BAMB
BUILDINGS AS MATERIAL BANKS

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BAMB STAKEHOLDER NETWORK: SPECIAL INTEREST GROUPS

@ **LAUNCH OF THE BAMB STAKEHOLDER NETWORK,** BRUSSELS

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

SPECIAL INTEREST GROUP 2: REVERSIBLE BUILDING DESIGN

PRESENTED BY : DR. ELMA DURMISEVIC

Leading Partner :

UNIVERSITEIT TWENTE.

2.
Reversible Building Design

Contributing Partners :

bre

Zuyd Hogeschool

ZUYD

Vrije Universiteit Brussel

SARAJEVO GREEN DESIGN FOUNDATION

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the world of tomorrow is upgradable world with dynamic and reversible building configurations

Focus on design that can guaranty circular value chains, through which buildings and materials in buildings will sustain / increase their value.

This requires systemic change in the way we design, build and upgrade our built environment where dynamically and flexibly designed buildings and building products are fundaments of reversibility of buildings and building components as base of circular economy in building construction.

Instead of being to-be waste, building design gives buildings capacity to function as banks of valuable materials - slowing down the usage of resources to a rate that meets the capacity of the planet.

Dr. Elma Durmisevic, Head of the research EU Horizon 2020/BAMB Revisable Buildings Design, Design leader of GTB Lab and GDC pilots

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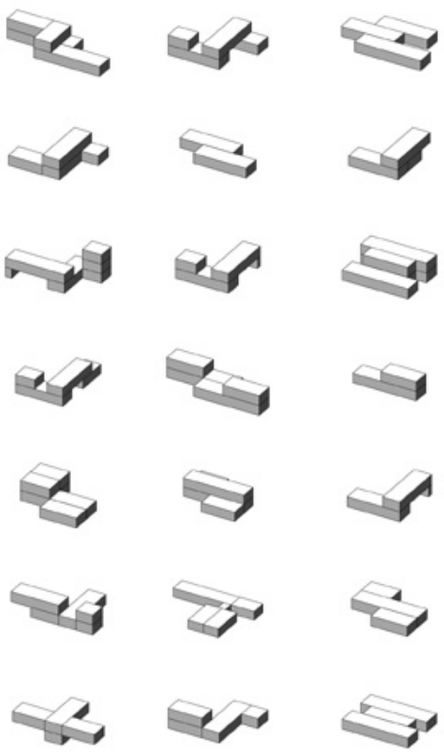
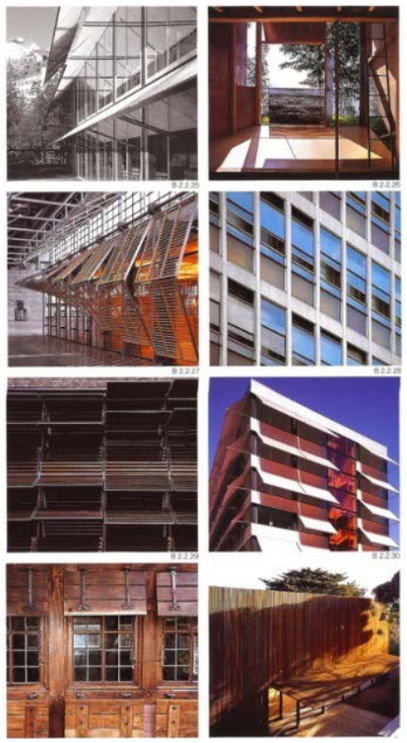
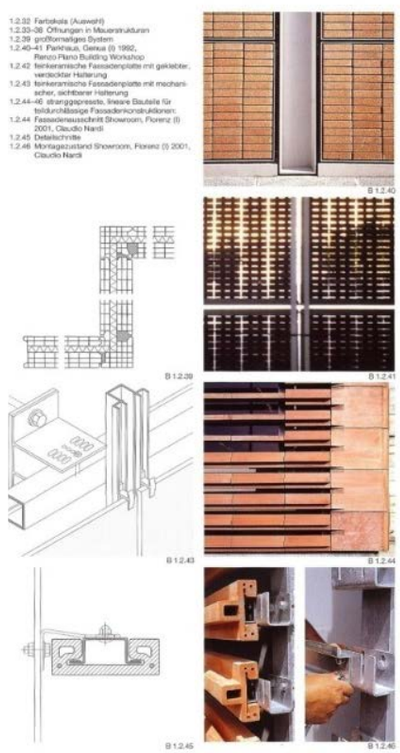
Dynamic Circular Buildings

By reversible building design







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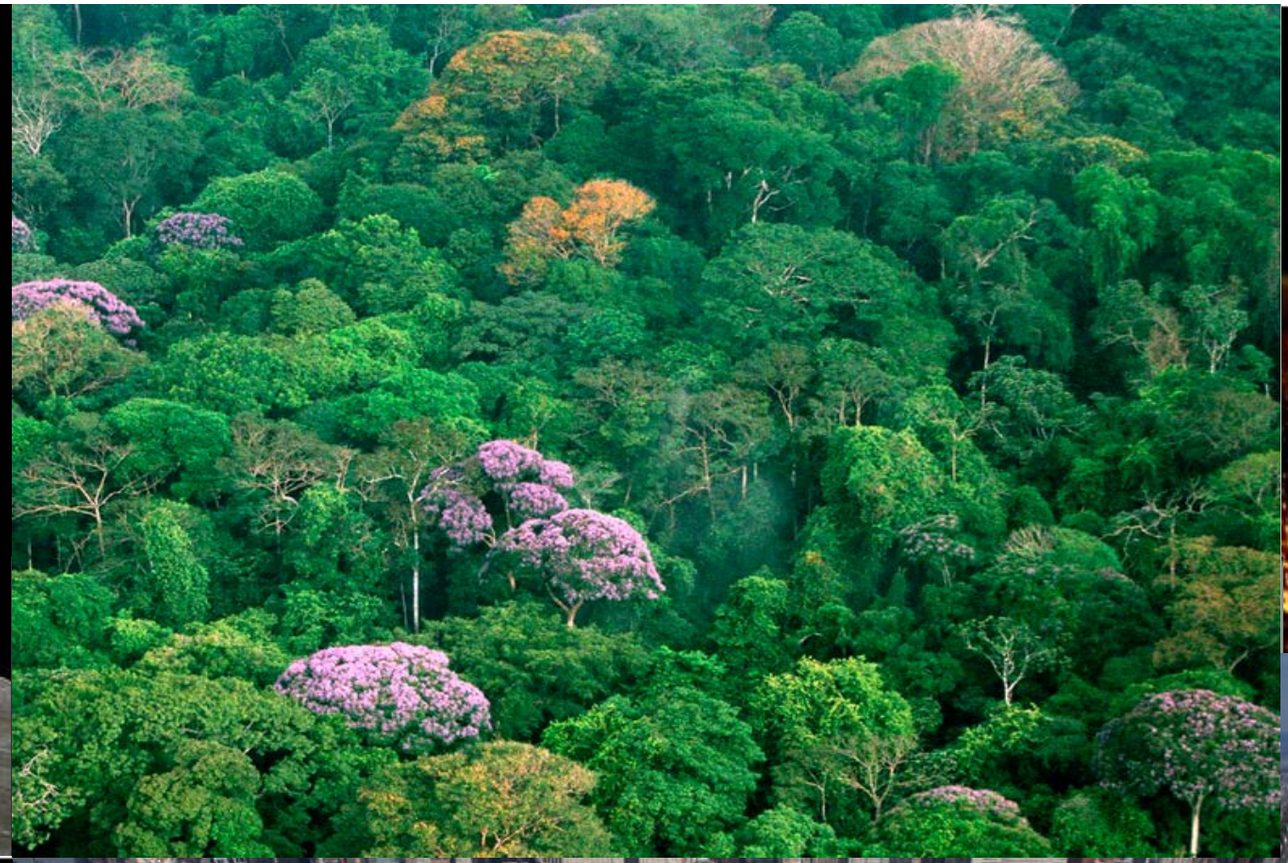
Environmental capital is becoming smaller



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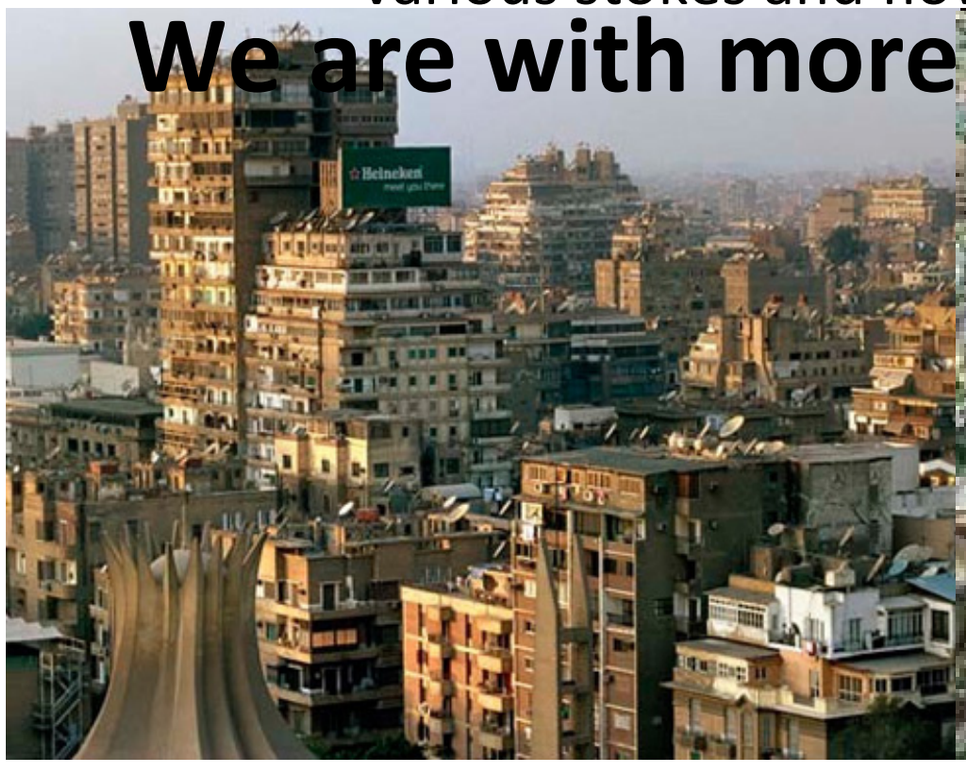
It is that through cities and buildings the mankind mediates its relationship to various stokes and flows of environmental capital.

We are with more having less at disposal



Way of using resources and making cities and buildings has turned out to be obstacle for sustainable development. As buildings are responsible for 50% of waste in Europe, 40% of CO2 emotions and 40% of waste generation.

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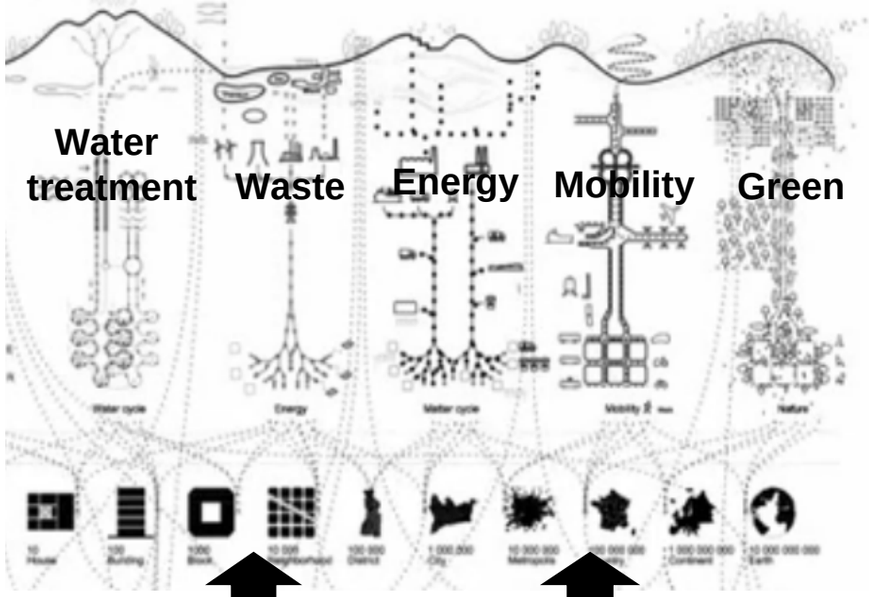
The world of today

City end performance

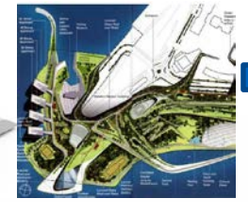


Market driven / consumption economy

Linear resource consumption Based on fossil fuels

The world of tomorrow

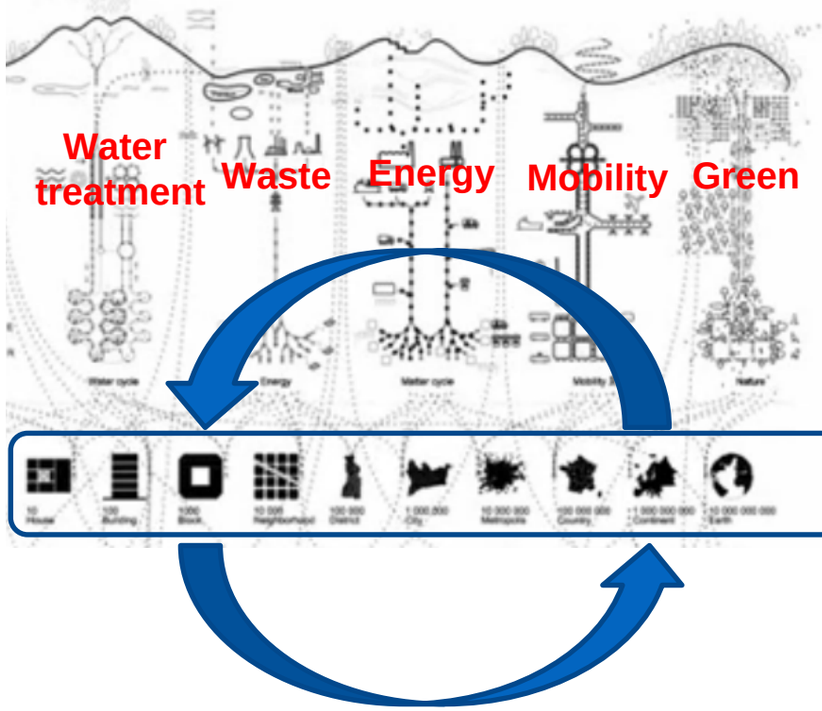
City end performance= cyclic metabolism that eliminates negative impact on the eco system



