Chapter 4 | Case Study and Technique Investigation

4.1 | Background

This chapter outlines the selection of the case study - *the Arthur and Yvonne Boyd Education Centre* - and the process of data collection associated with the building. In the subsequent segment of the chapter, the process of digital reconstruction of the building and a series of visualisation technique explorations are detailed. The discussed techniques maybe found in the DVD-ROM Appendix.

4.2 | Case Study Methodology

One would think that an important aim of preservation of information about a building of heritage value would be for the benefit and knowledge of present and future generations. The more pertinent the

data gathered, the more valuable the collection would be. With this rationale of knowledge preservation, many architectural research projects have been investing much energy and effort in digital restitutions or restorations of historical or heritage buildings. They usually reconstruct lost or partially demolished architecture – a process which frequently also necessitates the 'reconstructions' of missing information and scenes. These reconstructions are done in an attempt to build a level of information sufficient to be studied by architecture scholars and students. Often, the information presented in such reconstructions is highly questionable despite claiming to be based on 'expert' narratives. The knowledge based on these reconstructions and narratives may therefore be misleading. Ironically, the discipline and funding bodies appear to take far less notice of or active interest in recording existing outstanding architectural works of today's era in a similar level of detail. These works may also have the potential to be recognised for their heritage values one day. It is difficult to fathom why preservation works frequently commence only once the information becomes part of the 'endangered memory' or is in the brink of the 'lost memory' database of an organisation. Must information on such outstanding works have lost a degree of accuracy before it is worth preserving? This paradox, however sadly true, should ideally not be the scenario.

Early identification and information collection for buildings with heritage potential are essential in order to maintain an acceptable degree of accuracy. It is imperative that documentation commences while untainted and relatively complete information - both hard and soft types (which will be explained in the proceeding section) - is still available and accessible. This eliminates the need to reconstruct hypothetical scenarios as are often found in cases of heritage or archeological site documentation or reconstructions (Hynst et al. 2001).

In this research project, *the Arthur and Yvonne Boyd Education Centre* (AYBEC) is selected as a case study for digital presentation mainly for the following reasons:

- The building's significance in the Australian architectural/cultural heritage climate. It conforms with the local Heritage Council of New South Wales authority's assessment criteria for heritage status [Her01]. Moreover, built on land donated by the internationally well-known, late Australian painter, Arthur Boyd, it was designed by the Australian *Pritzker-prize* winning architect, Glenn Murcutt in association with Wendy Lewin and Reg Lark. This architectural masterpiece, symbolising the efforts of two important figures in the Australian cultural scene, has won numerous architectural awards which adds to the building's significance and strengthens the case for it as a worthy subject.

- Featured in the *Phaidon Atlas of Contemporary World Architecture* (Phaidon-Press 2004), the building is significant to the field as a contemporary example of a fine architectural work found in the world today.

- The accessibility and comprehensiveness of architectural information. Much of the building has not been altered from its original state and records of its construction are relatively complete. More importantly, the people involved in the design and construction are largely still contactable for interviews; they include the architects, engineers, client representatives and builder. It is currently managed by the Bundanon Trust as an education centre for young budding artists to continue the Australian art and cultural lineage. Since it is open to the public, onsite data are readily attainable.

- The relatively remote location of the site necessitates the need for an easily accessible alternate information source. A three-hour's

drive away south of Sydney and far from other major tourist attractions, it is currently not reachable by public transport.

- Apart from some individual posts on the internet, no adequate, information-rich digital publication has ever been done for the building. It has been featured in several books but has not been the subject of a special educational publication.

Information Types

The type of information pertaining to a building inevitably influences the way it can be effectively presented. For the purpose of this thesis, information types are streamlined into two categories:

- *Hard information*, which might be derived from the subject's physical form, environment and condition; this type of information is often collected directly from the site and construction documentation.
  Sources:
  - Site visits
  - Documentation

- *Soft information* (the invisible). The multi-faceted property of an architectural design's hard information is also echoed in the layers of soft information. This includes the analysis of the subject, accounts from users, designers and individuals involved, functional and effective observations relating to the realisation of design intentions and their impacts, as well as the building's hidden narratives and phenomenology. This type of information may be less tangible and less visual in nature. It may often be collected from interviews and critics' writings.
  Sources:
  - Interviews/feedback
  - Designers

    It is through its existence and its interaction with its context and users in the Cartesian space that architecture seems to multiply its

dimensionality. (refer to the interview transcript with Murcutt, Lewin & Lark where it is acknowledged that elements of surprises after the building came into existence later become part of the building experience itself).

- Engineers
- Site manager
- Builder
- Users
- Published materials

Drawings and Photographs

Apart from onsite measurement, working drawings also help in the construction of the digital model of the building. Sketches of design development that still exist in the record may be used at later stage for the study of explored design alternatives. Due to the sensitiveness of copyright issues, these drawings by the architects as well as the digital drawings by the engineers are not included in the appendix of the thesis. The copies may, however, be obtained through the Mitchell Library in New South Wales with the permission from the architects or directly from the consultants.

Most aspects of the building and some of the available documentations have been digitally photographed. These photographs not only provide textures for the digital model but also serve as a part of the visual documentation of the existing condition. They are included in the DVD-ROM Appendix.

Video Footage

Due to their pictorial continuity, video footages seem to express or narrate onsite conditions and landscape pertaining to a particular viewpoint, activity and time adequately well. This narration is limited by physical and mechanical constraints of the instrument, the operator and

the environment. These factors may have impact on the relaying of ideas and intentions through the restrictions of movement. Instead, computer animations can be used to overcome the physical limitations when complex visual sequences are required (movies like *Panic Room* (2002), for example, have used computer graphic substitutes to execute camera movements through layers of between-floor structures or for other scenes in which it is impossible for a physical camera to capture).

Considering the quality of final delivery and the platform that supports it, video footages of AYBEC are recorded using only manually operated camcorder. The simplicity of path and movement of camera takes into account the best narration of the subject to simulate onsite experience. The footages may still need to undergo post-production compression to allow improved display rate and/or editing to refocus particular captured views or remove unwanted scenes and 'disturbances'.

Video footages are effectively used to capture the appearance of the building details and the environment.

The following are lists of recorded movie files included in the DVD-ROM Appendix:

- details of front doors
- details of corridor beam and supports
- details of bedroom entrance
- details of bathroom
- details of roof overhang
- details of downpipe

- ‘scenic’ journey into the building compound.

- view from the hill overlooking the building

Consultant and ‘Client’ Interviews

The intention of these interviews is to obtain the following information components:

- the perception of what should be communicated about the building. This is to assist in the decision during the selection of information to be included in its digital presentation.

- knowledge about the building, including the design process and ideas.

- experiences of the building design and during the building construction process.

There is flexibility and informality in the interviews, and they rely much more on open-ended than pre-defined questions.

All the out-of-state interviews with the building consultants and manager are arranged where possible in groups. A group interview results in the observable interactions and viewpoints of or discussion about particular aspects of the building development and design process. The interaction seems particularly useful for an on-the-spot validation of what is being discussed. Single-subject interviews tend to encourage more in-depth accounts although sometimes the answers may require third-party verifications, although these verifications are only necessary if they are crucial information for material to be finally presented.

Release forms from the interviewees are necessary to allow the interview materials be used in this thesis (please refer to Appendix). Recorded interviews undergo a transcription process and these texts are then sent to the interviewees for their final approval. Thus, only the approved transcripts are included in the appendix of this thesis.

The group interview comprises the following individuals:

- Glenn Murcutt (Architect)
- Wendy Lewin (Architect)
- Reg Lark (Architect)
- James Taylor (Structural Engineer)
- Peter Bacon (Mechanical Engineer)

Mainly due to the difficulties in pre-arrangements, some individual interviews are conducted with:

- Sue Barnsley (Landscape Architect)
- Jonko Berg (Builder)
- David Chalker (former manager of the Bundanon Trust property)

The questions posed to the builder and the former Trust manager differ slightly from the questions given to the other consultants which include:

- What aspects or features of the building/architecture would you like others who are not able to pay a visit to know?

- How would you explain the building to someone who is able to visit it in order for him/her to understand it fully?

- Reflecting on the past tours to AYBEC which you might have conducted, what questions were raised by the participants/guests about the building and design?

- Without a proper conducted tour, what other aspects do you think visitors to AYBEC would have missed about the building?

- With your knowledge on the limitations of representations in any media, what features of/aspects related to AYBEC would you consider impossible to be explained and only an on-site visit could provide?

- What features of/aspects related to AYBEC that even a site visit will not be able to explain? What are the limitations of an on-site visit in explaining the architecture of AYBEC?

Questions on design rationales...

- Briefly describe yourself and your design philosophy. How much of your own background influenced the design?

- How did the project come about? When?

- What factors influenced you to take on the project?

- What initial considerations were there in the brief?

- How much did the client influence the outcome of the design?

- Briefly describe factors that influenced the design.

- Why the design/arrangement?

While the questions to the builder include:

- How did you become involved and why? How did you start and what did you start with? (similar to questions posed to the others)

- What were the challenges?

- Which part of the building were of recycled materials? Where did they come from? Were parts of the design influenced by the availability of these recycled members?

- How much was the construction influenced by the site condition and land form?

- In what ways have you influenced the design? Examples?

- How is the rainwater channelled into the storage tank? How are they distributed and used? How about bored water?

