

Hybrid Digital Media Architectural Visualisation Delivery - Murcutt, Lewin & Lark's The Arthur and Yvonne Boyd Education Centre on Digital Flatland

Verdy Kwee, Antony Radford and Dean Bruton

Hybrid Digital Media Architectural Visualisation Delivery - Murcutt, Lewin & Lark's The Arthur and Yvonne Boyd Education Centre on Digital Flatland

Verdy Kwee, Antony Radford and Dean Bruton

This paper shares ongoing research explorations into visualising and representing architecture through the limited real-estate spaces of computer screens. It proposes greater access, 'interactivity' and clarity in digital representations for the study, analysis and/or digital record of existing architecture by drawing on concepts and strategies - within and outside the discipline - to arrive at hybrid visualisation techniques. To illustrate some of these techniques, the paper outlines several issues in the production of hybrid media representations of the Arthur and Yvonne Boyd Education Centre. This award-winning building was designed by the 2002 Pritzker Prize-winner, Glenn Murcutt in association with Wendy Lewin and Reg Lark. It is recognised as a landmark in Australian architecture and a worthy subject of our representation experiments.

I. INTRODUCTION

In an Australian Broadcasting Corporation (ABC) interview with Glenn Murcutt, a question was thrown at the architect: "How has computer technology affected your design process?"

Murcutt replied: "It hasn't done a single thing." [1]

This paper is neither about computer-aided design nor the role of technology in design process, especially in Murcutt's practice as it would appear to be candidly irrelevant. It is about the general digital representation of architecture on computer screens.

As a brief outline, the Arthur and Yvonne Boyd Education Centre (completed in 1998) is located in relatively inaccessible countryside on private land south of Sydney, Australia. Donated by the late, renowned Australian painter, Arthur Boyd, the centre serves as a venue for artists/resident artists and students to conduct art workshops. In addition to various architecture journals and books, it has also been featured in video documentaries on contemporary architecture, including 'In the Mind of the Architect' by ABC national television, above. Its presence in the World Wide Web includes The Kenneth F. Brown Asia Pacific Culture and Design Award Archive. [2]

Presently, mixtures of texts and 'supporting' photographs and occasionally reproduced architects' drawings are the most prevalent mode of presenting architecture. However, the dialogues between these two media - texts and photographs- in many architectural publications are often delivered loosely, heavily dependant on the readers' prior knowledge of the works to understand. Often too, if each exists independently it would little affect the presence or meaning of the other. For example, Frominot (2003) in her comprehensive review of Murcutt's work writes:

"The building's interstices have been conceived as carefully as its volumes, as has the interface between the building and its environment. The dormitory range envelope 'feathers' increasingly towards its outer limits, thanks to the tapering down of the structural frames, the slenderness of the corrugated iron roof and the projection of fin-like sun-breakers...." [3]

This textual description is accompanied by two photographs of the building on the same page showing the exterior of the building (similar to Figure 1). Whether these pictures are meant to serve as visual references to the texts is unclear.



◀ Figure 1: Pictures similar to these are depicted on the same page as that of the textual explanations' in Fromonot's book. (photographs by Verdy Kwee)

The Phaidon Atlas of Contemporary World Architecture includes four photographs - all of which are external views - a section, a plan and a sketch by the architects showing the framing of views seen from the entrance portico. The text seeks to explain the composition of the building. An extract of the Atlas reports:

“...The communal gathering spaces - hall, dining area and verandah - are grand, bold gestures united under a soaring roof plane. The smaller-scale dormitory areas that extend southward along the ridge are pod-like units articulated by concrete blades that screen the sun to the east and west, focusing the dormitories' outlook on to the river below...” [4]

One could argue that the arbitrary nature of the relationship between the signifiers (words) and the signified (objects) [5] and thus also the accepted

occurrences of polysemy (highlighted above), does not justify the predominant use of textual language as an accurate representation of certain kinds of objects [6], especially of one as complex and multi-faceted as architecture. Furthermore, detaching textual descriptions from the subjects or pictures they are referring to, as illustrated above, decreases the legibility of the former.

