Simulation of Clinical Work Environments using BIM and Computer Gaming Technology.

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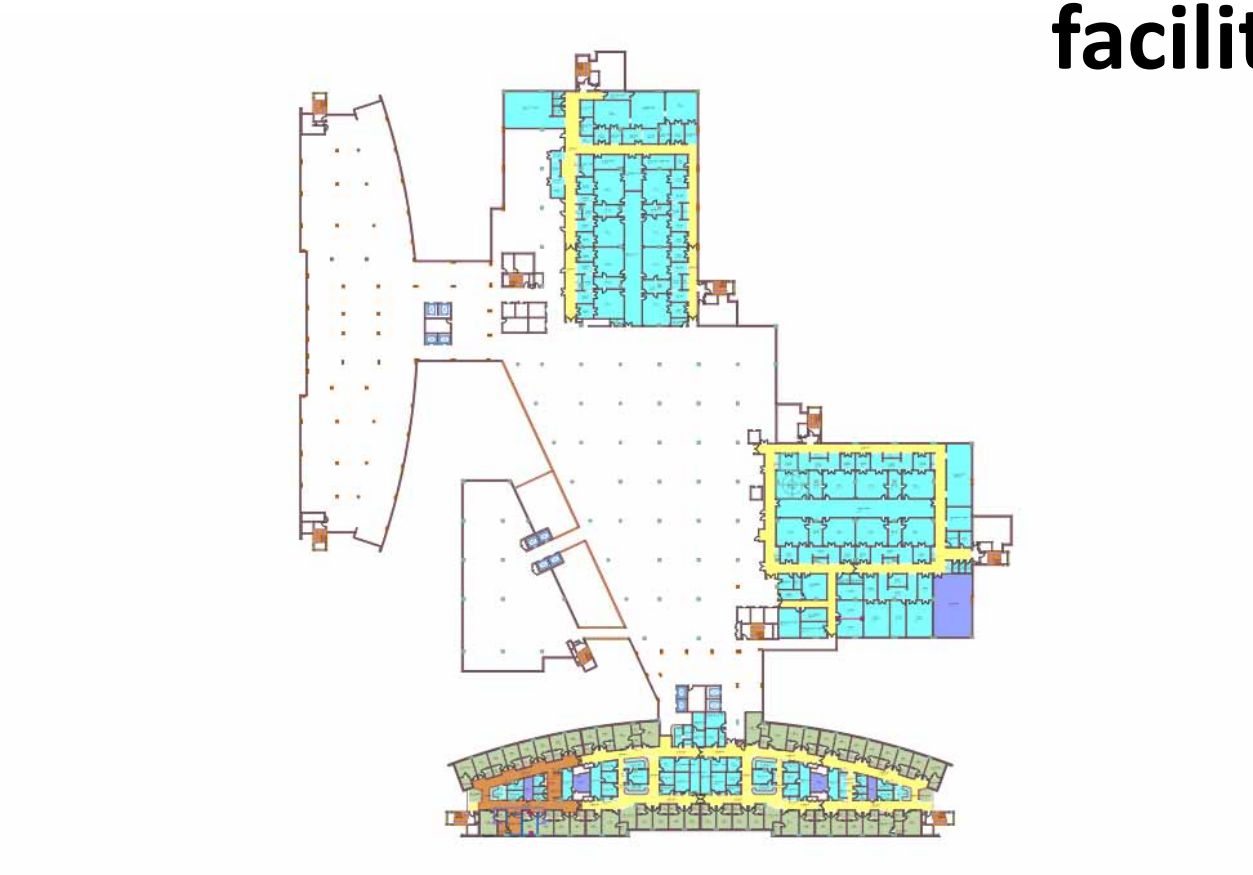
Background.

Building Information Modelling (BIM) is gaining wider acceptance as a replacement CAD technology to design and document facility designs.