City end performance

cyclic metabolism that eliminates negative impact on the eco system

City metabolisme performance



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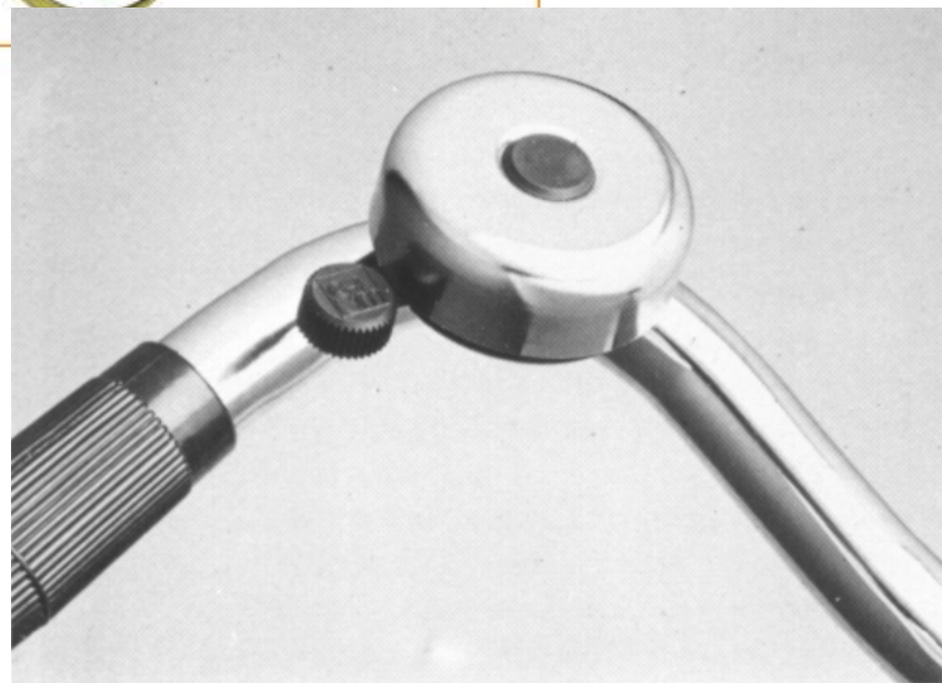
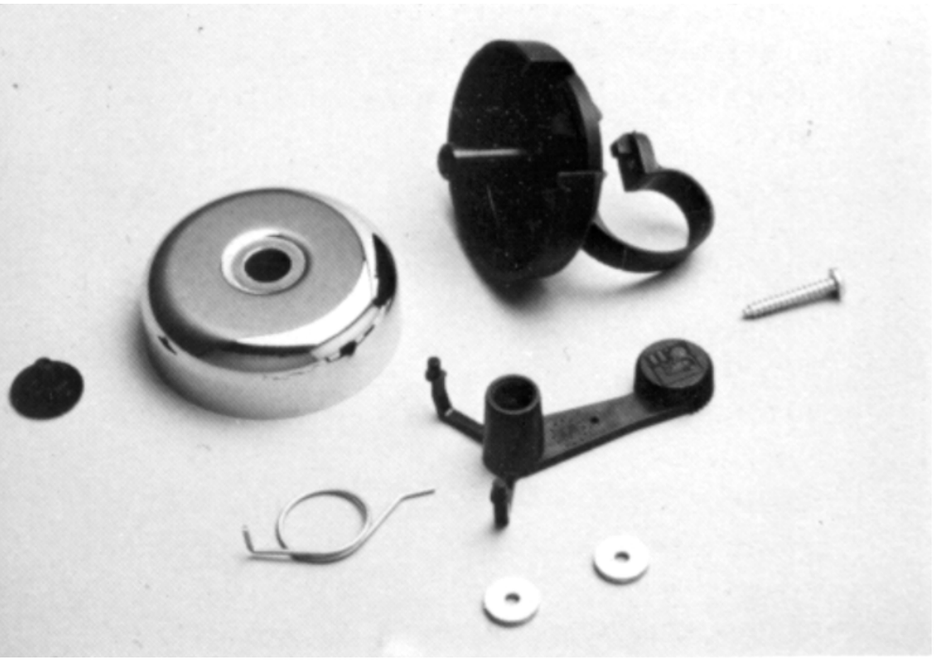
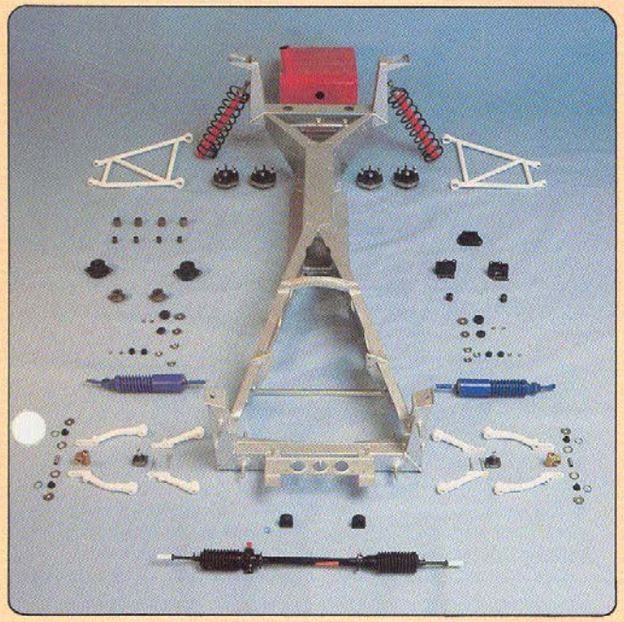
Trends in product design GREEN ENGINEERING CONCEPT





ALL ITEMS CONTAINED IN THE KIT APPEAR BELOW



REPLACEMENT BODY AND INTERIOR PARTS

- 1 × Replacement body shell
- 1 × Left hand light pod housing
- 1 × Right hand light pod housing
- 1 × Front bumper
- 1 × Rear bumper
- 1 × Bonnet
- 1 × Boot lid N.B. body and panels are unpainted
- 1 × Heater grill
- 1 × Front laminated windscreen
- 1 × Front windscreen rubber
- 1 × Front screen rubber chromed plastic filler strip
- 1 × Burr walnut veneered dashboard
- 1 × Pair of seat retrim cover assemblies
- 1 × Full interior black carpet set
- 1 × Full wiring loom (state alternator or dynamo preference)
- 1 × Interior centre console
- 1 × Pair interior screen pillar trims
- 1 × Pair underdash board wiring cover trims
- 1 × Pair door panel trims
- 1 × Pair door panel firmers

- 1 × Hood storage tray
- 1 × Hood frame
- 1 × Soft top hood P.V.C. (mohair optional)
- 1 × ¼ Tonneau cover (mohair optional)
- 30 × Female tanax fasteners
- 30 × Male tanax fasteners
- 1 × Packet hood buttons
- 1 × L/H door shell
- 1 × R/H door shell
- 1 × Crash pad on top of dash

REPLACEMENT MECHANICAL PARTS

- 1 × Lotus galvanised chassis
- 2 × Rear springs
- 2 × Rear shock absorber inserts
- 4 × Rotoflex drive couplings
- 24 × Rotoflex bolts
- 24 × Rotoflex nyloc nuts
- 1 × Engine mounting – left hand
- 1 × Engine mounting – right hand
- 1 × Gearbox mounting
- 2 × Bottom shock absorber bush kits
- 2 × Top shock absorber bush kits
- 2 × Anti-roll bar lower link bushes
- 2 × Top differential mount bushes
- 2 × Top rear suspension mountings
- 4 × Rear suspension large 'A' frame bushes
- 4 × Rear suspension small 'A' frame bushes
- 2 × Rear suspension 'A' frames
- 1 × Steering rack (rebuilt unit on exchange basis)
- 2 × Steering rack mounting bushes
- 2 × Front shock absorbers complete with springs

- 8 × Front suspension tubular wishbones 'with bushes fitted'
- 2 × Top front suspension ball joints
- 1 × Front suspension L/H bottom trunion
- 1 × Front suspension R/H bottom trunion
- 1 × Trunion bush kit for both trunions

Trunion and top ball joint nuts/bolts

£2,875 + Vat

LIMITED PERIOD ONLY

Open 7 days, kit on display at Northwich.

All goods are offered subject to availability, the Company reserve the right to alter or modify without notice, prices are subject to alteration without notice.

Christopher Neil Sportscars would like to point out that they have no association whatsoever with Lotus Cars Ltd, nor do they purchase parts directly from the Lotus factory. Now in our 10th year of business with literally thousands of satisfied customers worldwide the parts we sell are all Christopher Neil parts, proprietory parts or genuine Lotus parts.

Demolition versus disassembly ? – state of the art

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Are there benefits of buildings designed with one end of life option?

Dr. Elma Durmisevic, Head of the research EU Horizon 2020/BAMB Revisable Buildings Design, Design leader of GTB Lab and GDC pilots

Facility for Recycling of Building and demolition waste in Rotterdam

Recycling bouw- en sloopafval Rotteerdam

Dr. Elma Durmisevic, Head of the research EU Horizon 2020/BAMB Revisable Buildings Design, Design leader of TB Lab and GDC pilots

Value degradation of buildings and building materials

Dr. Elma Durmisevic, Head of the research EU Horizon 2020/BAMB Revisable Buildings Design, Design leader of GTB Lab and GDC pilots

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Shaping the world of tomorrow

Building Demolition and Construction Waste is Design Mistake

Durmisevic 2015

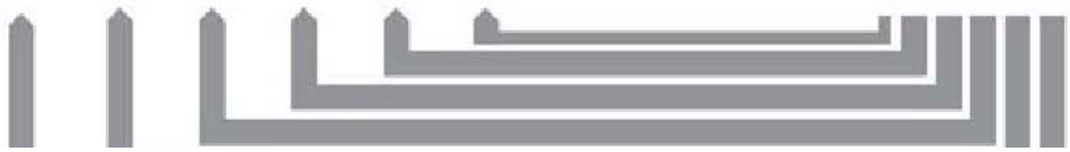
Dr. Elma Durmisevic, Head of the research EU Horizon 2020/BAMB Revisable Buildings Design, Design leader of GTB Lab and GDC pilots