As architecture cannot be wholly 'textualised', by the same token, it can never be fully replaced by any other object that represents it. As it is, even experiences and hence, perceptions and interpretations, of the real architectural object onsite vary according to influencing elements that shape the moods and the journeys of the observers. Still, since architecture is not as transportable as other forms of art, representations of it are the most practical means of communication. If this is the scenario, [how] could architecture be best represented or narrated by combining the best possible aspects of different media - especially on the 'flatland' [7] of the computer screens?

2. MIXED DIGITAL MEDIA AND HYBRIDISATION

The notion of 'mixed digital media' can be interpreted in three ways. Firstly, it may simply mean the assembly of data of exclusively digital origins; for example, digitally created sounds, texts or images from digital videos and photos. Secondly, as Manovich suggests, the term can imply the 'remix between the interfaces of various cultural forms and new software techniques' [8]. Digitisation offers an opportunity for a new playing field in that it allows this interaction of different cultural forms by providing a platform where traditional formats of media may be digitised, transformed and combined. Thirdly, 'mixed media' also encompasses the 'borrowing' and mixing of digital media tools and concepts, and traditional/new digital techniques deployed in other disciplines. It also suggests the re-adaptation of concepts to serve purposes other than those for which they were originally intended, such as the borrowing of software for purposes outside those for which it was originally intended, which Glanville refers to as 'software abuse'. [9]

The term 'hybrid', as opposed to 'mixture', implies that the whole construct or the amalgamation of the media is an 'indivisible' entity, different from the sum of its components. As a basic example, a digital photo montage of architecture brings and manipulates an architectural concept which could be in the digitised form of painting, airbrushes or three-dimensional model into a digital photograph of the actual building's context/environment. Each could exist separately but narrate different stories on their own. Works such as the rendering in print of the Florence high-speed train station (Foster, N. 2003) superimpose line and solid forms in its representation to augment visual clarity and impact. At times too, other paper-based hybrid architectural renderings play on collages with

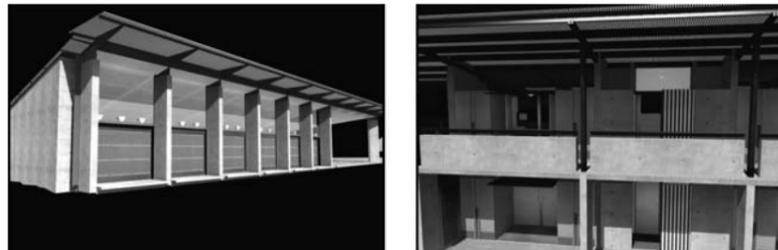
outcomes bordering between/fading from architectural representations and/to abstract/fine art drawings - e.g. Norman Day Architect's drawing by artist Marc Raszewski and Ivan Rijavec Architects's drawings by artist Zbigniew Jaworski. [10]

In the following sections we discuss and assess some examples in the hybrid digital visualisations to deliver architectural information through the computer screen - a work-in-progress on the representation of the Arthur and Yvonne Boyd Education Centre.

3. ANIMATION - LEARNING FROM ARCHITECTURAL DOCUMENTATION AND MOVIES

Animations are becoming an integral part of the description of architecture. In the silent movie era, music and captions supported the actions on the screen. Although the actions could exist independently, without captions, they could be subjected to wider possible interpretations, which sometimes maybe unintended.

In today's cinemas, languages are often translated to draw different cultural backgrounds closer. With some limitation, translations - through subtitles or dubbing - are often used to convey particular ideas and cultural symbolisms. Architecture is inevitably dependent on visual narration for its explanation of peculiarities of forms or qualities of design. Visual narration assists in 'materialising' the form, scale, colours and fabrications, spatial/environmental relationship, language, details and to varying degrees, the spatial experience of a building (Figure 2).