- If you could do things differently now, what would it be ?

These questions, although prepared and given to the interview subjects a few days before the sessions, tend to vary in the course of the interviews. This variation is unavoidable and done primarily to seek clarifications of given information.

The interviews are generally over an hour long of recorded audios. Because of a few corrective changes requested by interviewees, only

the final transcripts are included in Appendix A. The discussions provide a clear insight into the design process, principle and intentions as well as the project initiation, development and construction. These interviews will have to be edited – through appropriate audio extractions or transcript excerpts – before they are ready to be used to explain particular aspects of the building.

In retrospect, for ease of extraction for the incorporation in a digital presentation, the questions could have been organised such that the discussions are carried out according to building areas as much as possible. It is less time consuming to piece together quotes of discussion about a particular aspect of the building when they are found at one segment of the interview. This is especially useful when sound-bites are extracted.

Building User Feedback

In order to understand responses to the built environment, users of the centre are requested to answer a short feedback form. Due to the fact that the nature of visitors' arrival is unpredictable and the users are groups of young students who arrive at different time intervals, written questionnaires are disseminated with the assistance of the onsite building manager. As much as care may be taken to phrase the questions, answers may turn out to be unexpected when subjects are asked to write and submit their responses.

Some of these questions include:

- How would you describe this building in three sentences to someone who has never seen it?

- What three things/features do you find most interesting about the building?

- How would you describe your experience of this building today?

- How important are the following in experiencing the architecture?

    - The form
    - The colour
    - The scale/proportion
    - The rhythm
    - The textures
    - The daylight
    - The artificial lights
    - The sound
    - The view
    - The air quality
    - The temperature
    - The smell

While most of the individuals involved in the design and building of the structure are adults and very much involved in the building design and construction processes, the users of the building are mainly school children who visit the premises for a definite limited period. This presents an interesting contrast in the types of responses. As an overall assessment, it would have been more effective if in-person feedback sessions were conducted to ascertain the accurateness of responses. This is with consideration of some of the age groups of the participants who may not understand the question readily. Furthermore, as much as user perception and experience obtained through questionnaires may be useful in certain aspects, the users' varied backgrounds may render vastly different levels of responses. Thus, it may be found difficult to categorise the answers. Despite this, the collected responses are tabulated and included in Appendix A for possible future use. These data are not used to assess the effectiveness of onsite visits, although that could prove a future possibility.

Other Additional Information

Much analysis in architectural publications would require site-specific observations for interpretative descriptions of the building and environment. This necessitates personal contributions from architectural critics apart from designers' explanations. Existing writings from other publications and journals may be the sources for these contributions.

Additional information has also been carefully filtered from the records kept by the Bundanon Trust found during the second visit to the site. The collection of documentations relating to the building process appears to be intact. A selection has been digitally photographed but excluded from this DVD-ROM appendix for sensitive copyright reason.

4.3 | Technique Investigation Methodology

In order to propose some visualisation possibilities for the presentation of architectural information on the computer screens, some investigations into available techniques are carried out. In most of the shown investigation modules of visualisation techniques, the digital model of *The Arthur and Yvonne Boyd Education Centre* is used.

Before discussing several explorations of visualisation techniques, the following section first outlines some considerations associated with the digital reconstruction.

Data Collection, Digital Reconstruction and Rendering

Modeling of existing architecture requires site measurement, site study of construction as well as detailed study of available construction drawings.

The following are some of the factors that are considered in the digital reconstruction of the building:

- *Onsite measurement.* For the accuracy of digital recording of an existing building, it is not sufficient to rely only on printed materials or secondary sources as the basis for a well-constructed model. Site measurement and modeling from the existing structure is important to represent what is actually realised. The construction drawings should only be treated as a reference and used for verification purposes since they have been prepared for the builders and other consultants and do not necessarily reflect the final built product. Changes to design may occur during the construction process. In most cases, this type of documentation is not updated to reflect these changes. Therefore, care must be taken, and we must not assume its accuracy. Onsite measurement is the only dependable source of information, especially when the building is still in its original state.

  In the initial work done for the modeling of *the Arthur and Yvonne Boyd Education Centre*, the method of onsite measurement is used to develop the digital model. This requires a few days. Accessible details are accurately measured, digitally rebuilt and their generic material recorded, edited and applied. Although this process requires a high degree of investment in time and effort, it reduces the margin of errors that may demand much more time to correct if discovered later. As an added benefit to the onsite measurement, some active observations about the building, its details and environment happen during the process. These observations may form part of the analysis of the building.

- *Material recording and mapping.* Theoretically, it is possible to record and apply every material used to a building model. No one texture, in reality, is repeated; therefore, ideally this ought to be depicted. However, in digital reconstruction, apart from the fact that

mapping of a different image on every plane would prove taxing on the present processing power of computers, in order for the captured image to be useable, the collection process would require an unobstructed view, free from object and time-related influences (eg. light/shade/shadow). Therefore, discerning choices of sources from which generic patterns or textures may be extracted have to be exercised. One consideration relates to the quality of source that would necessitate the least amount of digital editing of the image. A picture taken onsite to be used as material mapping on the model has particular global illumination information attached to it. This means it carries, although not precisely, the bounces of light/s from objects and environment immediately surrounding it. This eliminates the real need to use Paul Debevec's technology of HDRI (High Dynamic Range Image) which helps in enhancing a rendering through the use of environmental luminance.

- *Verifications.* Checking of the digital reconstruction against the available architectural documentations assists in verifying details that may not be easily accessible onsite. It is also a process where it would be possible to indicate in the digital record areas where differences between construction drawings and the building occur. Construction drawings and other documentation may be excellent additional materials to understand the development during the construction process. As an example, in *the Arthur and Yvonne Boyd Education Centre*'s case, when checked against the construction drawings, it can be seen that the angle of the roof and ceiling in the dining hall of *the Arthur and Yvonne Boyd Education Centre* is different from the original intended design. This forms a part of subsequent investigations about the process of design and construction. Some of the findings of onsite and drawing discrepancies require another visit and confirmation. A follow up visit to the centre is necessary also to facilitate the collection of additional information missing in the initial visit.

When modeling is completed and textures are 'correctly' mapped, the rendering phase takes over. The depiction of close-to-accurate lighting and global illumination is a time consuming process. In his paper, Asanowicz argues that reality in computer rendering is overrated (Asanowicz 2005). His argument refers loosely to a certain expectation of 'adequate' representation. 'Adequacy' depends on circumstances. An architectural model that serves as a substitute to an onsite visit demands a degree of quality of visual representation. For instance a close simulation of a timber member is preferred to an abstraction which may only show a colour that might best represent it. However, the application of different textures to every face so that they represent the real onsite conditions may not be necessary if the intention is to provide a general impression of the type of timber used rather than a study of the unique texture of the timber. A level of accuracy in portrayal of materials and textures is required for visual tactility reason in order to depict a building for study purposes. Recording the existing materials and patterns and reapplying them to the model is part of the process of documentation needed for the digital reconstruction of an existing building. Judgment and discretion has to be made in choosing and applying various materials on numerous planes to reflect near onsite condition.

There is a thirst for the 'real'. As Poster observes, this is clearly depicted in the popularity of reality television shows. 'They create both intensifications of reality and substitutes for reality without ever attaining it' (Poster 1995, p.17). The underlying reason for this 'thirst' is the yearning for knowledge and experience. To most, the simulation of reality is the substitute medium between the reality and this knowledge.

It is appropriate to define, for our case, the limits of this 'adequate' modeling and rendering. They encompass the following:

- Material textures/patterns (representative texture for every material)

- Details of construction and members

- Proportions of elements
- Relationships of elements
- Lighting
- Shadows

Whether the final image should be exactly like the site conditions is arguable and perhaps unimportant. We do rely on computing algorithms to calculate the degrees of illuminations that helps simulate reality but this may not necessarily result in an accurate replica of onsite reality. There are many more variables associated with the real that are usually not taken into account in computer renditions, such as the condition of the sky which may affect the colour of the light and how it, in turn, affects bounces of lights throughout the building. Although this could be simulated, variables or combinations of variables like this cannot be accurately predicted.

Modeling constitutes only a part of the representation of architecture. Lighting and material assignments require as much, if not more, time and effort to accomplish. The brick floor pattern of the digital reconstruction of the building, for example, must correspond with the onsite condition. This is important to note and to be represented as the patterns seem to have been calculated exactly to fit within the border of stone-tiled frames throughout the building.

The current computer technology has not provided a robust system that would facilitate the recreation of land formation complete with close-to-site foliage configurations. As such, photographs are often used in conjunction with a three-dimensional digital model as composites.

The Approach to Exploring Presentation Techniques

To overcome the inadequacy of tools for architectural visualisation and presentation, one current flexible technique lies with further exploitations through the mixes or combination of a variety of media. However, this does not usually translate to the use of the most accessible and 'user-friendly' vehicle for the digital communication of architectural information. The use of various media sometimes calls for the use of different applications or technologies for each of them.

The notion of 'digital mixing' can evolve in three ways:

- it could be interpreted to denote the assembly of materials of exclusively digital origins - eg. digitally created sounds, texts or images from digital videos and photos.

- Secondly, as Manovich suggests, mixing can imply the 'remix between the interfaces of various cultural forms and the new software techniques' (Manovich 2003). Technology allows this interaction of different cultural forms by providing a new platform where traditional formats of media are digitised, transformed and combined. Digital photo-montage of architecture, for example, brings and manipulates an architectural concept which could be in the digitalised form of painting, airbrushes or three-dimensional model into a digital photograph of the building's context and environment.