closing cycles

Cities as Material Bank

STAD ALS
GRONDSTOFFENBANK

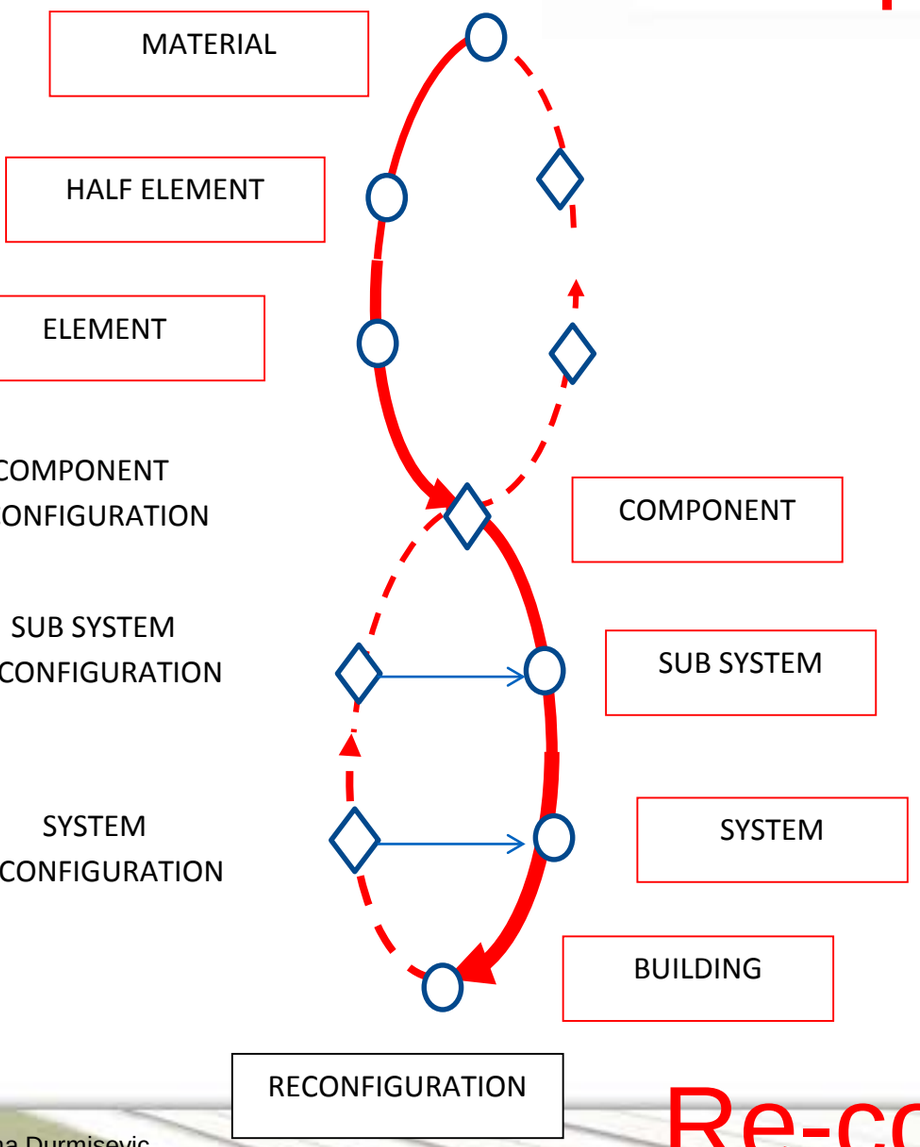
ACTIVE RE-USE

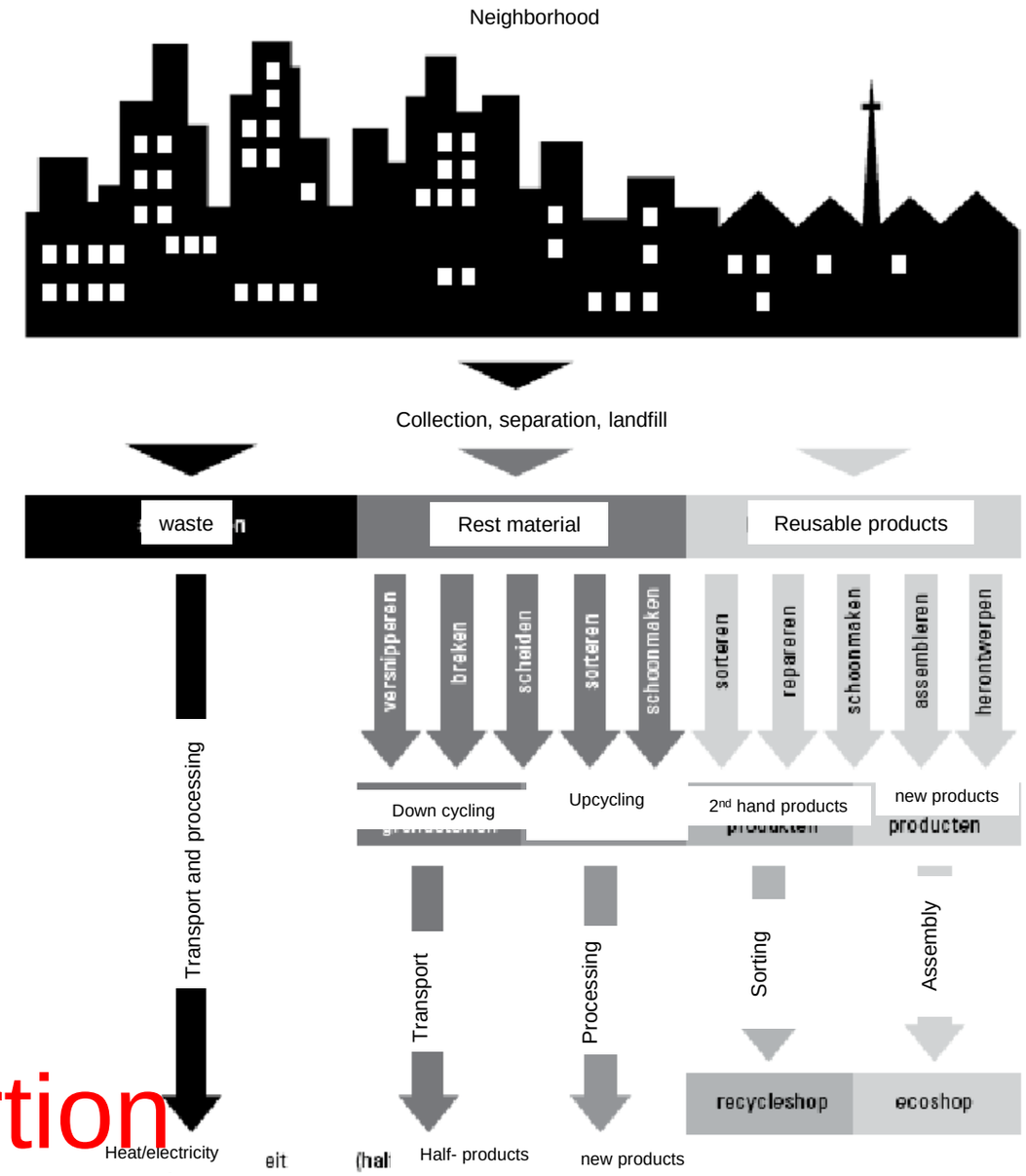


URBAN MATERIAL FLOWS

Products, fine material and rough material flows

upcycling





Re-configuartion

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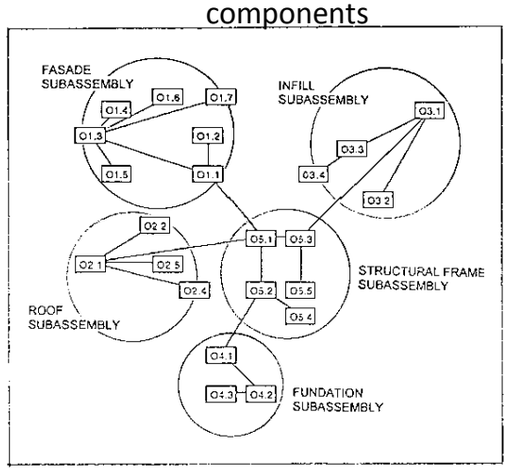
Relational diagram between building components

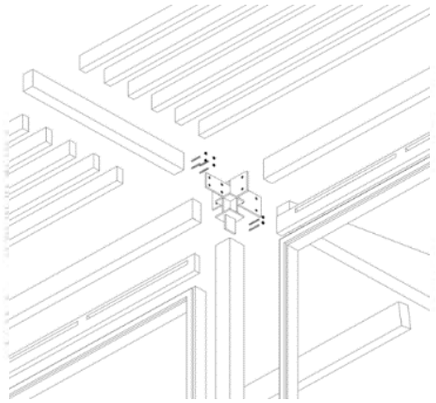


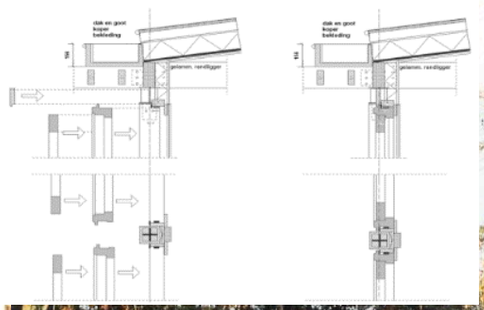
DEMOUNTABLE FAMILY HOUSE TE BILTHOVEN

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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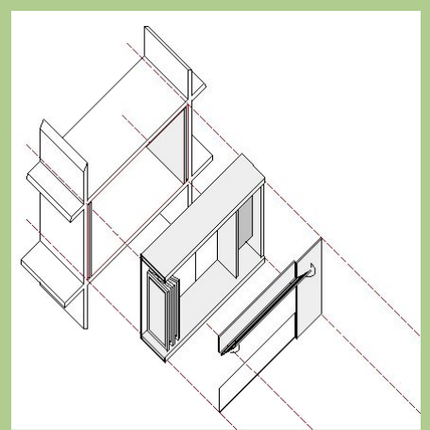
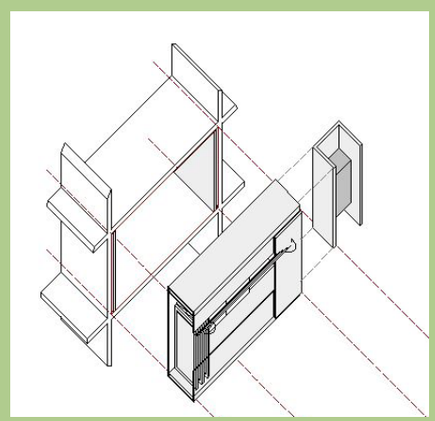
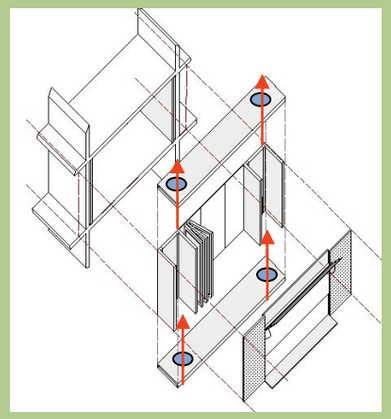
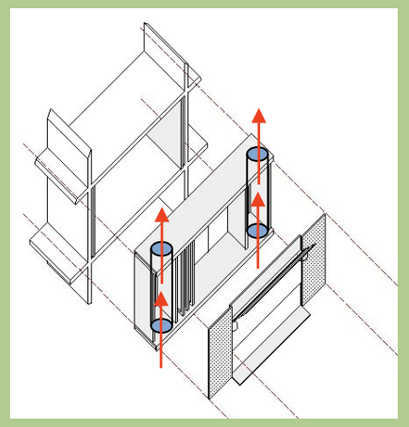
Re configuratie









IDF modulen

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projectname

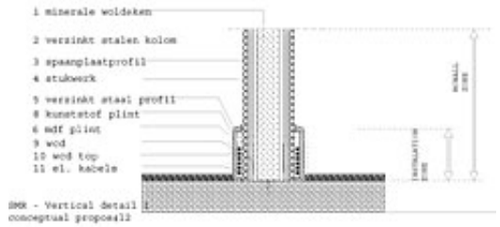
SMR wall system

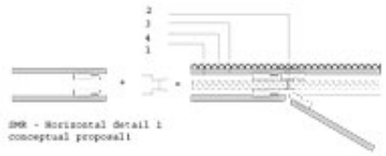
Flexible wall system for housing

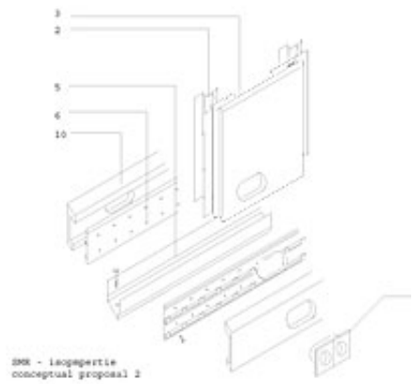
Design 2000

In corporation with:

Polynorm, Corus TU Delft







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Measures for Future Value

- Up-cycling
- Element/Component reuse
- **Adaptive**
- **Design quality (Prevention by design)**

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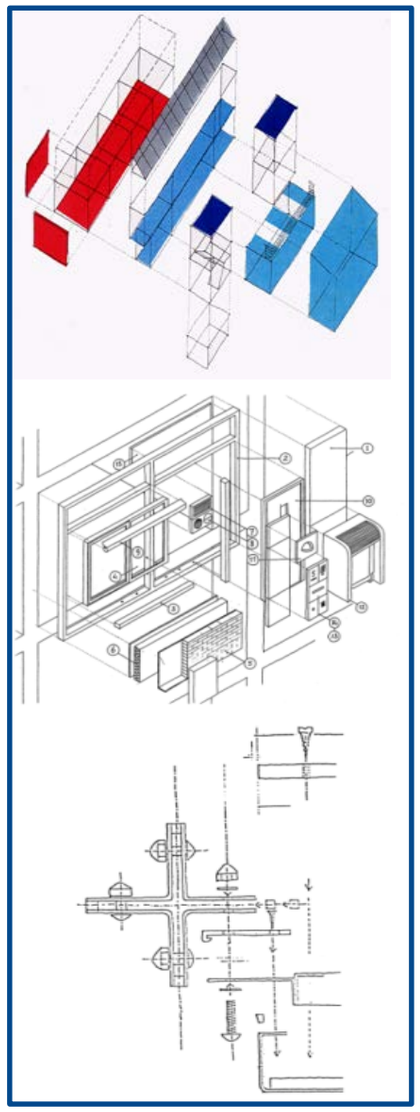
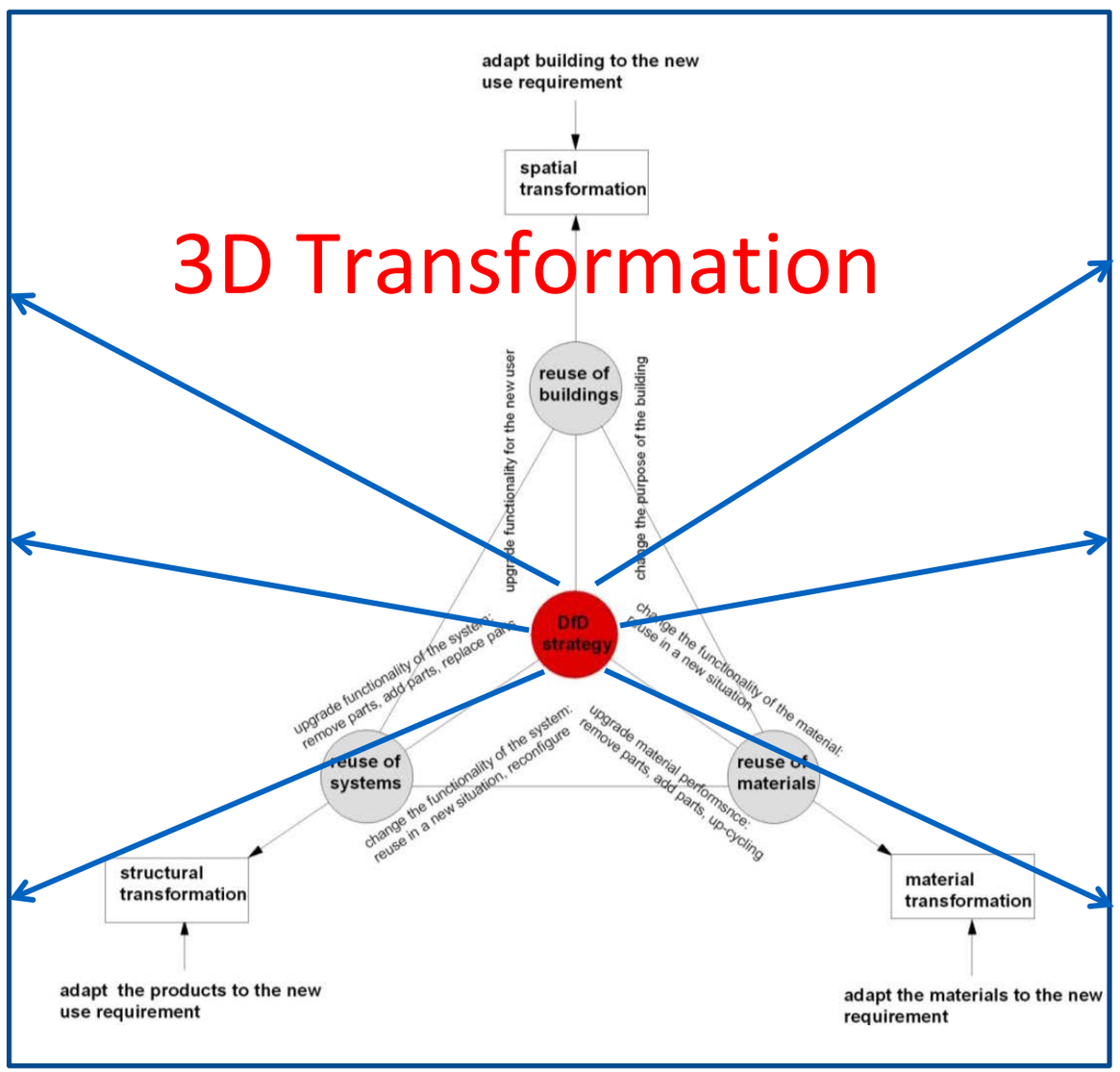
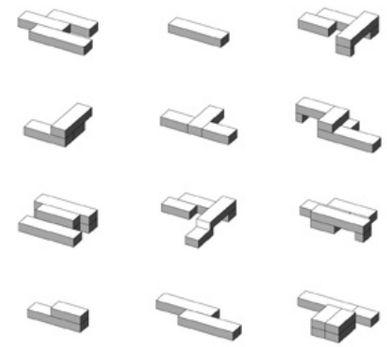
Design Task:

Long term Value creation through multiple dimensions of transformations







Durmisevic 2006 ©

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Future Value

=

High Transformation capacity + High reuse potential

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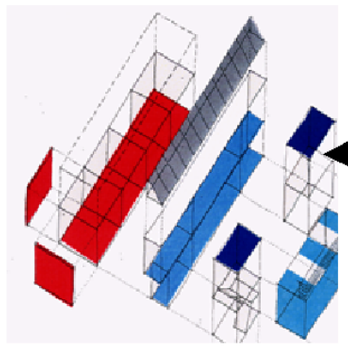
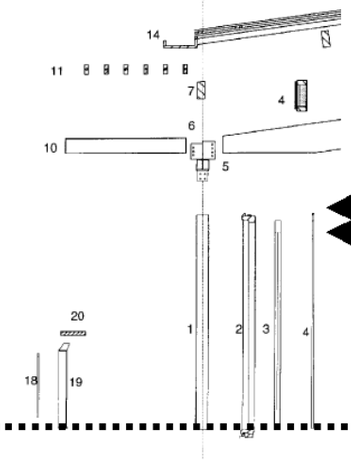
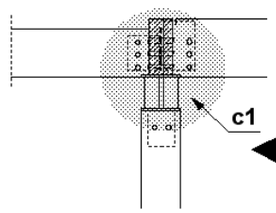
Transformation capacity

Reuse Potential

Three elements of configuration And corresponding design		Performance Criteria for Transformation	Disassembly Aspects of Building Configuration
Functional decomposition = Material levels		**Independence**	❑ Functional independence ❑ Systematization
Technical decomposition = Hierarchy		**Exchangeability**	❑ Hierarchy ❑ "Base element" specification ❑ Life cycle coordination
Physical decomposition = Interfaces			❑ Assembly sequences ❑ Type of connection ❑ Geometry

