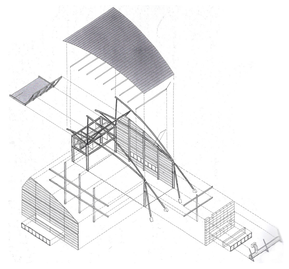
EXPLORING CIRCULARITY europengineers on Piano



USE CASE

The Thalès factory, an ex-Thomson factory in Guyancourt, was designed between 1988 and 1990 by the architect Renzo Piano, who was also responsible for the design of the Centre Pompidou on the site of a former aerodrome in Paris. The buildings are formed in a red metallic structure and a curved roof, giving emphasis to natural light and their parallel arrangement allowing new constructions according to the development perspectives.

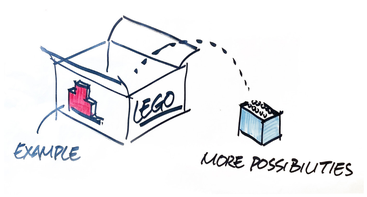
Unused since the transfer from Thalès to Elancourt in 2008, the buildings will eventually be used for various projects, including residential buildings and the subway station of Line 18.

INTRODUCTION

The first stage in the circular building economy is an assessment of the existing structure. This is necessary to determine the potential of the existing structure and will inform the dismantling methodology that is required. The assessment at this phase includes collecting all the relevant documentation of the elements themselves. This includes the role they have played in the existing structure and the circumstances and loads that they have been exposed to during their lifespan. Following this it is necessary to form an inventory of the available elements. These elements must be assessed in line with an adopted quality management system to determine their suitability for re-use.

This will inform the requirements for visual, on-site and laboratory testing to determine the material properties and the outcome of this testing will finalise the inventory of elements that can be used in the new design.

For this approach to work, a considerate dismantling approach and sequence must be adopted to ensure damage to the existing members is avoided.
The design approach will then be one to maximise re-use of existing suitable members and minimise the use of new members.