- Thirdly, it could also encompass the 'borrowing' and mixing of digital tools and concepts, and wherever possible, traditional or new digital techniques deployed in other disciplines. This may act as a catalyst to change the way media are viewed and utilised in the architectural field. It suggests the re-adaptation of concepts to serve purposes other than those for which they were originally intended. An example is the use of software for purposes outside those for which

they were originally intended, which Glanville refers to as 'software abuse' (Glanville 1995, p.14).

In order to facilitate the complimentary relationship between various media, it is important to understand the strengths of each media type. This thesis has commented on the uneasy relationship between common textual and visual descriptions. Often, the outcome of this relationship renders the subject misunderstood and thus the record of knowledge distorted. The effectiveness in delivering certain information types is partly based on the choice between the visual and the non-visual (literary) components. Since most of the hard information can be relayed visually while the soft information still seems to be more effectively explained verbally or textually, the challenge lies in articulating the interrelationships between the non-visual elements and their visual counterparts in order to establish a referencing system that increases comprehensibility.

The following sections will look at some possibilities of stretching the currently available visualisations found within and outside the architecture discipline. They include addressing the needs to accommodate more informative content while increasing their delivery performances through media integration. The techniques shown in these sections have been conceived and made possible through a series of smaller experimentations on visual interactivities. (see DVD-ROM Appendix for examples under folder '/processes-experiments'). Based mainly on the digital model of *The Arthur and Yvonne Boyd Education Centre*, some explorations of delivery techniques are assessed below. It is advised that the figures are read in conjunction with the digital materials included in the DVD-ROM Appendix (folder name: '/figures').

Learning from Architectural Documentation and Movies

Animations are becoming an integral instrument for describing an architectural work. In silent movies, music and captions support the

actions on the screen. Although the actions could exist independently, without captions, they could be subjected to wider possible interpretations, which sometimes may be unintended.

In today's cinemas, languages are 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 and environmental relationship, language, details and to varying degrees, the spatial experiences afforded by a building (Figure 4.1a).

Figure 4.1a *Screenshots from the animation of 'The Arthur and Yvonne Boyd Education Centre'.*

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 (Figure 4.1b). With the presence of texts and speech, the visual narration 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. No longer is any of the media modular; the whole is more than the sum of its parts. This collaborative

interdependence of media helps strengthen the understandability of the subject.

Figure 4.1b *Screenshots from the animation with textual descriptions.*

Learning from layering

The concept of layers has been utilised in many graphic software systems including CAD/CAM applications. In traditional practice, the layering technique is used by animators to see through an 'onion skin' paper to refer to an image when working on their next drawing. The notion of layering takes advantage of human ability to link corresponding images to construct a narrative sequence. In illustrating the development of a city through time, Ripper Kos has used a layering technique in the field of urban study by image replacements; his images of the city of Rio deJaneiro maintain the same viewpoints and rendering quality of the city while depicting progressive changes of the urban built form (Ripper Kós 2003; Ripper Kós and Barki 2005). Similarly, a database system that incorporates layering of images of three-dimensional urban models was also illustrated earlier by Osman Ataman and Kate Wingert's works (Ataman and Wingert 2001). In the discipline of architecture, a degree of interactivity and incorporation of different media could be introduced to explain some aspects of our selected building.

This section illustrates this layer referencing technique 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 are engaged with its transformation to a three-dimensional representation (Figure 4.2). Multiple layers of other related information, if available, could also be juxtaposed. A benefit of this technique is to enable the information extraction of a particular element in the three-dimensional representation through reading textual descriptions accompanying the two-dimensional drawings.

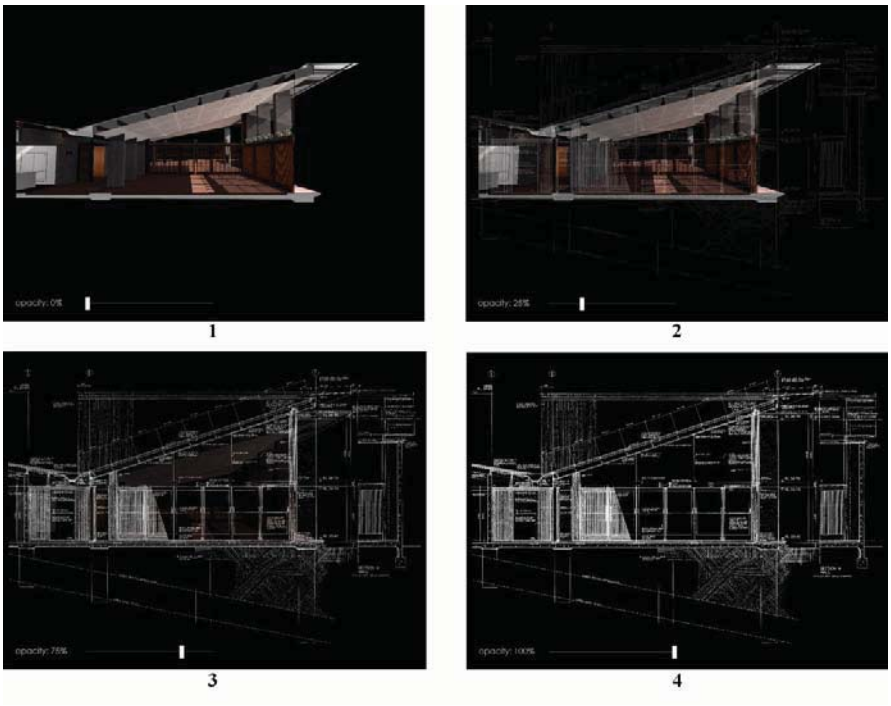

Figure 4.2 *Screenshots from layering concept with opacity adjustments.*

Secondly, in some cases where sizes and scales are stated, the perceptual clarity of scale and depth may be developed. Spatial experience, imperative in experiencing architecture, is thus also introduced in the two-dimensional construction drawing. As pointed out by Pita, three-dimensional spaces can never be understood by means of two-dimensional representations unless they have been experienced before (Pita 2005). Although it might not be a real-life experience, the three-dimensional image here may serve as the closest bridge to this understanding.

On the third level, this relationship is important since the physical tactility of objects has been replaced by a visual substitute in the three-dimensional image. The reading of texts in the construction drawing helps to describe visually the used material. As Agostinho suggests, since we operate in both analytic and synthetic judgment (Agostinho 2005), words trigger the recall of previous physical experiences. As such, the combination of the two images is intended to compliment and reinforce one another in order to narrow the possibilities of diverse perceptions.

Lastly, by directly relating the two-dimensional drawing to its three-dimensional counterpart to enhance the legibility of material, sizes, textures, depth, scale, it is possible to conclude that one could derive or heighten skills in reading architectural construction drawings. The understanding of this relationship of two-dimensional line drawing with its three-dimensional counterpart refreshes the experience of the two-dimensional representation.

The concept of 'layering' could also be applied to a Quicktime ® object VR for architectural analysis purposes to show the progressions of a component make-up. This assists in understanding the relationship of such components toeach other (Figure 4.3).

Although a layering technique augments the content relationship between different drawings, legibility is sometimes an issue. The drawing size and the relationship of the extracted segment to the entire building may not seem clear. This can be explored and addressed in more detail as the work progresses.

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 levels 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 on the architectural section drawings.

Adding textual narratives into this form of visualisation may help to explain the components' roles in the larger context of the design.

