Green Transformable Buildings
By reversible building design

Paradigm Shift towards Circular Buildings and Economy
Due to technological and ICT revolutions, we are witnessing increasing acceleration of change almost on daily bases in all fields. These changes affect the way we communicate, work, learn, live, while trends and predictions risk to be overrun at the time they are identified as such. What is the physical answer to this increasing dynamics, considering the capacities of the planet and human physical and psychological needs?

(Durmisevic 2015)
Upgradeable built environment
Environmental capital is becoming smaller
It is that through cities and buildings the mankind mediates its relationship to various stokes and flows of environmental capital.

Considering the downstream of the resources we need to imagine a new world with new value system. In doing that, development of new design concepts and integrating innovative engineering and production technologies are key accelerants towards reversibility of the existing downstream of resource.
Reversing the process of degradation

The world of today

City end performance

Water treatment  Waste  Energy  Mobility  Green

Market driven / consumption economy

Linear resource consumption Based on fossil fuels

The world of tomorrow

City end performance = cyclic metabolism that eliminates negative impact on the eco system

City metabolism performance

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the world of tomorrow is upgradable world with dynamic and reversible buildings

Whereby design needs to guaranty circular value chains, through which buildings and materials in buildings will sustain / increase their value.

Instead of being designed for demolition and to become waste, reversible building design gives buildings capacity to reverse the processes and building structures back to the initial set of elements and to re-configure them to answer new requirements.

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Reverse the process of degradation
Value degradation of buildings and building materials
Dynamic and Circular Building is shaping the world of tomorrow.

The world in which building demolition and construction waste is Design Mistake

Durmisevic 2015
Future Value = Reversible Building =

High Transformation capacity + High reuse potential
Design Task is to guaranty long term value of buildings by **high transformation and reuse potential** of buildings and materials on three levels.
Reversible building design
Keeping materials in a use loop

REVERSIBLE BUILDING DESIGN PROTOCOLS

Durmisevic (2006) Transformable Building Structures
Independency indicator of Transformation
Expending the reuse of building, systems and components through
Modularity
Replicability
Upgradability
Exchangeability

Indicator of transformation
Standardization of Interfaces for increased Reuse potential

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IDF modulen

Reconfiguration
Flexible wall system for
housing
Design 2000
In corporation with:
Polynorm, Corus TU Delft

SMR wall system

project name
SMR wall system

Flexible wall system for housing
Design 2000
In corporation with:
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Demontable Family House has been designed by Durmisevic as a part of a PhD project ("Transformable building structures") at the TU Delft in collaboration with M.P. Evelein.

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Measures for Future Value

• Up-cycling

• Element/Component reuse

• Adaptive

• Design quality (Prevention by design)
kg =

CO₂ footprint = \frac{kg \times CO₂/kg}{Lifecyle \times X}

CO₂/kg =

Life cycle =

Domain of the designer | 4\textsuperscript{th} dimension
Canal house, Amsterdam
Frederic Blancard (1620, 1728)

Bos et al. (2012) Mixed-use, in the case of flexible buildings
Sustainable future:
Technology is a tool to provide better quality of life. However psychological human needs often overrule physical once. Design is the place where purpose and meaning revive the matter. This makes design become fundamental to our physical and psychological comfort and key to sustainable wellbeing.

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ARCHITECTURE AS COMPLEX System INTEGRATING THREE SUBSYSTEMS

Dynamic space configuration
Dynamic structural configuration
Dynamic Esthetics

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Laboratory for Green Transformable Buildings

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Story behind Reversible Buildings/BUILDINGS AS FLOWERS

Design building as a flower that make people happy, Flower as a source of inspiration, curiosity, positive feeling and expression of love, Flower that is self regulated and adjustable to the climate, and extends its life through future flowers ...
Reversible Building Design Symposium part II
Horizon 2020
Buildings as Material Banks
Integrating Materials Passports with Reversible Building Design to Optimize Circular Industrial Value Chains
THE AIMS of BAMB (Buildings as Material Banks) are:
- the prevention of construction and demolition waste,
- the reduction of virgin resource consumption and
- the development towards a circular economy addressing the EU Work Programme on Climate action.

BAMB METHOD: In order to improve the value of building materials for recovery two complementary value adding frameworks will be developed and integrated, (1) materials passports and (2) reversible building design.

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