DOCUMENTATION

- Historical analysis
- Archival research

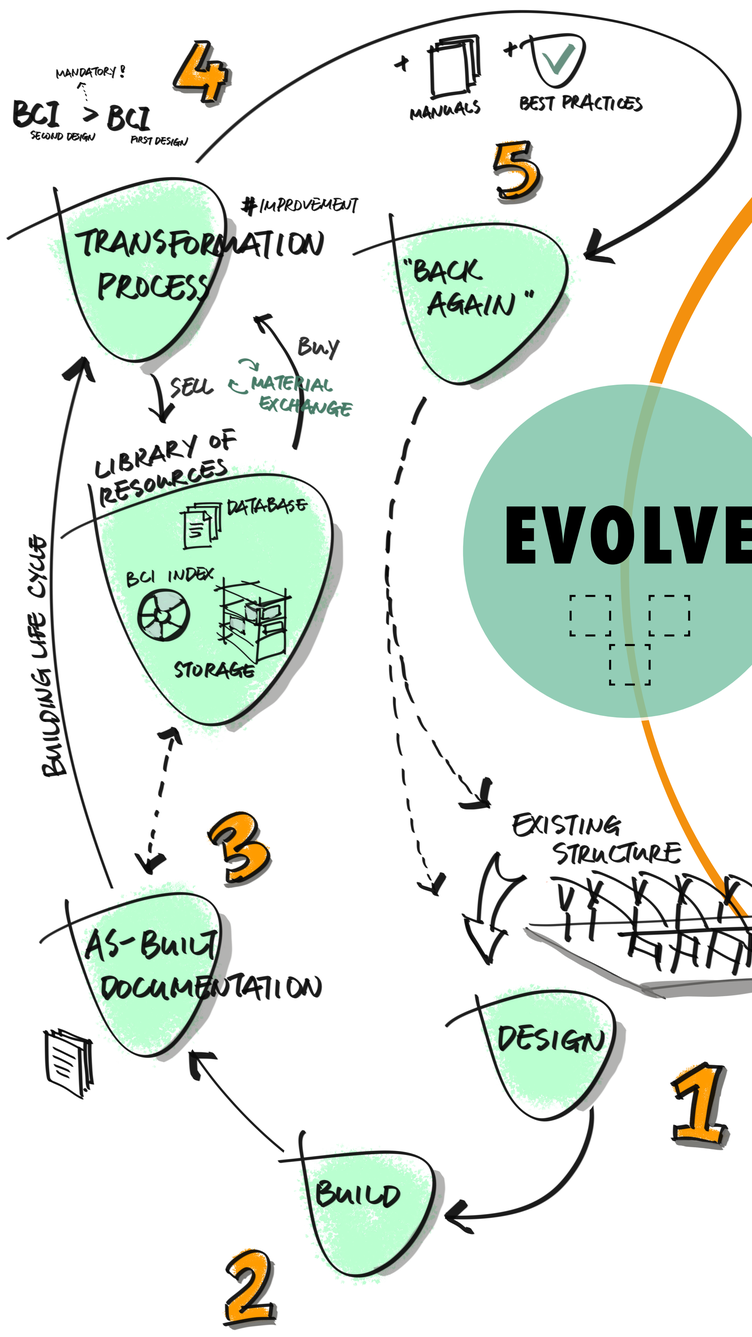
DIAGNOSIS

1. Evaluate types and volumes of elements to reuse

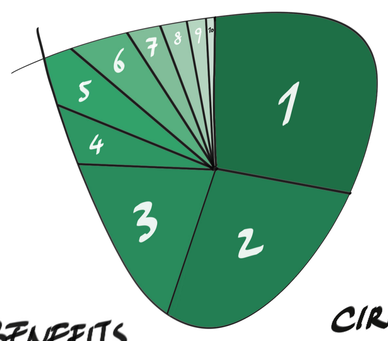
2. Evaluate material's residual performances
- Visual inspection / In-situ measurements
- Sampling and laboratory testing

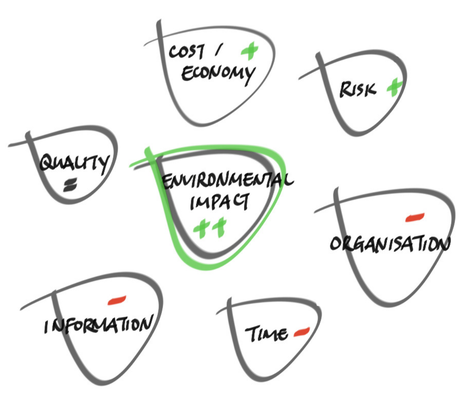
3. Selection of elements to be reused
- Dismantling plan / Prepare for storage