Design ⟵ ⟶ **Evaluation**

Durmisevic 2006 ©

Revisable Building Design Protocols

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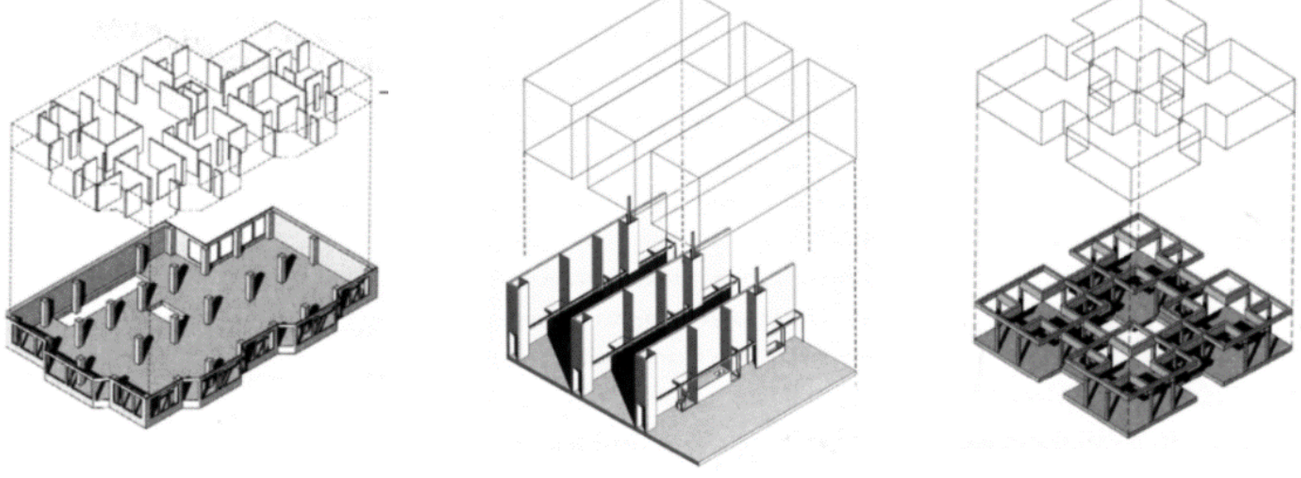
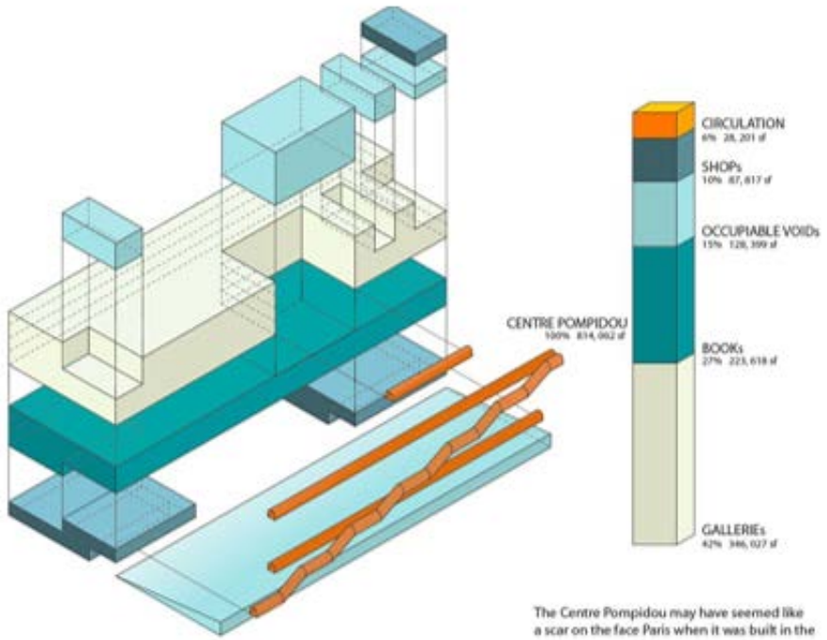


Functional and physical performance criteria for transformation

Space frames/spatial capacities
Form and position of the core/ carrier of transformation
Physical Capacities
Disassembly potential



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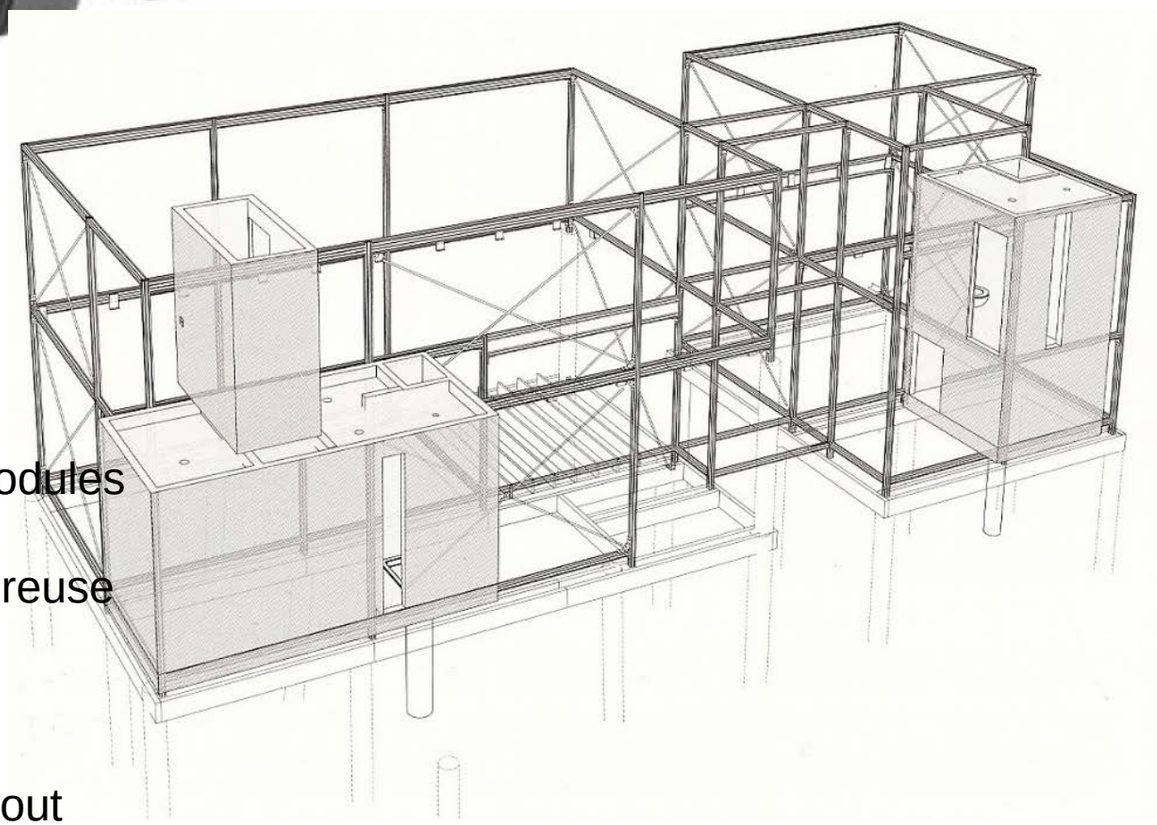
Independency

Independency indicator of Transformation

Expending the reuse of building, systems and components through Modularity
Exchangeability
Replicability
Upgradability



On building level

- Modularity (unit/ system/ component/)
- Independency between different functional modules

On module level

- Upgradability of modules by reversibility and reuse

(upgrading by adding new technology/ new functionality/replacing functionality

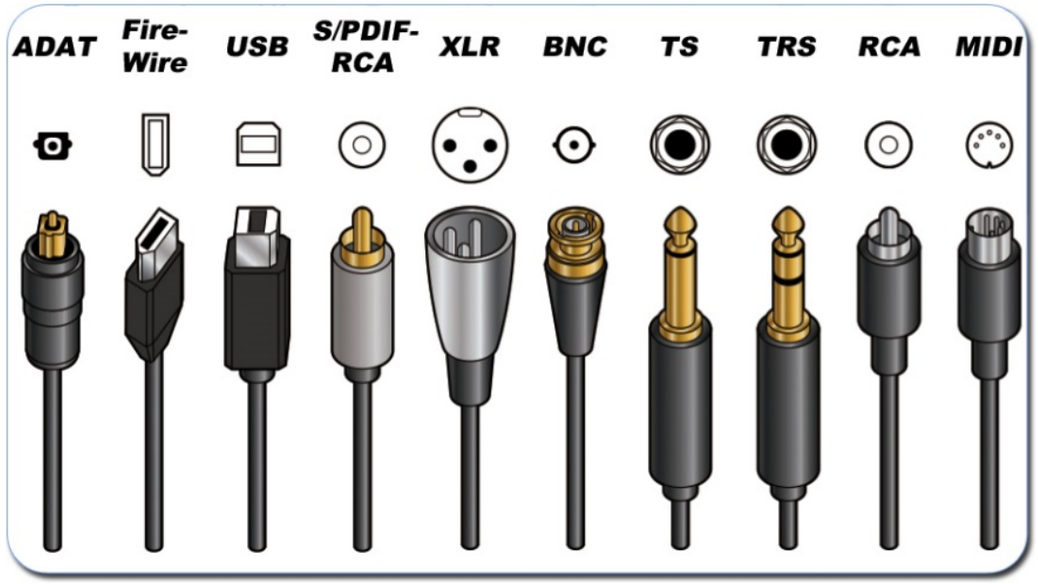
Individualization of modulation

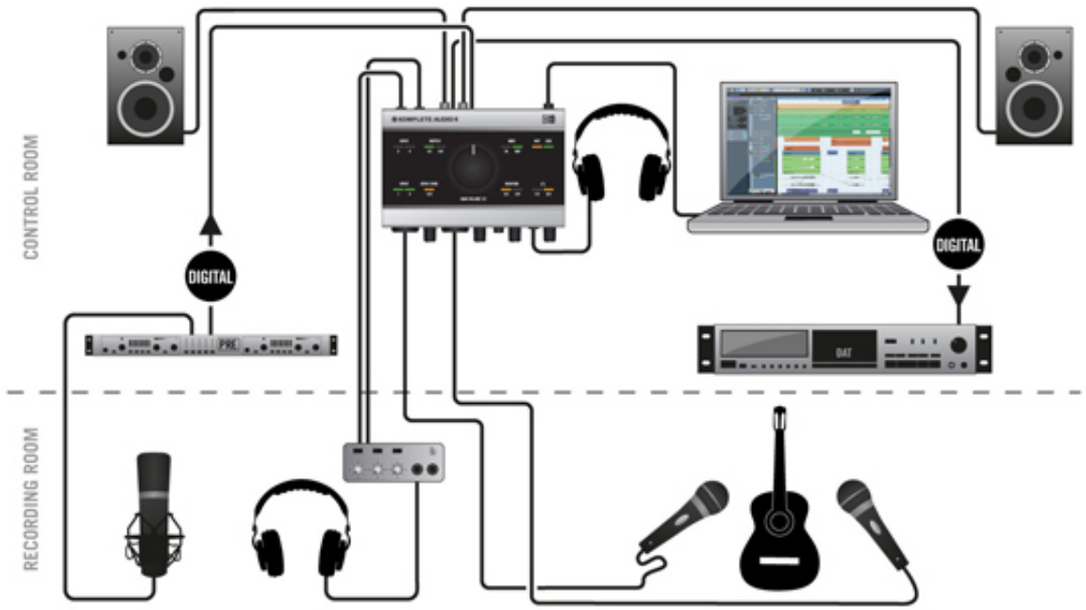
- possibility for in-time customization of modules without bringing them back to the manufacture

Dr. Elma Durmisevic

Exchangeability

Exchangability indicator of transformation Design for Disassembly requirements:
Standardization of Interfaces for increased Reuse potential efficiency as base for new economy And new business models around circularity





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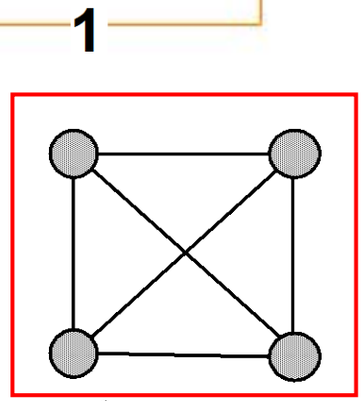

