

Gathering21

Construction Innovations
for Future Generations

CitA

Enabling a Twin Transition: Digitalization for a Circular Built Environment

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5th CitA BIM Gathering Virtual Conference

21 - 23 September 2021

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INTRODUCTION



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Twin Green and Digital Transition Call 2021

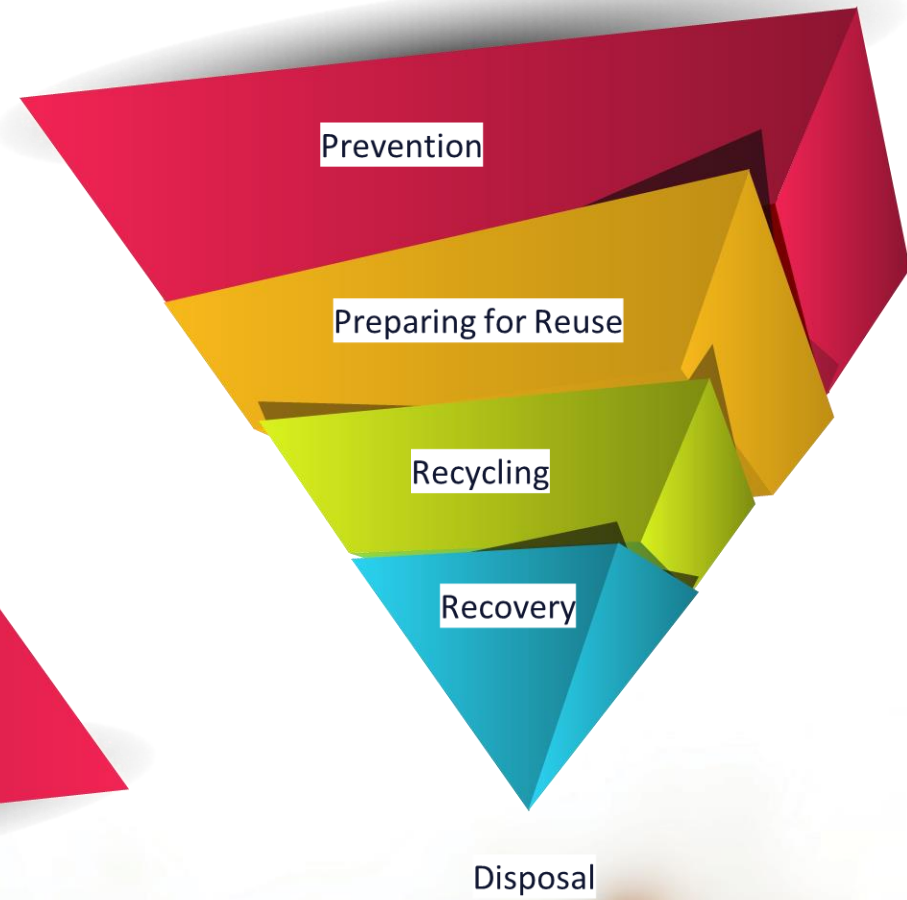
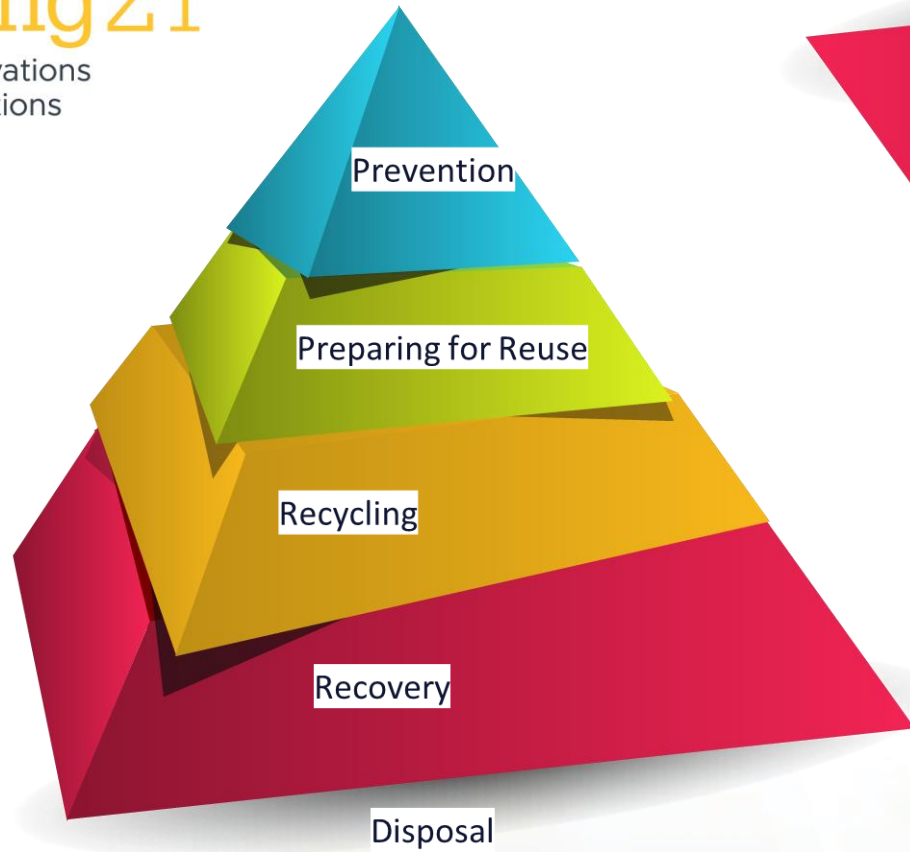
- Digital permits and compliance checks for buildings and infrastructure
- Automated tools for the valorization of construction waste
- Breakthrough technologies supporting technological sovereignty in construction
- Deploying industrial-urban symbiosis solutions for the utilization of energy, water, industrial waste and by-products at regional scale



