Methods for implementing Building Information Modeling and Building Performance Simulation approaches - DTU Orbit (14/03/2019)

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In the present thesis, a number of studies into the adoption of Building Information Modeling (BIM) and Building Performance Simulation (BPS) are presented. The thesis has two main goals. The first is to explore the benefits and challenges of adopting (a) BIM as a platform for Architecture, Engineering, Construction, and Facility Management (AEC/FM) communication, and (b) BPS as a platform for early-stage building performance prediction. The second is to develop (a) relevant AEC/FM communication support instruments, and (b) standardized BIM and BPS execution guidelines and information exchange methodologies.

Thesis studies showed that BIM approaches have the potential to improve AEC/FM communication and collaboration. BIM is by its nature multidisciplinary, bringing AEC/FM project participants together and creating constant communication. However, BIM adoption can lead to technical challenges, for example, getting BIM-compatible tools to communicate properly. Furthermore, BIM adoption requires organizational change, that is changes in AEC/FM work practices and interpersonal dynamics. Consequently, to ensure that the adoption of BIM is successful, it is recommended that common IT regulations and standardized exchange formats, and in-depth preparation and training of AEC/FM project participants are given a high priority. It is essential that this preparation and training are supported by common BIM standards and execution guidelines.

Thesis studies also showed that BPS approaches have the potential to improve early-stage building performance prediction. However, because of complex BPS information exchange structures, the BPS process is not always practical, highlighting the need for these structures to be simplified and more, clearly articulated.

In this thesis, buildingSMART standard approaches, such as the Industry Foundation Classes (IFC), Information Delivery Manual (IDM), and Model View Definition (MVD), are proposed to provide clarification and consistency for BIM and BPS adoption, particularly, for BIM and BPS information exchange.

As part of the thesis, a modular IDM Framework to define and organize generic, decomposed IDM Packages was developed. The IDM Framework, which, ideally, should consist of appropriate number of IDM Packages to support all main processes of the AEC/FM project life cycle, is particularly effective at providing the basis for developing an IDM Project Plan. The IDM Project Plan is created by selecting the specific IDM Packages required for the specific AEC/FM project. In this approach, the IDM Project Plan can help communicate the overall scope of the AEC/FM project, processes to be carried out, organizational interactions, and required information exchanges.

In this thesis, it is concluded that common BIM and BPS execution guidelines and information exchange methodologies, such as the modular IDM Framework and generic IDM Packages, generate value by providing a shared understanding and a unified platform for BIM and BPS adoption.

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