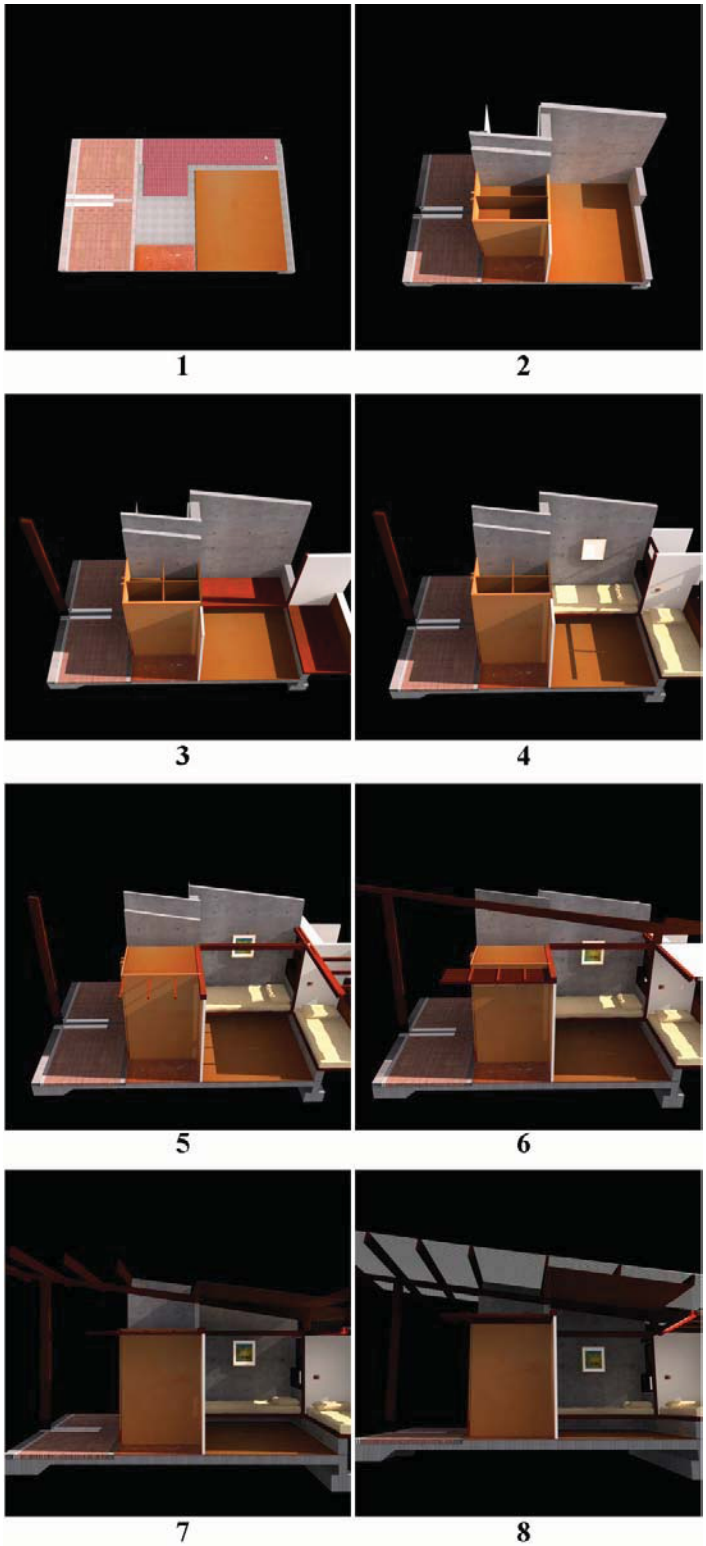

Figure 4.3 *Screenshots from Object VR showing accommodation block segment.*

Learning from Sliding Overlays

An example of sliding overlays is the RAM Player feature in the 3D-graphic software, Autodesk's 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 with sliding position controlled by the user. While any images could be loaded for comparison, it is also possible to take the idea further to overlay two different forms of images – digitised 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 4.4).

Figure 4.4 *'Overlaid' images showing the Architect's drawings with their corresponding three-dimensional representations.*

As mentioned, 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 are able to readily

relate the two-dimensional elements in construction drawings with their three-dimensional representations which are complete with material and textural codes and annotations. 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 segment.

Layering of images may not be confined to still images. Moving images could possibly be overlaid to narrate a particular idea, while maintaining a precise frame of reference.

Learning from a Magnifying Lens

To address the issue of legibility, one method is derived from the age-old concept of a magnifying lens. Much like the magnifying glass, digital magnification creates an enlarged virtual image of another image This proves useful in dealing with the limited screen size in displaying a large document. Magnification has been extensively used in 3D games, more than for CAD/CAM applications. 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, as oppose to zooming, retains the contextual relationship with the original image because the larger picture is still visible. Zooming which is more popular in CAD/CAM applications, replaces the whole screen display with only the enlarged portion by the user. Disorientation often occurs 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 to be legible (Figure 4.5 and 4.6).

Legibility of details can be augmented through magnification. Planning for screen space allocation and deciding on a technique of magnification may prove challenging considering the restriction on screen display size. More issues would arise if the drawing document is too large to be effectively placed on screen without any panning capability.

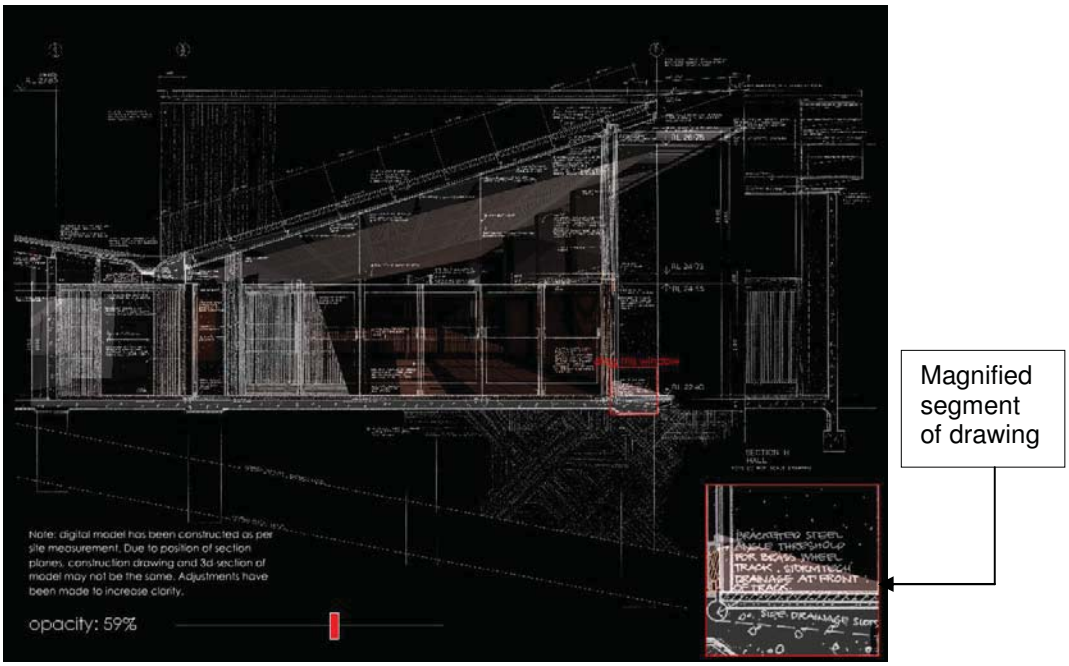

Figure 4.5 *Layers with opacity adjustments and magnification feature.*

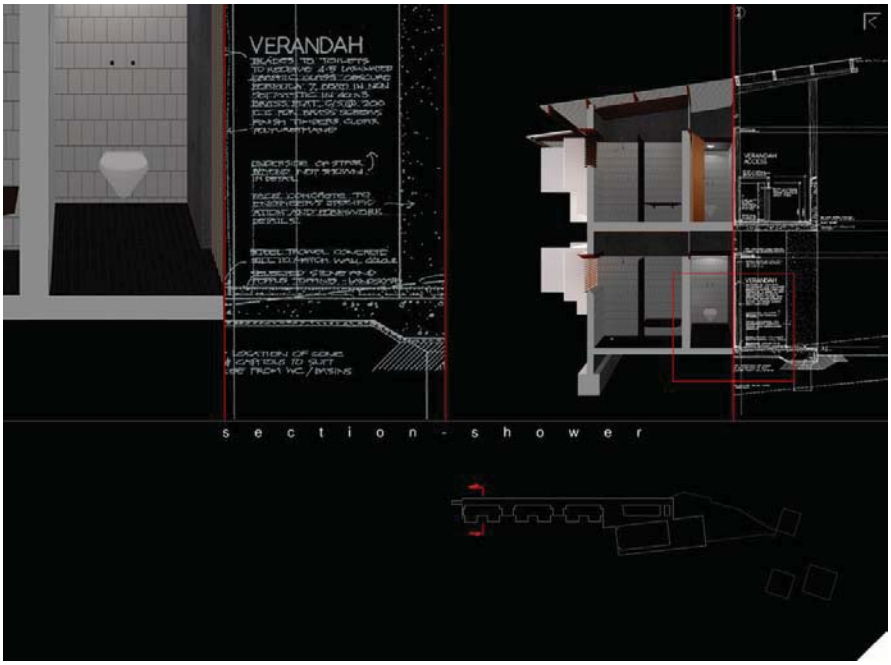

Figure 4.6 *'Overlaid' images with magnification feature.*

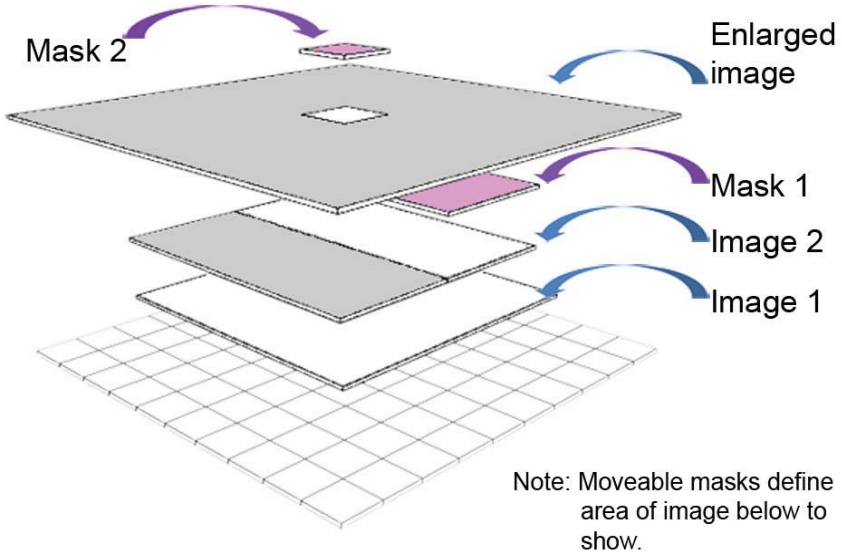

Figure 4.7 *Stacked still images of close reference.*

Learning from Zooming and Panning Techniques in Graphic Applications

Computer aided drafting and desktop publication applications have undergone cycles of improvement in their graphical interfaces. Features that have been developed over decades to overcome limitations of computer screen space are zooming and panning technologies. Many graphic navigation ideas can be derived from these applications.

