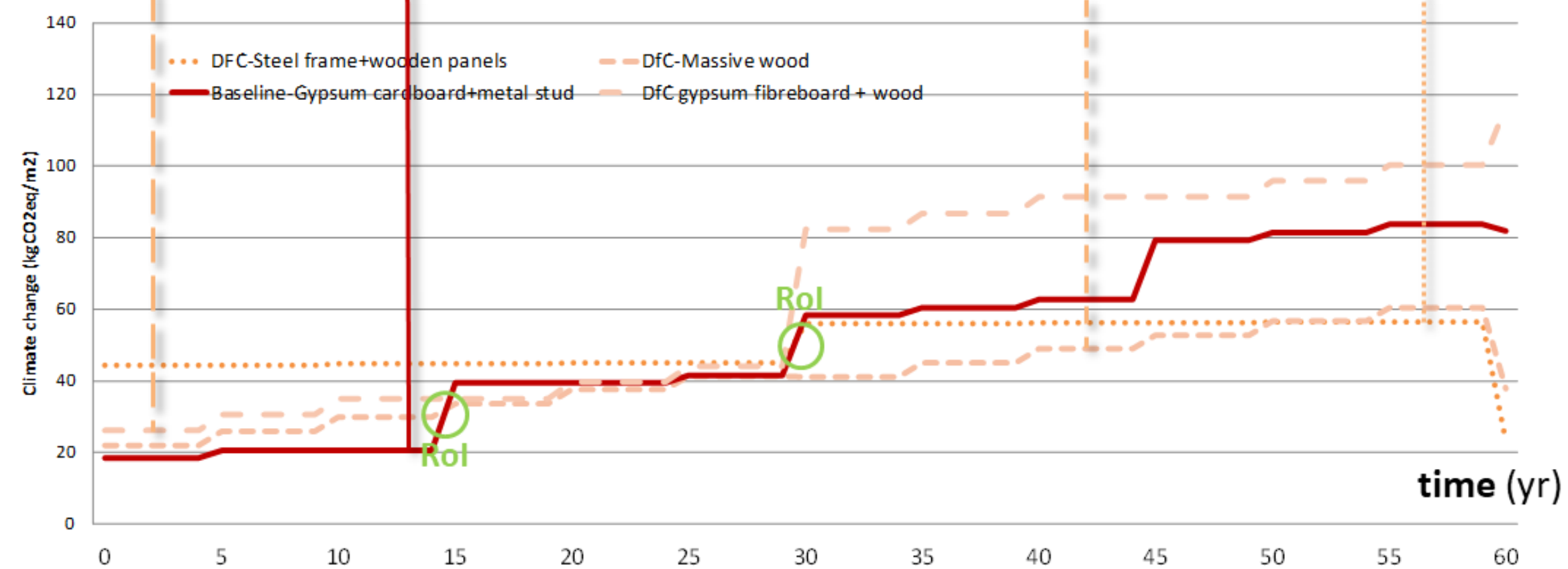
SYSTIMBER

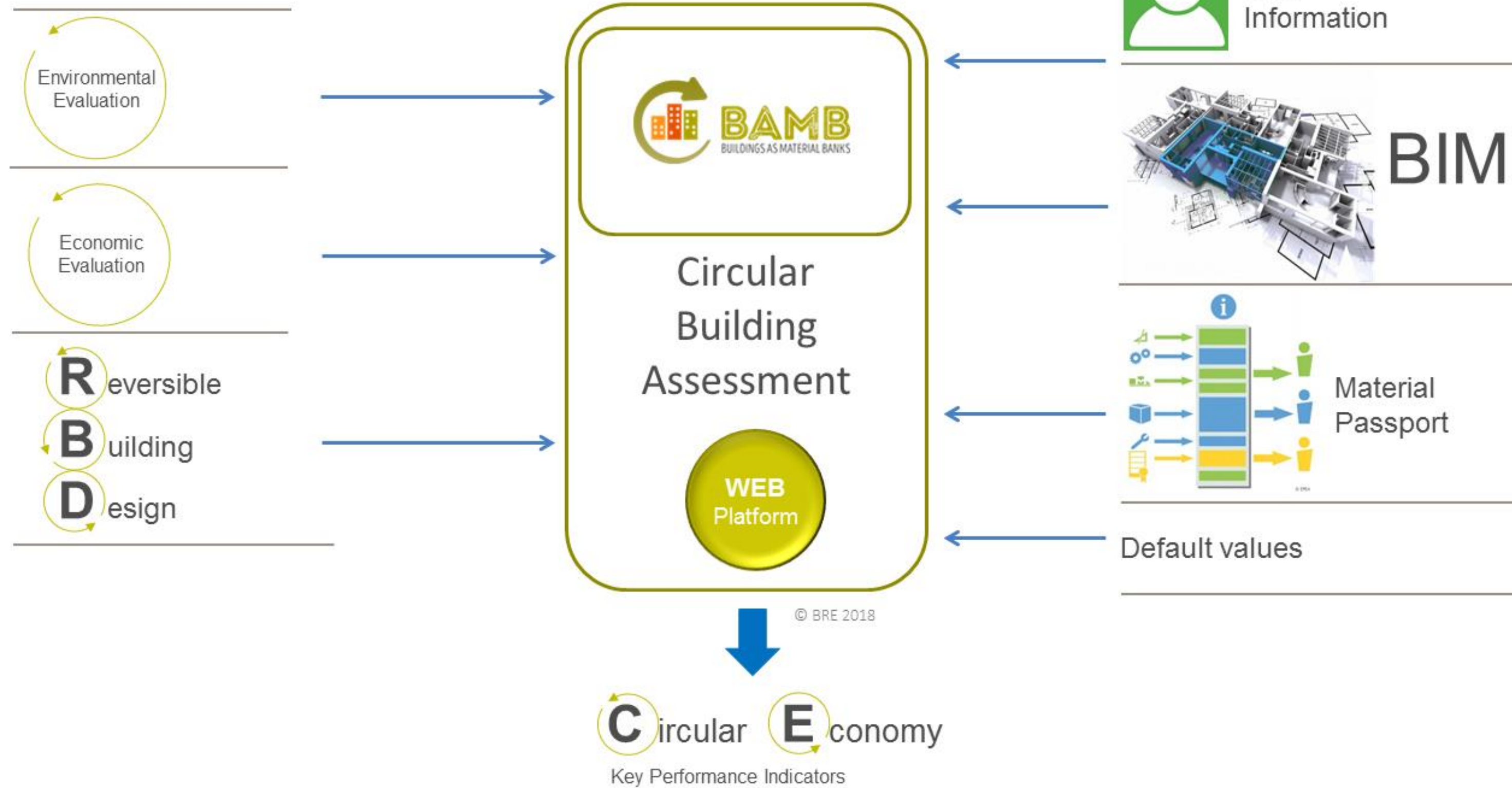


FIN. cost (€/m²)



GWP (kg CO₂ eq./m²)



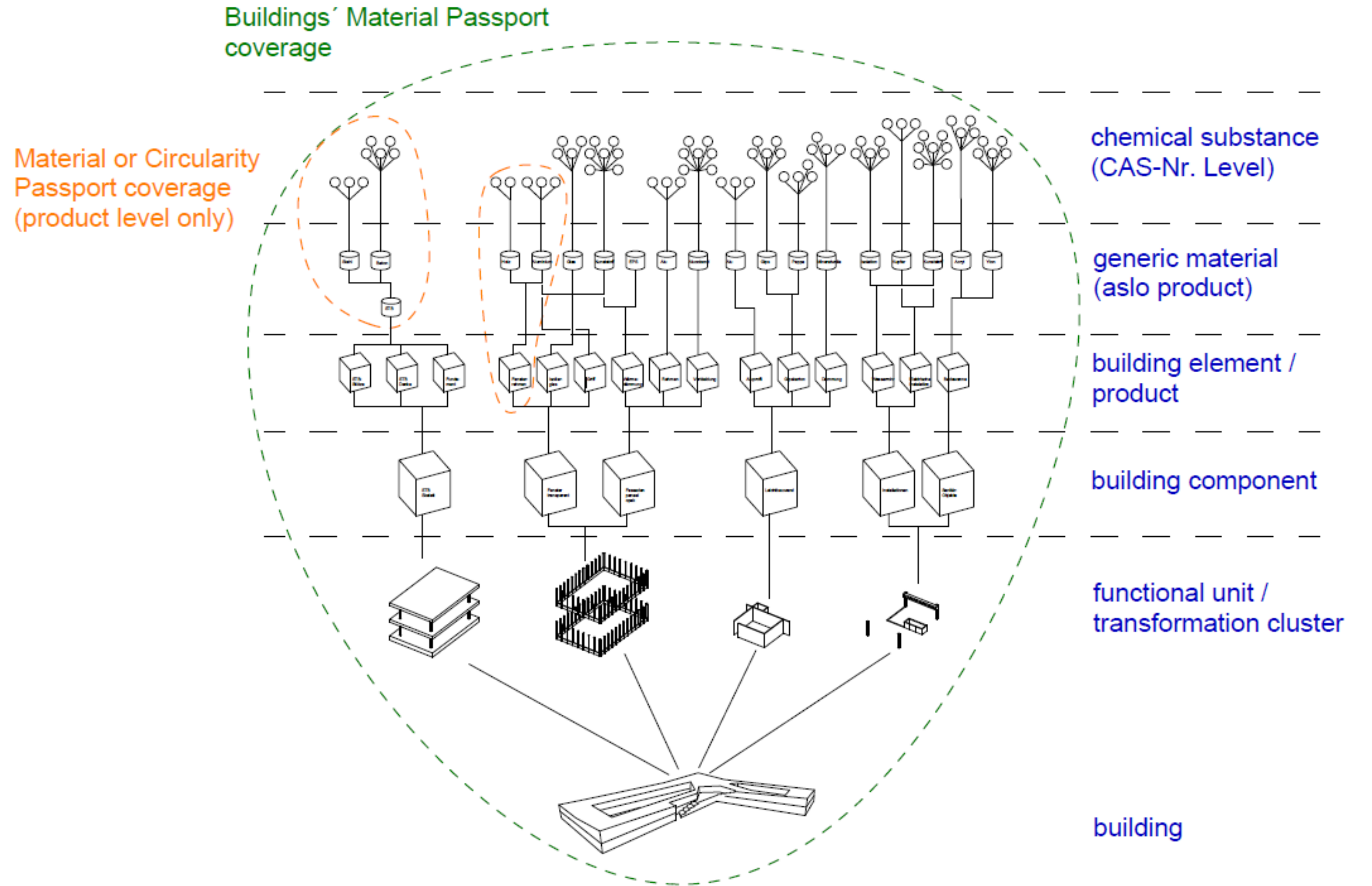


Property Sets	Building	Space	Element	Materials
Building Identity Info	•			
Project Common	•			
Project Cost Common	•			
Building Dimensions	•			
Reporting Metrics RBD	•	•	•	•
Reporting Metrics LCA	•	•	•	•
Reporting Metrics LCC	•	•	•	•
Reporting Classification	•	•	•	•
Object Identity Common		•	•	•
Element Quantities			•	•
Element Time Common			•	•
Reversibility Common			•	•
Service life factors			•	•
Function Requirements		•	•	•
Element Common			•	•
Element Costs Common			•	•
Climate Change			•	•
Reference Library			•	•
Space Base Quantities		•		
Space Time Common	•	•		
Space Common		•		

Property Set:	Building Identity Information
Attribute	Description
Building ID	A unique identifier assigned to a building. A temporary identifier is initially assigned at the time of making a planning application. This temporary identifier is changed to a permanent identifier when the building is registered into a statutory buildings and properties database.
Building or Scenario Name	Provide a name for this building / scenario. E.g Building 1 - Scenario 1
External Wall	A summary of the predominant external wall construction type for early design stage description.
Structural Frame Material	The primary load bearing structural construction type of the building i.e. steel framed, timber framed etc.
Type of Ventilation	Type of ventilation strategy i.e. naturally or mechanically ventilated used in the assessed building.