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What do you see?

Cost of material damaged during handling/storage

Cost of skip hire

Cost of materials in the skip

Cost of re-handling waste if skip is overfilled

Labour cost to fill the skip





Breeze Blocks €1.43 each

**Plywood Sheets
€29.43 each**

Insulation Sheets €5.30 each

**Returnable Pallets
€5 each**

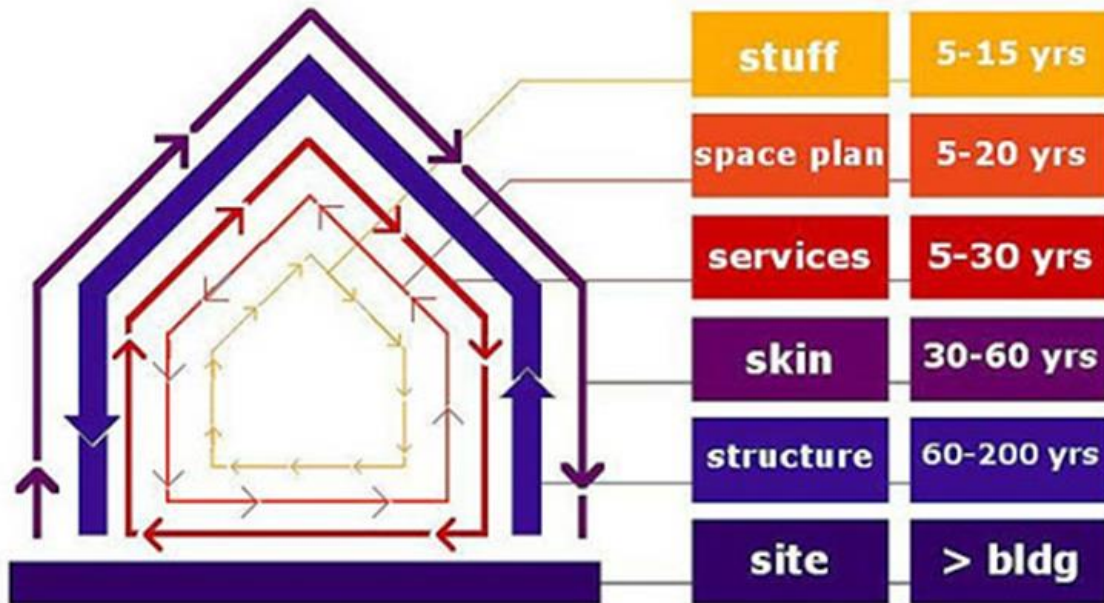
Insulation Sheets €5.30 each

DPC roll €5 each

Fire Barriers €3 each

Timber 'waste' in the mixed skip

Metal 'waste' in the mixed skip



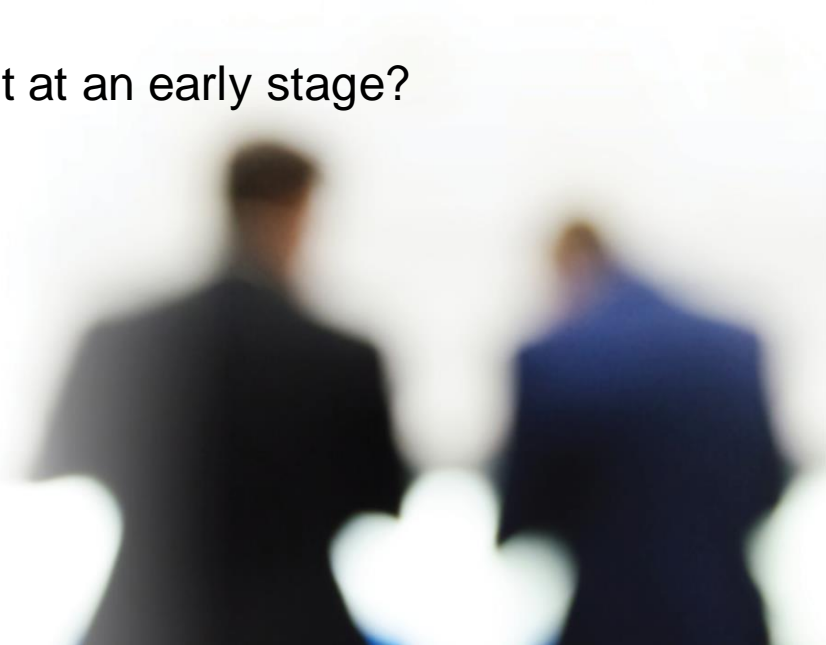
Think about...

the natural resources and human capital that go into the built environment.

Then think about...

