Because of its scale and the role it plays in our lives, a healthy built environment is of vital importance. As a part of material culture, buildings have to support human needs. But mainly because of their static nature, obtained through design, most contemporary buildings and their components have a negative impact on their surroundings. The huge quantities of waste produced during demolition and the still rising emission of greenhouse gases created during use of the building, manufacturing and waste treatment of its components are environmental indicators of an unhealthy design.

HENDRICKX (VUB) and VANWALLEGHEM invented a design approach that includes a dynamic view on the built environment. It encloses guidelines to design multiple construction systems, all, compatible with each other, by which a variety of adaptable and reusable construction elements can be composed. Each construction system is made of a minimum number of basic elements and a set of combination rules. They allow the conversion of each construction into a different configuration, by means of adding, removing or transforming the basic elements that it is made of. It offers a high potential of direct reuse. The outcome can be compared with the 'Meccano' building set, which, in this view, encloses all materials and techniques, and is applicable to all scales.

The goals of this PhD research are to study the technical feasibility of this new design approach and to assess its environmental benefits and impacts on construction, building component and material level. These goals are to be accomplished through the structural design and environmental assessment of 2 practical case studies. The design cases are limited to temporary applications, such as transitory dwellings in Belgium and infrastructure for foreign relief situations (i.e. accommodation, shelter, offices, and canteen).

Approaching design and environmental evaluation of temporary constructions in a systemic way, this PhD contributes to the technical translation of some important detailing principles to facilitate reuse of constructions, their components and building materials. Furthermore, the research provides some insights for strategic environmental planning in the built environment.