◀ Figure 2: Extracts from the 'silent' animation. (For a clearer representation, please refer to <http://www.arch.adelaide.edu.au/~a1094108/IJAC/index.html>)

The addition of textual and verbal narration, however, is required to directly address aspects such as the nature and background of the project, functions, design rationale, spatial descriptions, and highlight features that may not seem obvious in the visual narratives. The animation in Figure 3 extracts text-to-speech technology of the AT&T Lab [11] to convert textual to verbal architectural narration. With the presence of texts and speech, the visual narration in Figure 2 is experienced differently. Conversely, these texts and speech components would have also made different or perhaps no sense if taken out of the context of their visual companion.

► Figure 3: Extracts from the animation with textual descriptions (For a clearer representation, please refer to <http://www.arch.adelaide.edu.au/~a1094108/IJAC/index.html>)



3.1. Considerations for Animations

Rasmussen outlines issues of architecture that should be observed: solids/cavities and their effects, colour planes, scale and proportion, rhythm, textural effects, daylight effects and sound. [12] Relying on digital architectural animation alone, however, may not fully address all these factors as limitations do exist in any one type of representation technique. Animations are not exempted.

Architectural animations are largely a linear form of presentation, framing views from a predetermined camera movement, speed and path - a more restrictive version of a theme-park ride which usually may not reflect an ordinary human experience. However, this could be seen as strength for use in architectural studies since it highlights the 'important' attributes. Due to this, it deviates from the exploration freedom of spatial/architectural quality seen from any arbitrary human-scale point-of-view. Considering this aspect, animations alone may not serve as a reliable way to portray architecture.

Perhaps seen as adding to the existing bias, the introduction of textual and verbal narratives appears to especially draw attention to a specific focus within the entire narration. The amount of information presented in this textual form is dictated by the timing of the preset, linear moving image. In this condition, information has to be pre-selected based on the author's judgment and discretion. Distractions may occur when textual/verbal information overrides the visual narrative. However, digital movies like the above could be replayed at random points and even paused for a more prolonged study. While this could possibly 'alter' the original experience to a certain extent by shifting a degree of control back to the viewer, any visual, textual/verbal information could also be recaptured.

4. LEARNING FROM LAYERING

The concept of layers has been utilized in many graphic software systems including CAD/CAM applications. The technique of layering is used by film animators to see through an 'onion skin' paper to refer to their previous image to work on their next drawing. This section illustrates a digital layer referencing technique used to serve as a starting point to relate two originally

different media. By adjusting the opacity of the foreground layer (two dimensional line drawing), viewers may be able to readily relate it to its three-dimensional representation (Figure 4). Multiple layers of other related information, if available, could also be juxtaposed.

Similarly, by applying 'layering' to an object VR for architectural analysis purposes, the progressions of component make-up may be narrated. This assists in understanding the relationship of these components (Figure 5).

4.1. Considerations for Layering

Although the layering technique augments the relationship between different drawings, legibility on the computer screens is sometimes an issue - i.e. the drawing size and the relationship of the extracted segment to the entire building may not seem clear. An object VR renders a digital experience of architecture in a different manner to that of a panoramic VR. It does not include the experience of 'being in the space', but provides a holistic view instead. It is this strength, coupled with its ability to manipulate views, which makes it suitable for studying component relationships. To effectively exploit its usability, the level of legibility and focus need to be considered. In the above example, for instance, instead of displaying the entire building or block of the accommodation wing, a smaller section is extracted based approximately on the architectural section drawings. Adding textual narratives into this form of visualization may help explain the components' roles/functions in the larger context of the design.

5. LEARNING FROM SLIDING OVERLAYS

An example of overlays is the RAM Player feature in the 3D-graphic software, 3D Studio Max; it is often used to compare two different rendered images. This is similar to the above layering concept, but it employs a sliding transition which gives an overlaying effect. While any images could be loaded for comparison, it is also possible to take the idea further to overlay two different types of images - digitized and computer rendered pictures, for instance. Three-dimensional images can be 'overlaid' on the corresponding two-dimensional construction drawing for an enhanced reading of the images (Figure 6).

