RESEARCH AND CONSULTANCY TEAM

TRANSFORM is the research team within the Architectural Engineering Department of the Vrije Universiteit Brussel that studies the effect of designing, engineering and constructing in a transformable and reusable way. The objectives of the team include the facilitation of research and gathering of expertise on the assessment and design of materials, components and structures that anticipate change and time through architectural engineering.

The researchers of our team are engaged in diverse specific aspects such as the transformable building design, technical feasibility (prototyping) and structural performance of transformable and demountable structures, their safety, their environmental and financial benefits (LCA – LCC) and drawbacks as well as in their implementations on an urban scale.

Since 10 years, the TRANSFORM research team is a pioneer in research on the topics of the BAMB project, dealing with a circular building economy, building transformation and material reuse. www.vub.ac.be/ARCH/ae-lab/transform

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MISSION STATEMENT

We live in an age where rapid changes in cultural trends, global markets and technological innovation increasingly lead to resource depletion and waste production. Because most of the earth’s mineral and fossil resources are finite, they should be used and reused wisely. As designers, we are challenged to create answers that remain sustainable in a continuously changing context. The structures of the built environment in which we operate are never end states, but phases of a process. Facilitating transformations is vital to sustainable development. This requires holistic approaches that take change into account and help alleviate future problems.

By introducing transformational capacity at different design levels, TRANSFORM aims to maximise the sustainability of settlements, structures and components through time while minimising the waste of resources. We believe that transformability can act as an important catalyst for sustainable development because of the social, economic and ecological qualities it generates over time and the life-cycle resource management it incorporates.

WHAT DO WE DO

TRANSFORMABLE DESIGN CONSULTANCY

LCA / LCC FOR TRANSFORMABLE CONSTRUCTIONS

PROTOTYPING OF TRANSFORMABLE SOLUTIONS (including impact tests and acoustical performance tests)

POLICY & ARCHITECTS GUIDELINES FOR TRANSFORMABILITY

RECONVERSION PROJECTS

(INTER) NATIONAL RESEARCH PROJECTS

Un bloc de 8 modules va être reconfiguré par le groupe TRANSFORM suivant les principes de conception de bâtiments réversibles. Ces modules pourront ainsi être transformés de manière fonctionnelle à travers le temps, par exemple passer d’une maison d’accueil écologique à un espace de travail temporaire, ou encore à un café littéraire ! Grâce à la collaboration avec les partenaires industriels, des solutions innovantes en matière de construction seront développées et intégrées, permettant aux modules d’être améliorés ou adaptés par la suite, en même temps que tous les composants pourront être réutilisés. Les modules existants vont être reconfigurés afin que leur structure puisse mieux se prêter aux évolutions futures : les installations techniques et les blocs sanitaires vont être réorganisés et regroupés pour faciliter les changements d’affectation dans le temps. Par ailleurs, l’utilisation de connexions réversibles et de matériaux de construction durable pour la façade et le cloisonnement sont des aspects cruciaux pour assurer un cycle de vie durable à ces modules rénovés en fermant toutes les boucles de matériaux.

Enfin, tout le processus sera suivi de près pour cartographier les opportunités et les obstacles à l’implémentation de l’économie circulaire dans l’industrie de la construction.
An innovative DynamicWall concept was developed as a sustainable alternative for conventional wall systems used in buildings today. A wall system was designed dealing with the questions of reversible design and reuse of components, that can be easily assembled in analogy with Do It Yourself (DIY) kits like e.g. IKEA products. The transition of the wall concept towards a marketable product is made possible through research collaboration with an important Brussels industrial partner specialised in flexible and environmental wall systems (i.e. Tecnibo, situated in Forest, Bruxelles).

Prototyping models were successfully tested on vertical impacts and acoustical performance under laboratory conditions in order to validate the wall system’s application in a real context. The acoustic performance of the demountable wall system was optimized for a residential context and was tested in the acoustical laboratory of BBRI. The concepts can be transferred to another context like schools, offices, etc. (http://www.vub.ac.be/ARCH/ae-lab/projects/dynamicwall)

Through implementation in a real demonstrator project the applicability of the wall concept was fully explored. The demonstrator project is situated in the high-rise apartment building ‘Résidence Aigle’ in Sint-Joost-ten-Node (Brussels). The architect Jan de Moffarts (ORIGIN) provided the design plans for the new partition wall subdividing a large room in 2 smaller spaces: a new bedroom and bureau. The partition wall consist of two parallel wall fragments with a offset of 30 cm, separated by a central part in which book shelves are integrated accessible from two sides. A large central book shelf is accessible from the bureau side on the upper wall side and a smaller book shelf is accessible from the bedroom side. The initial idea of the architect was to construct this wall assembly with multiplex boards directly glued to each other. In the context of the DynamicWall project it was proposed to mount the multiplex boards to an additional demountable backing structure with additional insulation for the acoustical comfort. The use of a dynamic building kit offers the advantage that adjustments are still possible and that the wall assembly still is demountable (and reusable) in the future if there is a need again for e.g. a larger room.
CONSULTANCY FOR TRANSFORMABLE RENOVATION OF APARTMENT BUILDING ZELZATE
- KPW ARCHITECTS + OVAM

