EDITORIAL - CASE STUDIES OF BIM IN USE

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EDITORIAL

The use of information-rich parametric modeling 3D CAD models is increasing in the AEC industry. With this special issue we want to collect and share the benefits and challenges of using Building Information Modelling (BIM) for stakeholders in the building process, i.e. owners, architects, contractors, suppliers and others. Case studies of BIM applications are currently being presented in conferences and workshops worldwide. An example of such an initiative is the International Alliance of Interoperability initiated Building Smart forum for the industry and governments to identify, test, review, recommend and implement smart ways to deliver quality buildings and services to the facility owners using BIM technology. Another example is the annual award by the American Institute of Architects for projects that have used integrated and interoperable building information models.

The objectives of this special issue are as follows:

- To report the use, benefits and challenges of BIM technology in architecture, construction and engineering projects in quantitative figures.
- To share views on how costs and benefits (both hard and soft values) of BIM can be identified and measured/estimated in AEC projects.
- To identify the technical issues such as interoperability, data management etc. as well as the changes in organisations and business practices needed for the successful implementation of BIM models and tools in AEC projects.

The Manning and Messner paper *BIM Case Studies in BIM Implementation for Programming of Healthcare Facilities* investigates the benefits of using BIM in the early conceptual stage. Primary benefits that were identified are (1) rapid visualization, (2) better decision support upstream in the project development process, (3) rapid and accurate updating of changes, (4) reduction of man-hours required to establish reliable space programs (5) increased communication across the total project development team (users, designers, capital allocation decision makers, contracting entities, and contractors), and (6) increased confidence in completeness of scope.

Ku, Pollalsis, Fischer and Sheldon discuss how the *3D Model-Based Collaboration in Design Development and Construction of Complex Shaped Buildings* can be successfully implemented. The findings from three case studies suggest that collaboration methods on 3D models differ with the architects' approaches to geometry control.

The Leicht's and Messner's paper, *Moving toward an 'Intelligent' Shop Modeling,* focuses on the value and challenges of implementing BIM for trade shop drawings in an ongoing case study project. The process used by the construction manager to develop the specialty contractor packages, the breakdown of the 3D and BIM requirements by specialty contractor, the steps to begin and to carry out coordination are discussed. One of the areas found to be of the most value so far was the planning and transparency of the process.

The four detailed *Case Studies of BIM Adoption for Precast Concrete Design by Mid-Sized Structural Engineering Firms*, reported by Kaner, Sacks, Kassian & Quitt shed light on the obstacles in implementation, the achievements and disappointments, and the changes in workflow and personnel that the firms have experienced. The results reveal clear improvements in engineering design quality, in terms of error-free drawings, and steadily increasing improvement in labour productivity. They conclude, that "progress in adopting BIM is slow but certain".

Khanzode's, Fischer's and Reed's paper discusses the *Benefits and Lessons Learned of Implementing Building VDC Technologies for Coordination of MEP Systems on a Large Healthcare Project*. The benefits include labor savings, 100% pre-fabrication for the plumbing contractor, only one recorded injury throughout the installation of MEP systems, less than 0.2% rework, zero conflicts in the field installation of the systems and only a handful of RFI for the coordination of the MEP systems, and 6 months' savings on the schedule and about $9M savings in cost for the overall project. The lessons the team learned include the level and type of details team members need to include to achieve benefits from the use of BIM / VDC tools for the coordination of MEP systems.

Dehlin's and Olofsson's paper, *an Evaluation Model for ICT Investments in Construction Projects*, proposes a new project-oriented evaluation model of ICT investments. The models' application is illustrated using a case study project. The shift in focus from costs/benefits for the individual stakeholders to costs/benefits for the project gives a momentum to optimize the use of a new ICT tools in construction. This will surely affect the processes and the contractual environment in the project, since it has to support sharing of information and achieved benefits and the costs of the investment in the project.

None of the presented case studies on the use of BIM above have presented any interoperability issues using the IFC standard. In the last paper, *Interoperability in Practice: Geometric Data Exchange using the IFC Standard*, Pazlar and Turk report on tests performed with file based geometry exchange between different CAD software applications. The test examples revealed several cases of information distortion and/or information loss both on the entity and attribute level. Unsatisfying model handling proved to be characteristic of all the tested exchange scenarios. The authors' conclusion is that in the future more effort should be put into the IFC interface development.

To summarize; the benefits of using of BIM have been demonstrated in several case studies of real construction projects. Benefits can be found in all phases in the building project ranging from the conceptual design to the realization of the building. It also seems that most stakeholders in the building process benefits from the use of BIM, but maybe the greatest beneficiary is the client. Therefore investments in BIM technology should be evaluated on the project level, sharing the costs and benefits between all stakeholders.

Case study results in the application of the IFC standard to real projects are largely lacking. Technical comparisons, such as that by Pazlar and Turk, show the significant weaknesses that currently exist. Comparisons with other data exchange approaches are also generally lacking, as are comparisons with proprietary interfaces. These results indicate that no exchange approach is currently satisfactory and that interoperability is a major limitation in the advance of BIM.