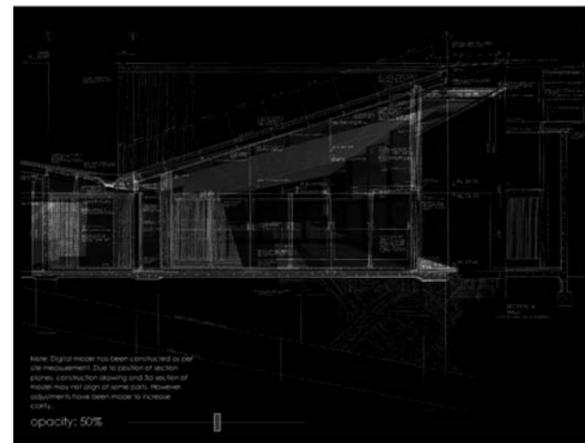
5.1. Considerations for Overlays

As in the idea of layering, by juxtaposing and aligning the three-dimensional rendered image on top of the corresponding architectural line drawing, the spatial quality suggested by the line drawing may be appreciated. Furthermore, viewers could readily relate the two-dimensional elements in construction drawings to their three dimensional representations which are complete with material/textural suggestions. Depending on the size of the actual document and the limitation of screen size, however, architectural annotations describing the components may not be legible. This is addressed in the next section.

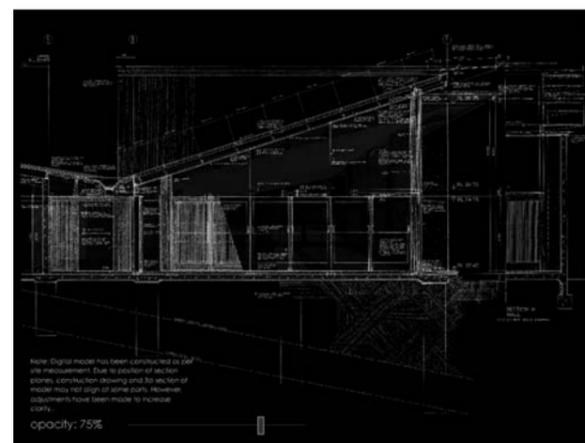
► Figure 4: Extracts from layering concept with opacity adjustments (For a clearer representation, please refer to <http://www.arch.adelaide.edu.au/~a1094108/IJAC/index.html>)