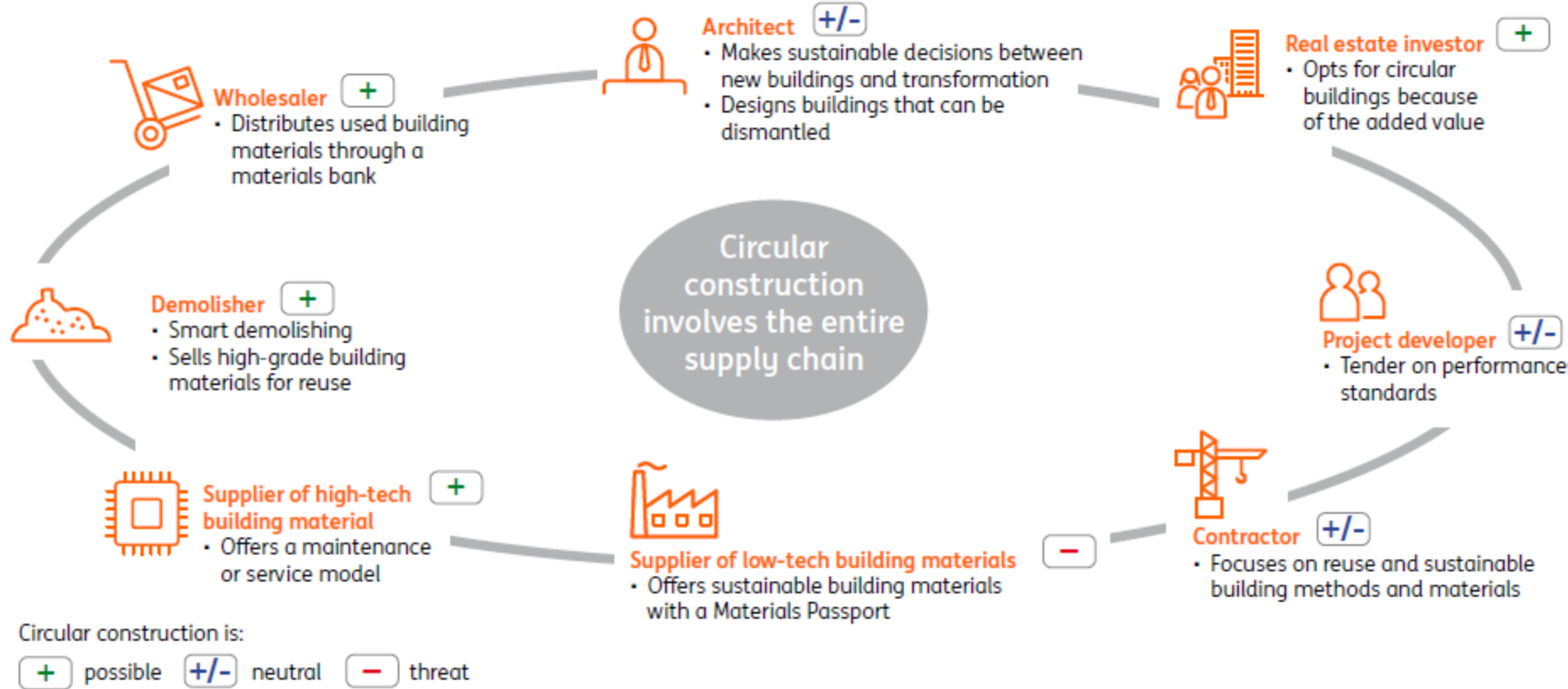
VALUE and UTILITY

...and think about it at an early stage?



Activities of supply chain partners in circular construction

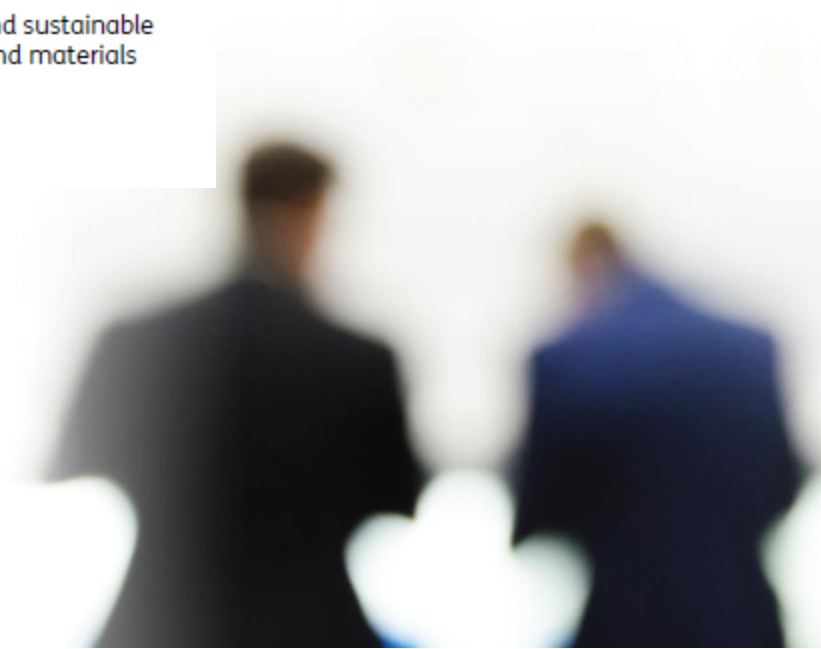
Circular construction has consequences for all supply chain partners