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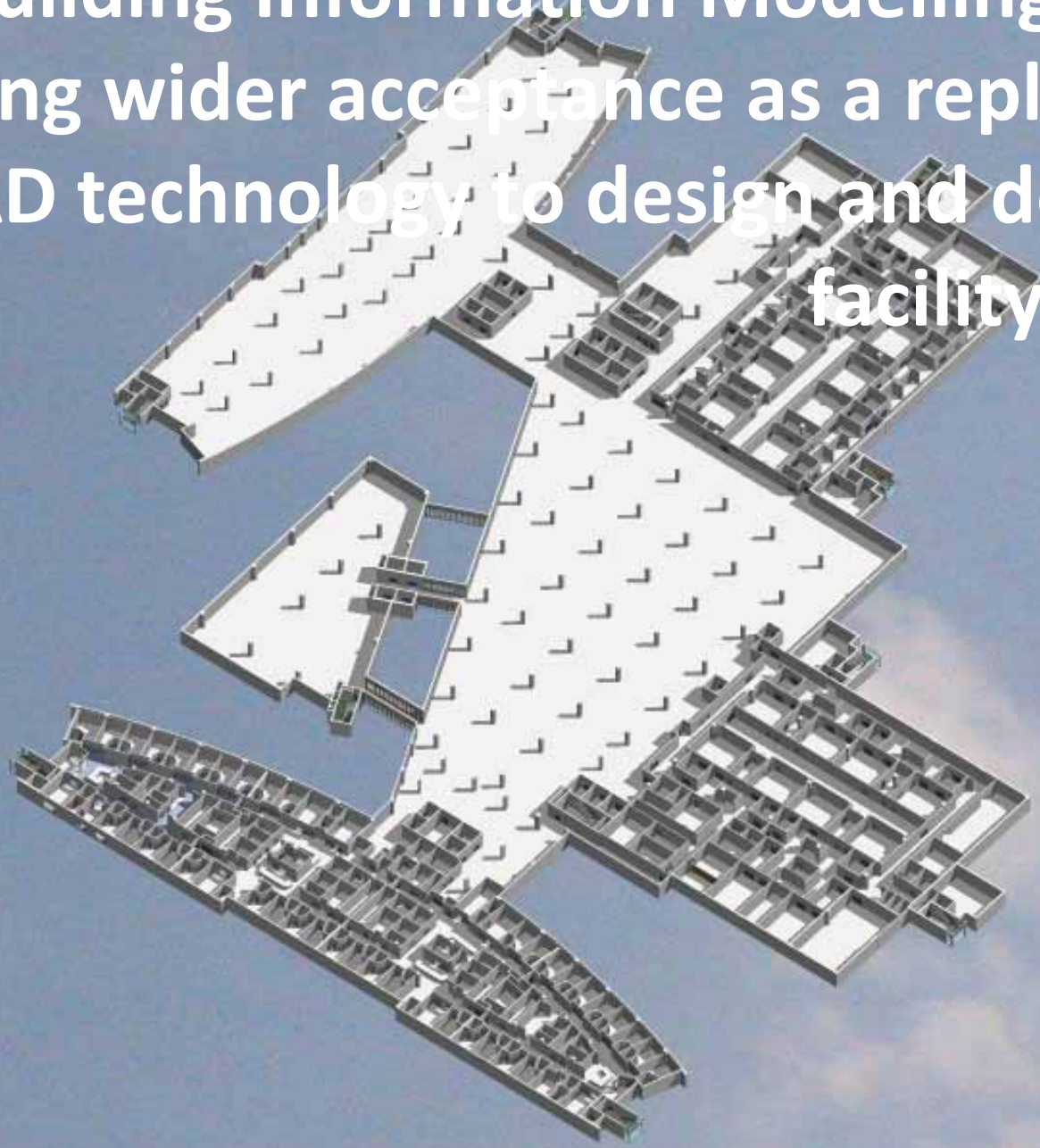

