



## Case study

# New Østfold Hospital project

## Background

Østfold is a county lying south-east of Oslo in Norway. In the late 1990s, the county started planning a new hospital, replacing the existing six hospitals. The project was then put on hold until 2009.

In June 2009, Helse Sør-Øst (South Eastern Norway Regional Health Authority) decided to move forward with the project. A decision was also taken to adopt an open BIM strategy in the project, in the belief that it would improve quality and efficiency. In the tendering process for the engineering design, open BIM was made a requirement.

The hospital is 85,500sqm and will offer the full range of services, including psychiatric care, which until now has been provided at separate hospitals.

## The project

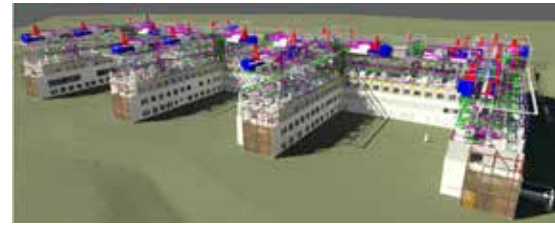
The comprehensive use of BIM at the New Østfold Hospital project is a first for Norway. Although the country has other large projects using BIM, this is the first to do so at scale with an explicit strategy, and covering all parts and phases of the project.

Realising these ambitions was never going to be easy. Experience of open BIM among suppliers was limited, but the suppliers responded positively to the open BIM requirement.

The project moved forward on the basis of a widespread use of BIM. Models were to be used for digital information exchange between client, designer, contractor, management organisation and other stakeholders in the project as far as practicable and feasible. BIM was to be used actively, not only for drawing production but also to improve understanding of the task and achieve transparency. It was used in planning, co-ordination, reporting, communication, interface planning and control and quality assurance through all the phases.

One goal of overriding importance is to create a model that can be used in the operation and management of the building once it opens, and the quality of the final model for handover to FM has been front of mind during design and construction.

As detailed design began, the BIM model was exported to IFC format every week and made available to the design team and the client organisation, both as separate IFC files and assembled as a complete Solibri model.



*Above: New Østfold Hospital project – model (in Navisworks) and construction works*

*Below: Visualisation of the hospital, showing the care taken on the landscaping*



## User involvement

Around 50 user groups were set up, covering different functions in the hospital. They helped to work out the layout for functional areas and rooms in a process that involved doctors, nurses and technical staff. Meetings for the different functions were held, and BIM was used to visualise and verify the solutions put forward.

## Construction

The BIM model was included in the tender documentation sent to the bidders during procurement in order to help with costing. The winning contractors had access to the weekly updated model from the start of the contract and all the way through the construction phase.

Rendra O software has been used to access the model and documentation. The model is streamed to an android or iPad tablet, which is used routinely by the construction managers and some of the contractors. The main contractor for fixtures and furniture has used the streamed model to install its products, instead of using drawings, thereby saving one set of drawings.

## Data management

The project used the dRofus tool for the synchronisation of rooms, fixtures, furniture and equipment. The hospital project has around 4,300 rooms and tens of thousands of items of equipment, and dRofus enabled the project team to ensure that the room data matched the model and that rooms, areas and equipment were validated.

## BIM for training

The model is also being used in a gaming environment, which has been created for simulation and training purposes. Hospital employees can gain familiarity with their new workplace, moving around the virtual hospital and getting early experience of new routines and procedures. The training programme, developed by Attensi, began in autumn 2014.

## Benefits of open technology

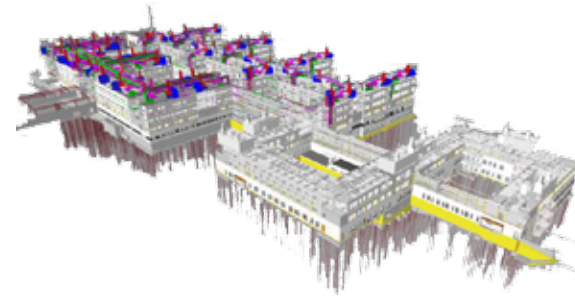
- The BIM model has given the client an unprecedented insight into the progress and completeness of the design process.
- Clash detection was an integral part of the process, with clashes starting high and ending low.
- BIM was used in tendering and procurement.
- Contractors used the model for quantity take-off.
- Prefabricated steel, concrete and outer wall elements used the model as a basis for their own model work and production.
- Use of the Rendra O mobile device is seen an 'incredible step forward', offering immediate access to the model and swift resolution of problems.

Citing the benefits of IFC and open BIM, the project director, Dag Bøhler, says: 'It is essential for us to be independent of specific software or software suppliers. We want to give consultants the freedom to use the best software for their purpose and we need open BIM in the operations phase, as software will come and go many times during the service life of the hospital.'

## Going forward

The project noted the shortcomings in the existing tools: the absence of good object libraries, the lack of IDMs (information delivery manuals) explaining which attributes and properties are required for different objects and their use, and the inflexible nature of the IFC export function of major authoring tools. In short, although open BIM is working, the fine-tuning of object content, attributes, properties and export is required. These problems need to be resolved in the short term. Model size was also noted as a problem.

Nonetheless, there is satisfaction with the use of open BIM. The health authority plans to use the Østfold hospital project as an example of how open BIM can be implemented at scale and will disseminate the lessons learnt, both inside and outside the industry. From 2016, the health authority, along with two other public sector clients, will require IFC-compliant software.



Top: Model (in Solibri), showing below-ground piling  
Below: Rendra O software allows the model to be streamed to personnel on-site on a tablet

### Clash detection

One example of the benefits of clash detection was in radiator design. Part way through, the radiators were changed and made wider and larger than originally designed in order to reduce surface temperature. Clash detection was used to check whether the change resulted in conflicts with fixtures and furniture. Without this tool, valuable time would have been lost in checking out the implications of the change.

### Heroes of Interoperability

This project was overall winner in the 2014 Business Gain through Open Technology awards.



### Acknowledgments

Thanks are made to Dag Bøhler and the New Østfold hospital project team for the content of this case study.

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