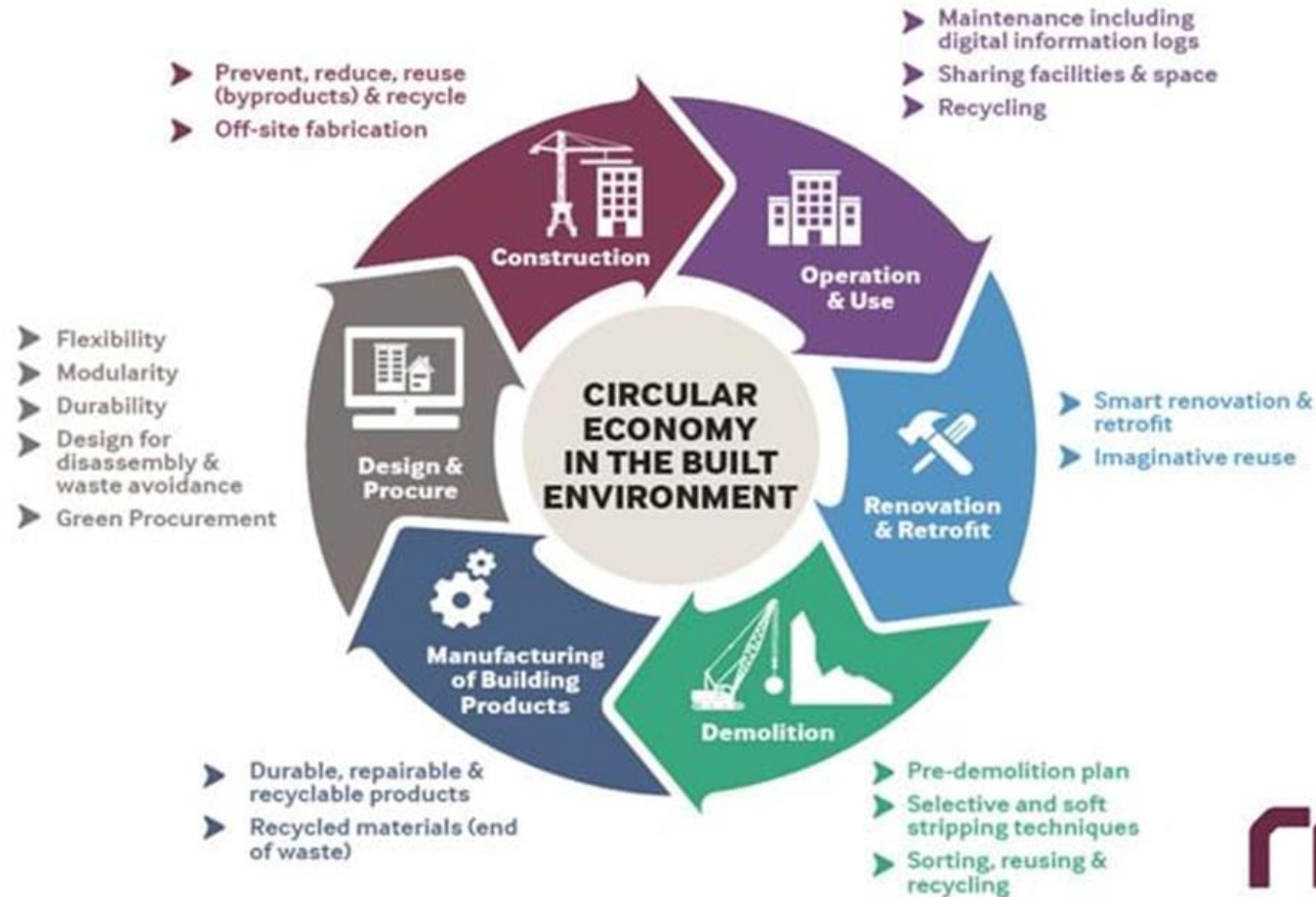


What is the role of the planning authority?