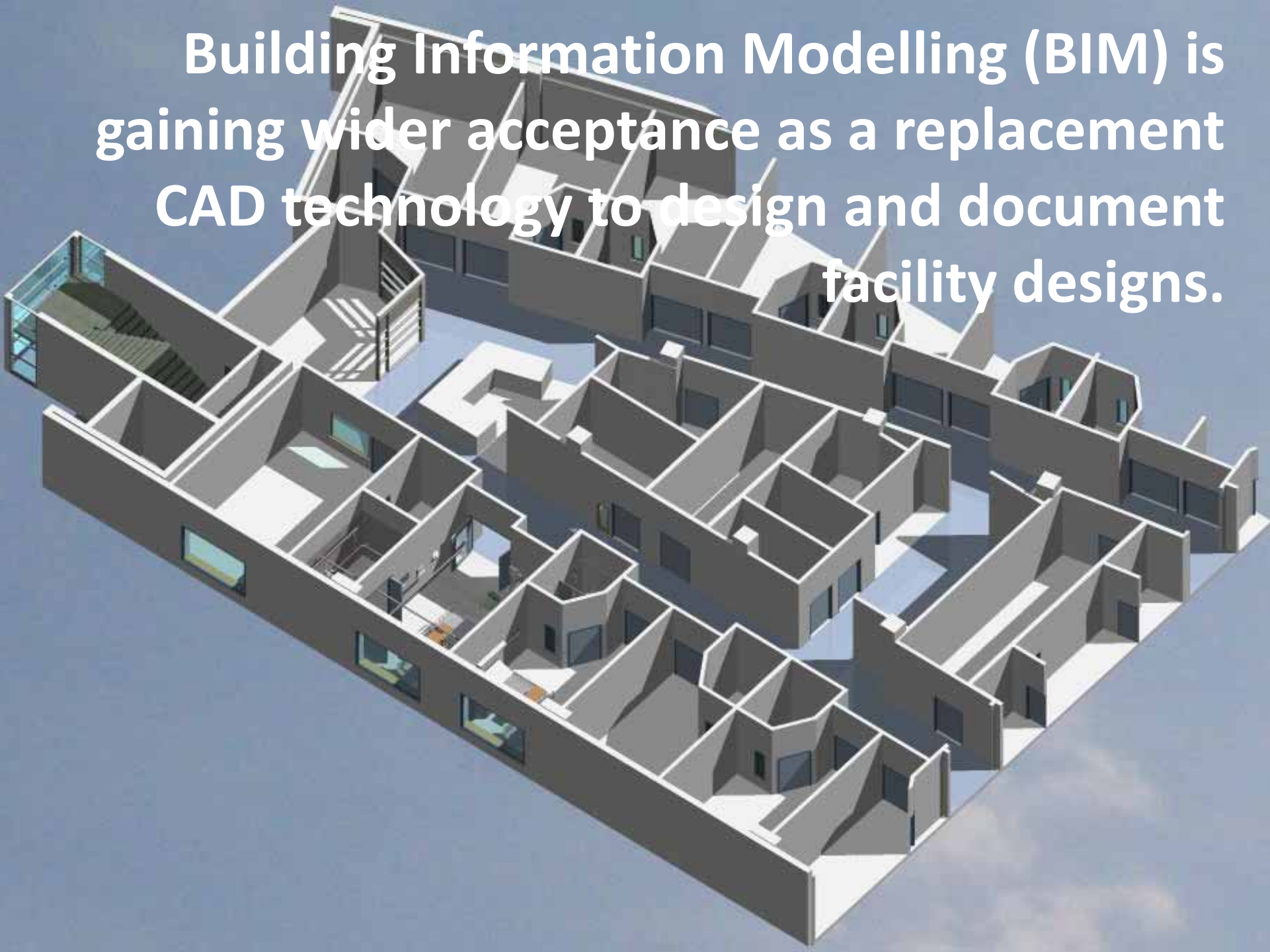
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