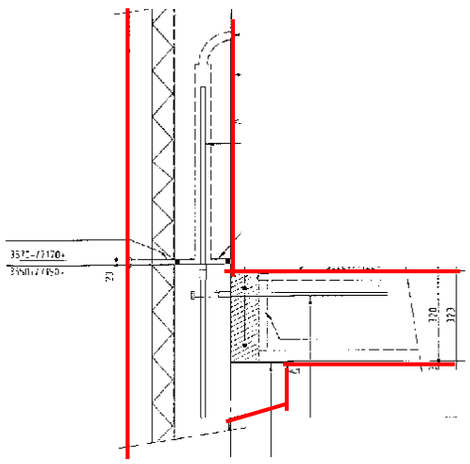

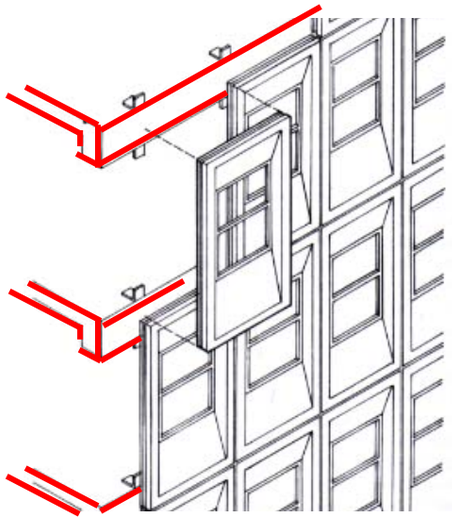

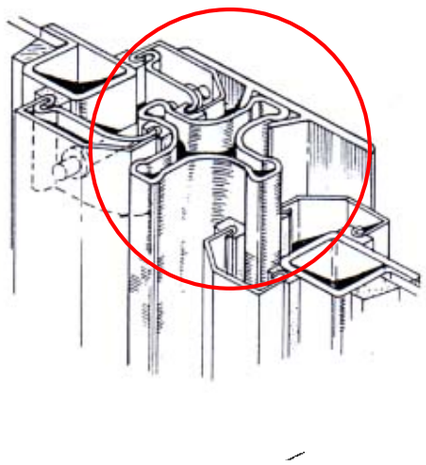

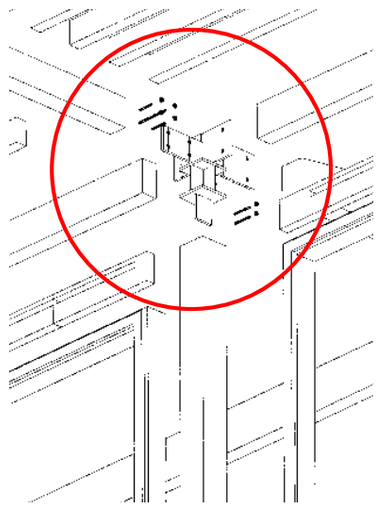

- **BASE ELEMENT SPECIFICATION on different building levels**

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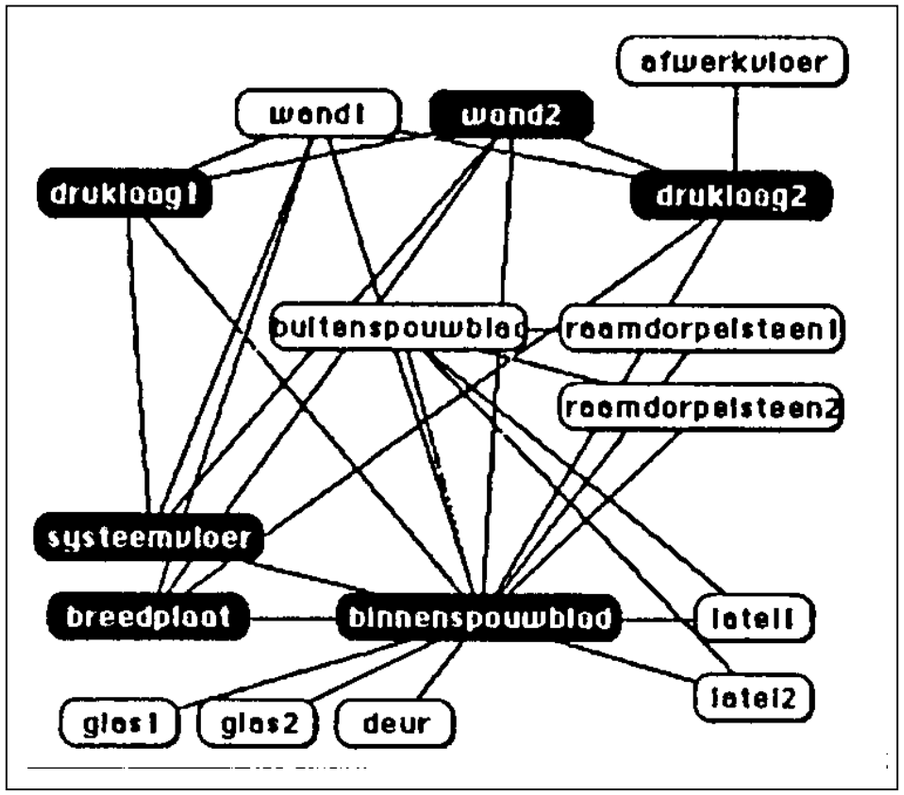

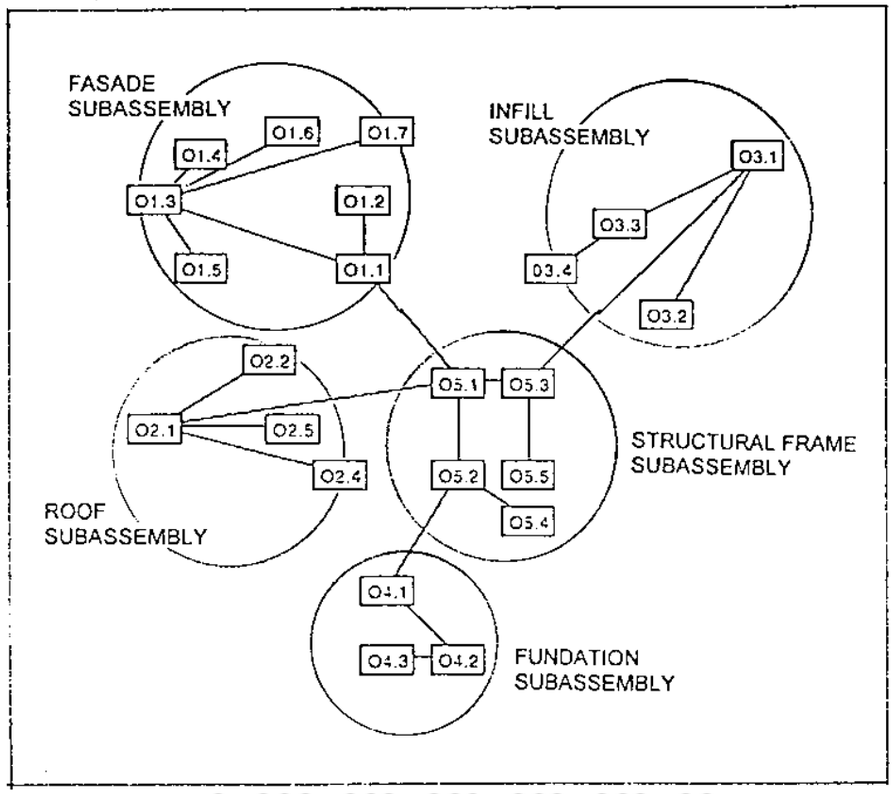

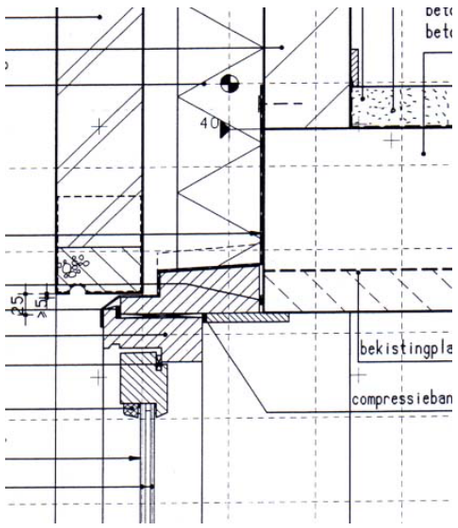

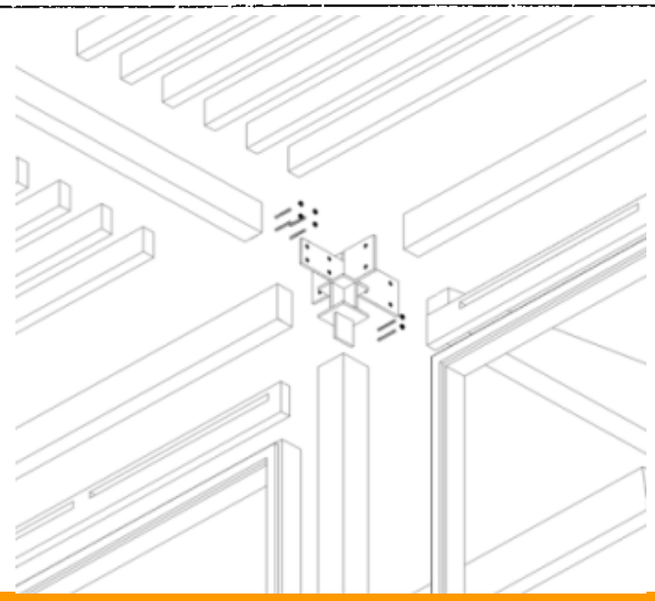

Hierarchy of parts

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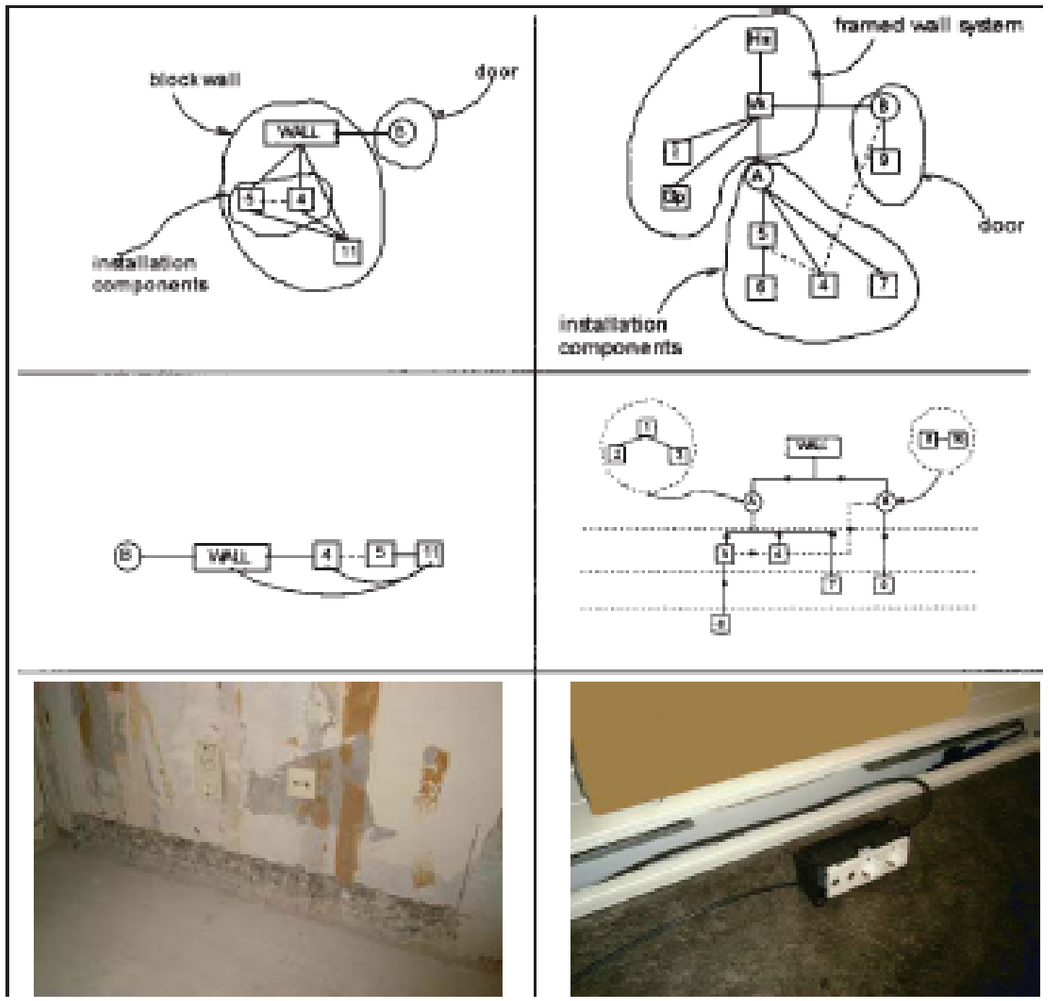

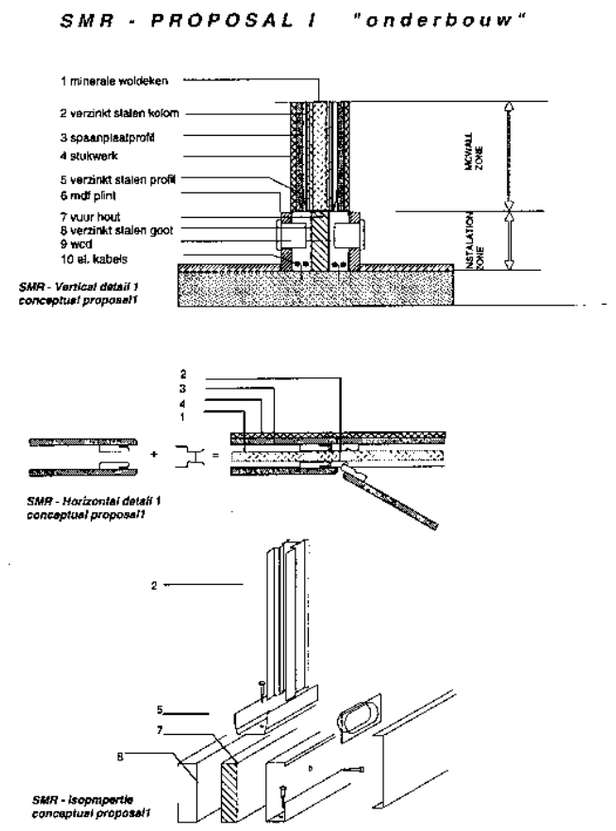

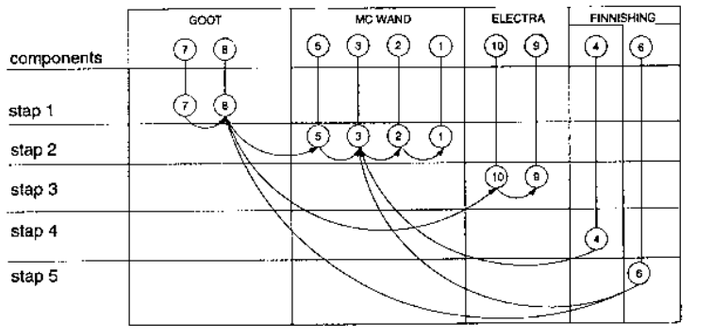

Assembly of the independent clusters in 5 steps. Each cluster answers specifiek requirements and has diferent life cycle expectences. The sequences have a caracter of paralel assembly.

Functional decomposition

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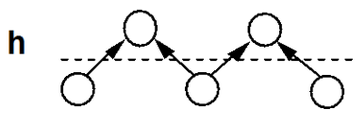
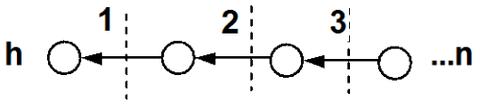
ASSEMBLY SEQUENCES