Each supply chain stakeholder has a role to play.

(Van Sante, 2018)





The importance of...

Pre-development decisions

Development requirements

Viewing the existing built environment as a resource

Ensuring consistency throughout each phase

COMPLEMENTARY TECHNOLOGIES

PLATFORM



CYBER-PHYSICAL COMPLEMENTARY TECHNOLOGIES

	Drones	Autonomous vehicles	
Laser scanning	Radio tracking devices in operation	On-site drones (in construction)	Geographic Information Systems (GIS)
Automated pre-fabrication	Predictive maintenance	On-site robotics (in construction)	Self-assembling blocks



Skanska's Collaborative On-Site Construction Robot

Cloud-based
logistic
platforms

Optimization
of building
functions



Additive and Robotic Manufacturing
Artificial Intelligence
Big Data and Analysis
Blockchain Technology
Building Information Modelling
Digital Platforms
Digital Twins
Geographical Information Systems
Material Passports and Databanks
The Internet of Things

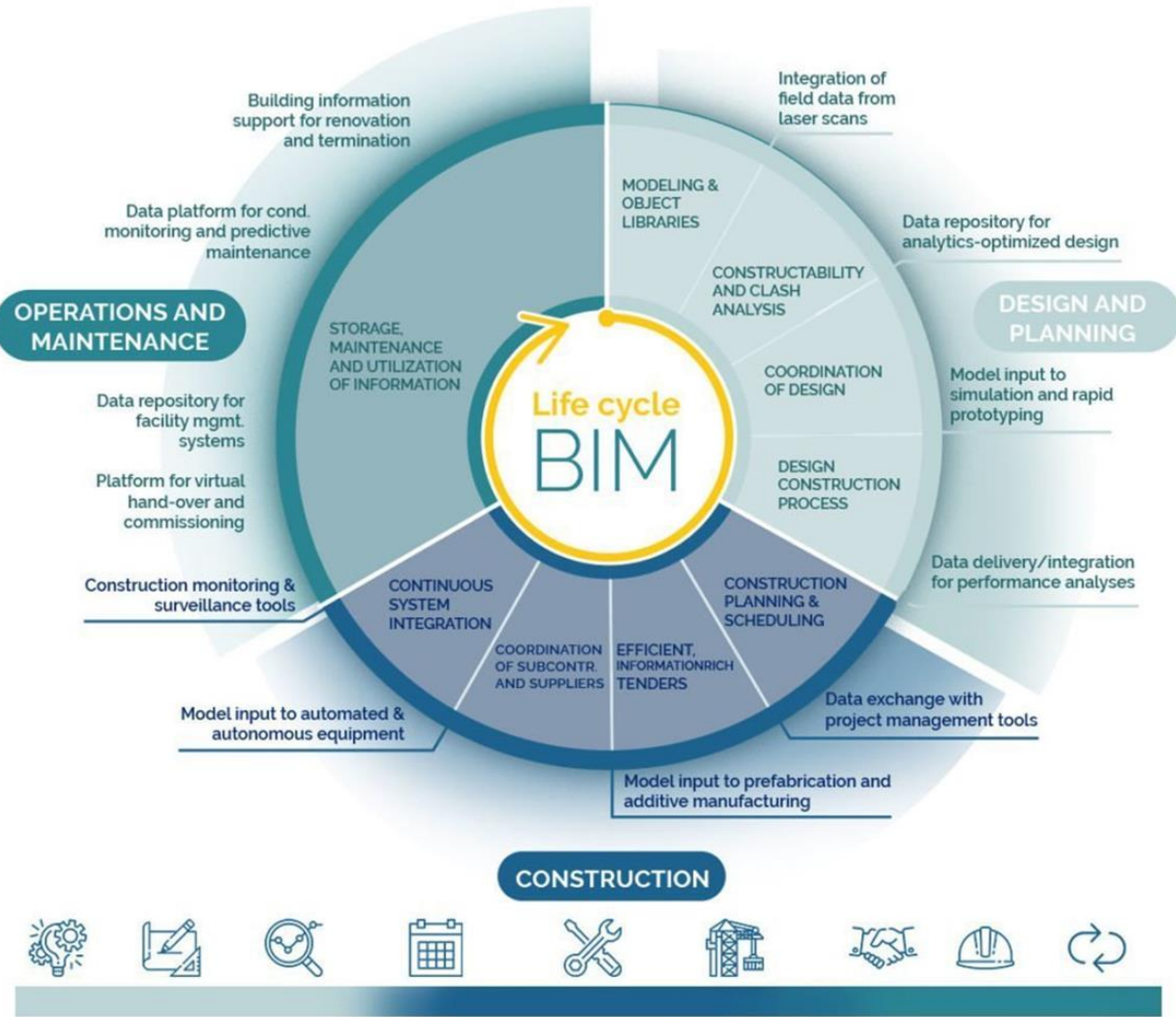
Pre-use phase

Use phase

Next use phase

Sultan Çetin, Catherine De Wolf and Nancy Bocken (2021)





<https://www.cemexventures.com/discover-how-bim-is-implemented-in-each-phase-of-the-construction-industry/>



1. Richard's project

Add a location

Edit details

Participants

Export

- Stage 2. Concept
- Stage 0. Strategy
- Stage 1. Brief
- Stage 3. Definition
- Stage 4. Design
- Stage 5. Build and commission
- Stage 6. Handover and closeout
- Stage 7. Operation and end of life

Overview

Details

MAYOR OF LONDON
**CIRCULAR
ECONOMY
STATEMENT
GUIDANCE**

MAYOR OF LONDON
**DESIGN
FOR A
CIRCULAR
ECONOMY**

Draft for consultation, October 2020

PRIMER

GOOD GROWTH BY DESIGN

2.030 Comment on Project strategies as requested.

Client



2.040 Monitor progress of Concept Design.

Client



Client



Project lead



Lead

During
Design
requ
The
num

importance at this stage will depend on how they are to influence the Concept Design. Examples include the Sustainability Strategy. The Final Project Brief should be issued as part of the Information Exchange at the end of this stage.