Material Passport vs. Buildings' Materials Passport - range of examination



(c) based on: V. Brenner, Recyclinggerechtes Konstruieren, University of Stuttgart, 2010



MANUFACTURER
Doscha

PRODUCT
Doschatherm
Insulation



33 MANUFACTURER
DOSCHA BV BY ENKEV
PRODUCT
Doschatherm
Sheep wool insulation

MATERIAL PASSPORT NUMBER 33

PRODUCT FEATURES

- + thermal and acoustic insulation
- + purifies the air by binding volatile compounds
- + 100% biobased and biodegradable



MATERIAL HEALTH ASSESSED



REVERSE LOGISTICS IN PLACE



(PARTS) DESIGNED FOR BIOSPHERE



(PARTS) DESIGNED FOR TECHNOSPHERE



CONTAINS RENEWABLE CONTENT



CONTAINS RECYCLED CONTENT



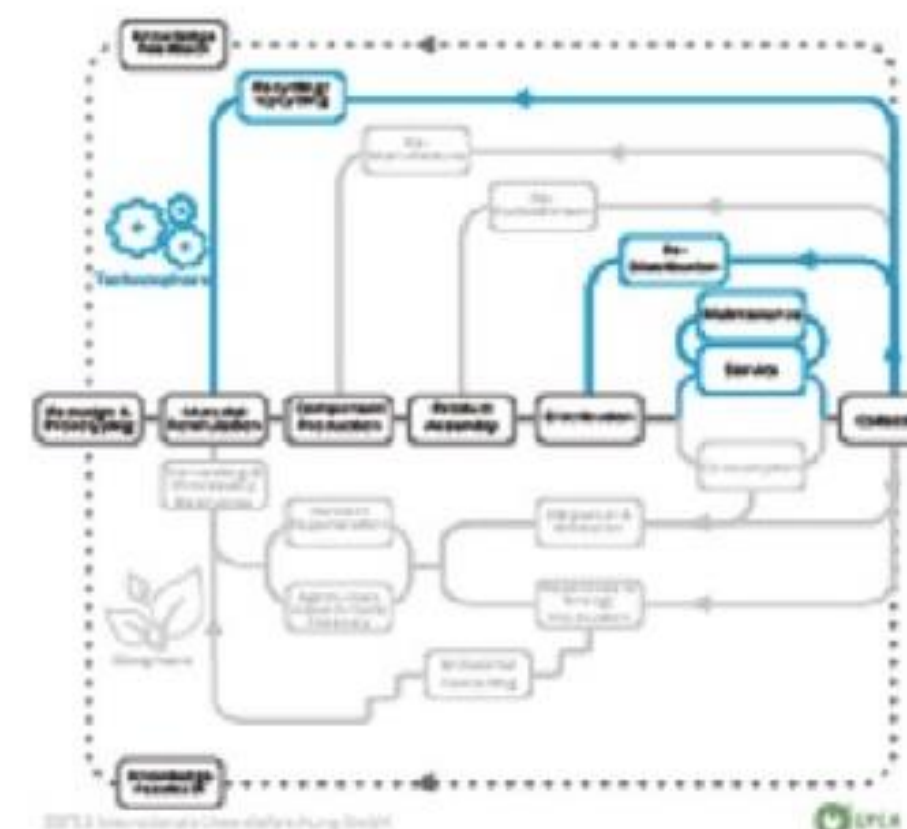
BAMB
BUILDINGS AS MATERIAL BANKS
THANKS FOR VISITING US!
www.bamb2020.eu

BAMB Materials Passports Platform
Link: <https://passports.bamb2020.eu>
Username: guest
Password: bambplatform



Reuse potentials

Doscha insulation mats can be reused for insulation purposes, or mechanically processed into new products for other applications.



Product story

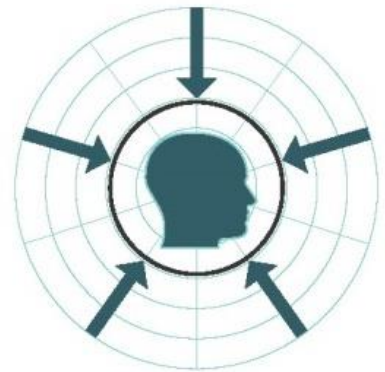
The material can be clamped in the wall construction and when needed tacked. The wool fibre has exceptional strength, therefore only few attachment points are needed. After use the material can be detached and replaced.

