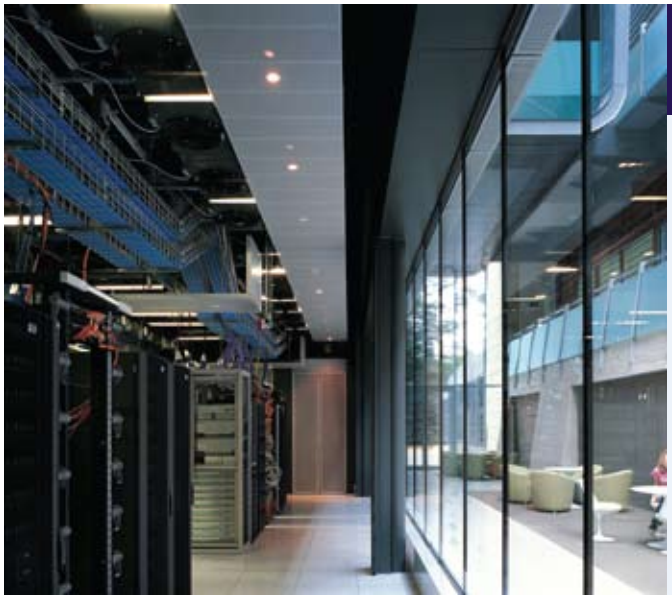
CONSTRUCTING EXCELLENCE
in the built environment

demonstration project



Wellcome Trust Sanger Institute

Project Name:	Wellcome Trust Sanger Institute
Project Location:	East of England
Themes:	Building Information Modelling, Integration and Collaborative Working
Project team:	Wellcome Trust / NBBJ / ATISREAL (Fuller Peiser) / MACE / Faber Maunsell Hurley Palmer Flatt / Turner and Townsend / William Hare / GIG / Phoenix Electrical
Project Timescales:	November 2001 – April 2005
Contract Value:	£96m
Type of Work:	Newbuild

The Wellcome Trust's Sanger Institute is a central research facility for those working on the Human Genome Project. In 2001, the Wellcome Trust looked to expand the site, located in Hinxton near Cambridge, to include space for 2,000 staff, further laboratories, a new data centre, a research support facility and a multipurpose dining, meeting, sports and community facility.

The master plan also includes two additional phases which will provide further buildings to house start up companies and an "innovation centre". The environmentally sensitive nature and rural setting of the site meant that an environmental impact assessment was carried out and the final building was designed to complement and blend into the surroundings. Building Information Modelling was used primarily as a design tool in this project but also aided specification and was handed over to fabricators to develop for their own use. Its successful application has led to it being applied further and more extensively in subsequent projects.

Drivers

The designer, NBBJ Ltd, is the UK office of the American-owned NBBJ. NBBJ strongly advocates the use of Building Information Modelling (BIM) as they see it as central to collaborative and integrated working. Globally NBBJ uses BIM as an integral part of their design and construction process and it is even used to generate cost estimates. Internationally, use of BIM is becoming more widespread and it is already a requirement in countries such as Singapore and Denmark.

The client's primary targets for the project were a high quality development of complex scientific buildings, delivered on time and on budget. The client along with their Construction Manager, MACE, set a target of zero defects. The project team felt that these challenging targets could only be met by close collaboration between team. In this project the BIM enabled closer collaborative working as the team members were working from the same model, owned by the designer.

Use of BIM was essential for the Sanger Institute project as the design featured an intricate roof involving complex geometrical angles. The BIM enabled the roof to be constructed virtually and then handed over to the steel supplier to ensure that the steel elements were manufactured correctly which avoided costly mistakes once the steel arrived on site. The BIM was also used as a communication tool for the planners. At the planning stage the BIM allayed the fears of the planners and local community by showing a detailed view of the building in the rural landscape.

