

## ARCHITECTURAL DESIGN AND VIRTUAL WORLDS

Kok Hong Lau and Mary Lou Maher

### Abstract

The combination of architectural design and virtual world design has led to a rapidly expanding area of study and possibly the birth of a new profession. The potential as well as the uncertainty in the area of virtual architectural design are challenging to anyone who is concerned with our living environment, whether it is physical or virtual. *Living* in the virtual realm has raised the attention not only of architects, but also philosophers, social scientists and the wider academic and professional community. The discussion and debate on cyberspace will certainly remain an important branch of virtual architecture. In this paper we explore the potential and implications of architectural design in virtual worlds.

### Architectural Design in Virtual Worlds

In "Internet Dreams", Stefik (1996) presents several metaphors that have developed around the concept and use of the internet. Among these metaphors are: the internet is an information superhighway, the Internet is a marketplace, the internet is a virtual community. Identifying these metaphors provides a means for understanding what is possible with the Internet. Extending one of the metaphors and providing additional functionality on the internet, makes possible uses that otherwise may not have been imagined. The developments in virtual worlds as games and virtual communities have used many of the words (e.g. Figure 1) and images (e.g. Figure 2) of building design. This implies a conceptual metaphor of place which can be extended to architectural design.

From the early Dungeons and Dragons, a text-based virtual world, to Active Worlds (<http://www.activeworlds.com>), a 3-D immersive collaborative modelling world, we witness a gradual transition from textually described online environments through to virtual places that are described in 3D geometry, sounds and textures. Various design approaches have been developed to provide virtual world designers with a set of design principles and parameters

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46H 102V 2199X 5C Exits:NESWUD> Nowhere
  You stand in the void between the heavens above and the green sphere of
  Krynn below. From here, you can see three pillars reaching up from the
  depths below, holding up the universe. These three pillars are colored
  black, red and white and form a triangle. As you peer closer, you notice a
  fourth, almost invisible pillar in the middle of them, sepearate, yet still
  a part of the whole. From here, six shimmering portals exit unto the face
  of Krynn below, each emblazoned with a huge plaque across the front.

A faint voice echoes: New players should type 'help newbie' and 'topics'.
A stack of maps floats in the void here.
A bulletin board hangs motionlessly in the void around you.

46H 102V 2199X 5C Exits:NESWUD> exit
Obvious exits:
North - Clerk's Office
East - The Pig and Whistle
South - Reception
West - The Hall of Justice
Up - The Seeker's Inn
Down - Market Square of Kalamen
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Figure 1. An example of words used to describe a virtual world (ArcticMUD <http://www.arctic.org/> Last accessed 05/09/99)



Figure 2. The Palace uses the imagery of buildings to create a sense of place (The Palace <http://www.thepalace.com/> Last accessed 05/09/99)

in order for them to effectively design an online environment. Among them, text and graphical approaches (Cicognani and Maher, 1998) have been identified although possibilities also exist for other approaches. Our experience in designing virtual worlds reveals a process whereby precedents studies are carried out by reviewing the current state of virtual architecture and is followed by a formulation of a design brief (Maher, Simoff, Gu, and Lau, 1999). This indicates that not only is the product of architectural design of interest in designing virtual worlds, but the process is also relevant. Although architectural design is noted for the forms and places created, the meaning of these places lies also in their function. The functional aspects of physical architecture can influence the design of virtual worlds.

### Architects as virtual world designers

"Click, click through cyberspace; this is the new architectural promenade" (Mitchell, 1995). This seemingly utopian remark made by William Mitchell suggests the inherent architectural nature of cyberspace. The involvement of the architect is also subtly implied. However we have yet to witness fellow architects treating the design of virtual worlds seriously. Do architects need to be bothered at all?

Currently we observe that programmers or computer scientists are designing most of the virtual places and in most cases these places are quite functional in a sense that they do fulfil the demands of certain people at least in the short-term. Although the individually provided solutions might seem optimal for specific cases, especially when users "own" the portion of online space hosting their products (e.g. the disk space on a Web server), on a global scale the environment suffers from long term difficulties in its organisation and accessibility (Cicognani,

A., 1999). Some of more popular virtual places are often perceived as linear spaces rather than spatial. For example a common chat place is often treated as a single existing dialogue window, rather than a room with spatial quality. The approach is pretty much a desktop metaphorical one and it does fulfil its chatting purpose. We may later think of these early virtual worlds as vernacular virtual architecture.