EPEA©

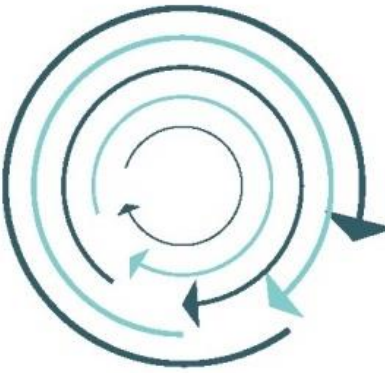
REMs

MATERIALS PASSPORTS (MP)

BUSINESS INNOVATION



CUSTOMISATION



CLOSED ENVIRONMENTAL LOOPS



COLLABORATION ECOSYSTEM



EFFICIENT OPERATIONS



BUILDING- A SHARED ASSET

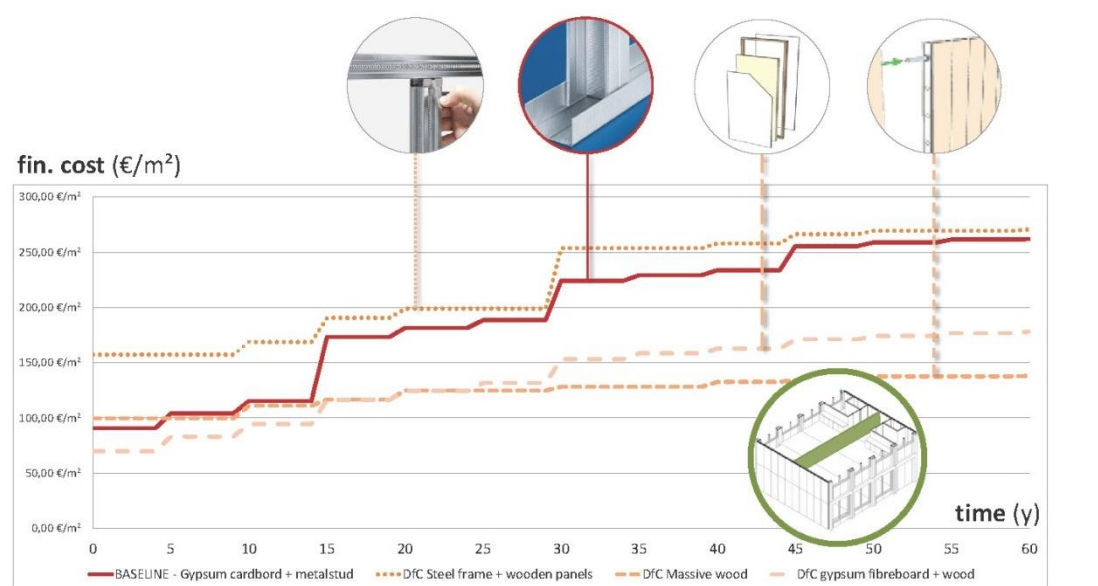
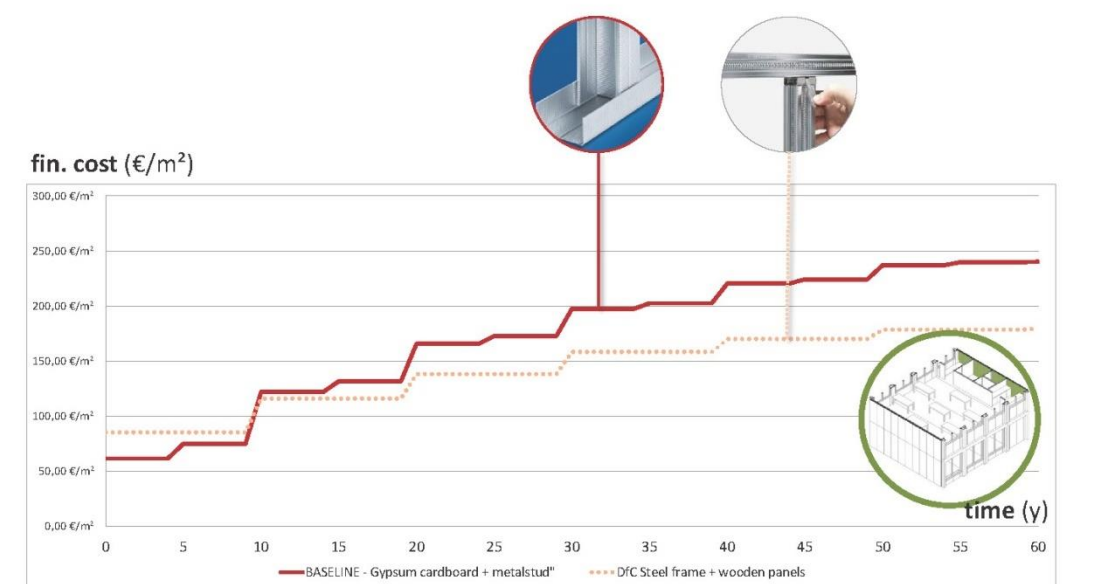
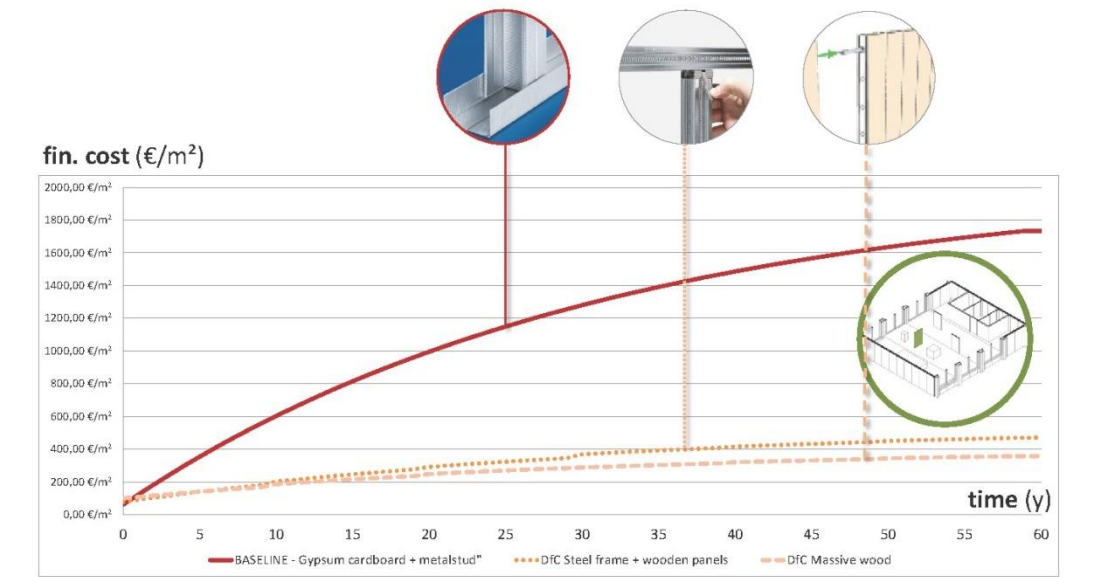