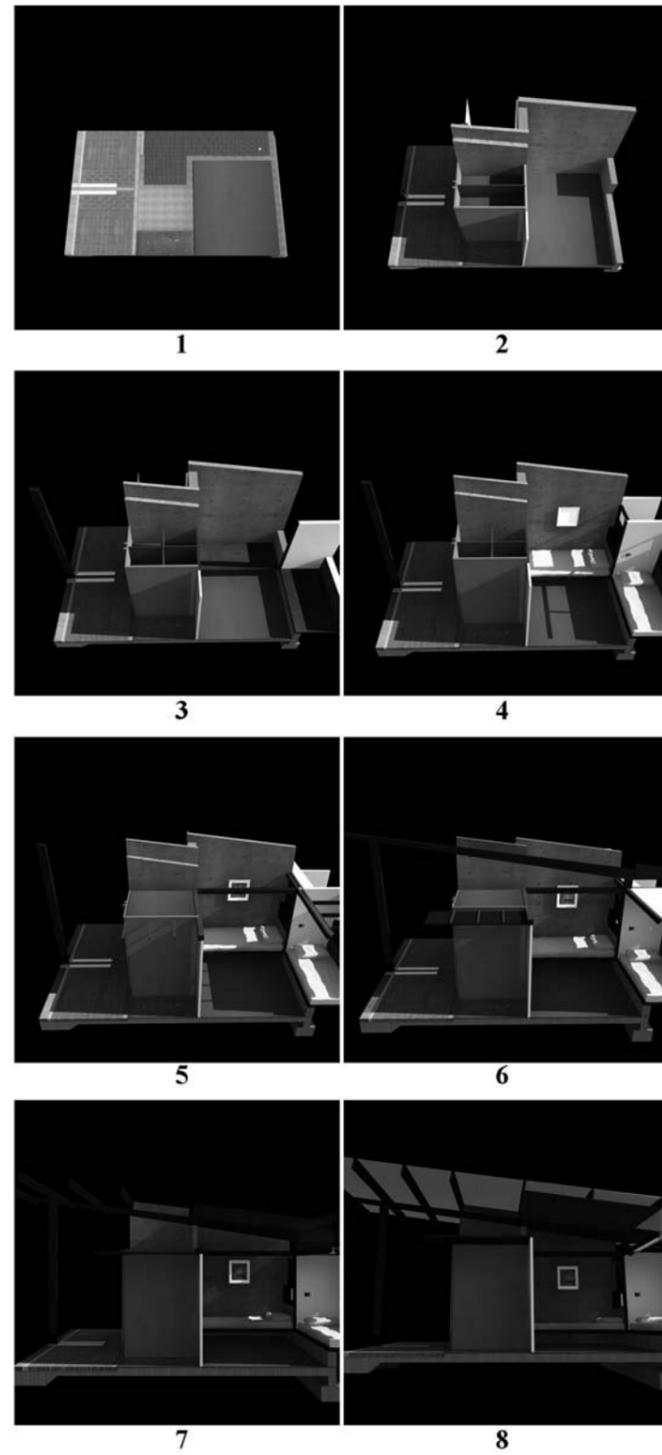
a. 25% opacity



b. 50% opacity



c. 75% opacity



◀ Figure 5: Extracts from Object VR showing accommodation block segment (For a clearer representation, please refer to <http://www.arch.adelaide.edu.au/~a1094108/IJAC/index.html>)

► Figure 6: 'Overlaid' images showing the Architect's drawings with their corresponding three-dimensional representations. (For a clearer representation, please refer to <http://www.arch.adelaide.edu.au/~a1094108/IJAC/index.html>)

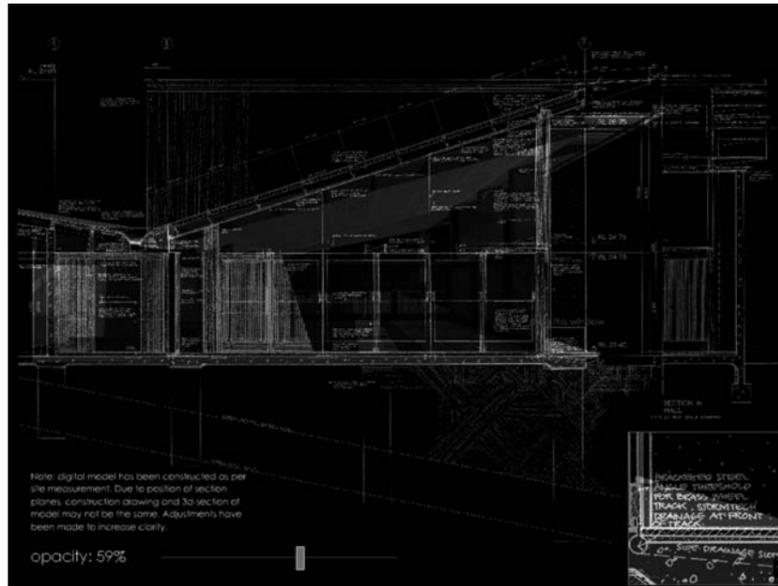


6. LEARNING FROM MAGNIFYING GLASSES

To address the issue of legibility, one method is derived from the age-old concept of magnification glasses. And much like the magnifying glass, digital magnification creates an enlarged virtual image of another image. This proves useful in dealing with screen size limitation to display a large document. Magnification too has been extensively used in 3D games; in a 3D first-person 'shoot-em-up' game, for instance, two or more scene versions with different field-of-views sharing a common central focus run concurrently, and much like layers, they are interchangeable depending on users' requests.