The expanding virtual world and the ever-increasing intensity of online activities is having a significant impact on our social and cultural environment, hence affecting the built environment and potentially altering lifestyle. Since architecture is concerned with the condition of the built environment, the current state and development of virtual architecture is certainly not to be ignored by anyone who is concerned with the quality of the physical built environment. As the effect of online activities is gradually penetrating into our daily life, architects will be presented with a design situation that poses more complicated and interwoven problems. More and more the design profession is confronted by design problems that require a multi-dimensional view and cross-disciplinary approach.

In three-dimensional virtual places we are increasingly confronted with higher degree of spatial organisation, including descriptions and the relationship between content and space. As we try to go beyond casual social activity and do more complex and demanding tasks we find we need a few interconnected rooms with different functional objects for differentiation of tasks. This is when the concept of spatial design and organisation comes into play. Since the architect is traditionally trained to manipulate spaces and places to provide functionality, they may well be suited to design online places.

#### Implication on education and practice

Architectural education has embraced the concept of a virtual design studio. Since the first Virtual Design Studio in 1993 (Wojtowitz, J. Ed., 1995), we have developed a better understanding of the means and opportunities for virtual collaborative design environments (Maher, Simoff, and Cicognani, 1999). We can now distinguish between a virtual design studio that provides similar functionality as the physical studio but allows for collaboration among participants around the globe, from a virtual design studio that allows collaborative modelling in an immersive 3D world, referred to as *designing within the design* (Maher, Simoff, Gu, Lau, 1999). These developments have provided opportunities for students to have cross cultural design experiences as well as develop a knowledge base of computer-mediated collaboration.

For the profession, the increasingly globalisation of design teams creates a need for better online design and communication environments. A virtual design office presents itself as an opportunity for architects and designers to better utilise human resources and minimise cost and time spent on travelling and maintaining a running office. The design of these environments can take many forms, for example, Figures 3, 4, and 5 illustrate three different

approaches. These developments have the potential to change the way architects work and also to change the designs they create.

In light of this, the architecture profession and education sector should respond to the new conditions and start addressing various issues directly related to the profession. Architecture schools should consider incorporating the study of virtual architecture in the curriculum with an aim to cultivate a theoretical and philosophical understanding of virtual worlds including the social and technological changes brought to the built environment by intensified online activities. At a more practical level, some computing technologies and programming can be taught to assist in the design of digital space, just like construction technologies are being incorporated into architectural training to assist in building construction. This will not only provide students with a sound knowledge of virtual architecture but also some basic skills to explore and shape the electronic frontier.

The investigation into the nature and design of virtual environments has triggered a series of social, philosophical and environmental debates among philosophers, and social and computer scientists. A similar concern has yet to be observed within the design profession. The profession needs to assume a new paradigm of looking at virtual worlds design and look at it positively to discover those of its aspects that can enhance our living environment, and at the same time study the impact it might have on the built environment. William Mitchell in his book *City of Bits* pointed out that:

“An architect will increasingly confront practical choices between providing for bodily presence and relying on telepresence. They will be forced to explore the proper respective roles of physically constructed hardware and symbolically encoded software, and of actual space and virtual places. And eventually they will find new ways to