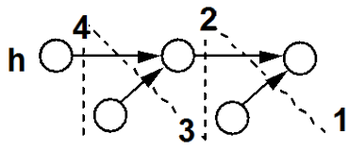
1 parallel



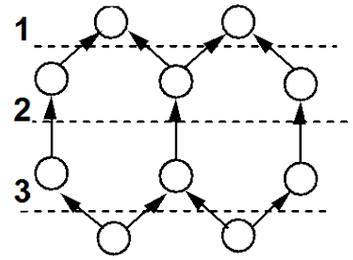
2 sequential



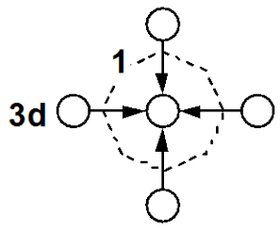
3 interlock

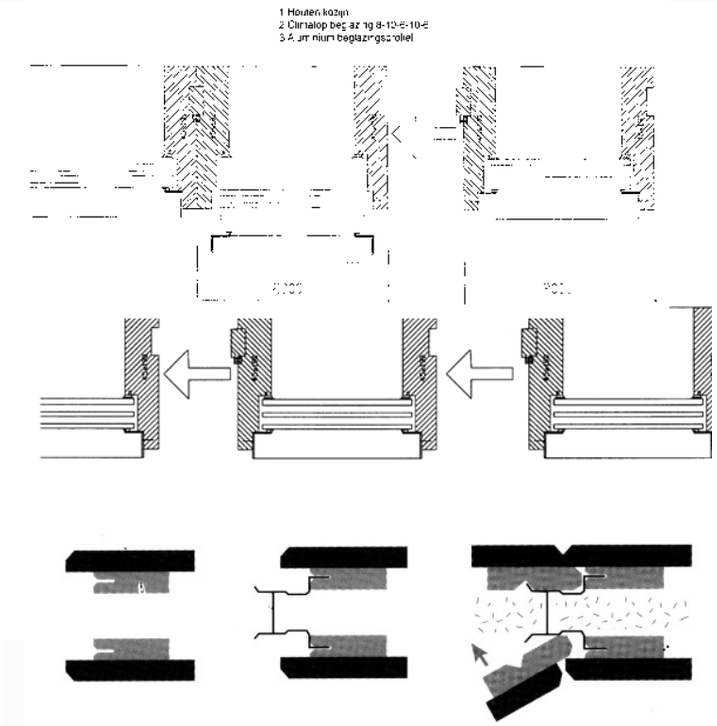


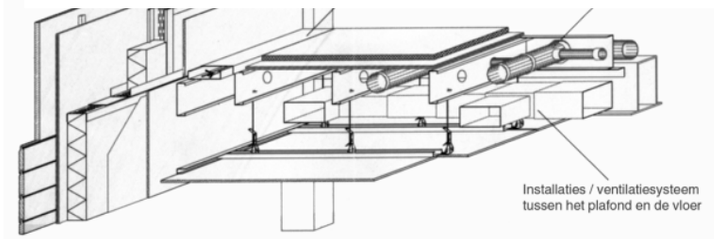
4 closed circle

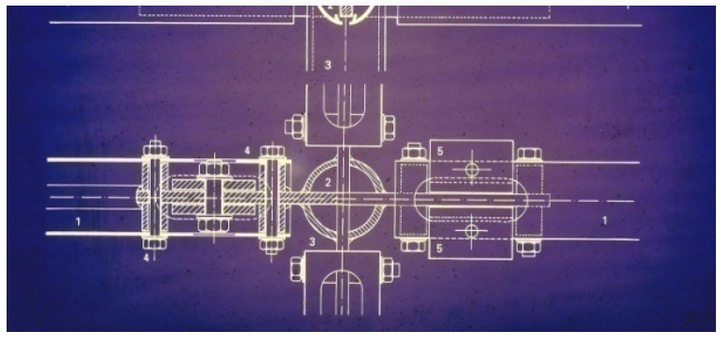


5 gravity (attractor)









Physical composition / decomposition

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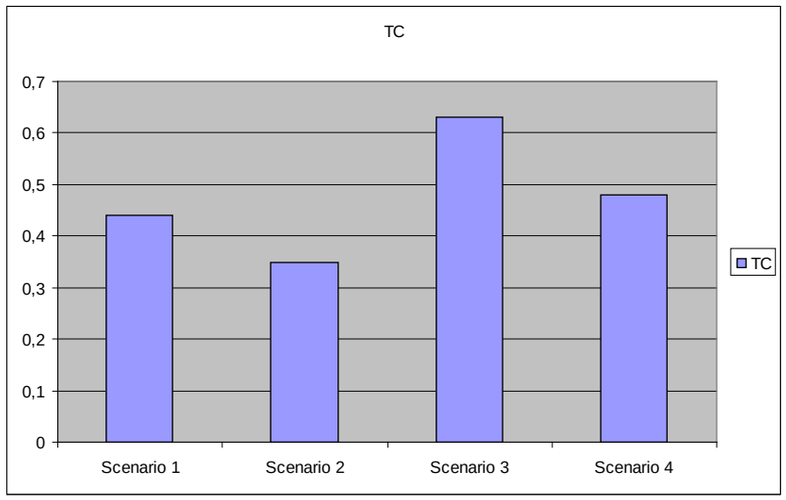
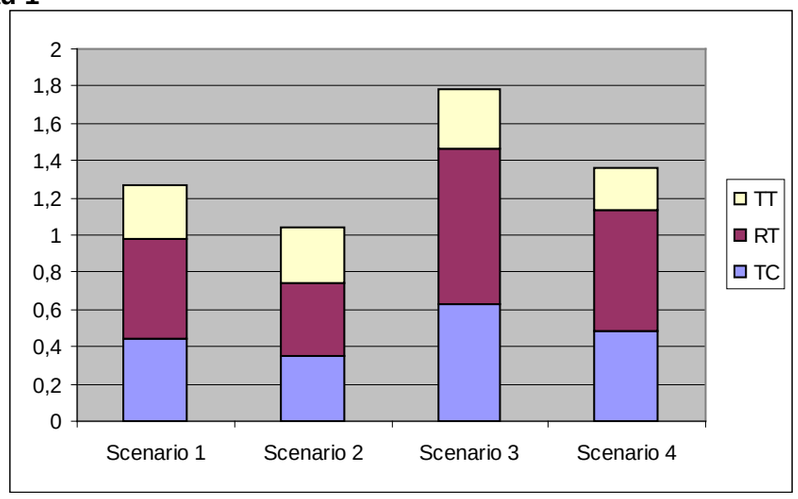
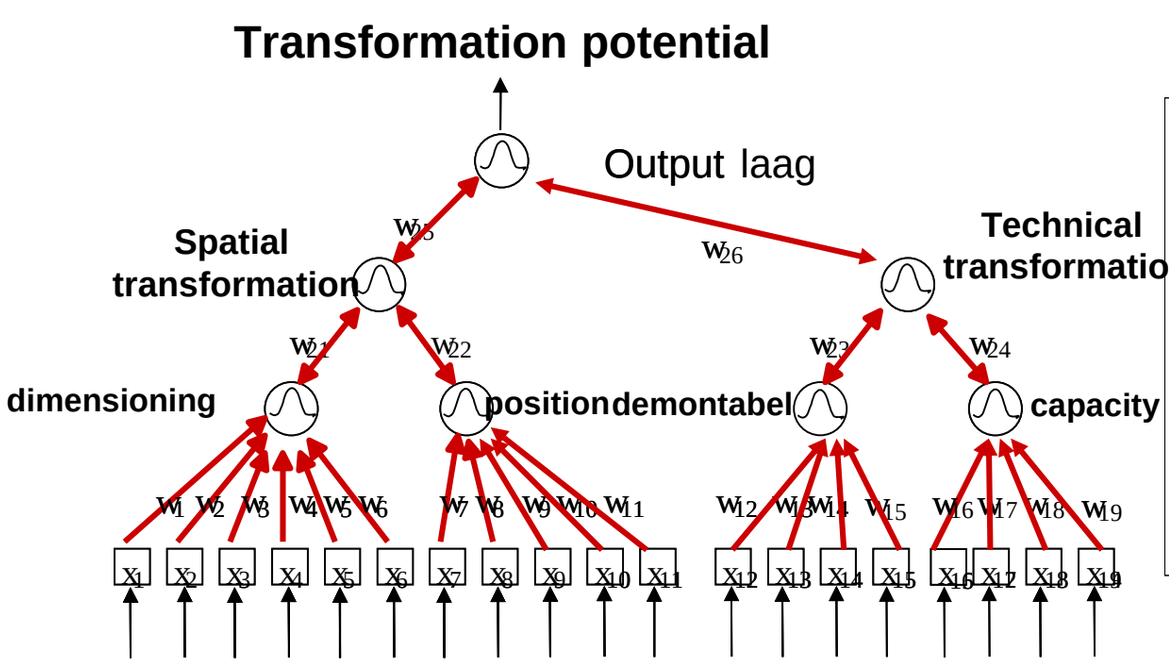
Transformation profile of a building and reuse potential of its elements



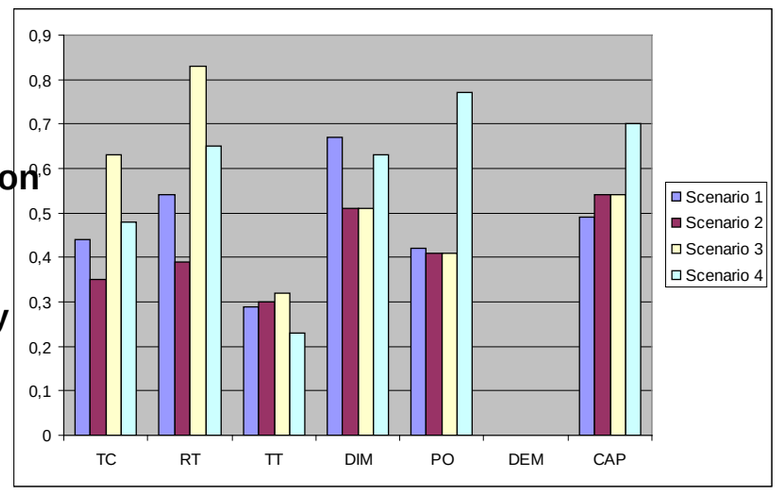
Niveau 1



Niveau 2



Niveau 3



Drie meest sensitieve aspecten
7,2,14

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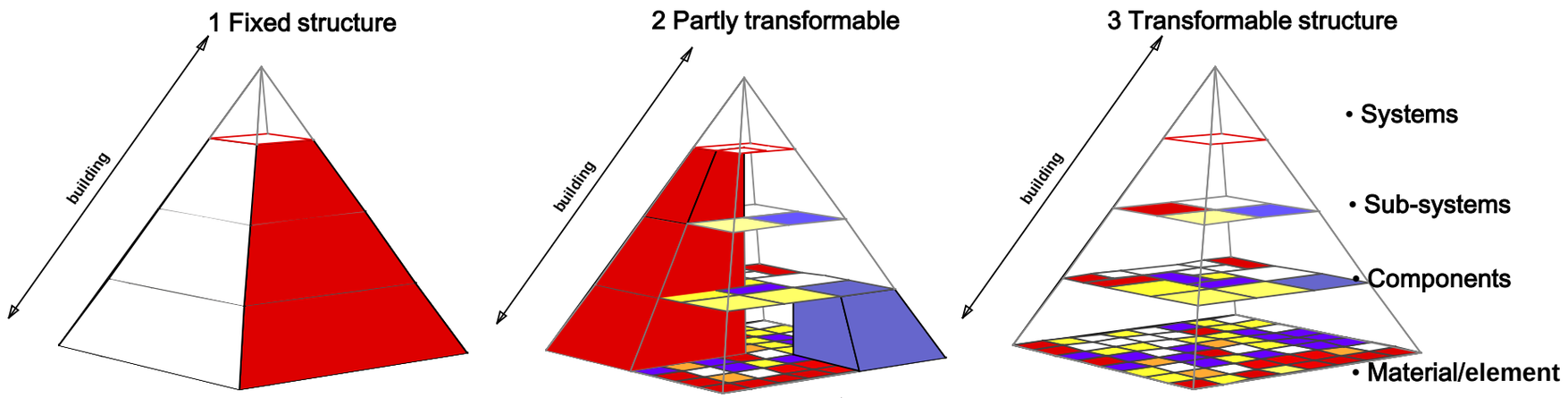
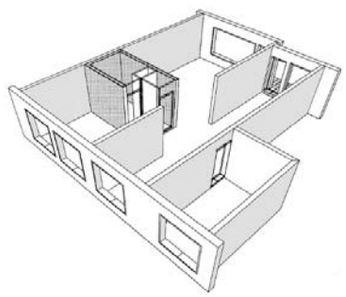
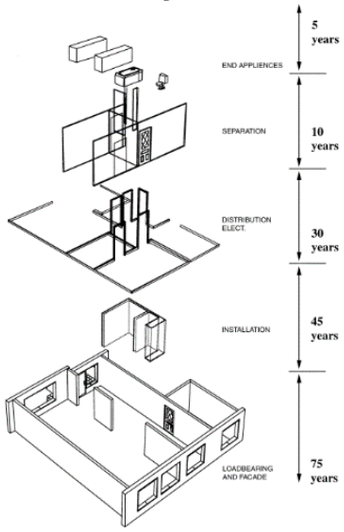
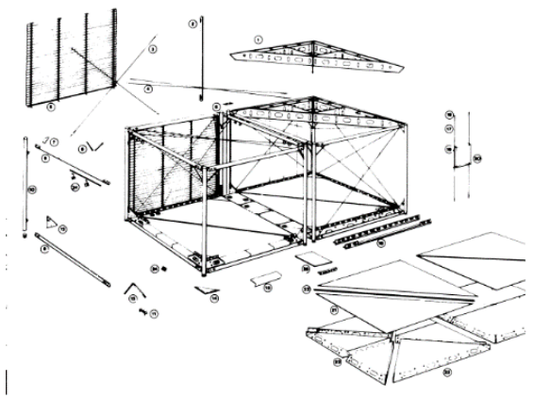
FROM STATIC STRUCTURES TO reversible STRUCTURES
High TP + High RP









Durmisevic 2006

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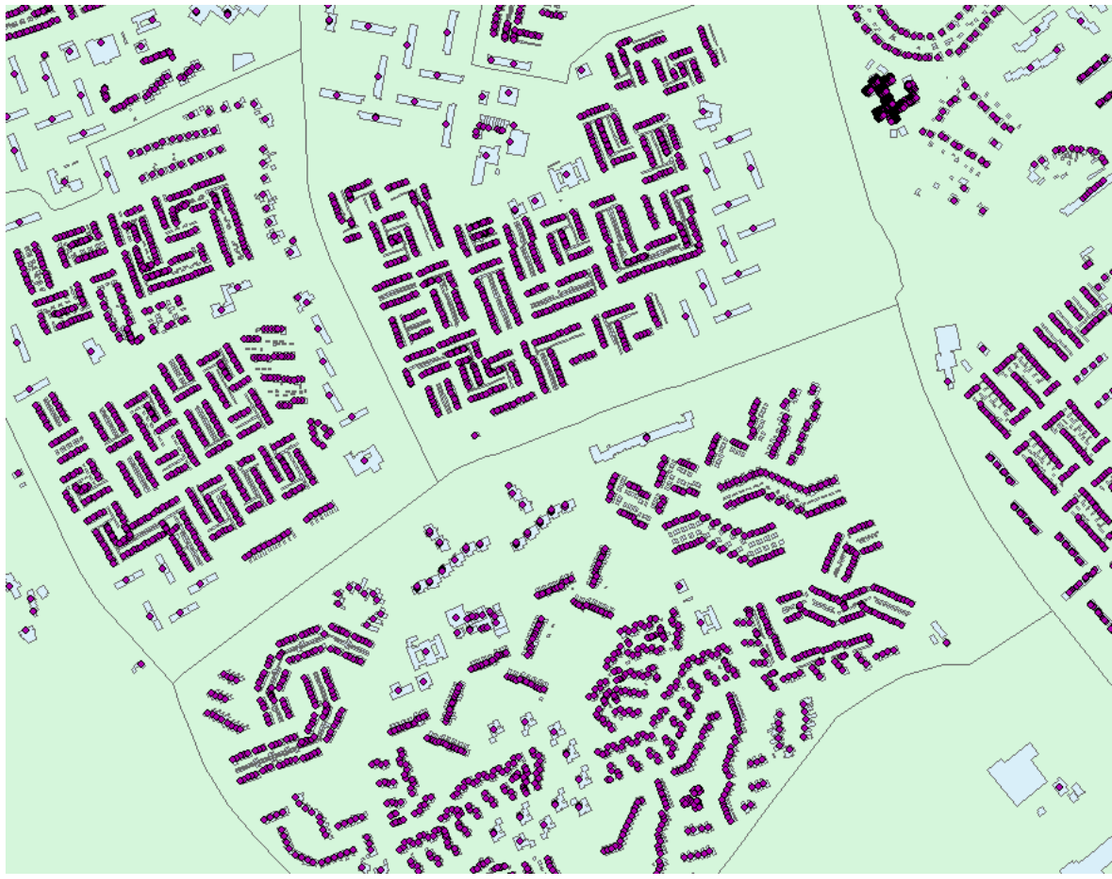
Criteria for measuring building *transformation capacity and reuse potential of elements per function/typology' integrated into a dig ital building registration in the Netherlands*