Jose R. Kos and Jose Barki (Ripper Kós and Barki 2005) note the difficulty in presenting information on the computer screen and highlight that the digital zoom technique, which has been used in many CAD systems for vector images and readapted by Raskin for bitmap images, could help counter the problem (Raskin 2005). CAD systems' use of vector-based graphics allows for magnification without loss of resolution. The implementation of bitmap graphics (such as those by Raskin), on the other hand, would facilitate magnification only to the extent of the resolution of the bitmap could allow. Higher resolution would necessitate larger size images and therefore, could affect navigation or viewing speed. Large images often lose necessary information when forced into the limited screen space. While zooming into an area of interest within the image helps to enhance the legibility, panning facilitates the ability to displace the magnified portion of an image within the limited screen area more readily.

Learning from 3D Stereo images

3D stereo images may be produced on a computer console. They range in complexity and costs, from anaglyph (red/cyan) glasses to 3D shutter glasses. This section investigates simple, low-cost techniques for three-dimensional depth perception, which employ the use of stereographic image pairs (Figure 4.8) and anaglyph glasses (Figure 4.9). Adding textual information and location/view bearing on a key plan renders the visual component more informative.

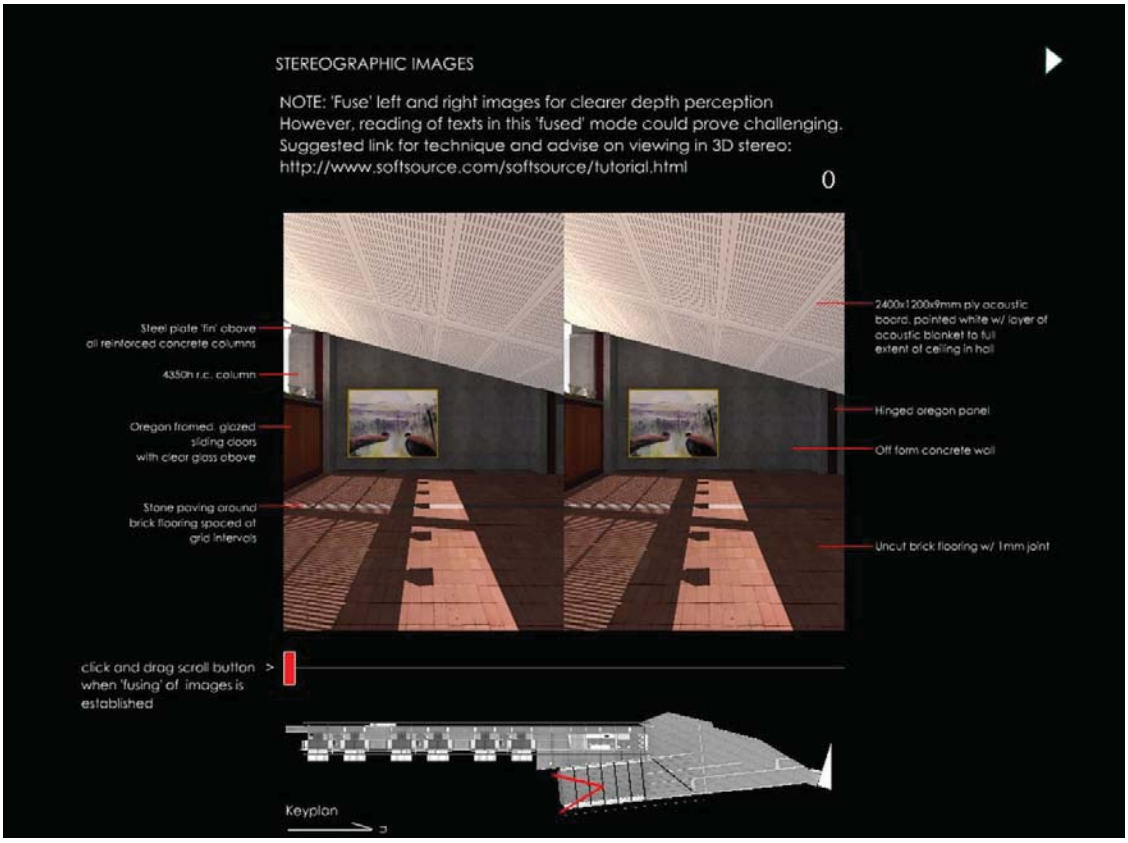

Figure 4.8 *Stereoscopic images of hall interior with textual explanations.*

Stereographic image pairs for the use of architectural studies on a computer console still pose a challenge despite their potential as highlighted by Alan Cook (Cook 1995). The ‘fused’ image does take time to experience and some viewers may fail to see it. There is also a factor of image size to consider; smaller images are 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 provides 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.

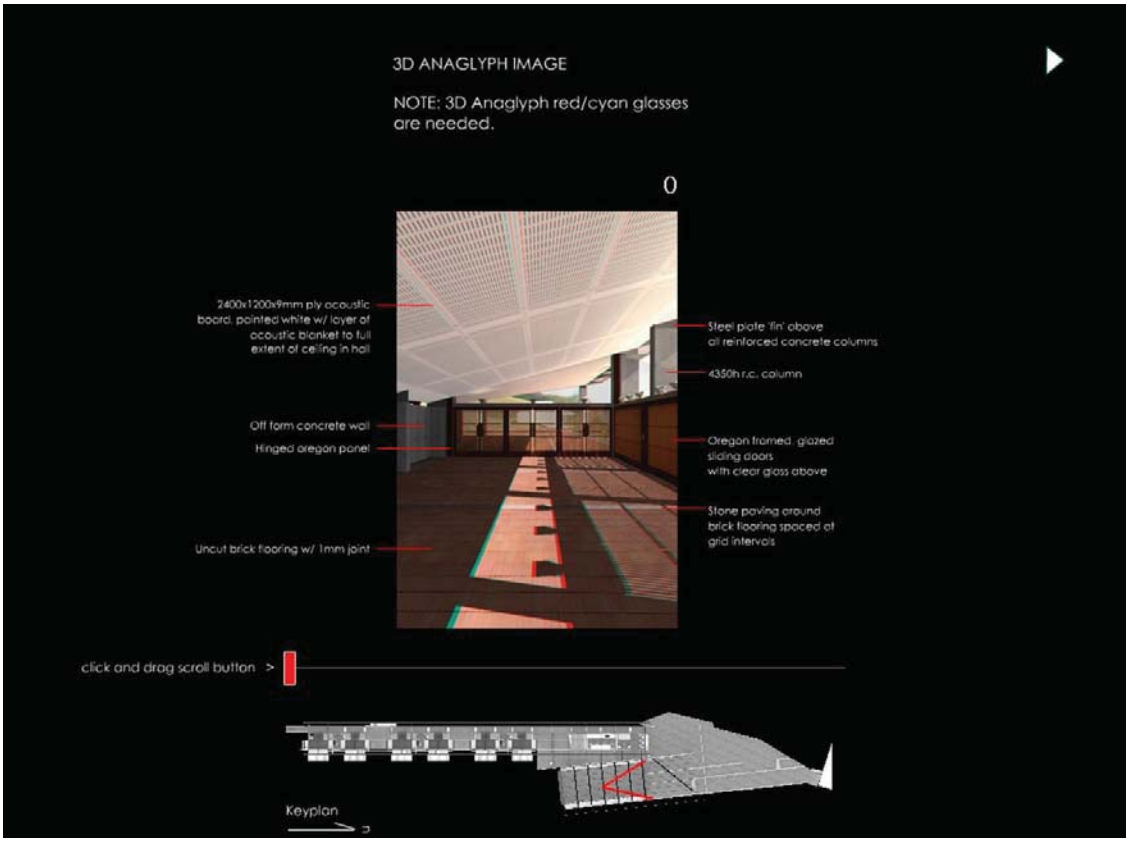

Figure 4.9 *3D Anaglyph image of hall interior with textual explanations.*

Another factor to consider is that these images comprise 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 'flatness' of the computer screen.

Learning from the Interactivity Technique in 'Reflectance Field' Demo

Realtime relighting that results in the possibility of illuminating an object within alternative environments and lighting conditions has been rigorously explored in the field of graphics (Devebec et al. 2000). The ability to relight an object in various contexts and locations realtime to achieve the correct global illumination from the surroundings is not absolutely necessary in architectural subjects where the environments are almost always fixed. The presentation technique employed,

however, may be readapted for architectural 'relighting'. By combining the layering of pre-rendered images of an architectural subject under different lighting conditions it is possible to simulate a similar interactive technique to that used in Devebec's work. Below (Figure 4.10) is an example of a 'teapot' architecture illustrating this concept. The model of a teapot here is used to allow quick output of rendered images due to the smaller number of processed polygons. A similar concept could be applied to an architectural subject. The technique allows a light source to be positioned on the left-hand side of the image/s. With every movement of the light source and its position determined, a pre-rendered image is recalled.

The benefit of this in the study of an architectural subject is two-fold:

- to understand the light and shadow movement in 'real-time'. For example, if a series of pre-rendered images of various sun-paths are layered and invoked interactively, one could understand how sunlight contributes to the architectural or spatial qualities of the building.