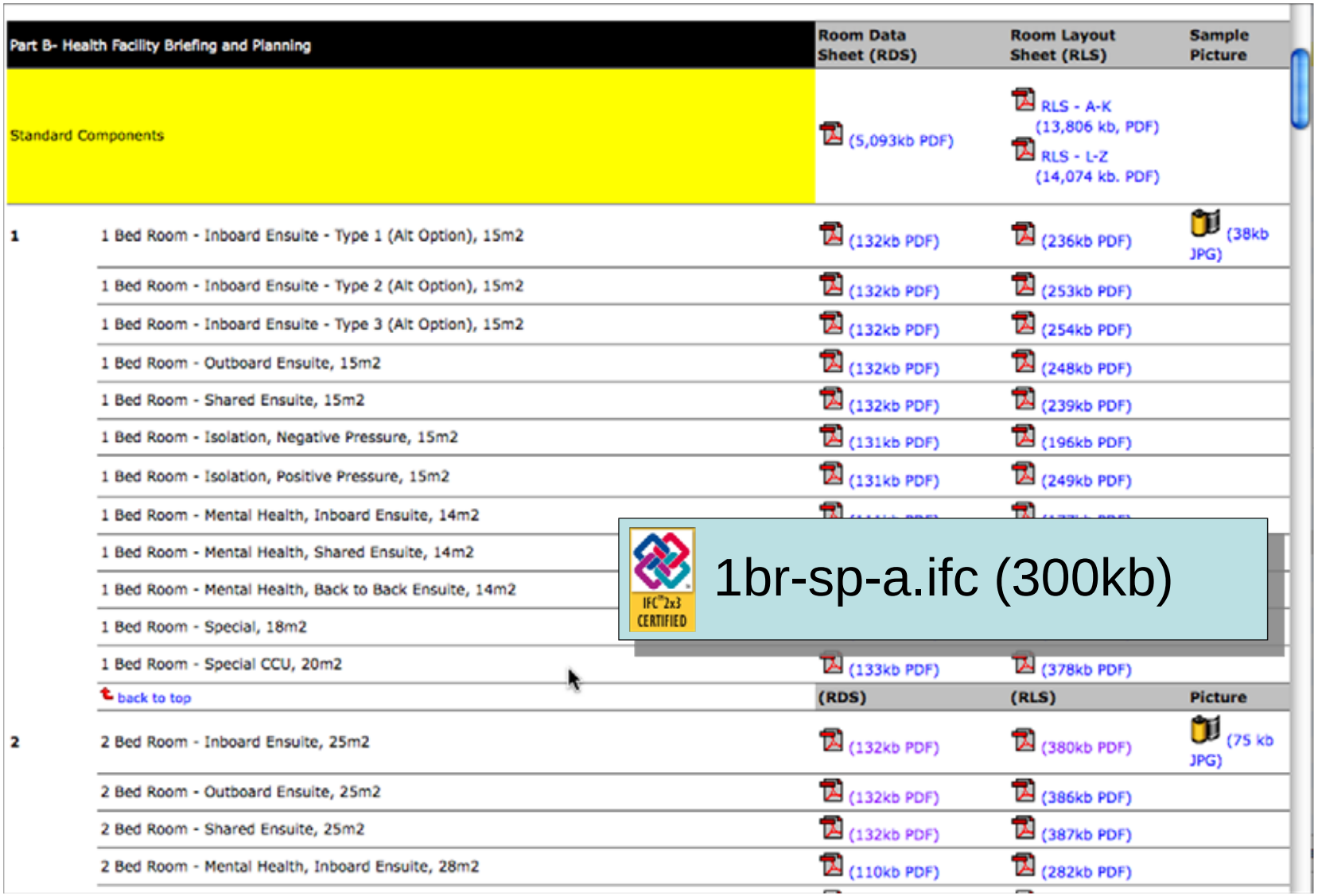
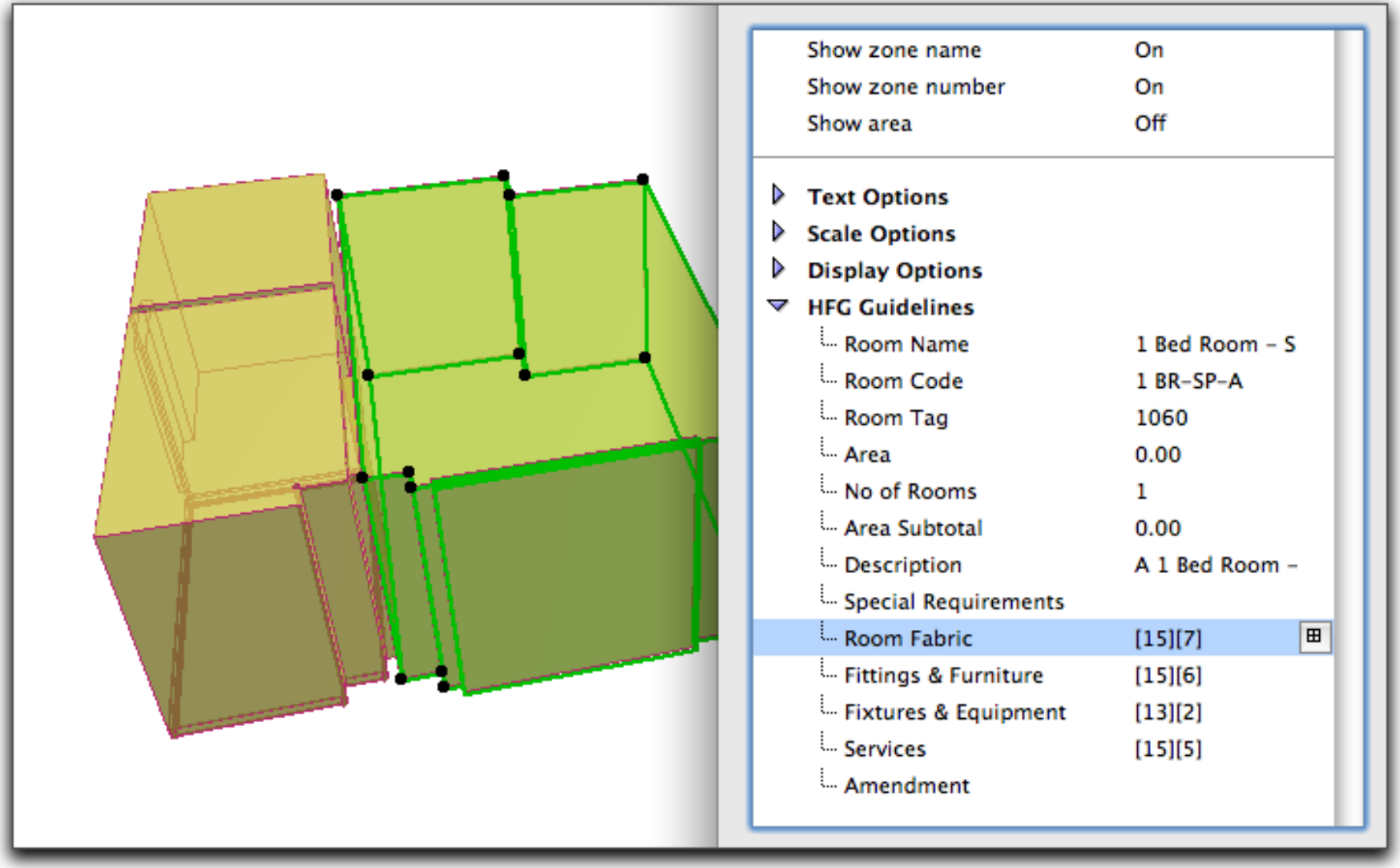
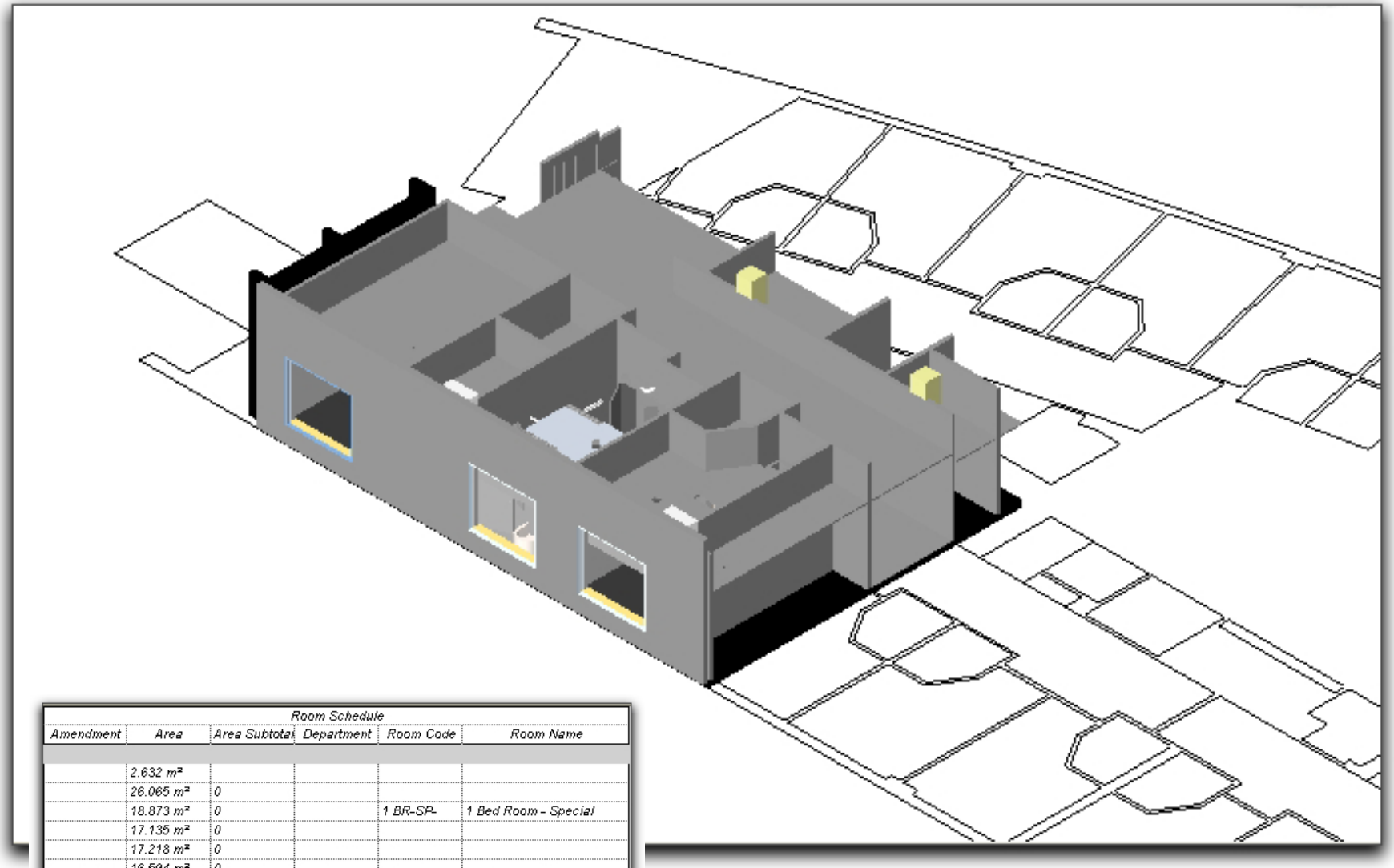


