Evaluation of BIM and Ecotect for conceptual architectural design analysis

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The main goal of the present paper is to investigate how BIM tools and Ecotect can be integrated as an active part of an integrated design process for conceptual architectural design. The integrated design has an interaction between the skills of the architect and the engineer thought-out the process and thereby avoiding problems solving after the design has been finalised. The process has been analysed from an architect’s point of view dealing with design at fictive sites in Copenhagen.

The use of BIM tools in the process of designing are often concentrated in the end of every phase. The tools are thereby not incorporated into the process, but mainly used as a passive toll for evaluating the design. The use of BIM tools can be incorporated from the phase of analyzing to the phase of synthesis and can thereby be an active part of the design process from the early stage. The integration of BIM also has the possibility to make the gap between the engineer and the architect smaller by improving the communication across the different fields of expertise. For the present research the implementation of Revit and Ecotect is evaluated from the mind maps to see where the different program is best fitted into the process. Another important factor to take into consideration when speaking about the IDP is the time factor. The use of time is unavoidable to take into account when going from theory to implementing in real life. The use of time in each phase cannot be longer when implementing BIM tools because the phase of presentation has to be ended before the deadline. It is therefore important that the use of BIM tools does not slow down the process of designing but keeps it fluent. Figure 2 shows where Ecotect and Revit can be implemented into the different phases of the IDP. Revit can as the modelling tool be used in all of the three phases from the analysis to synthesis, because alterations of the design are necessary in all of them. Ecotect has the greatest advantages of use in the sketching phase but can also to a certain extent be used in the analysis phase. The design is generated in Revit and then imported into Ecotect for analysis. After the analysis the information about the performance of the design can be underlined and new modification of the design made in Revit as shown in Figure 1. Conceptual modelling and building modelling can be used in the analysis phase from Revit and Ecotect which can provide analysis of the overall site conditions and thereby be used for investigating parameters such as sunlight, shadow and other weather conditions. These inputs are useable in the analysis phase because it is mainly concentrating on identify the elements of the site that can be use further in the sketching phase.

In the sketching phase Revit is integrated along with Ecotect and the investigation becomes concentrated on the inner and outer building volume. The analysis from Ecotect is therefore concentrating on both analyzing the façade and the internal rooms. The analysis Ecotect can provide deals with all of the main aspects of the building envelope. Modelling in Revit in the sketching phase becomes more detailed and also concerning the inside of the building and thereby moving to another detailing level from the conceptual massing. In the sketching phase not only the building shape can be
calculated and evaluated but also the rooms and the different functions in the rooms become and shape giving parameter. In the synthesis phase Revit can be used together with other BIM tools than Ecotect, because the level of detail gets so high that the calculation methods in the programs not are accurate enough.

Figure 1. The phases in the integrated design process where Revit and Ecotect can be implemented.

The three phases of analysis, sketching and synthesis and the use of Revit and Ecotect have been analysed, discussed and presented in (Thuesen 2009) with respect to the durability of Revit and Ecotect as an active part of the design process for conceptual architectural design. The output from these investigations is outlined in the following sections.

The results of the research indicate that BIM tools combined with Ecotect can deliver useable qualitative input for sketching investigations during a conceptual architectural design process.

References