- to be able to perceive depths from a single view-point created by the movement of light and shadow that cannot be seen in a single static image.

Figure 4.10 *Controllable light position/lighting study.*

Considerations for Digital Presentation

Visual presentation techniques are certainly not limited to those explored above. The examples only exemplify some approaches to the fundamental requirements and need for the presentation of a particular building or building type through the use of layering and mixed media.

One commonality in most that could be derived is the existence of a hierarchical representational structure that stems from the general to the less general (particular) through the use of a layering system. Such a pattern also conforms to the process of human observation and learning in the real world where we assess the overall situation before studying the details of an object of interest.

Any decision concerning the use of an information conduit requires an assessment of technological opportunities and limitations. This not only involves the technology to present and deliver the types of information but also its availability to the intended audience.

There are also compatibility issues. Operating system variations and the discrepancies found in browsers impact on the display of certain types and formats of information. Currently, one of the ways to resolve these incompatibilities is the use of plug-ins, readers or players that work on multiple platforms. For an example, the most popular web-based presentations are run on Adobe's Flash player which works on both Apple and Windows systems.

Students and the public at large increasingly turn to the Internet as their first and main source of information. The use of the Internet presently requires a compromise between image quality and size. What began as an only text-based vehicle has within two decades expanded to delivering images, sounds, and moving pictures (Levinson 1999). As technology improves, allowing higher compression qualities and bit-rate transfers, it is expected that the delivery of adequate image quality will become mainstream.

An in-depth knowledge of many new and often complex technologies is required to effectively present aspects of architecture. Table 4.1 is a summary of the number of software applications which were required to produce the works depicted in this chapter. Comparatively, architectural

software applications are far from the dominating class in the production of these examples.

Table 4.1 *Software applications used in the production of illustrations*

ILLUSTRATIONS

	SOFTWARE APPLICATIONS						
	Architectural (CAD)	2-D Graphic	3-D Graphic	Video Editing	Others	Total	Scripting Required
Figure 4.1a Animation	1	1	1	2	2	7	No
Figure 4.1b Animation	1	1	1	2	3	8	No
Figure 4.2 Layering	1	2	1	-	-	4	Yes
Figure 4.3 Object VR	1	2	1	-	1	5	No
Figure 4.4 Overlays	1	2	1	-	-	4	Yes
Figure 4.5 Layering	1	2	1	-	-	4	Yes
Figure 4.6 Overlays	1	2	1	-	-	4	Yes
Figure 4.8 3D Stereo	1	2	1	-	-	4	No
Figure 4.9 Anaglyph	1	2	1	-	1	5	No
Figure 4.10 Lighting	-	2	1	-	-	3	Yes

More daunting than the often steep learning curve for each of these software applications, are the technical issues involved in the execution of the techniques. 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 conventional printed texts and photographs which create hegemony of particular media in present architectural publications. This

trend has gone unquestioned because the alternative digital solutions have been relatively inaccessible.

4.4 | Summary

Due to the varied information types and sources available for *the Arthur and Yvonne Boyd Education Centre*, different means of data collection have been implemented. The process of this data collection at the same time enhances one's comprehension about the building; this is crucial since a level of understanding is required in order to narrate the information well to the general public. Although the collection of information outlined in this section is vast, only selections are used depending on their relevance to the purposes of the illustrative presentation.

At the time this thesis is written, apart from information collection, it is still a painstaking effort to construct the model of existing architecture with level of details suitable for study use. The construction of the virtual model itself needs a thorough understanding of the relationship between construction and detail elements that make up the existing building. This is important because the final representation has to reflect such understanding as well. There are current research projects which look into ways of constructing computer models of architecture from two-dimensional photographs and sketches (Devebec and Taylor. C.A. 1996; Guéna 2005). There are also digital 3D scanning techniques that could provide points on geometric surfaces from which 3D meshes could be generated but with much effort of 'cleaning'. These, including photogrammetry (Van den Heuvel, 2000 and Maher and Burry, 2002 as cited in Guéna 2005) are useful primarily for the reconstruction of intricate geometries of existing architecture. For simpler detailed work, it is still advisable to construct the digital model in a 3D application manually.

Several combinations of digital visualisation or presentation techniques for detailed architectural studies, analyses and records may be enhanced through the re-interpretation and hybridisation of technological strengths, concepts and strategies found within and outside the field - traditional or otherwise. Not one particular technique would be able to show the full extent of the object of architecture through the computer screen. Since each medium possesses its own unique strengths, combinations of them need to be considered.

Central among the three components of this research is the creation of the digital presentation of *The Arthur and Yvonne Boyd Education Centre*. The collected data and the survey result would eventually dictate the direction in which this digital presentation is redesigned, deploying some aspects of the explored visualisation techniques. The presentation examples in this chapter are predominantly leaning towards the layering aspects of media.

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 devised to describe architecture with visual clarity. Despite the recent development of digital visualisation and media presentation techniques (see Kowalski 2007), we are currently still far from having established acceptable mainstream patterns of representing architecture in digital media in the way that print media have achieved.

Manovich states: 'The computerization of culture not only leads to the emergence of new cultural forms….it redefines existing ones….' (Manovich 2001, p.9). Refining existing visualisation methods helps in redefining architectural presentation method to steer the understanding of architecture through new directions and to new levels.

Chapter 5 | Digital Presentation Prototype

5.1 | Background

This chapter presents the illustrative prototype of the digital presentation of *the Arthur and Yvonne Boyd Education Centre* included in the enclosed DVD-ROM. Many of the visualisation techniques explored in the previous chapter have been developed and readapted here. Since it serves only as a sample, not all explored techniques and data collected about the building are used.

As indicated in the survey, the amalgamation of various media to contribute to the legibility of the conveyed messages in architectural publications need to be thoroughly explored. Similar to Oxman's Think-

map (Oxman 2004) in concept, the proposed scheme outlined below is based on analogical/referential reasoning that connects a knowledge structure of similar thoughts. The approach adopts a main stem of media from which other represented knowledge would branch through the use of visual layering. Therefore it is hierarchical in nature – from media that represents a broader spectrum of information to ones that are more specific. Here, one may also step back and explore the 'bigger picture' again. The ability to manipulate and control certain properties of the presented media provides an exploratory extension to the system.

The selected media in this illustrative example include mainly:

- Animations (2D and 3D)
- Still images (2D and 3D)
- Photographs
- Video Footages
- Texts
- Audio

It is advised that the remainder of this section is read in conjunction with the digital presentation included in the DVD-ROM accompaniment at the front page of this thesis.

5.2 | Guide

The following is a brief guide to the program installation and the familiarisation of the user interfaces. The DVD-ROM included in this thesis contains the following files:

- Autorun.inf

- AYBEC.exe (installation file)

This DVD-ROM installation contains only the installation file for the PC-Windows ® operating system created using the freeware Install Creator by Clickteam. While it is also possible to create an Apple-Mac ® installer, this provision has not been considered at the time being.

Installation

The Autorun.inf file should automatically execute the installation file AYBEC.exe when the DVD-ROM is inserted. The specifications of the user's hardware may affect the installation and subsequently performance of the program. In the case where installation file does not run automatically, it can also be done by locating and running the file AYBEC.exe from the DVD-ROM.

Figure 5.1 shows the welcome window of the installation process. Click 'Next' to proceed.