'Overview of building typologies and construction methods of construction will indicate future value proposition of the existing buildi ng stock



- BAG - *'Basic registration of Addresses and Buildings*'

National database based on addresses

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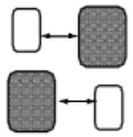
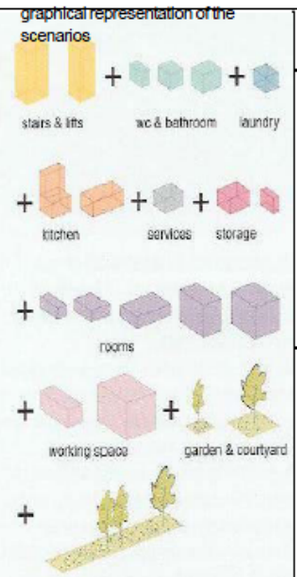
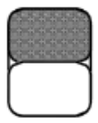
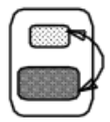
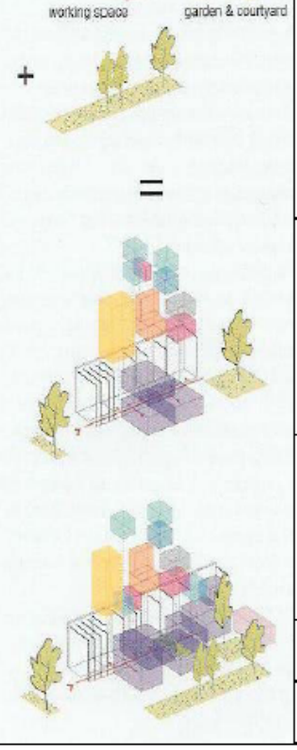
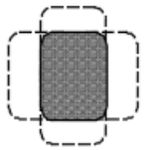
Setting up design protocols and development of virtual simulator

Reversible building forms

Transformation model
Compatible spatial config.

	Strategy	Building level	graphical representation of the scenarios	System & component level
1	Free repositioning of the functional zones 	The ability to reposition different functional units within one building structure. This means that building_ function remains the same but its sub-functions can be moved from one location to another. bathroom units moved from one location to another		The ability to reposition different components within one system structure. This means that systems function remains the same but its components can be moved from one location to another. electric components within the wall
2	Reconfiguration of one functional zone (partitioning into another within the sam structural constrains 	The ability to reconfigure one space from one function to another. That means that the space changes the function within the same structural constrains. multyfunctionality		The ability to reconfigure one function of the system into a new function. This means that the systems function is partly changed by insertion of some new components Facade system that in place of closed section introduces and open section Partitioning wall that in place of finishing panel introduces TV screen
3	Internal rearangment 	Free internal partitioning of one functional zone into sub-zones. For example, partitioning of office spaces. The main function is not changed, only the size of sub-zones		Free Internal partitioning of system into subsystems and components. For r example facade system whose components can be replaced from one location to another as shown on the example of Next 21facade system (chapter 3)
4	extendibility 	The ability to extend the building horizontally or vertically		The ability to extend the system by adding subsystems or components to it horizontally or vertically
5	combination of two strateg	free repositioning and partitioning		
6	combination of more that t scenarios	free repositioning, partitioning and extendibility		

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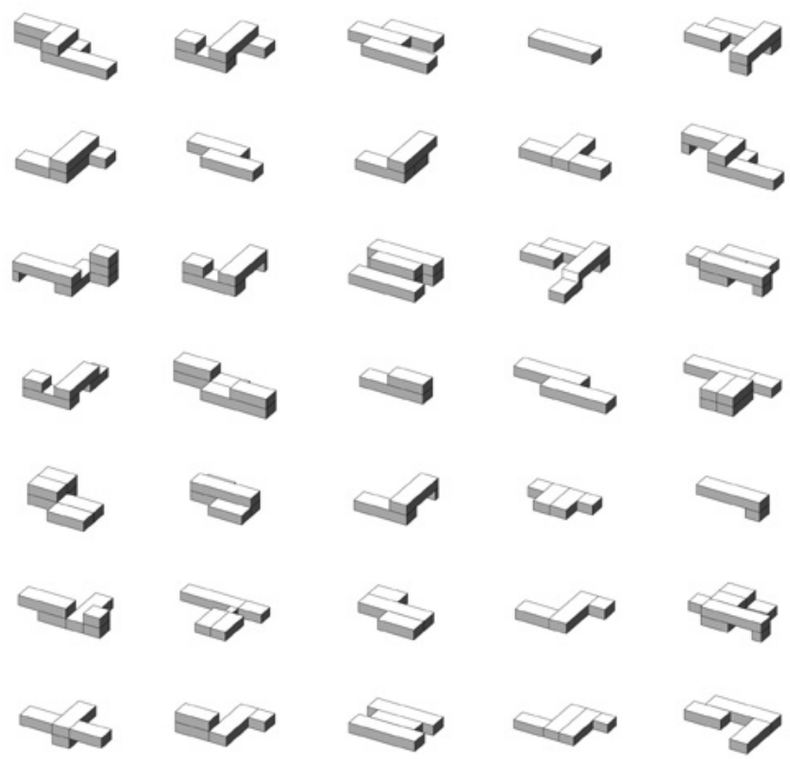
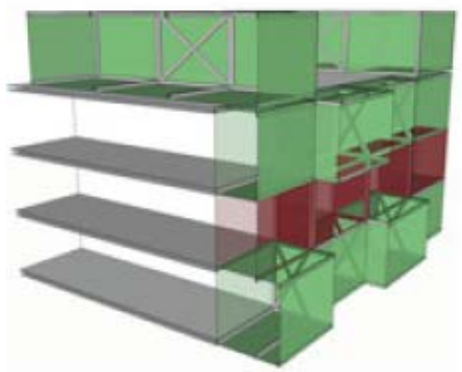
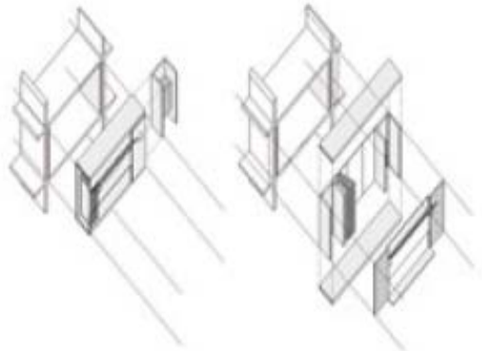
radeable built environment







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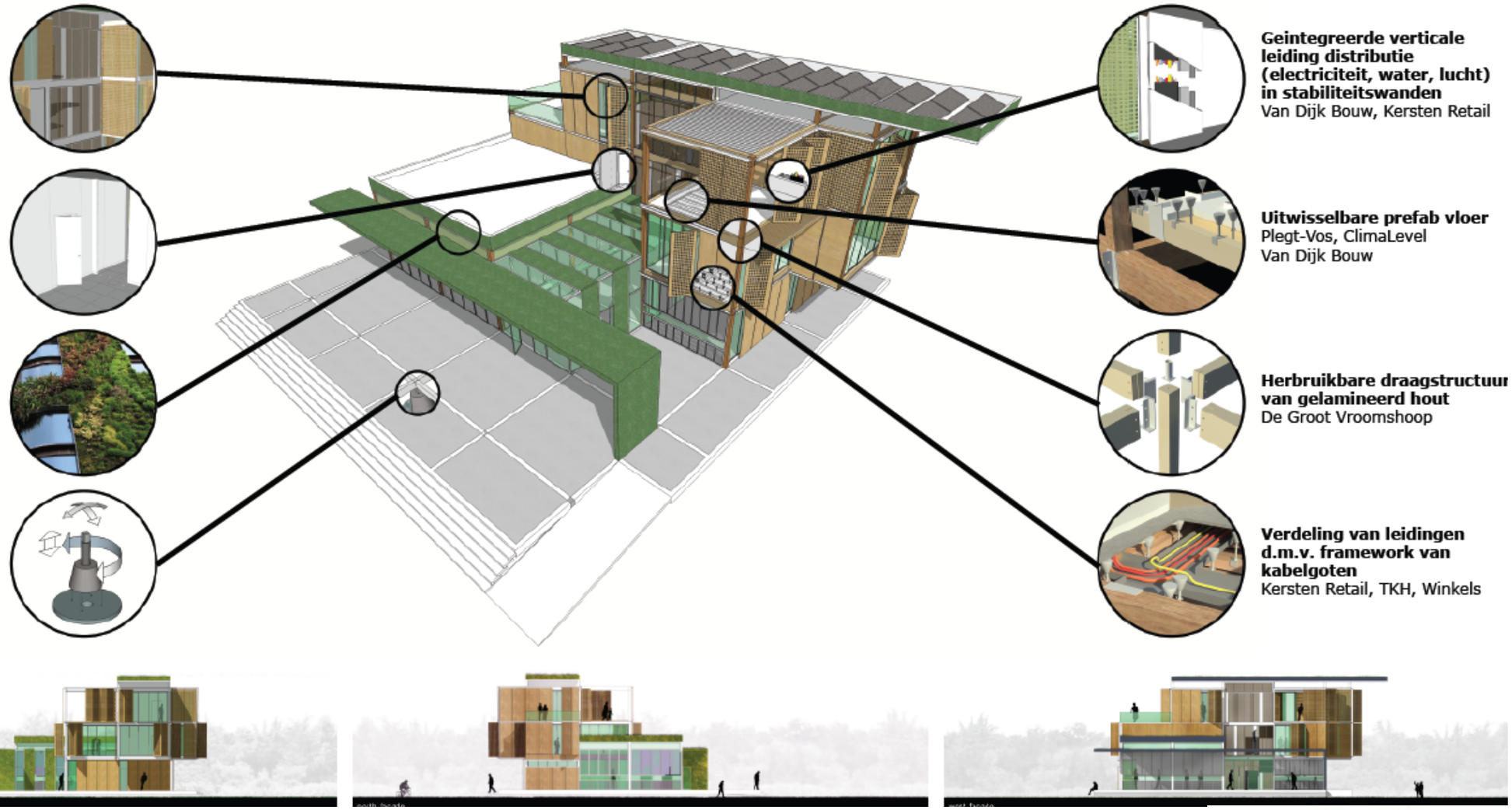
PLATFORM VOOR KOPLOPERS IN BOUWINNOVATIE

BIHTS



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VAN DIJK GROEP

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Duurzame Bouwsystemen

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ROC van Twente

SAXION

gtb lab

Dr. Elma Durmisevic

Dr. Elma Durmisevic, Head of the research EU Horizon 2020/BAMB Revisable Buildings Design, Design leader of GTB Lab and GDC pilots