Enablers

Recent advances in technology have enabled BIM to be used more extensively. Software packages such as Revit are now compatible with different systems which enables the models to be transported between the two. This is combined with increasing computer literacy amongst graduates who are confident using computer based design tools. This combination of improved software and higher skills levels amongst designers helped the use of BIM in the Sanger Institute project.

Selection of the Team

The Construction Manager, MACE, was brought on board at the early design stages to assist with buildability and sequencing of the construction phase. Mace also suggested which sub contractors should be invited to tender as they had experience in delivering similar projects. Despite the integral use of BIM in the project, previous experience with the technology was not seen as essential when tendering for sub contractors. Some of the suppliers

such as the steel manufacturers had experience in using BIM prior to this project however this did not feature in the tendering decision making.

The designer's previous experience using BIM meant that they did not have to seek any external support to develop and operate the BIM. As a project can be constructed in a virtual environment, use of the BIM can help to reduce the risk involved in a project. For this reason, sub contractors were asked to submit quotes without any contingency for the Sanger Institute Project. The designer was able to take on this level of risk as they were able to ensure that any issues in the design were ironed out in a virtual environment before construction began on site.

Model Development

The BIM was developed at an early stage in the project and was used to aid the detailing and generate 3D images and code cladding and roofing materials. As well as aiding procurement of materials, the team also found that the BIM aided collaboration as all members of the team were working together from a common design and a common model. Files were shared collaboratively using the BWI electronic documentation system and design software included TriForma, AutoCAD and XSteel. This aided a common understanding between team members. The tool was also a useful communication tool for the client as it enabled better visualisation and meant that the end product was the same as the design.

Once the design model was complete, parts of it were handed over to the various sub contractors. Each sub contractor developed the 3D model based on what they needed and the level of information required. The steel suppliers were able to adapt and modify the model where appropriate and it was then handed over to the pre cast contractors. The project exemplifies designer led model for BIM, in future projects fuller BIM implementation could include a shared ownership of an information resource within the supply chain.

Benefits

The team identified the primary advantage of the BIM as being the specification for the unique and complex roof design. Non-orthogonal angles and geometrics meant that the BIM was essential in indentifying the correct steel sizes needed. The steel that arrived on site was correct and costly rectifications and aborted work were completely avoided.

The BIM also aided cultural integration between the team and reduced the adversarial approach that is often found in construction projects. Working from the "same page" allowed any problems to be worked through as a team.

Fit for Purpose

Use of BIM has meant that the final building meets the design expectation. The client is extremely satisfied which is evidenced by the fact that they have engaged the designer to work on future projects.

Conclusions

The project was brought in on time and on budget and with zero defects. This excellent performance was greatly aided by the use of BIM as it enabled effective programming and identification of any clashes in services or components. The project received a special mention in R&D Magazine's annual "Lab of the Year" competition in 2006 for the design an engineering of entire complex, with particular note for the supercomputing data centre and the way that the design complimented the natural landscape.

The BIM was seen as so successful that NBBJ have applied it to other projects. The use of the 3D model has increased and extended to be used to assess the viability of some sustainability elements such as whether or not a building can be naturally ventilated. On each subsequent project NBBJ have tried to develop and introduce new uses for the BIM. For instance, the next project involved handing over the BIM to the structural engineer and in another project, the BIM was used in the door schedules. As a result of the Sanger Institute project, NBBJ have identified the need to engage like minded members of the project team as they feel that correct use of BIM will be integral to future projects.

"The architecture is of a high quality and design, incorporating the latest sustainable building techniques. The interaction between the built environment, the hard and soft landscaping and the developed and non-developed areas demonstrates the quality of the planning . . . Many of the practices and solutions adopted for this project can stand as best practice for others."

Judges' comments, RTPI Award for Planning for Business 2005

"NBBJ and the contractor developed a true partnership with the Trust based around a very clear commitment to understanding our objectives and managing the risks."

David Scott, Project Director, Wellcome Trust

"They have worked very hard with the users and other representatives to understand the necessary functions and design accordingly."

John Cooper, Director of Resources, Wellcome Trust

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