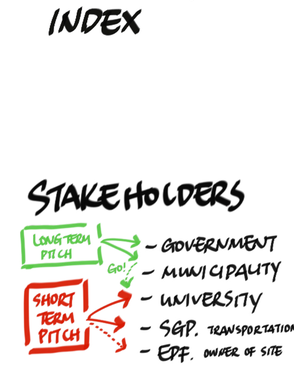
DISMANTLE



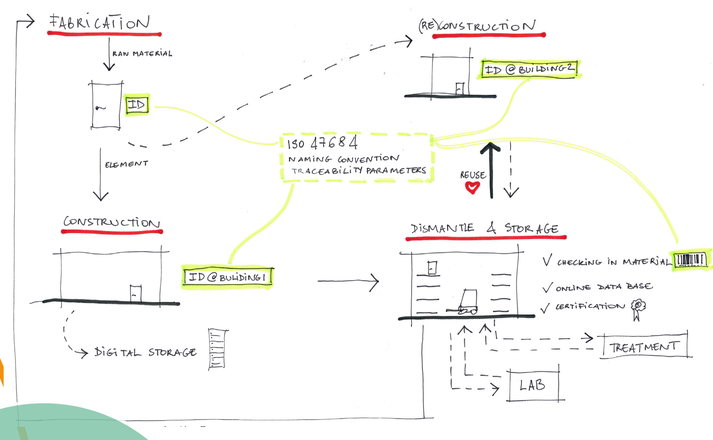
EVOLVE







STORE



PHYSICAL & DIGITAL STORAGE

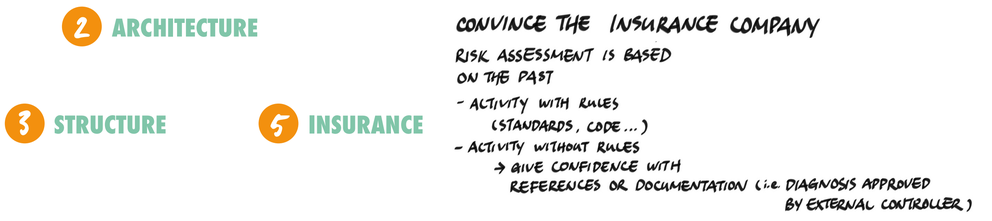
A key aspect of achieving the circular economy is how the components make their way from their initial location to their new home. The physical aspects of the component need to be considered in tandem with the digital aspects to ensure the traceability of the components and the workability of the circular economy model with the many seperate actors involved. This will be achieved through checking in and checking out components physically as well as digitally to avoid double counting.

DESIGN

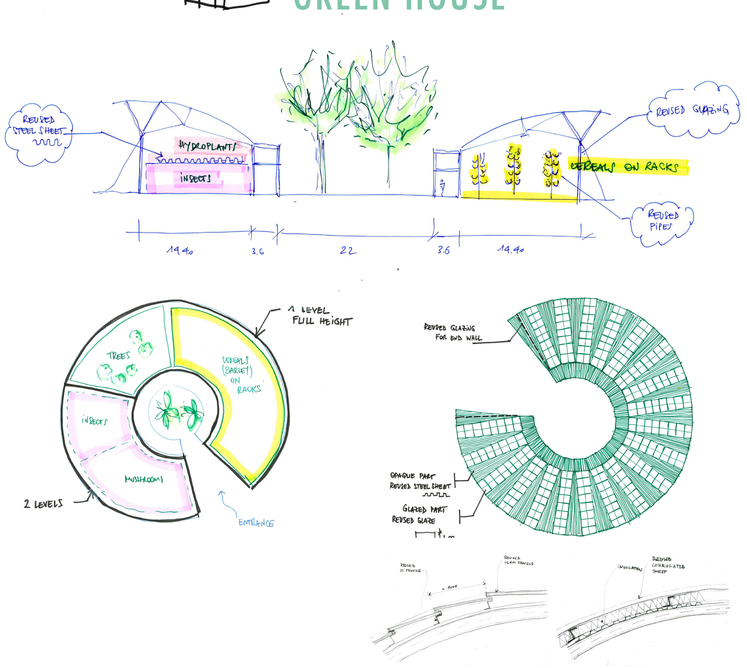
1. PROGRAM
2. ARCHITECTURE
3. STRUCTURE
5. INSURANCE