Part B- Health Facility Briefing and Planning		Room Data Sheet (RDS)	Room Layout Sheet (RLS)	Sample Picture
Standard Components		(5,093kb PDF)	RLS - A-K (13,806 kb, PDF) RLS - L-Z (14,074 kb. PDF)	
1	1 Bed Room - Inboard Ensuite - Type 1 (Alt Option), 15m2	(132kb PDF)	(236kb PDF)	(38kb JPG)
	1 Bed Room - Inboard Ensuite - Type 2 (Alt Option), 15m2	(132kb PDF)	(253kb PDF)	
	1 Bed Room - Inboard Ensuite - Type 3 (Alt Option), 15m2	(132kb PDF)	(254kb PDF)	
	1 Bed Room - Outboard Ensuite, 15m2	(132kb PDF)	(248kb PDF)	
	1 Bed Room - Shared Ensuite, 15m2	(132kb PDF)	(239kb PDF)	
	1 Bed Room - Isolation, Negative Pressure, 15m2	(131kb PDF)	(196kb PDF)	
	1 Bed Room - Isolation, Positive Pressure, 15m2	(131kb PDF)	(249kb PDF)	
	1 Bed Room - Mental Health, Inboard Ensuite, 14m2			
	1 Bed Room - Mental Health, Shared Ensuite, 14m2			
	1 Bed Room - Mental Health, Back to Back Ensuite, 14m2			
	1 Bed Room - Special, 18m2			
	1 Bed Room - Special CCU, 20m2	(133kb PDF)	(378kb PDF)	
	back to top	(RDS)	(RLS)	Picture
2	2 Bed Room - Inboard Ensuite, 25m2	(132kb PDF)	(380kb PDF)	(75 kb JPG)
	2 Bed Room - Outboard Ensuite, 25m2	(132kb PDF)	(386kb PDF)	
	2 Bed Room - Shared Ensuite, 25m2	(132kb PDF)	(387kb PDF)	
	2 Bed Room - Mental Health, Inboard Ensuite, 28m2	(110kb PDF)	(282kb PDF)	

