

Thesis title **"The importance of interactivity for contemporary CAAD tools"**

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Abstract

Architects have at their disposal an abundance of digital tools dedicated to different tasks from the conceptual phase to construction-site aids to the process of monitoring the building's lifecycle. Every available tool has its advantages and limitations, and they all determine our work to a certain extent. The digital era brought us CAD and BIM software, immersive virtual or augmented reality interfaces, and fully automated solutions based on artificial intelligence. This variety of available programs and methods can make the architects' work easier, but it can also be confusing when choosing which tools to learn or apply to specific tasks.

This thesis has four principal research goals: to **organize the knowledge about contemporary CAAD tools, develop a method for evaluating CAAD tools, develop a method for categorizing them, and explore the development of future architectural interfaces.**

The author reviews 182 examples of tools, interfaces and methods used by contemporary architects, from widely used commercial programs to experimental technologies from academia. The cases are stored in a digital database structured in a way that allows describing them in a similar manner. The descriptions consist of qualitative and quantitative information, most of which is encoded numerically. This mathematical definition allows the author to use statistical metrics to evaluate and categorise the analysed cases.

To evaluate the tools, the author introduces the concept of interactivity. This normalised numerical value indicates the tool's responsiveness, flexibility and ease of use. The author implements algorithmic clustering for categorization, i.e. dividing all the cases into groups of similar elements.

This dissertation starts with an introduction that describes the problem and its significance and lays out research goals, questions and hypotheses. The introduction is followed by the part that covers the theoretical framework, including the literature review about human-computer interaction in architectural processes. It explains the evolution of the architect's tools and their influence on the design processes from a historical perspective and shows the shift from traditional tools to their contemporary digital versions. The third part presents the methods implemented in the research: the theoretical base of how the author proposes to calculate interactivity and the algorithms used to categorise CAAD tools. The fourth part is a detailed description of 29 cases from the database that the author considers most representative of exemplifying the categorisation and interactivity estimation results. The fifth part of the thesis presents the conclusions derived from the research and a critical view of the proposed methods by pointing out their biases and limitations. Finally, the author speculates about possible future trends in architectural tools and how they may affect architects' work.

Keywords: CAAD, human-computer interaction, architecture, interfaces


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