CAPTURE VALUE MODEL

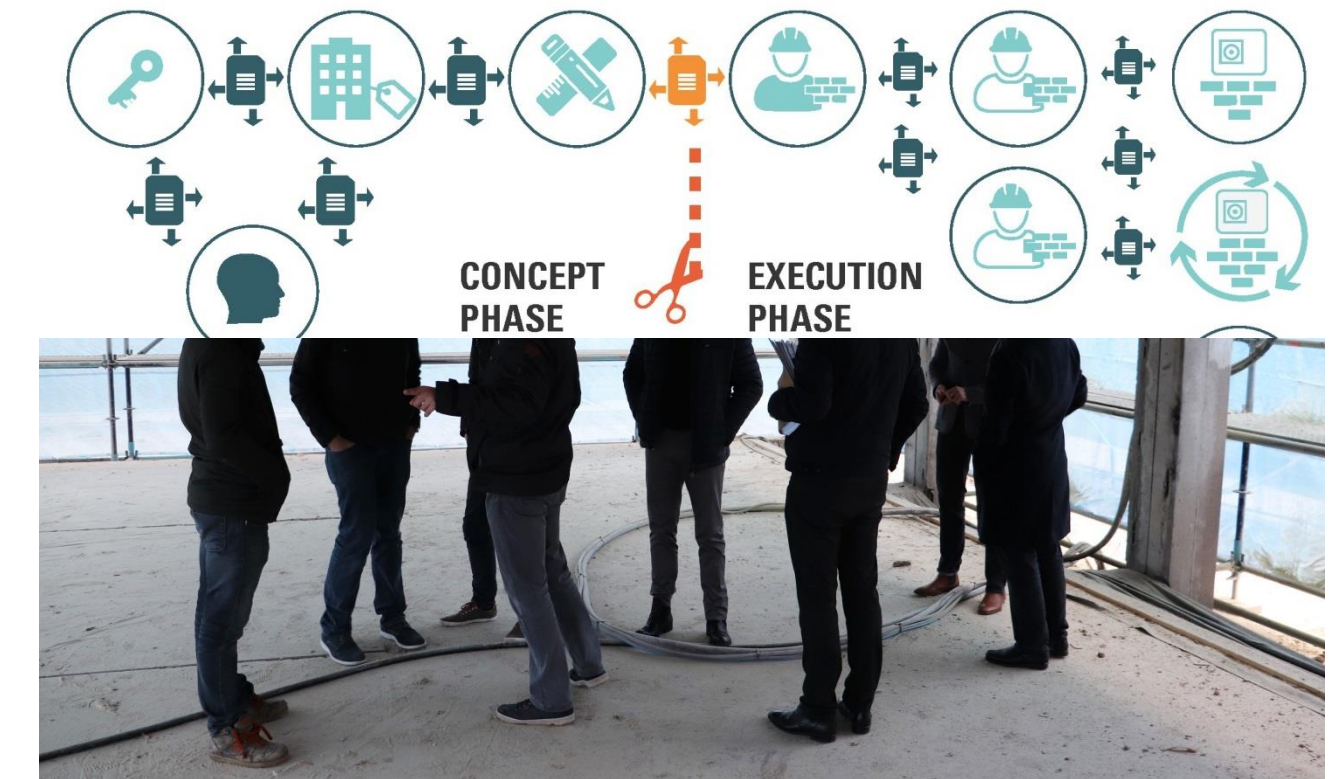
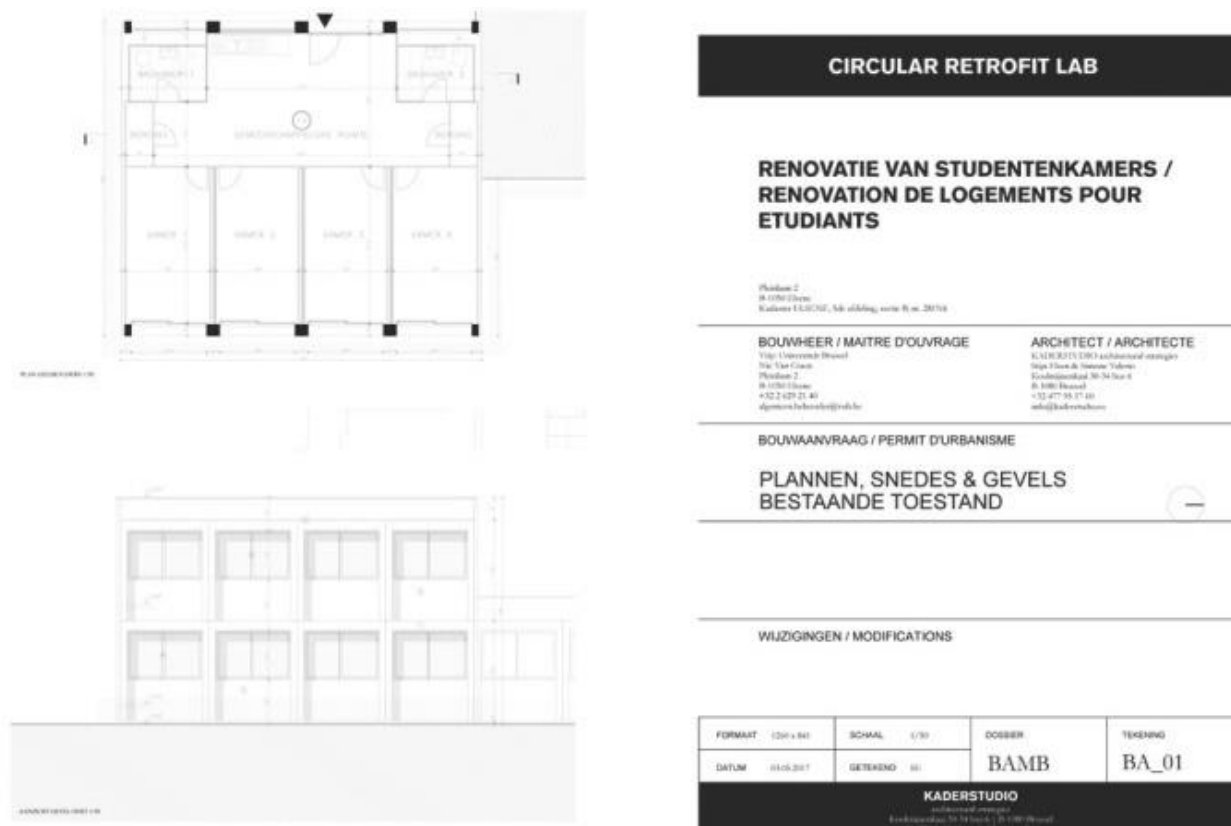