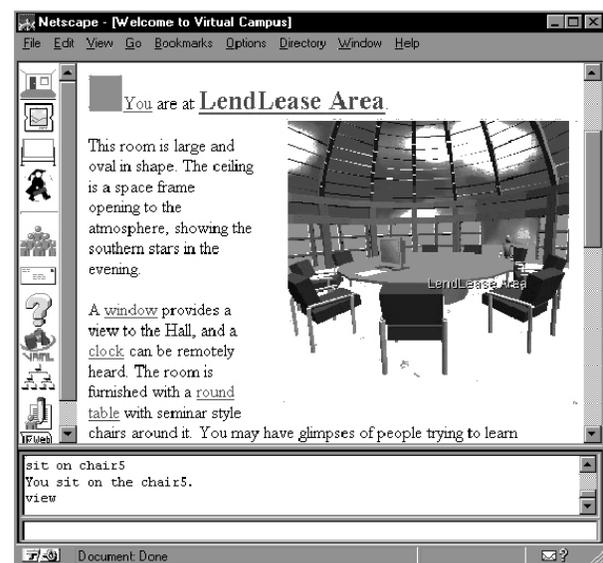


Figure 3. A virtual meeting room designed as a physical place

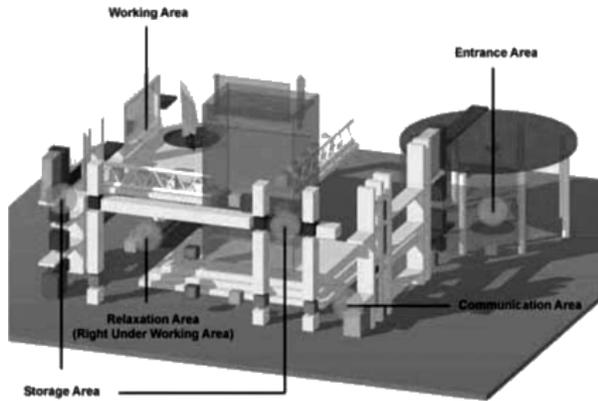


Figure 4. A virtual office designed as a virtual place

accommodate human needs by recombining transformed fragments of traditional building types in a matrix of digital telecommunication systems and reorganised circulation and transportation patterns." (Mitchell, 1995, p 172)

### Research directions

One of the practical things to do in a virtual world is distant collaborative design. However the consideration of locating the design studio in virtual places remains conceptual and there is plenty of room for research to work out the feasibility of this option and how this can be done. Collaboration in a virtual place has the potential to facilitate design as a result of having it at a unified location with a sense of place and presence. More experiments with the "virtual place" type of collaborative design studio are needed.

The representation of 3-D immersive virtual buildings and environments within virtual worlds has yet to be developed further. Representation is particularly important because it is not just the appearance but rather the appropriateness of chosen geometry and function. An unsuitable choice of representation will result in an environment that is unfamiliar or unrecognisable. On the other extreme, blindly imitating physical forms without questioning their meaning and function in a virtual world gets in the way of the development a functionally sustainable virtual environment. There is a need to push for the search for a design language suitable to the nature of online activities. The new representation will probably result in a form that may not look like its physical counterpart but still retain a recognisable and navigable space. It is also highly possible that there is more than one set of design languages that are suitable for virtual worlds design.

Central to the usefulness of a virtual environment is its intended function and behaviour. Without function and behaviour any virtual place is merely a 3-D geometry that people can walk through and observe. A virtual architect needs to respond to the activities that will take place in the virtual world and start conceiving a structure and form with required function and behaviour so that people can start doing constructive and useful things in virtual worlds. Again, simulating the physical counterpart of a virtual

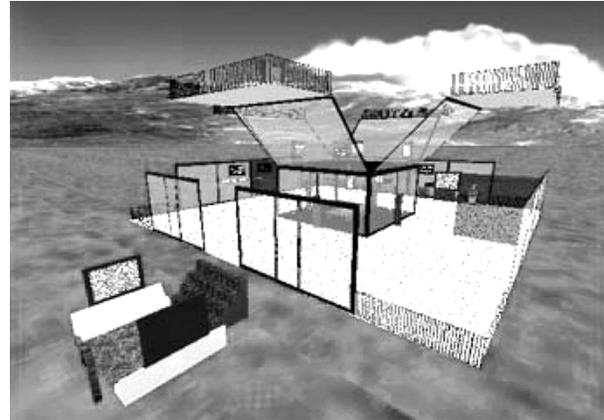


Figure 5. A virtual office on the virtual building site

object in terms of its function, structure and behaviour may seem to be an obvious choice but it is not necessarily the best one.

A truly functional virtual environment needs to be habitable and navigable in order for its functions to become useful. To effectively orient people within a virtual environment requires a detailed study of environmental cognition. The way-finding principle needs to be considered as a design issue especially in a large and complicated virtual environment. Since representation determines largely how we experience virtual space it may well be closely related to environmental cognition. Exactly how these cognitive principles can be applied into design requires carrying out more experiments and demonstrations.

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**Kok Hong Lau** is a research assistant and **Mary Lou Maher** is Professor of Design Computing - both in the Key Centre of Design Computing and Cognition, Faculty of Architecture, University of Sydney.