Requirements on 3D building information models and electronic communication – experiences from an architectural competition

Kjeld Svidt
Per Christiansson

Aalborg University
Agenda

- The Danish Digital Construction project
- Requirements on 3D modeling
- The test project
- Capturing experiences from different parties of the test project
- Results and conclusions
The Danish Digital Construction project

- Investigations showed low productivity and low quality in the industry
- The industry did not seem to use and get possible benefits from information technology
- Ministry of Economic and Business Affairs decided that public building owners should introduce specific IT requirements for all partners in their construction projects
- Requirements were developed from 2003 to 2006
AALBORG UNIVERSITY

CIB W78 Santiago July 15-17 2008  Kjeld Svidt it.civil.aau.dk

Actors of the Digital Construction project

Ministry of Economic and Business Affairs

Public building owner

Public building owner

Public building owner

Architect

Consulting Engineer

Other consultants

Contractor

Digital Construction
3D requirements
Test project
Experiences
Conclusions
AALBORG UNIVERSITY

Digital Construction
3D requirements
Test project
Experiences
Conclusions

Actors of the Digital Construction project

Ministry of Economic and Business Affairs

Requirement Developer
Digital Tender

Requirement Dev.
3D models

Requirement Dev.
Project Web

Requirement Dev.
Digital Handover

Public building owner

Public building owner

Public building owner

Architect

Consulting Engineer

Other consultants

Contractor

Requirement Developer
Digital Tender

Requirement Dev.
3D models

Requirement Dev.
Project Web

Requirement Dev.
Digital Handover

Public building owner

Public building owner

Public building owner

Architect

Consulting Engineer

Other consultants

Contractor
Actors of the Digital Construction project

Ministry of Economic and Business Affairs

Requirement Developer
Digital Tender

Requirement Dev.
3D models

Requirement Dev.
Project Web

Requirement Dev.
Digital Handover

Public building owner

Public building owner

Architecture

Consulting Engineer

Other consultants

Contractor

Develop requirements

Use requirements

Fulfill requirements
The scope of this paper

Testing the first version of 3D-model requirements in an architectural competition on modernizing a cluster of university buildings.
Requirements on use of 3D models

- Modeling concepts and information levels with inspiration from ProIT project in Finland
- Possible to require IFC
- Examples of data requirements for a number of visualisation and simulation possibilities
- Collected in two publications giving background and inspiration to make requirements
The test project

• Modernizing a cluster of university buildings
  • more daylight in the corridors, especially by roof light
  • incorporation of social rooms near entrances of the buildings
  • more or less covering of outdoor areas between buildings
  • establishing a covered square at the main entrance

• Building owner invited 4 architects
  • Gave them IFC model of existing buildings
  • Required IFC model of proposals supplemented by traditional visualisations and descriptions (did not use much else from the requirements publications)
  • Required all communication to be electronic and handled through a web based document management system (project web), i.e. no paper based letters posters etc.
Capturing experiences from the test

- The development consortium assisted the building owner in creating the IFC models from existing ADT models
- Participation in all meetings between the building owner and invited architects
- Participation in all meetings of the jury
- Subsequent interviews with all parties of the project
Capturing experiences from the test

- The development consortium assisted the building owner in creating the IFC models from existing ADT models
- Participation in all meetings between the building owner and invited architects
- Participation in all meetings of the jury
- Subsequent interviews with all parties of the project
Results and conclusions (1)

- The client decided to make further demands on electronic communication and presentation than specified in the requirements to be tested.
- On the other hand, he did not manage to do very specific demands on 3D-models based on the requirements publications.
- The main demand regarding 3D-models was the IFC requirement.
Results and conclusions (2)

• The new requirements on 3D models (as interpreted in this project) were positively received from all parties of the project.

• The architects only had minor problems in fulfilling the requirements including IFC import and export.

• The delivered IFC model from the owner was used directly as a basis for visualisations of the proposals; i.e. reuse of models 😊.
Results and conclusions (3)

• The client didn’t carry out any further treatment of the delivered IFC models.

• Decided to show the ‘raw’ models directly in an IFC viewer during the assessment committee meetings (which gave a few problems with large models)

• This raises some questions regarding the choice of tools for a certain visualisation purpose and the possibilities (or missing possibilities) to handle different information levels of large and complex building models.
Results and conclusions (4)

• Participating architects showed a generally positive attitude to the 3D requirements.

• One participant expressed that the requirements forced the architects to solve some problems in the early phase, which could have caused greater problems later in the project.

• However, the competences to build object based models for such purposes are not always available in the competition team. The necessary tools are more common in the detail design teams.
Results and conclusions (5)

• Difficult for the involved parties to distinguish clearly between different parts of the requirements, e.g. ‘visualisation’, ‘3D-models’, ‘electronic communication’ and ‘electronic presentation’.

• Participants associated 3D requirements with pure electronic communication and Internet based information transport.

• This was further associated with pure ‘electronic’ presentations on a projector which has a very limited resolution compared with traditional posters and other paper based presentations.

• Generally, it was difficult to keep the main focus on the 3D requirements, which were the main subject to be tested in the project, but we still captured many valuable experiences.