GREEN TRANSFORMABLE BUILDING LAB (FACADE AS A SERVICE)

CIRCULAR RETROFIT LAB (JuuNoo) (PARTITION WALL AS A SERVICE)



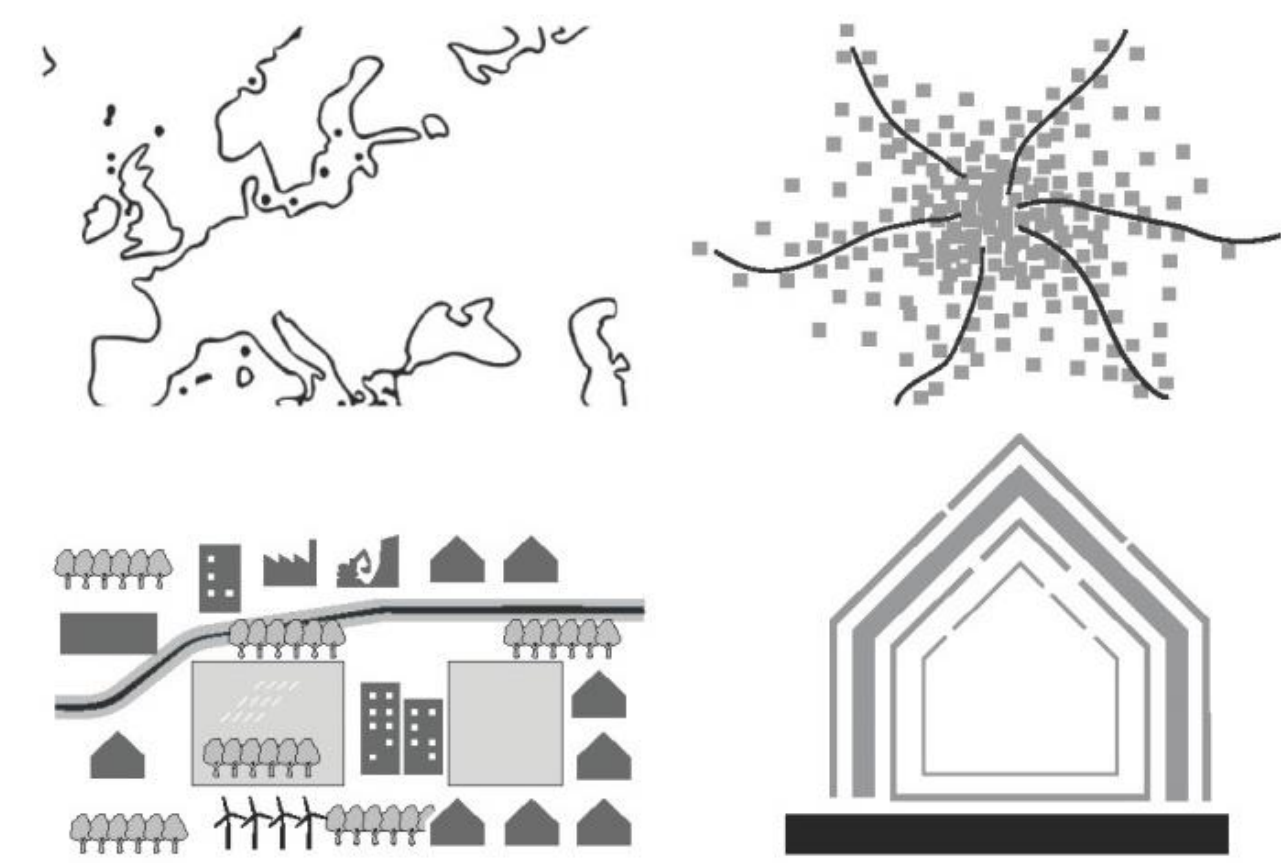
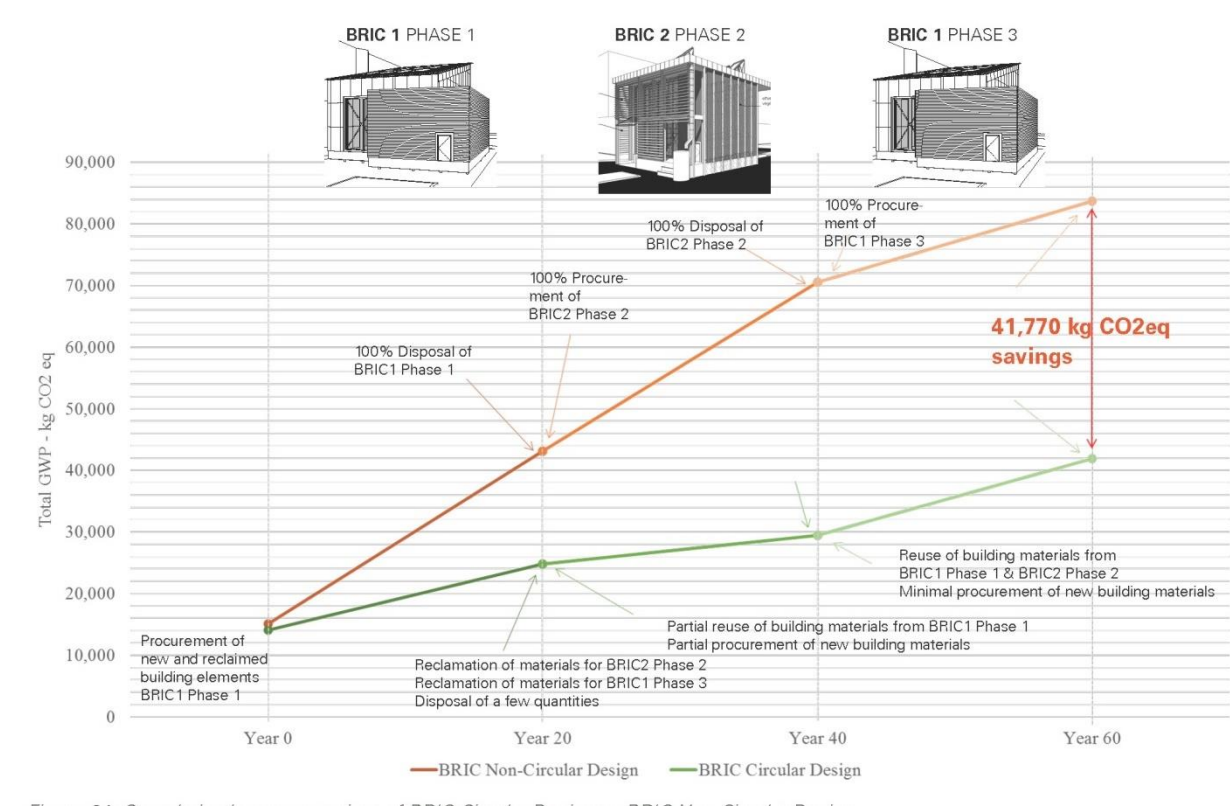
CIRCULAR RETROFIT LAB CREATE AND CAPTURE VALUE LCC & LCA