HFG information is in PDF format.



Creating intelligent data on room objects.



Room Schedule

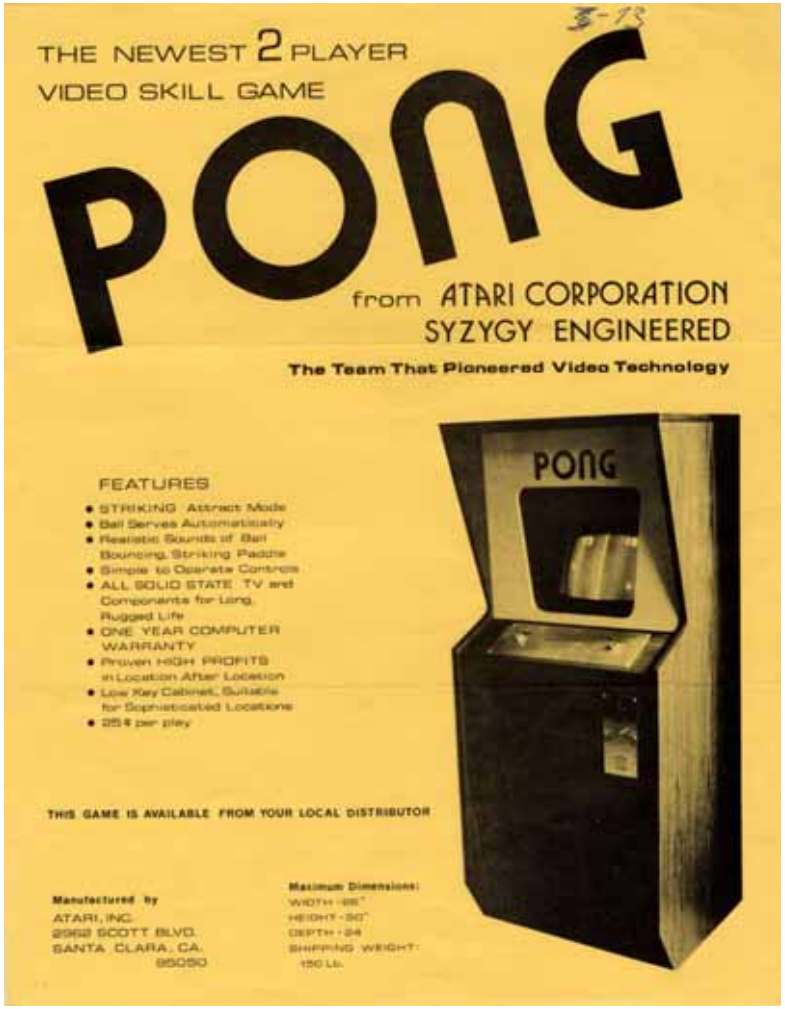
Amendment	Area	Area Subtotal	Department	Room Code	Room Name
	2.632 m²				
	26.065 m²	0			
	18.873 m²	0		1 BR-SP-	1 Bed Room - Special
	17.135 m²	0			
	17.218 m²	0			
	16.594 m²	0			
	16.653 m²	0			
	14.642 m²				
	25.956 m²	0			
	5.325 m²	0			
issue 2, 2	7.005 m²	6		ENS-SP	Ensuite - Super
	4.253 m²	0			
	4.186 m²	0			
	4.186 m²	0			

IFC room data sheet model

Despite increasing adoption most client groups and users associated with facility development have no experience of the new opportunities that BIM facilitates.

