

A new era of virtual cooperation

While specialist software has made a valuable contribution to design and construction, the benefits to date have been limited by a lack of interaction between software applications.

Current software tends to develop a model of a building for example, based around the specialist application of a single user, rather than foster collaboration through a multidisciplinary approach. Physical meetings of members of the conceptual design project team remain a primary means of communication.

One means of addressing this problem is through a Collaborative Virtual Environment (CVE), and at the Cooperative Research Centre (CRC) for Construction Innovation, a special project team is addressing this issue during the conceptual design phase of a project.

A CVE is a computer-based environment

accessible to a range of stakeholders in a project, which provides a common platform for storing items like 3D and 2D models, text (including comments), and other records of interaction between the parties. To allow collaboration between the parties, the CVE requires two basic features:

1. A means of facilitating modeling; and
2. A means of facilitating communication and collaboration.

Active Worlds is a commercially available 3D CVE that provides a way to share context, be aware of other users, communicate with text and visual records, and manipulate objects in a collaborative environment.

However, current CVEs do not provide a mechanism for reconciling the different views of the object held by the different disciplines e.g. an architect; a structural engineer; a heating, ventilation and air-conditioning consultant; and a fire protection engineer. This is the area of focus for the project team.

The same object within a structure often has different meanings to different professions: an architect may see a wall as an element with certain properties which occupies and partitions a space, while a structural engineer may see it as a load-bearing element – but these two views need to coexist. One discipline may effect changes to an object, which influence another discipline's view of the object, and these changes need to be communicated to the users.

The project team's approach to supporting multi-disciplinary collaboration, and multiple views of an object, is to supplement the Active Worlds platform with additional collaboration tools such as a webcam and sketchpad, an

object database, and an agent system that facilitates the multiple views of an object.

The collaboration tools emulate processes that the project team has observed in the real world environment. High bandwidth communication is necessary to bring these tools together in a virtual environment.

An architect wishing to add a wall to an existing building can copy and modify an existing wall and drag it into place. By moving an avatar (a 3D representation of a person located in the 3D world), the architect can see the new design from different perspectives and adjust the location of the new wall. The agent software would notice the change and associate the new wall with the architect's view.

The different disciplines' models co-exist on the virtual site. A designer can decide which parts of the models will be visible by selecting one or more disciplines in a control panel and an agent modifies the visible objects.

Different users can collaborate using chat sessions and a sketchpad that allow the user to sketch over a background image. A webcam and audio facility allow collaborators

to use tools not provided in a typical 3D virtual environment.

Teams of people from different offices are often involved in a major project and at times it is necessary to bring them together physically for meetings - something that is costly and time-consuming.

David Marchant is IT Manager Global at architects Woods Bagot which has offices throughout Australia and in Hong Kong, Bangkok, Kuala Lumpur, Dubai and London. He says the practical value of this research is that it provides a means of bringing together a multi-disciplinary team from multiple locations around the world without them being physically in the same place.

Project Leader Mary Lou Maher, Professor of Design Computing at the University of Sydney, believes that when the project is completed at the end of the year, the industry will have a blueprint for how to work with a virtual environment.

"We have shown that it is possible for different disciplines to view and communicate about a project in a virtual world, as if they are on the construction site and we are collecting

data to highlight the benefits of this process. When this is combined with other work on data exchange and standards, the industry will have the information to move forward with using the technology and the decision will then be on who is best placed to lead the way," she said.

Dr Keith Hampson, Construction Innovation's CEO, regards this research as improving the efficiency of the property and construction industry through greater integration of disciplines and adoption of a 3D conceptual environment that better reflects the real world.

He says he sees this software as an enabler for developers and industry. It will allow them to work with a consistent and common vision, regardless of geographic separation, reducing the time to move from a concept to a firm design and thus reducing miscommunication and misunderstanding.

Partners collaborating on this research project are Arup Australasia, Woods Bagot, The University of Sydney, The University of Newcastle and CSIRO.

For more information go to www.construction-innovation.info.