CONSTRUCTING EXCELLENCE
in the built environment

demonstration project

St Helens and Knowsley Hospitals

Project Name:	St Helens and Knowsley Hospitals
Project Location:	North West
Sector:	Buildings and Estates
Themes:	Building Information Modelling
Contract Award:	2006
Construction completion:	2009
Contract Value:	£338m PFI
Type of Work:	Newbuild and refurbishment

The St Helens and Knowsley Strategic Redevelopment (Hospitals) project is part of the Government Private Finance Intiative (PFI) programme. The project involves the redevelopment of two major hospital sites in the St Helens and Knowsley Metropolitan Borough Councils located in the North West of England. The £338m project is one of the largest healthcare PFI projects ever to be delivered and is the largest single investment in healthcare in Merseyside since the National Health Service was formed.

The development is one hospital split over two sites and includes the provision of 75,000m^2 (new build) and 12,000m^2 (refurbishment) at the Whiston acute general Hospital site and a new 25,000m^2 Diagnostic Treatment Centre at the St Helens Site. The 35 year PFI contract is being delivered by NewHospitals, a special purpose company formed by Taylor Woodrow, now VINCI Construction UK Ltd (VCUK) and Innisfree.

How Building Information Modelling was used

VCUK recognise the importance of collaborative working and embarked upon stage one of Building Information Modelling (BIM) by using the Avanti approach as an enabler for closer collaborative working. The initial aim of Avanti was to achieve zero defects in all production information and to spatially coordinate the project in 2D. This required the application of a true collaborative working environment. The team were attracted to the Avanti approach because it embraces three key aspects of successful collaboration within a project, namely process, people and technology.

Avanti principles are early access to all project information by all partners, early involvement of the supply chain, and sharing of information, drawings and schedules, in an agreed and consistent manner. Avanti focuses on people and processes, mobilizing existing enabling technologies. Team working and access to a common information model are at the heart of the Avanti SMP approach to a project's whole life cycle. This improves business performance, by increasing quality of information and predictability of outcomes and by reducing risk and waste.

Business Case for Building Information Modelling

The use of a true interoperable and integrated application of BIM forms part of the VCUK development strategy. However, at this stage a full integrated 3D model was still state of the art for some of their projects. The benefit of the BIM was identified as primarily, the ability to develop a fully integrated set of production information to achieve a 10% saving by producing spatially correct information.

Implementation/Planning

To engage the key members of the team in the most appropriate way, a series of one-day workshops were run targeted at:

- Middle management – main contractor, design team leaders and key contractor design managers.
- Lead designers – architect, structural engineer, services engineer and services contractor.
- CAD managers within those same organisations.

Barriers to Implementation

Feedback from team members to VCUK and the Avanti consultant following these workshops highlighted two concerns. Firstly, some of the workshop attendees considered that, as the project was already underway, a change of practice within the project could be too time-consuming and/or costly to implement. Secondly, it was felt that the project extranet would need to be reconfigured to deliver the necessary process management requirements and that this could lead to rework where documentation has already been uploaded.

How These Barriers Were Overcome

To address these concerns and perceptions, further discussions were held with the relevant team members to explore the change process in more detail to better judge the associated time and cost. In parallel with these further discussions, Avanti's consultants undertook a review of the processes for sharing and utilizing project data which the team already had in place. Effective processes such as these are one of the key principles which Avanti advocates, namely the Common Data Environment (CDE). It was felt that insufficient time had initially been devoted to developing workable and effective data sharing principles and procedures. Avanti's consultants felt that particular areas of risk related to the existing processes for:

- Achieving spatial co-ordination of design information
- The design sign-off (checking and approval) processes.

These concerns were understood by VCUK and the team members. This, combined with the confidence the team had gained from detailed discussions around the change process, led them to commit further to adopting the approaches proposed by Avanti.

A further key learning point is that the effort and cost associated with adoption of collaborative working practices must be clearly explained to team members so that they can feel confident in their judgments about the perceived benefit against the likely investment. The integration of the team helped to simplify and streamline the decision making process.

Implementation

Based on Avanti 'Standard Methods and Procedures' protocols for document naming, data file naming, and CAD layer naming were agreed. These also referenced the agreed design data origin, scale, orientation and so on, and procedures such as design checking. All of these are required to achieve effective data sharing through a Common Data Environment and ensure spatial co-ordination of the design.

Two areas of software implementation were overseen to mitigate some of the concerns expressed by team members:

1. A software solution was developed to update the legacy data and to align layer naming and file naming. This meant that existing data and documentation, produced prior to the agreement of a common project standard, could be converted to be compliant with the new naming conventions and avoid the need for significant rework.

2. VCUK, with the support of their extranet provider, specified the necessary adaptation to the extranet to ensure that the agreed methods and procedures could be supported. The aim here has been to provide a system that could collect, manage and disseminate data in a manner that:

- Effectively presents data and information in the required formats using appropriate browsers.
- Ensures compliance to agreed standards
- Reports on data and document delivery to aid design managers in the timely delivery of the construction schedule
- Facilitates the design and sign-off processes.

Not all the members of the supply chain used a 3D modelling method or BIM. "D" models or reference fields were made available with the 3D reference file for all team members to share and reference without needing to redraw or remodel. It was felt that cultural integration was achieved by a small but vital number of the design consultants and specialist contractors. There was less integration amongst the smaller design contractors and suppliers as they felt that processes did not fit their way of working. Integration was achieved as the project progressed.

Benefits Identified at the Design Stage

With the help of facilitated discussions around the project process and information management procedures, the design team were able to expose potential problems associated with some of the normal shortcuts that may be taken.

VCUK's Director of Engineering has also stated that the structured Avanti process has helped everyone understand better their position in the total picture of the project, and their role in managing risk.

A number of lessons learnt were identified by VCUK and the project team including:

- The team learned that disciplined adherence to the collaborative processes has the power to increase the quality of the data they exchange.
- The process assists in the achievement of spatial co-ordination i.e. 'fit first time' design information; it can provide a greater certainty of physical fit for off-site production and it will enable the delivery of co-ordinated and complete construction information in a timely fashion.
- Operation and maintenance information can be derived throughout the project process rather than purely through a dedicated process close to asset handover where timescales are normally such that production of accurate information is difficult to achieve.
- Rather than contradicting or replacing existing processes, VCUK found that the standards and procedures, were entirely compatible and complementary to other business processes which, in this case, include the VCUK design management procedures.
- Incomplete compliance to an agreed document naming convention causes problems for document controllers.
- There is a need to put an approvals process in place aligned within the project management documentation and the project extranet tool, otherwise the project risks having an insufficient approvals audit trail.
- Where model files are updated but changes not highlighted (e.g. by using bubbling) this can causing delays for those that then have to review all models and manually 'spot' the changes.

Conclusions

Better spatial coordination and fit first time were achieved on this project which the team felt were due to the delivery of better quality information and information sharing. The cultural integration between the team was also enabled by the better quality information sharing.

The experience of using the Avanti approach and initial stages of developing a BIM were extremely positive. The use of the ICT is being developed and will be implemented on future VCUK projects. Current activities have focused on design for manufacture and offsite manufacture within the European Commission co-funded project, "ManuBuild - Open Building Manufacturing", within the 6th Framework Programme. Also work is in the very early stages in a buildingSMART UK project which is "Advancing the use of BIM and FM Tools" for Facilities Handover. The pilot project will be created by bringing together problem owners with solution providers and buildingSMART expertise to deliver value by examining very specific data exchange requirements in the UK context.

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