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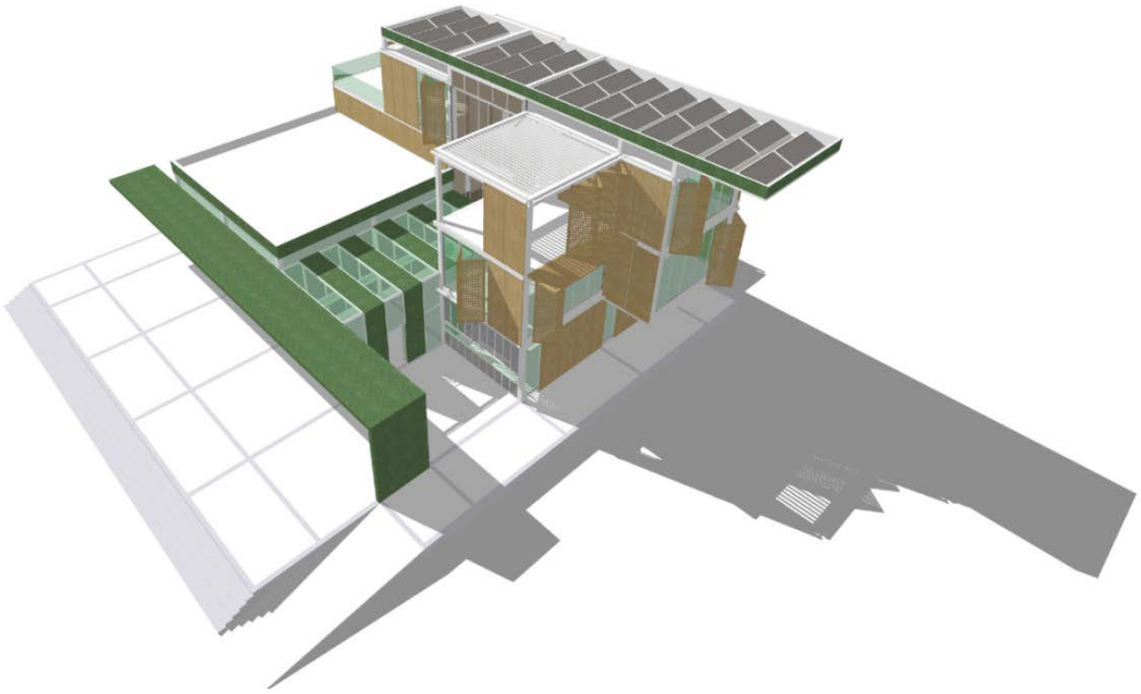
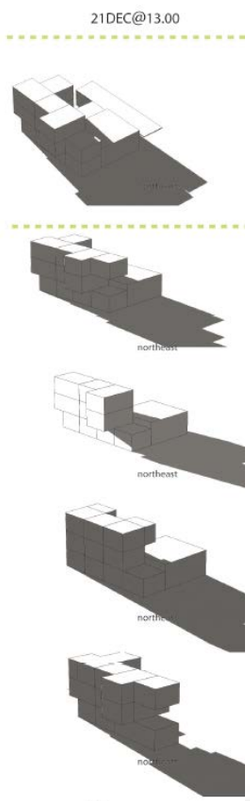
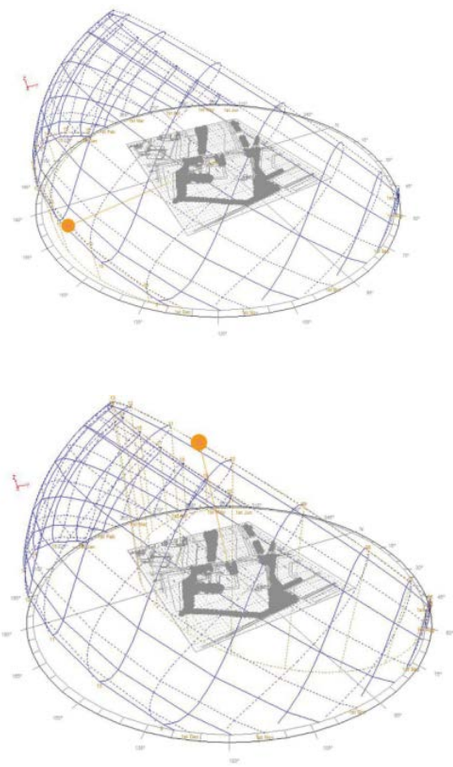
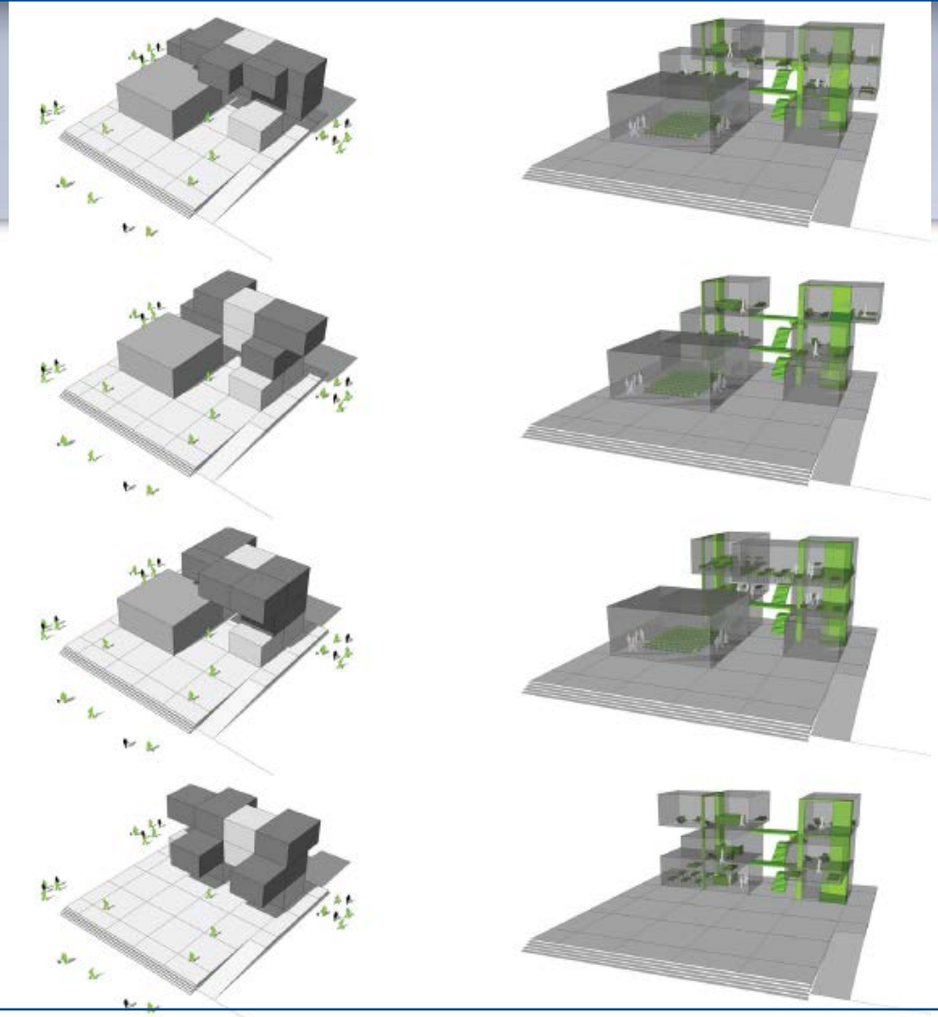
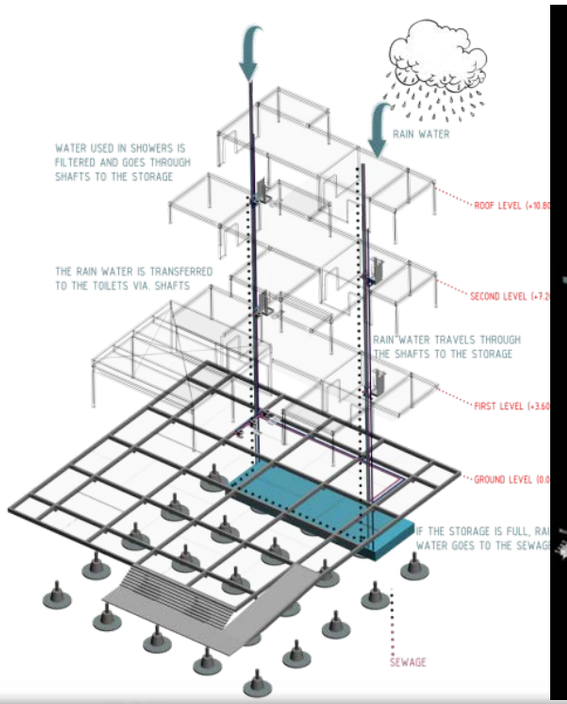


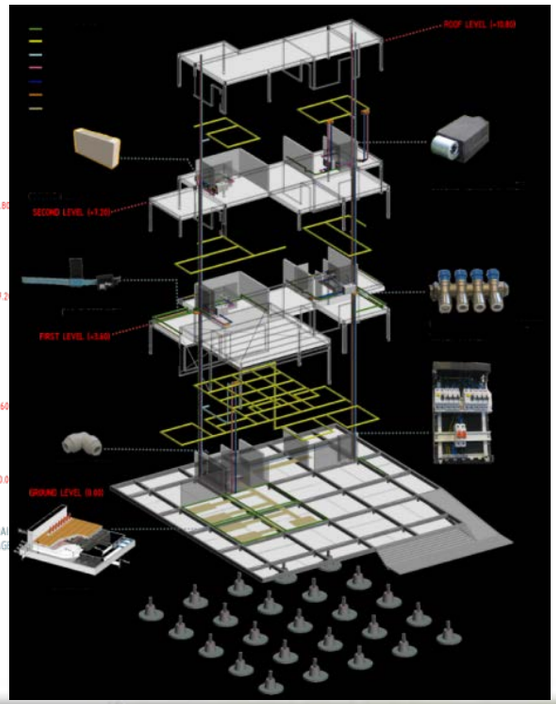
gtb lab











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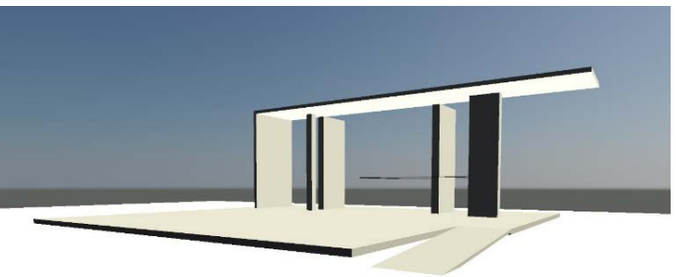

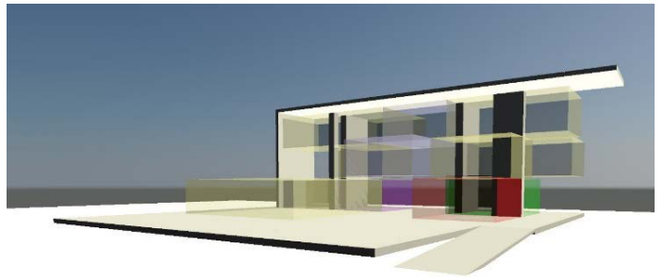

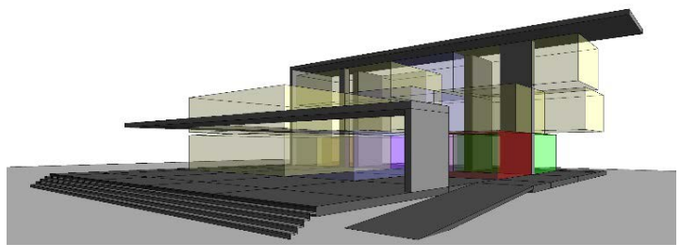

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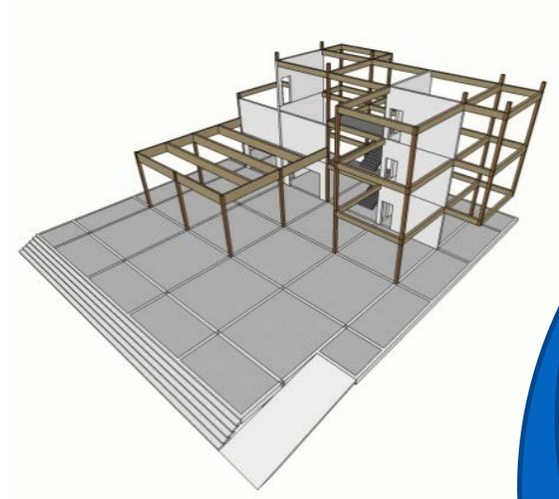

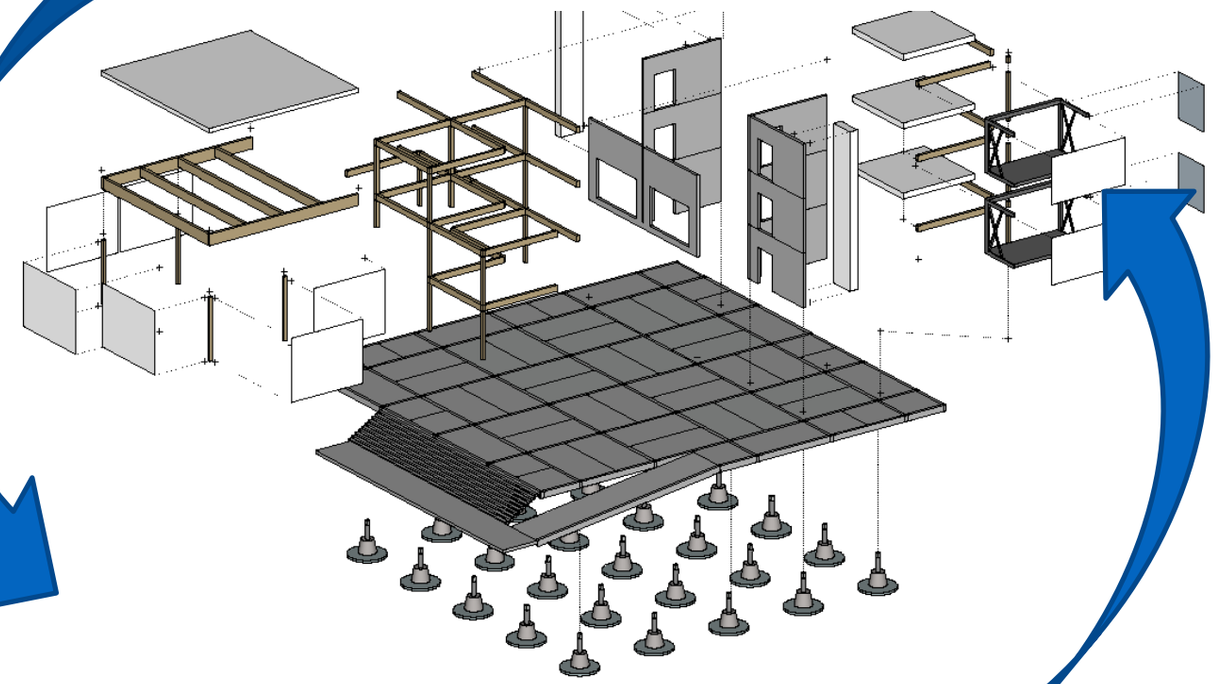

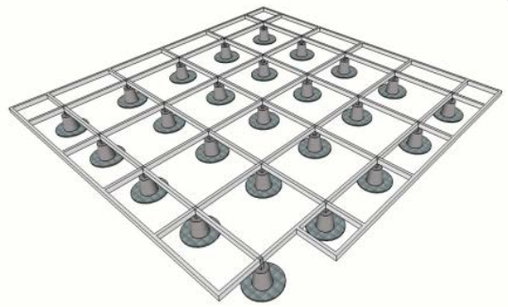

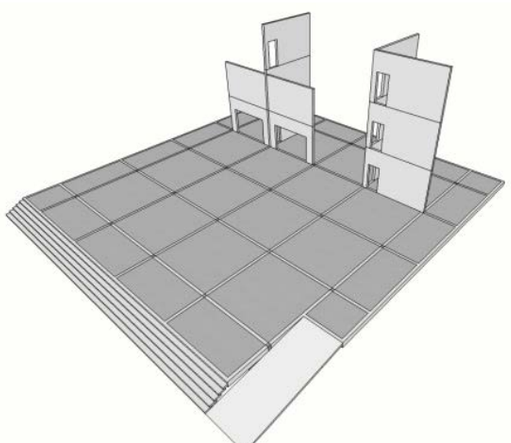

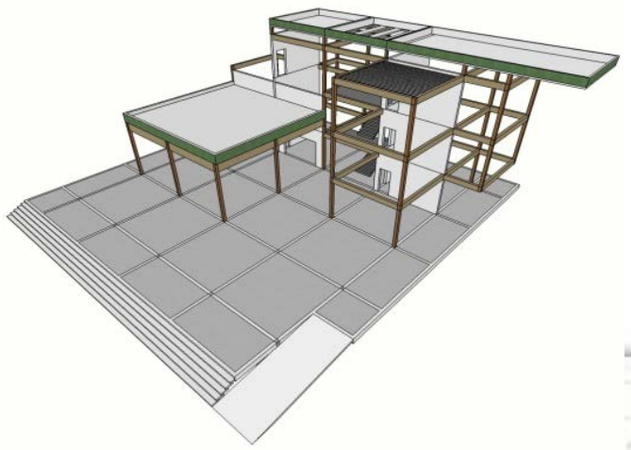

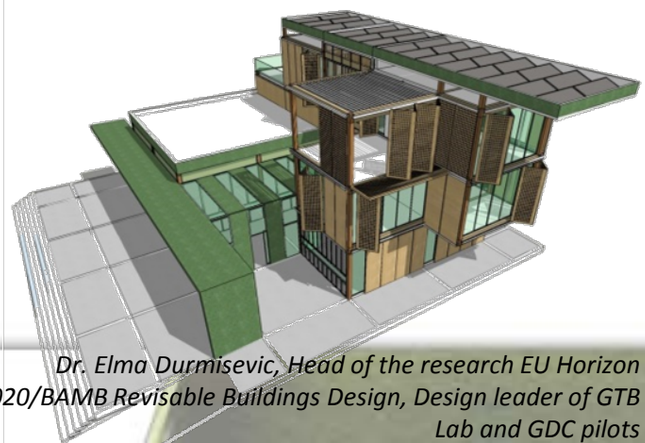

Dr. Elma Durmisevic, Head of the research EU Horizon 2020/BAMB Revisable Buildings Design, Design leader of GTB Lab and GDC pilots

REVERSIBLE BUILDING DESIGN - OPPORTUNITIES FOR STAKEHOLDERS

- Specifying and testing user requirements and design protocols with interactive simulator
- Collaboration on typology analyses of existing buildings
- Involvement in the design studios testing revisable design concepts through development of Green Transformable Building Lab

Dr. Elma Durmisevic, Head of the research EU Horizon 2020/BAMB Revisable Buildings Design, Design leader of GTB Lab and GDC pilots

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 ...