**Development of a BIM tool to assess the lifelong impacts of Transformable Design**

Circular material management is a key aspect towards a sustainable built environment. Transformable Design contributes to the reduction of excessive waste generated by maintenance and demolition, through the reuse of building components and materials. Nevertheless, current building practices will only shift towards Transformable Design provided expected (mid or long term) environmental benefits and financial viability. Therefore, there is a need for a usable assessment tool considering the lifelong impacts of Transformable Design.

As preliminary research, a user requirements analysis, conducted through interviews and surveys among several construction actors, will define which data visualization means are relevant for the tool's users. Then the research will elaborate a method to assess the capacity of building to be adapted (instead of demolished) to transformation and refurbishment scenarios. Therefore, on one hand, we will select and arrange parameters in order to model the service life of a building. Service life scenarios will define transformation and refurbishment needs according to the specific building's context, type and use. On another hand, we will integrate in the assessment the previously established Transformable Design criteria. Because these criteria mainly rely on qualitative aspects (e.g. accessibility, simplicity, functional dependency), their integration into a numerical assessment method will require the input of surveyed stakeholders' experience and the use of sensitivity analyses. In order to guaranty the objectivity of the overall method and its compatibility with the design process, the method will be implemented in a Building Information Modelling (BIM) tool, through the use of Autodesk Revit and Dynamo. Finally this tool will be tested on different case studies. Architects will test the user-friendliness and the relevance of the feedback provided. Experts in Transformable Design and Material Flow Analysis will confirm the results' accuracy. Using this tool, designers will be then able to compare different service life models and design scenarios to make better-informed decisions.

*Key words*

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