4 CIRCULAR DESIGN APPROACH

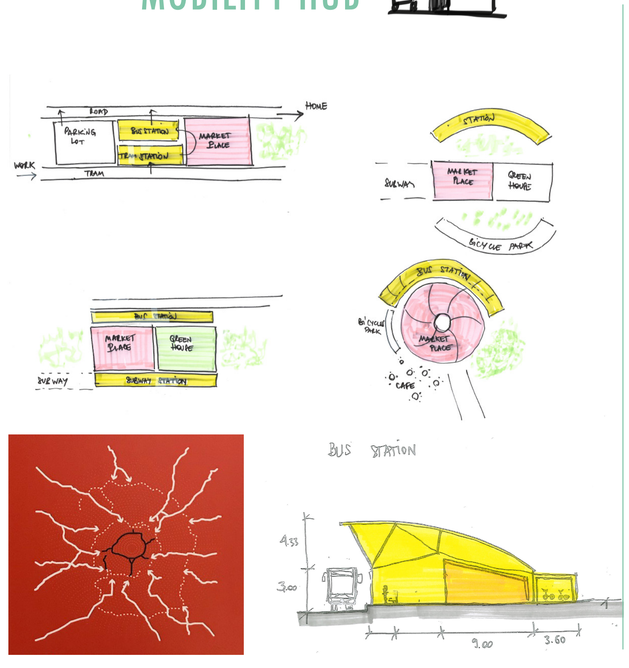
The 3 key characteristics of Circular design are: Modularity, Flexibility and Extensibility.
Modularity: Circular design is based on a structure which is conceived as a modular system. It excels in efficiency through the whole life cycle. From diagnosis and documentation of the material/component library to transportation and storage, from design options to assembly, execution and further evolvement.
Flexibility: Circular design encourages a flexible architectural program and architectural design. The rich treasury of "raw material (components that vary from site to site)" gives architects and designers great flexibility to adapt their proposal to different scales of application.
Extensibility: In case of further development of the site, a good circular design can be either exten



GREEN HOUSE

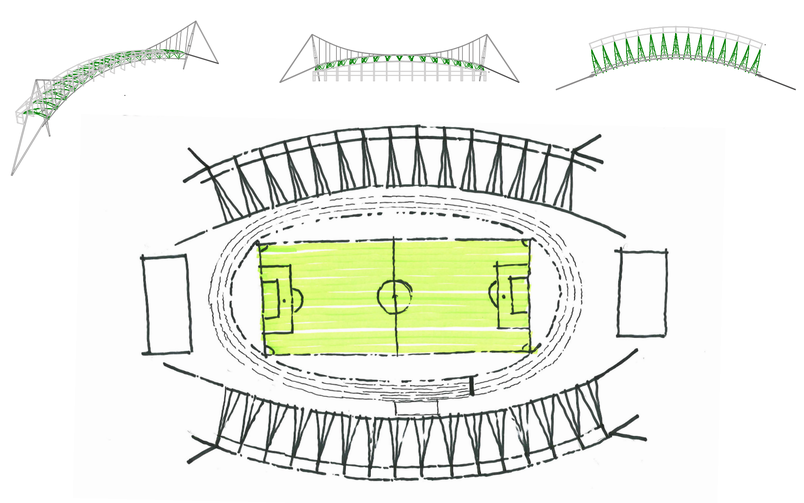


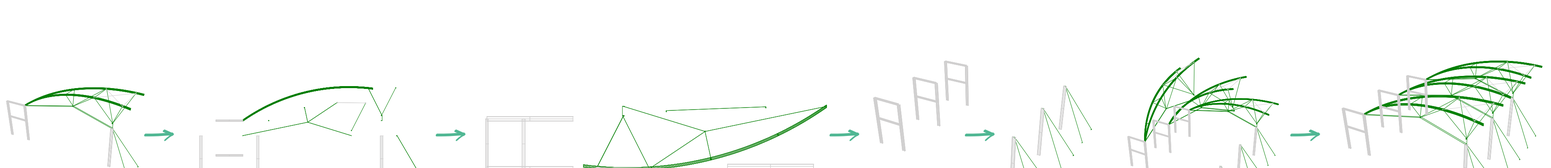
MOBILITY HUB



STADIUM

The Thomsom factory project highlights how Renzo Piano takes all advantages of the steel frame to design an elegant and slender roof cover. Instead of being demolished and forgotten, this structure could gain a new life with being integrated in a circularity process. And what better second chance for an architectural roof cover to be part of a stadium tribune. The principle proposed here consists in keeping the whole Renzo sub-tensed beams system and integrate it to a light and optimized steel suspended cable scheme : no reinforcement needed, total reuse of the existing structure, an example of the benefits of circularity.





THE PROCESS

The circularity process brings many assets compared with the traditional way of demolition and reconstruction. After having diagnosed the existing structure on site, elements whose abilities may have been damaged are sent to the factory for repair or repaint. Then, they can be directly reused on site for the new construction, minimizing the cost in financial terms, energy and transport.