Political, programmatic and cost factors are often so demanding that *critical analysis of the functioning of the hospital* is not undertaken.

Computer game technology has been pushing the technology envelope for the last 30 years.



Half-Life 2

UT3

Crysis

Little Big Planet

avatars - representations of human participants - can interact, and work with objects that have real-world mechanical behaviour such as weight, inertia, etc.

Objects can be opened and closed, pushed, lifted and actions triggered.

We've taken an off-the-shelf computer game and modelled clinical environments. Clearly the "theme" of a new environment is in no way dictated by the underlying mechanisms of the computer game.

Method.

This project describes the application of these two technologies to the developed design phase of parts of the new Gold Coast University Hospital Project, Queensland, to assess how they might contribute to improved understanding of the spatial arrangement, work flows and clinical and related processes.

In the first phase a BIM consultant, Atlas Australia, built a BIM model based on the 2D documentation from the design team. From this, high quality visualisations were generated (using Quicktime VR) of four key units (Operating Theatre Suite, Intensive Care Unit, Neonatal ICU, and a Bariatric Special Care room).

In parallel the research team developed an environment in UT3, by converting the BIM model, of the Operating Theatre suite, as a test, and then the Bariatric room. The Bariatric room has been presented to a University eHealth research seminar, a Project Directors group, the Hospital User Group Leaders and Design Architects. The critique and feedback from these four different types of users informed the development of a prototypical hospital simulation environment. This prototype will be the basis on which to develop the three remaining units.

After the completion of these a representative project user group will undertake a 2 day workshop using the environment as a live, interdisciplinary, assessment of the approach and to validate its benefits to health facility design.

Findings.

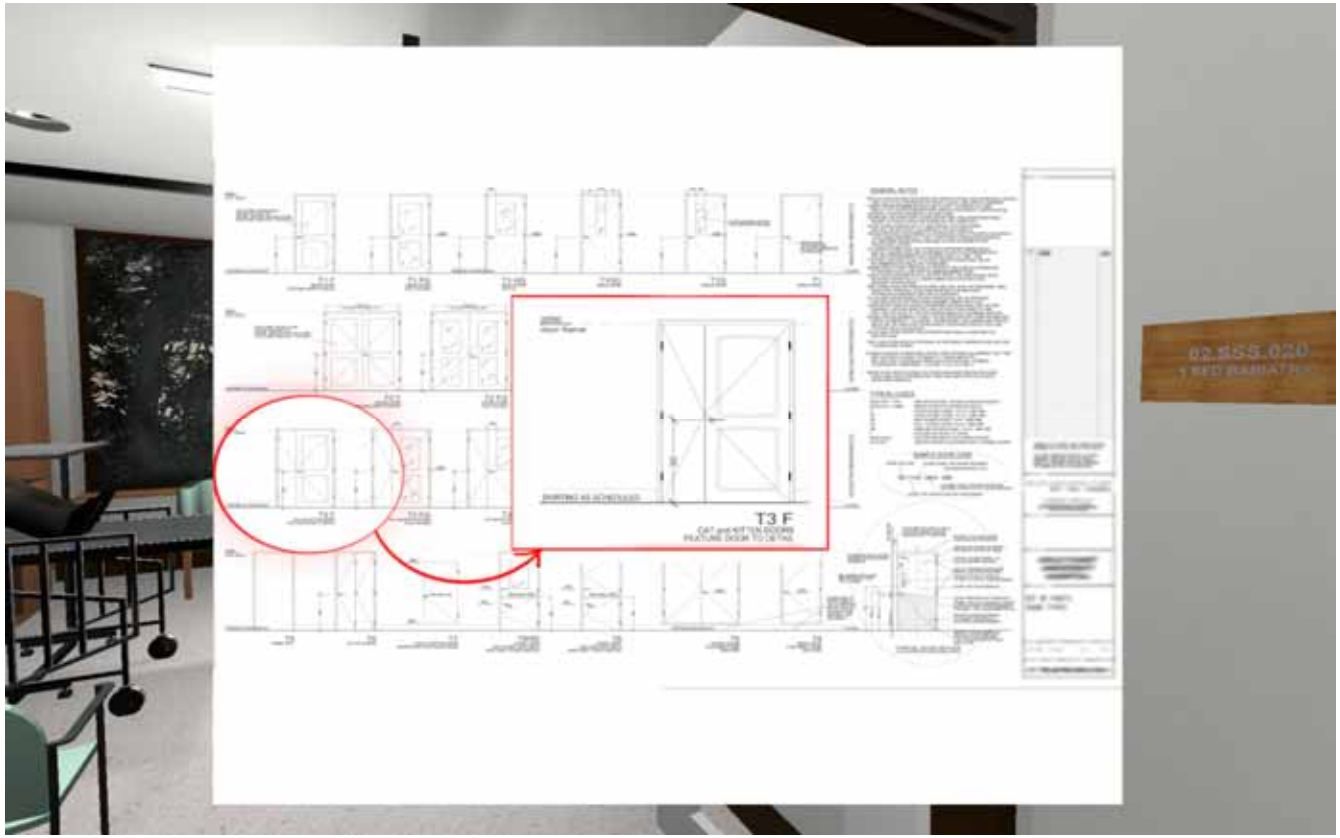
Presentation 1: University eHealth research seminar.