- REGULATIONS SHOULD FOSTER OPPORTUNITIES FOR CHANGE

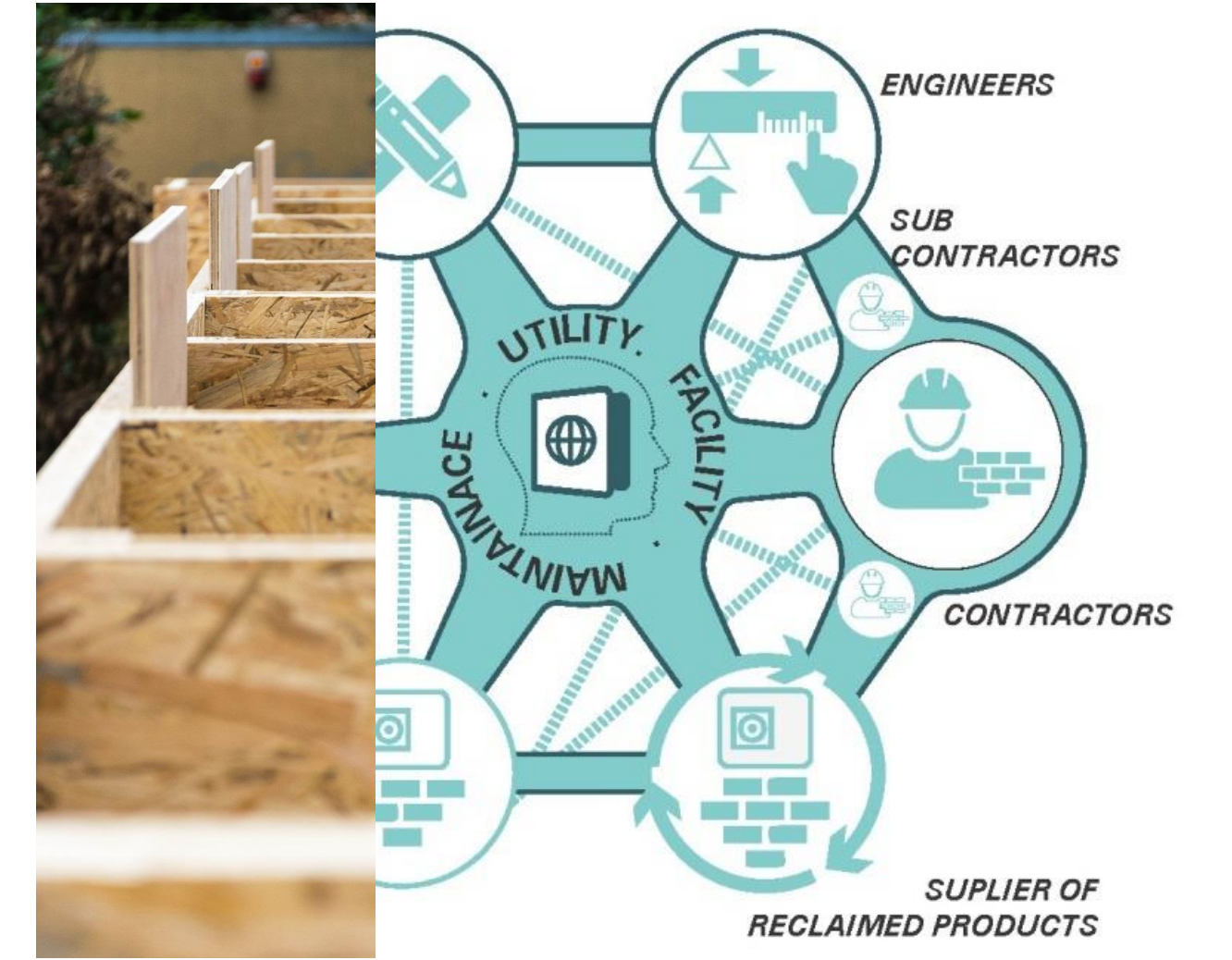
- SYNERGIES WITH EXISTING REGULATIONS (e.g.. WATER MANAGEMENT)