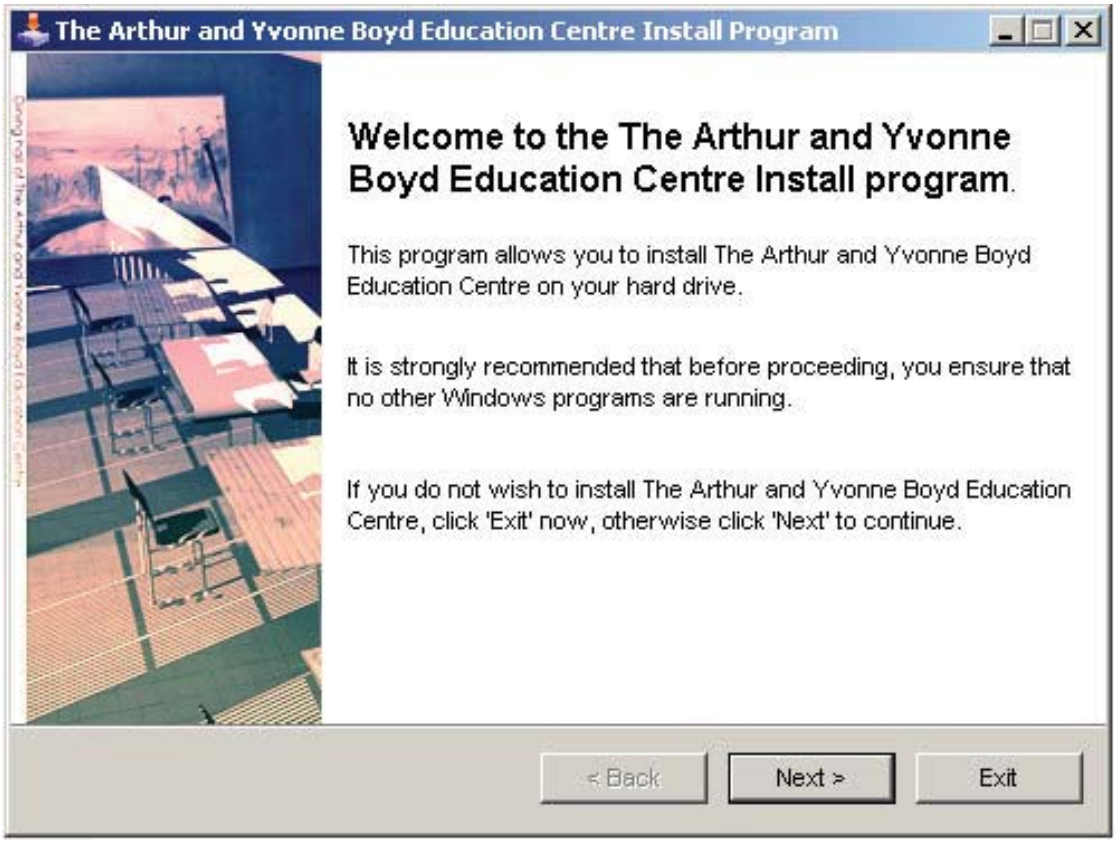

Figure 5.1 *Installation welcome window.*

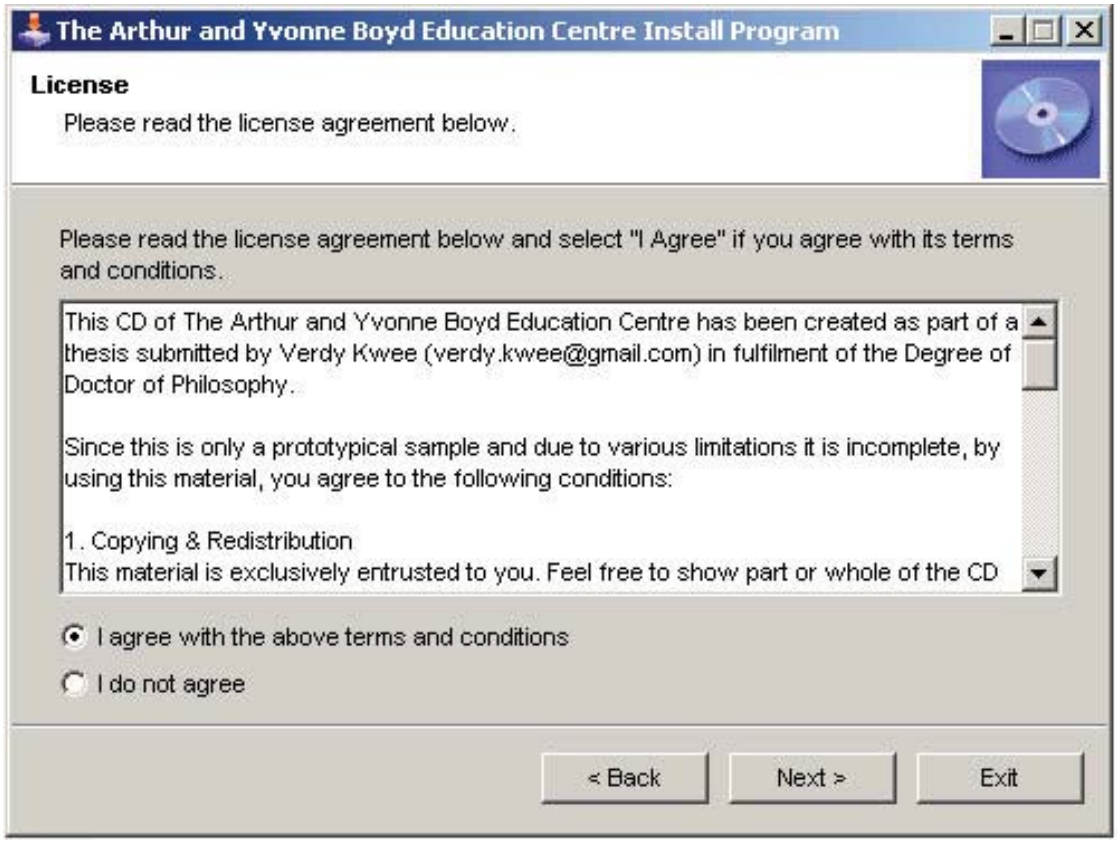

Figure 5.2 *Installation license agreement.*

In order to continue the installation process, user must agree to the terms stipulated by opting the 'I agree with the terms and conditions' radio button, followed by 'Next'.

The user agreement basically stipulates:

> 'This CD of *The Arthur and Yvonne Boyd Education Centre* has been created as part of a thesis submitted by Verdy Kwee in fulfillment of the Degree of Doctor of Philosophy.
>
> Since this is only a prototypical sample and due to various limitations it is incomplete, by using this material, you agree to the following conditions:

1. Copying & Redistribution
This material is exclusively entrusted to you. Feel free to show part or whole of the CD to anyone as part of a lecture or information session. However, please ensure that no copying and redistribution is done.

2. Warranty
The Arthur and Yvonne Boyd Education Centre Visualisation comes with NO WARRANTY.

While this program will work, there are still some unresolved navigation issues which may still need improvement.

Efforts have been made to make this material as reliable and safe as possible, however no party shall be held responsible for any possible damages arising from its use or misuse.

3. Do not decompile, disassemble, reverse engineer or modify the SOFTWARE or any portion of it.

Thank you!

Many thanks also to the following individuals and organisations that have made this project possible:

Antony Radford, Dean Bruton, Glenn Murcutt, Wendy Lewin, Reg Lark, James Taylor, Peter Bacon, Sue Barnsley, Jonko Berg, David Chalker, The Bundanon Trust, The Mitchell Library

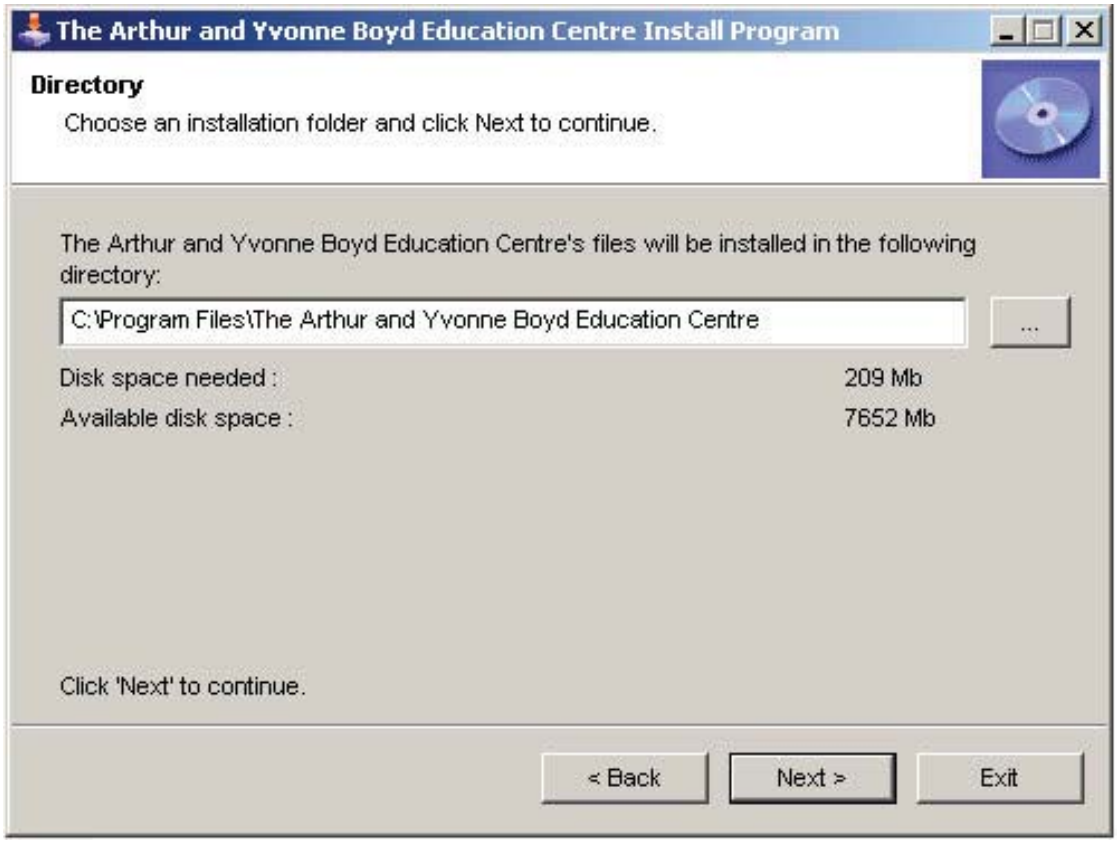

Figure 5.3 *Installation folder specification.*

By default, the installation folder is as shown above. This may be altered by locating an alternate choice or user's preference. Required disk space for the program is approximately 210Mb. One should choose a different location if there is little or not enough space in the current hard disk.