Dr Bridge said the simulated environments had "huge potential" and it seemed "relatively easy to restructure the game; but one could still see remnants of the original game ... the presence of a weapon and the 'alien' avatar."

Presentation 2: Project Directors Group.

There were two types of observations:

The first were from project managers whose concern was for fidelity of the visualisation environment so that their client team could ensure that the 3D models matched the 2D documentation.



The second type of observations in the review came from the nurse planners and user group leaders, who were more interested in the video clips showing the UT3 environment in action.

Bariatric Room Simulation:

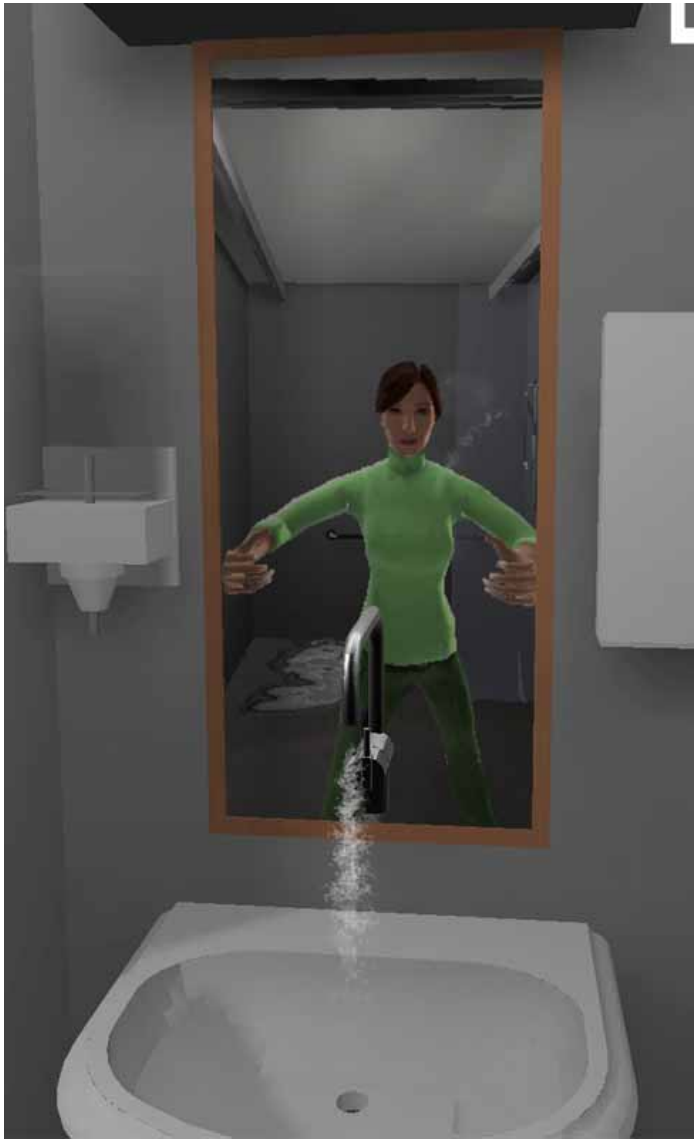
This video clip is approximately 200mb, so not included in this version of the presentation. Please contact the authors if you would like to view a copy.

Presentation 3: Hospital User Group Leaders and Design Architects.

“The whole design review process would have been completely different using these two new modelling technologies.”

“The approach could be instrumental in the commissioning phase by testing logistics and occupancy planning scenarios.”

When a Health Planner saw the StaffNurse looking into the mirror her comment was:



"my makeup is a mess“

In this case she was speaking for the avatar; projecting on a level of everyday reality and highlighting the empathy the avatar can engender.

User Group heads seemed to project qualities of being alive or dead onto the human figures within the UT3 environment quite unselfconsciously.

ICU Simulation:

This video clip is approximately 200mb, so not included in this version of the presentation. Please contact the authors if you would like to view a copy.

Conclusions.

The two technologies show powerful and complementary benefits:

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The BIM/QTVR/UT3 navigable model environments show a level of fidelity and realism impossible with traditional 2D documentation.

The two technologies show powerful and complementary benefits:

The UT3 environment extends this potential to understand process and behaviour through avatars and accurate physical models of the proposed design. The Avatar's presence and interaction is a key component/contribution of computer gaming technology.

Further Work: Crysis

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Thank You.

Questions, Observations or Feedback?

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