Magnification, in contrast to zooming, retains the contextual relationship with the original image where the larger picture is still visible; zooming, however, replaces the whole screen display with only the enlarged portion of the user's free choice; disorientation may often occur when zooming (in and out) are repeated beyond the user's ability to relate to the original picture.

In combining and overlaying architectural drawings and a rendered image onto the computer screen, magnification assists in reading details as well as textual descriptions which would otherwise be too small for the screen (Figure 7 and Figure 8).



◀ Figure 7: Layers with opacity adjustments and magnification feature. (For a clearer representation, please refer to <http://www.arch.adelaide.edu.au/~a1094108/IJAC/index.html>)



◀ Figure 8: 'Overlaid' images with magnification feature. (For a clearer representation, please refer to <http://www.arch.adelaide.edu.au/~a1094108/IJAC/index.html>)

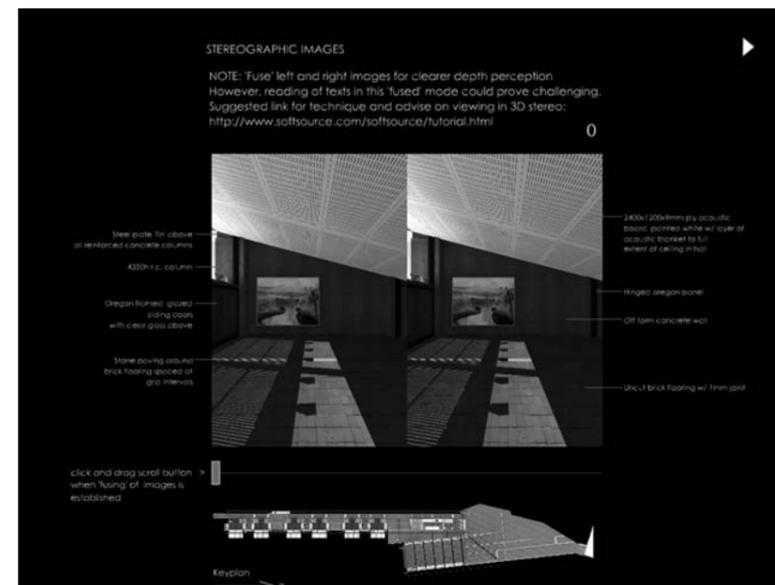
6.1. Considerations for Digital Magnification

Legibility of details can be augmented through magnification. Planning for screen space allocation and deciding on a technique of magnification may prove to be challenging considering the restriction on screen display size. To effectively place large drawing on the screen, panning capability may need to be considered.

7. LEARNING FROM 3D STEREO IMAGES

Three dimensional stereo images is a technique that renders the illusion of depth to two dimensional images; it necessitates the play of fusing images as perceived by ordinary human's left and right eyes. In architectural visualisations, such images may be produced on a computer console to provide the illusion of spatial depth. The viewing techniques range in complexities and costs - from anaglyph (red/cyan) glasses to 3D shutter glasses. This section illustrates simple, intriguing, cost-effective techniques for three-dimensional depth perception, which employ the use of stereographic image pairs (Figure 9) and anaglyph glasses (Figure 10). Visually, the inclusion of textual descriptions carries similar benefits in both, but reading techniques are different.