- FOSTER COLLABORATION BETWEEN STAKEHOLDERS



- NEED FOR CLEAR TARGETS
- INTEGRATE REAL COSTS: THE ENVIRONMENTAL AND SOCIAL COSTS

- SYNERGIES BETWEEN TERRITORIAL AND LOCAL REGULATIONS



- CERTIFICATION FOR CIRCULAR MATERIALS
- PROJECTS IMPROVE DATA SHARING

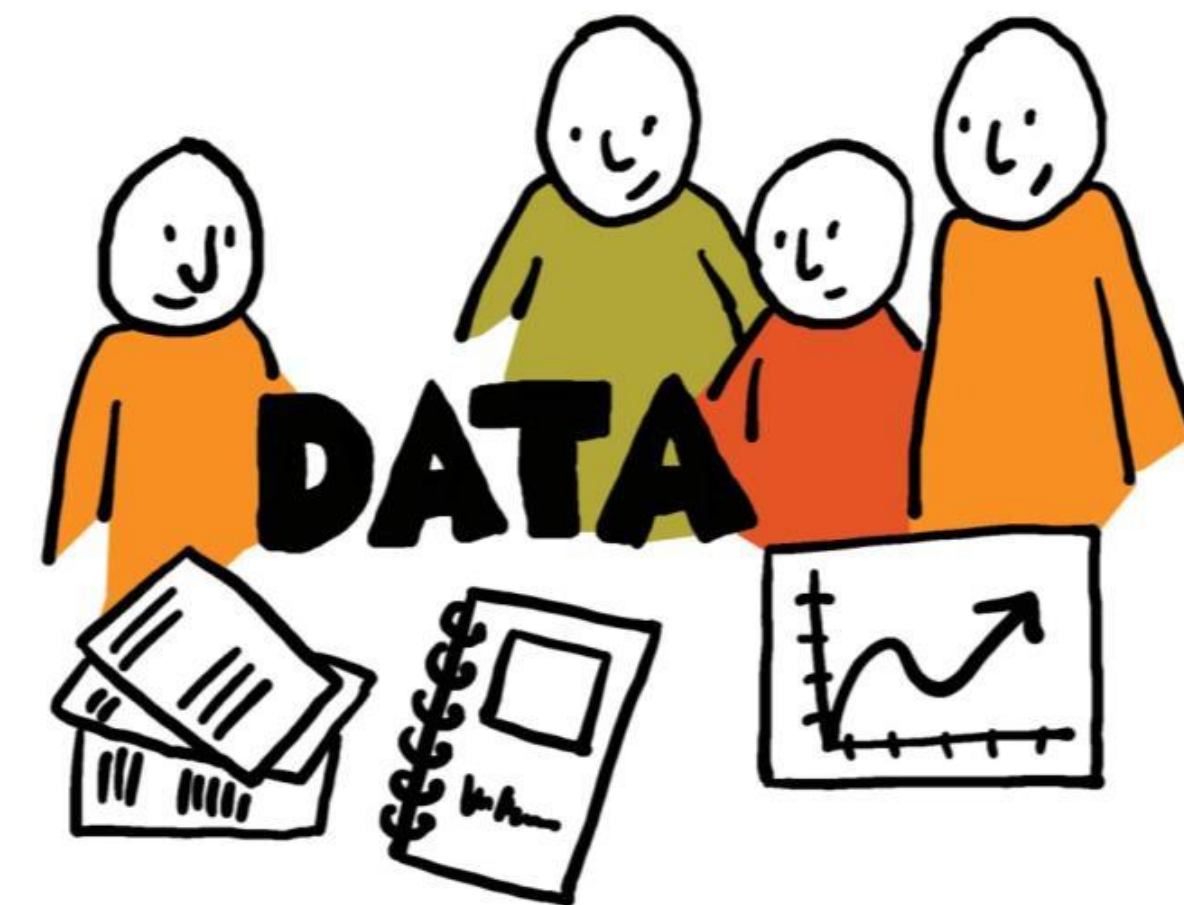
MAJOR SYSTEMIC CHANGES



**CHANGE IN DESIGN
CULTURE**



**CHANGE IN VALUE
DEFINITION**



**CHANGE IN
COLLABORATION ACROSS
ALL ACTORS**

