Decision support tool for the innovative and sustainable renovation of historic buildings (HISTool)

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The HISTool is a software-based tool for the analysis of the current building status, and a decision support tool for the innovative and sustainable renovation specifically of Gründerzeit buildings. These were built between 1840 and 1918 with partially standardized designs and components in Central-European cities.

The tool is designed to be applied particularly in the preparation and decision-making stage of renovation projects in the Gründerzeit building sector, prior to the actual planning phase. For the decision-making process, it is essential to provide solid data on different renovation options in an early phase based on life-cycle costs, without a lot of calculation effort.

A model of the building, which consists of 40 elements according to the specifics of Gründerzeit buildings, is the basis of the Excel-based software tool. Relevant elements and usage zones of Gründerzeit buildings are defined in diverse levels of detail, as displayed in Figure 1.
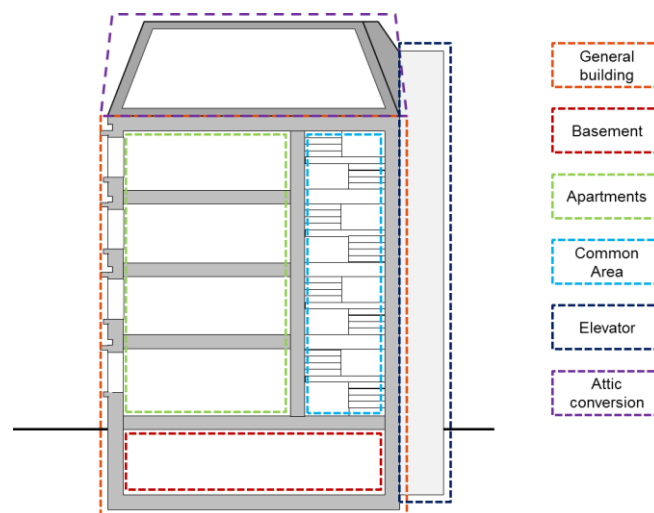

Figure 1. Building model, Source: e7

Specific renovation measures are predefined for each of the 40 elements. The library contains a thorough collection of measures, e.g. to improve thermal resistance, to reduce thermal bridges, CO_2-neutral heat generation, to implement a ventilation system with heat recovery, measures to eliminate dampness in the basement, or for the static improvement of structural components. Every renovation measure is defined with its technical characteristics, thermal qualities (U-values), lifetime and costs, which compose data sets that are stored in a database, as can be seen in Figure 2. All data sets consist of a detailed description of the individual components, the cost of every component and the above described technical parameters.
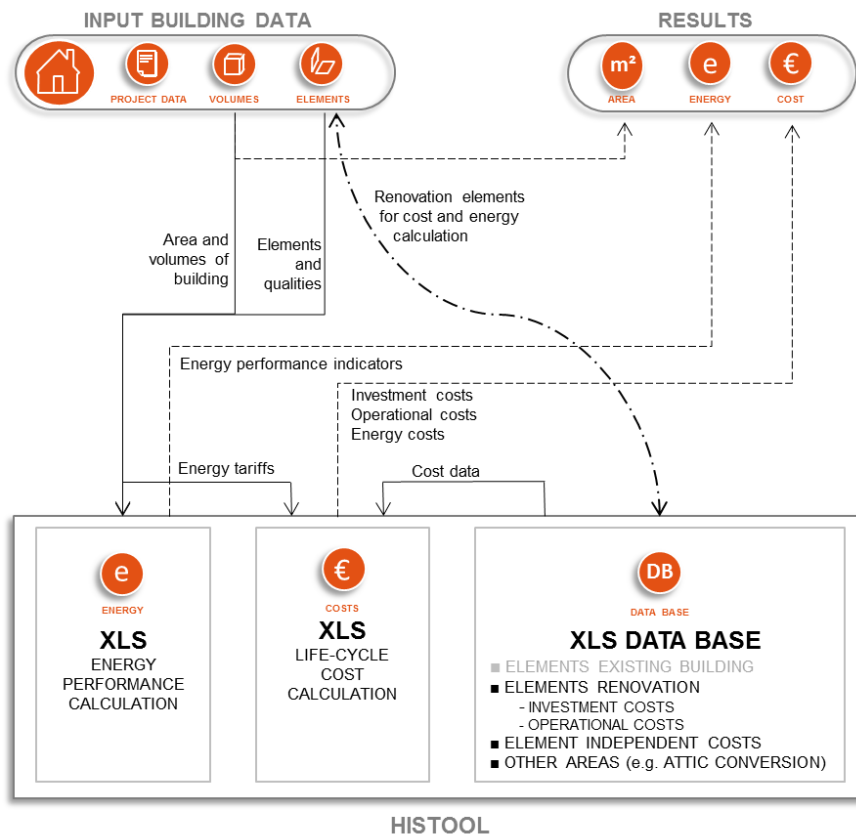
Figure 2. Tool structure. Source: e7

The tool is mainly used in the consultancy of building owners and real estate portfolio managers. It is applied in a twofold manner:

- During the preparation and pre-decision-making stage, prior to the actual planning phase. During this early stage of the process, it is essential to provide rough but solid data on different renovation options without a lot of calculation effort.
- During the detailed assessment and selection of measures in order to select and assess packages of measures in relation to initial planning targets.

The HISTool approach is closely linked to the new European standard "Conservation of cultural heritage – Guidelines for improving the energy performance of historic buildings" which was issued in July 2017 (EN 16883). The guideline describes the decision making process of energy performance improvement measures in historic buildings. Similar to the objective of HISTool, the focus of the guideline is to guarantee a data-based and prudent selection of technical improvement measures.

HISTool supports as well the initial process until pre-decision as the detailed design process when it comes to selection of specific packages of measures. After deciding if improvement of energy performance is needed and possible (initiation of planning process, building survey and assessment, definition of objectives have to be completed), the HISTool can be used for the assessment and selection of measures for energy refurbishment according to the standard EN 16883.

(For more information you can find the full paper at http://eehb2018.com/conference-report/)