Help to make decisions at this stage:

KEY REQUIREMENTS

Strategic approach (Table 1)

Circular Economy Commitments (Table 2)

Bill of Materials

Recycling and Waste Reporting Form



epa

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil



Circular economy guidance for construction clients:

How to practically apply circular economy
principles at the project brief stage

APRIL 2022

Partners

THE CHAMBERS
ESTATE

Partners



CBF

H&S



W

IFIT

CORE PRINCIPLES

Reuse (including refurbish and repurpose)

- Reuse the existing asset.

- Recover the materials and products on site or from another site.

- Share materials or products for onward reuse.

Design buildings for optimisation

- Design for longevity

- Design for flexibility

- Design for adaptability

- Design for assembly, disassembly and recoverability

Standardization or modularization

Servitisation and leasing

Design and construct responsibly

- Use low impact new materials

- Use recycled content or secondary material

- Design out waste

- Reduce construction impacts



Material passports are...

‘electronic and interoperable datasets that collect characteristics of materials and assemblies, enabling suppliers, designers and users to give them the richest possible *value and utility*.’

- ✓ Keep or increase the value of materials, products and components over time.
- ✓ Create incentives for suppliers to produce healthy, sustainable and circular materials and building components.
- ✓ Enable circular product design, material recovery and chain of possession partnerships.
- ✓ Support material choices in reversible building design projects.
- ✓ Reduce the eco-footprint.
- ✓ Make it easier to choose and specify healthy, sustainable and circular building materials.
- ✓ Facilitate reverse logistics to reclaim products, materials and components.
- ✓ Assess future material flows.
- ✓ Eliminate waste and reduce the use of virgin resources.
- ✓ Reduce the costs by managing resources rather than managing waste.