In 2015, TRANSFORM advised the design of a refurbishment project located in Zelzate. In 1961, architect Georges Bontinck designed a social housing apartment block for 192 inhabitants. The architectural office ‘KPW Architecten’ was commissioned to design a fundamental upgrade of the building (http://www.kpw-architecten.be/Hoogbouwplein). TRANSFORM and its research partners OVAM, VITO and ASRO (KU Leuven) collaborated with the designers in order to implement transformable strategies in this refurbishment project. This is done at different scales by quantitative and qualitative evaluations of design proposals. The ‘Design for Change’ research project provided better insight into the effects of transformable building at a social, financial, legal and environmental level, for schools, offices and houses.

During the consultancy programme, the qualitative assessment was a catalyst for an innovative and future-oriented design process. After TRANSFORM’s qualitative analyses and feedback, KPW architecten designed an apartment lay-out that can be developed to a complete tree of dwelling types. The process was developed as an investigative design exercise using future scenarios and the development of a “family tree” of compatible housing types. Thanks to this approach, KPW Architects became increasingly aware of the long-term consequences of their design choices. Based on the qualitative advice provided through the design guidelines, KPW Architects developed a “family tree” showing how standard apartment types could evolve in the future, e.g. into kangaroo, assisted and informal-care apartments.

Transformation from individual apartments to a co-housing unit (left bottom) is facilitated by a demountable wall system, applied at well-chosen places.
The EU funded HORIZON2020 project Buildings As Material Banks (BAMB) brings 16 parties throughout Europe together for one mission – enabling a systemic shift in the building sector by creating circular solutions. BAMB is creating ways to increase the value of building materials. Dynamically and flexibly designed buildings can be incorporated into a circular economy – where materials in buildings sustain their value. That will lead to waste reduction and the use of fewer virgin resources. www.BAMB2020.eu.

TRANSFORM is one of the 16 international partners of this European project (led by IBGE/BIM) and is responsible for the action theme ‘Reversible Building Design’ and for the construction of a pilot project on the VUB campus in which the principles of Reversible Building Design and Material Passports are being implemented.
The oversupply of office space and the shortage of schools in the Brussels Capital-District are indicators of the fact that our society is changing so rapidly, that constant transformation of our infrastructure is required in order to respond to these changes. However, due to the static character of our current building stock, transformation and adaptation of buildings often results in the demolition of building parts or even entire buildings. To avoid this, it should be possible to substantially reuse the inherent energy and materials of a building and in this way extend the sustainability of the building's total life cycle. Extending the life cycle of buildings, their components and materials implies the ability to transform them by means of reconfiguration and disassembly.

This research proposes a strategy for the transformation of vacant office buildings into schools, as an approach to solving the high office vacancy rate and the lack of schools in Brussels, and with the aim of increasing a building's transformation capacity. This will be done by applying four-dimensional design strategies in a transformation strategy that aims at increasing the building’s transformation capacity. It was also found important that a mix of functions be created for a successful transformation.

The strategy consists of two parts. The first part is a strategy for choosing a suitable vacant office building, while the second part defines guidelines for every building layer in order to make the transformation technically feasible while taking into account measures to increase the transformation capacity of the building. The strategy is applied to a real situation in a design proposal for building G on the RAC-site in Brussels. In this way, the strategy can be tested on a design case and optimized using the feedback obtained by the application.
CONSULTANCY FOR DEMOUNTABLE AND REUSABLE MODULE B.R.I.C.
- MAP ARCHITECTS + IBGE/BIM

CONSULTANCY FOR FOR TRANSFORMABLE RENOVATION OF APARTMENT BUILDING MECHELEN
- KPW ARCHITECTS + OVAM
  www.vub.ac.be/ARCH/ae-lab/projects/transform-mahatma-gandhi

DEVELOPMENT OF GUIDELINES FOR TRANSFORMABLE BUILDING FOR ARCHITECTS AND POLICY MAKERS
  www.vub.ac.be/ARCH/ae-lab/projects/index.html?sort=start_date&g=transform

DOCTORAL RESEARCH IN TRANSFORMABLE BUILDING DESIGN
  Paduart A. (2012). Re-design for change: A 4 dimensional renovation approach towards a dynamic and sustainable building stock
  Galle W. (2016) Scenario based life cycle costing, an enhanced method for evaluating the financial feasibility of transformable building
  Herthogs P. (2016) Enhancing the adaptable capacity of urban fragments

AND MANY MORE TRANSFORM PROJECTS AND STUDIES!
  www.vub.ac.be/ARCH/ae-lab/projects/index.html?sort=start_date&g=transform