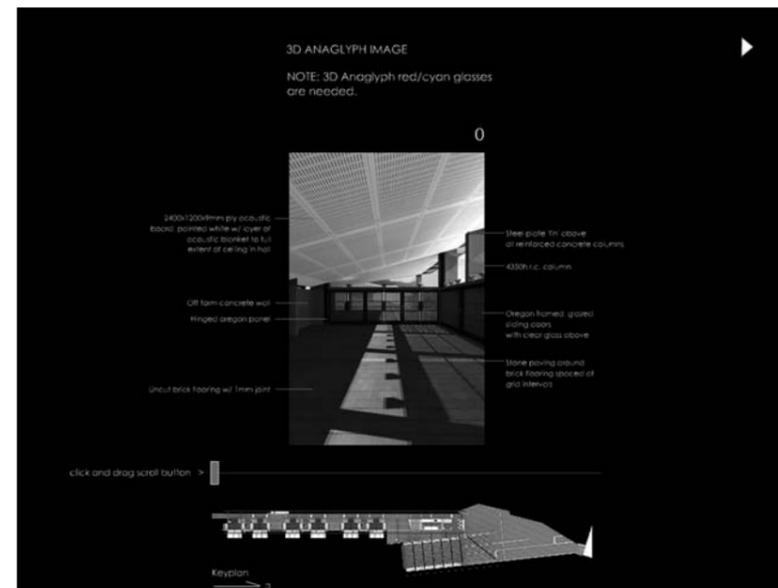
► Figure 9: Stereoscopic images of hall interior with textual explanations. (For a clearer representation and link to explanations for viewing, please refer to <http://www.arch.adelaide.edu.au/~a1094108/IJAC/index.html>)



7.1. Considerations for Stereo Images

Using stereographic image pairs for architectural studies on a computer console still poses challenges. Although it would provide the sense of visual depth missing in other modes of representations, the 'fused' image does take time to experience and some viewers may fail to see any at all; as it requires 'cross-eye' viewing technique, texts around the border of these images need to be read before the images are 'fused'. There is also the factor of image size to consider; smaller images seem easier to 'fuse' and this may not prove to be a suitable platform in the study of details in their context. However, the 'fused image' does retain the original colours and textures as opposed to the 3D anaglyph stereo image where the blue/cyan

glass filters provide only the illusion of merged colours. On the other hand, textual explanations are readily legible in the latter in 3D stereo mode, while they are unclear in the 'fused' image. Another factor to consider is that these stereo images are comprised of two separate, simulated perspective views from the right and left eye. Consequently, the rendering process takes twice as long. Despite these drawbacks, it is still a quick and effective tool to augment overall depth perception and escape from the restrictive flatland of the computer screen.



◀ Figure 10: 3D Anaglyph image of hall interior with textual explanations. (For a clearer representation, please refer to <http://www.arch.adelaide.edu.au/~a1094108/IJAC/index.html>)

8. DISCUSSIONS

Fully translating the experience of 'being in' a building into words and images is impossible. This is a fundamental problem in making an immovable art form accessible to the audience that would appreciate its qualities. Even devices such as 3D virtual interactive representations lack the multifaceted sensory experience of 'being there'. On the other hand, it is possible to construct a representation that both seeks to convey something of the form and materiality of the building and adds a level of information that is not readily available to the visitor. The paper highlights some experiments in constructing such a digital representation on computer consoles using hybrid media.

The combination of visualisation techniques for use in detailed architectural studies, analyses and records in the digital platform may be enhanced through the re-interpretation and hybridisation of technological

strengths, concepts and strategies found in other fields, traditional or otherwise. Not one particular technique would be able to show the full object of architecture through the computer screen. Depending on the type of study, several combinations of them need to be considered.

Manovich states: "Yet while new media strengthens existing cultural forms and languages...it simultaneously opens them up for redefinition." [13] Refining and redefining existing architectural visualisation methods are needed to steer the understanding of architecture through new directions and to new levels. For these possibilities to materialise and to help us validate and define the current position as well as the possible future directions for architectural visualisations and their deliveries, ideas outside the discipline need to be drawn upon and experienced. Currently an in-depth knowledge of other new and often complex technologies is required to effectively present myriad aspects of architecture. Table 1 is a summary of the number of software applications which were required to produce the works depicted in this paper. Comparatively, architectural software applications are far from the dominating figure in the production of these examples.