Other information requirements for circularity may include:

- ✓ Installation and connection requirements
- ✓ Embodied impacts and value
- ✓ Embedded recycled content
- ✓ Flexibility and adaptability potential
- ✓ Deconstruction and disassembly potential
- ✓ Durability and lifespan
- ✓ Embedded toxicity
- ✓ Reuse potential
- ✓ Recycling potential
- ✓ Prevention rating

The screenshot shows the 'Materials Passport Platform Prototype' interface. It features a navigation bar with 'Products', 'Buildings', 'Instances', and 'Logout'. A search bar is present in the top right. On the left, there is a yellow circular icon of a chair with a '+ Not Found' button below it. The main content is a table titled 'Products' with the following data:

Name [1]	Brand Name	Manufacturer	GTIN/EAN
Acroyel Wood	Acroyel Technologies	Acroyel Technologies	Unknown
Acroyel 4000	Acroyel 4000	Construction Specialties Inc.	Unknown
Almend Database Desk	Almend	Almend	Unknown
AlMaster®	Dense	Farbat	Unknown
Aluminium Door Furniture	AM-IV	AM-IV	Unknown
Armstrong Ultrasa	Armstrong	Armstrong World Industries Limited	0000364102735
Asu 210 Office Chair	HWA Ergonomics	Folk	

bamb2020.eu



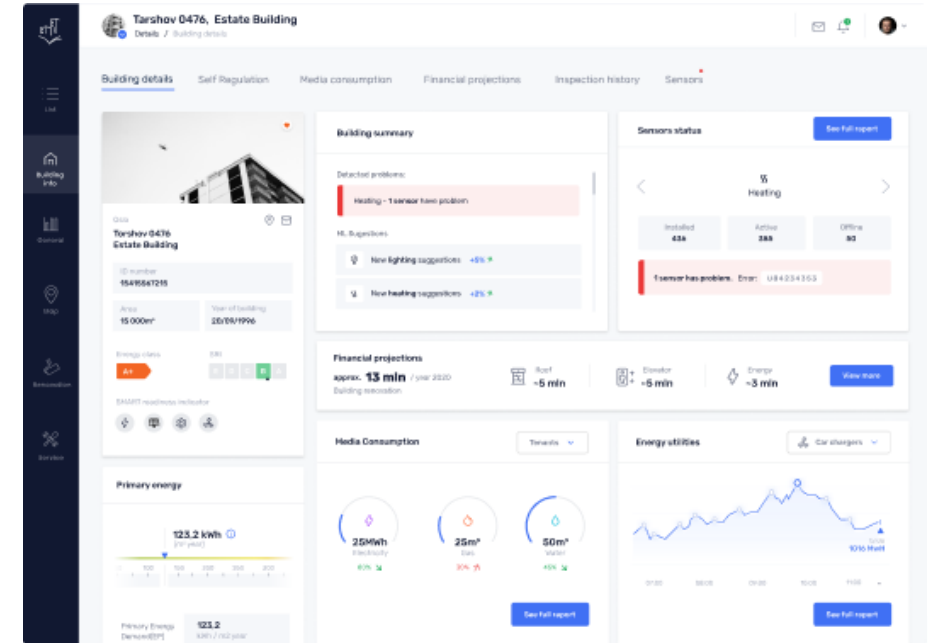
Digital Building Passports

‘Future projects can benefit from more precise, data-driven decisions in the planning process.’

‘Building passports would allow us to link new and existing datasets on the performance of buildings and attempt to develop better metrics to understand their impact,” the commission explained. “They would also allow us to link performance data to planning data, so that we can validate our assumptions and better monitor the performance of our planning policies.’

Building Better, Building Beautiful Commission (BBBBC) (2020)

Building Better, Building Beautiful Commission (BBBBC)





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Thank You

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