► Table 1: Software applications used in the production of illustrations

		SOFTWARE APPLICATIONS					
		Architectural (CAD)	2-D Graphic	3-D Graphic	Video Editing	Others	Total
ILLUSTRATIONS	Figure 2 Animation	1	1	1	2	2	7
	Figure 3 Animation	1	1	1	2	3	8
	Figure 4 Layering	1	2	1	-	-	4
	Figure 5 Object VR	1	2	1	-	1	5
	Figure 6 Overlays	1	2	1	-	-	4
	Figure 7 Layering	1	2	1	-	-	4
	Figure 8 Overlays	1	2	1	-	-	4
	Figure 9 3D Stereo	1	2	1	-	-	4
	Figure 10 Anaglyph	1	2	1	-	1	5

More daunting than the often steep learning curve for each of these software applications, are the technical issues involved in the techniques of execution. Understandably, this is one of the significant reasons why digital media have not been fully exploited in the architectural visualisation delivery area and why the majority of explanations are still reliant on printed texts and photographs. To enhance the comprehension of architectural works for the purpose of study and analysis, a new mode of delivery or perhaps a new 'language' of hybrid digital media visualisations will need to be contrived to describe architecture with visual clarity. We are still far from having established patterns of representing architecture in digital media in the way

that there are established patterns for its representation in print and film.

Acknowledgements

We thank the Bundanon Trust for access to The Arthur and Yvonne Boyd Centre and the provision of accommodation to facilitate extensive onsite study, recording and measurements; the Mitchell Library and the architects Glenn Murcutt in association with Wendy Lewin and Reg Lark for access to the architects' drawings; James Taylor and Associates for access to the engineers' drawings.

References

1. http://www.abc.net.au/arts/architecture/arch/ar_mur.htm [16-09-2005]
2. <http://www.mwkdesign.com/kbda-archive/2000-024/00024.htm> [16-09-2005]
3. Fromont, F., *Glenn Murcutt : Buildings + Projects 1962-2003*, Thames & Hudson, London, 2003, p. 286.
4. *The Phaidon atlas of contemporary world architecture*, Phaidon Press, London; New York, 2004, p. 39.
5. de Saussure, F., Charles B., Albert S., Albert R. and Roy H., *Course in General Linguistics*, Duckworth, London, 1983.
6. Friedman, A., Language and Movement in CAD Application, in: Tan, B.-K., M. Tan and Y.-C. Wong (eds), *CAADRIA 2000 Proceedings of the Fifth Conference on Computer Aided Architectural Design Research in Asia*, Centre for Advanced Studies in Architecture, Singapore, 2000, pp. 423-432.
7. Tufte, Edward R., *Envisioning Information*, Graphics Press, Cheshire, Conn, 1990, p. 12.
8. Manovich, L., *New Media and Remix Culture (Introduction to Korean edition of The Language of New Media)*, <http://www.manovich.net> [14-07-2005]
9. Glanville, R., Architecture and Computing: a Medium Approach, in: Kalisperis, L and Kolarevic, B (eds), *Computing in Design: enabling, Capturing and Sharing Ideas-ACADIA '95*, University of Washington Press, Seattle, 1995, pp. 5-20.
10. Luscombe, D., Peden, A., *Picturing Architecture*, Craftsman House, Australia, 1992, pp.36 & 56.
11. <http://www.research.att.com> [16-09-2005]
12. Rasmussen, S. E., *Experiencing Architecture*, Chapman & Hall Ltd., London, 1959.
13. Manovich, L., *The Language of New Media*, MIT Press., Cambridge, Mass., London, 2001.

Verdy Kwee, Antony Radford and Dean Bruton

The University of Adelaide
Department of Architecture, Landscape Architecture and Urban Design
North Terrace, Adelaide, SA 5005, Australia

verdy.kwee@adelaide.edu.au,
antony.radford@adelaide.edu.au,
dean.bruton@adelaide.edu.au