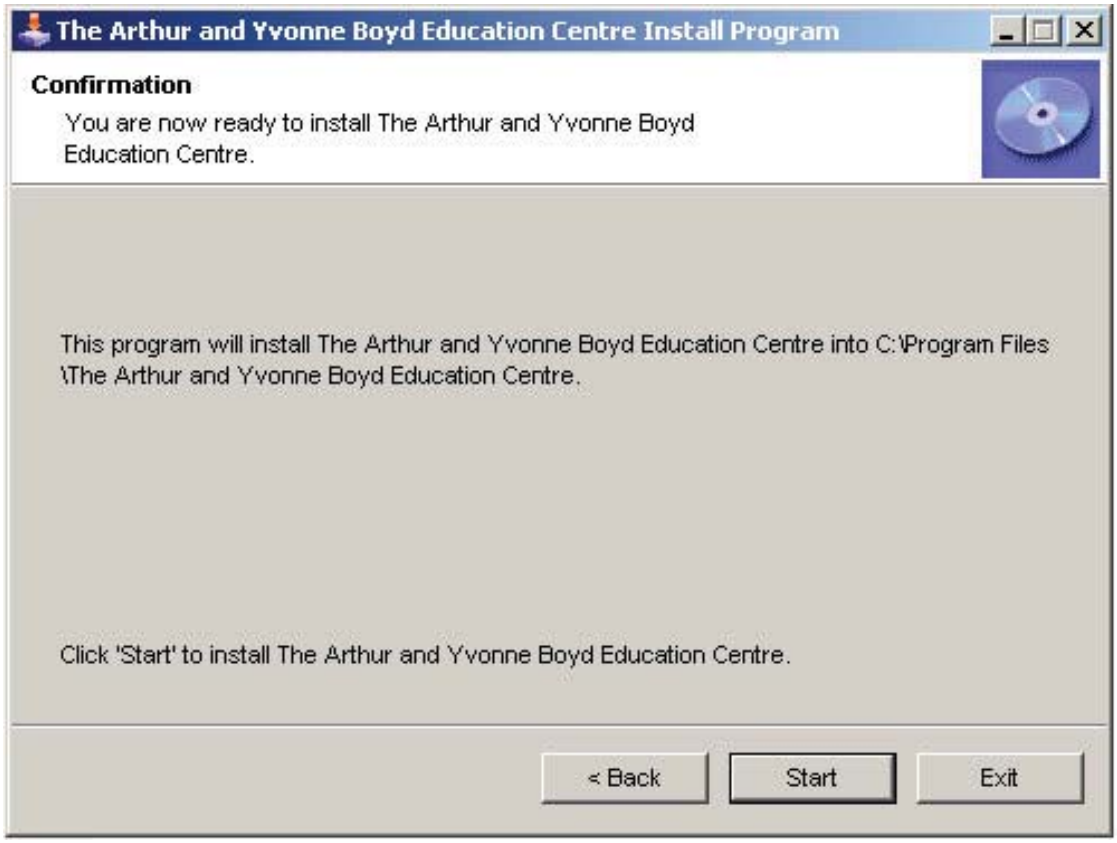

Figure 5.4 *Installation start.*

Installation should commence when 'Start' button is pressed and released. This allows the necessary files to be installed onto the appropriate folder specified in the previous prompt.

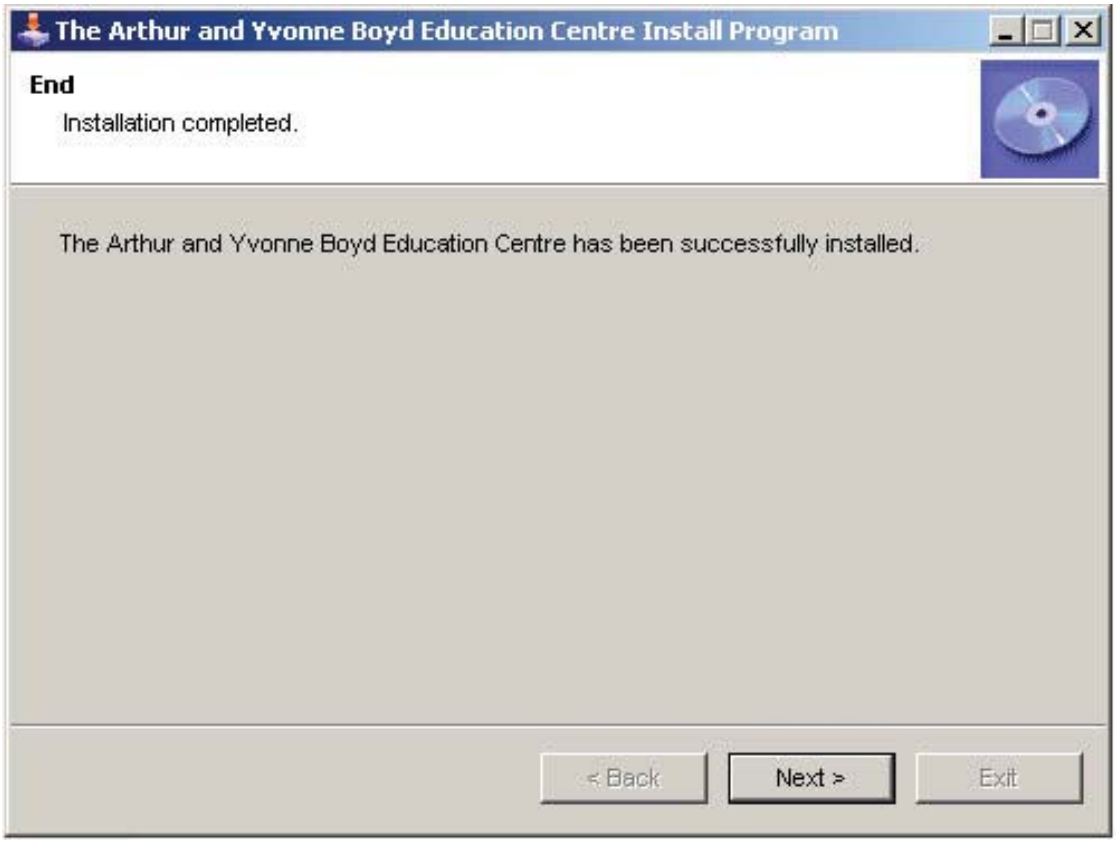

Figure 5.5 *Installation completion*

A successful installation process will find a program icon inserted on the Windows Desktop. This icon should launch the program. When run, the introductory screen of the program will show (Figure 5.6).

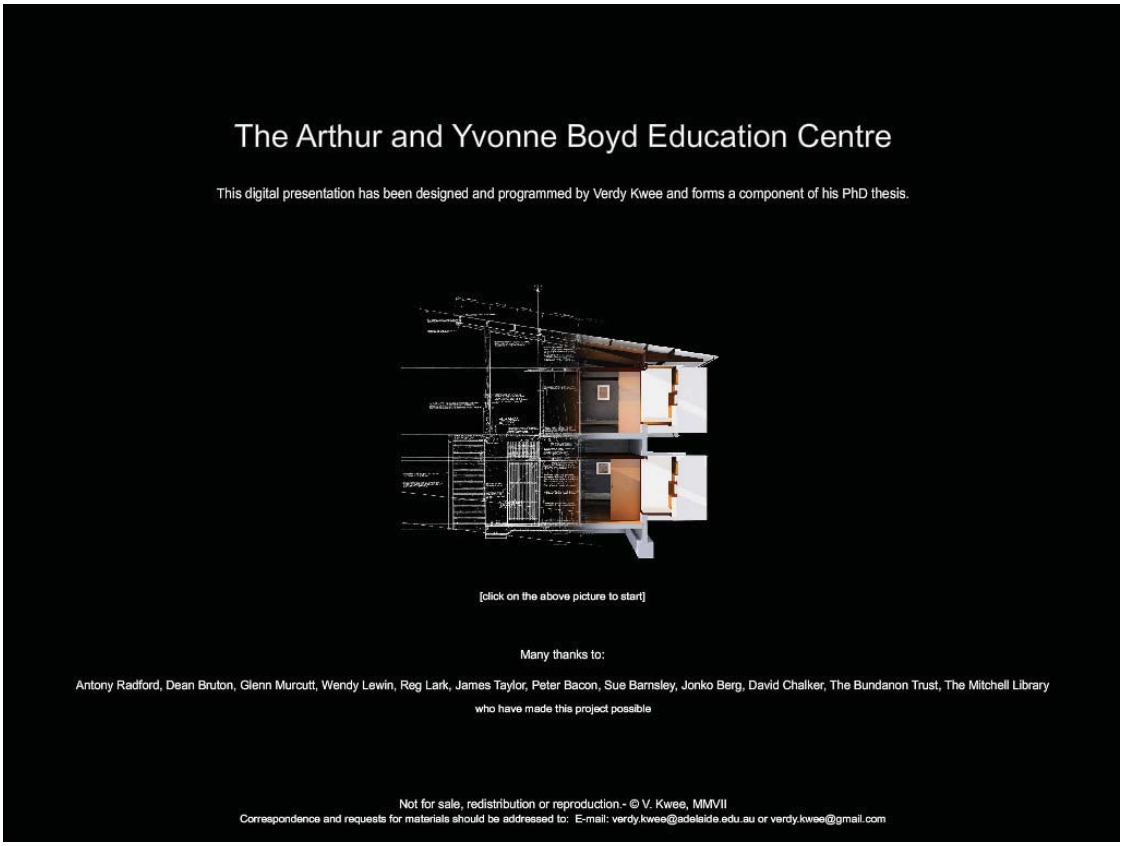

Figure 5.6 *Introduction page*

A click on the picture at the centre of the introduction page shall start the presentation.

Button Overview

Figure 5.7 denotes the main user interface describing the function of each button. Figure 5.8 describes the interface found on the 'Plan' page.

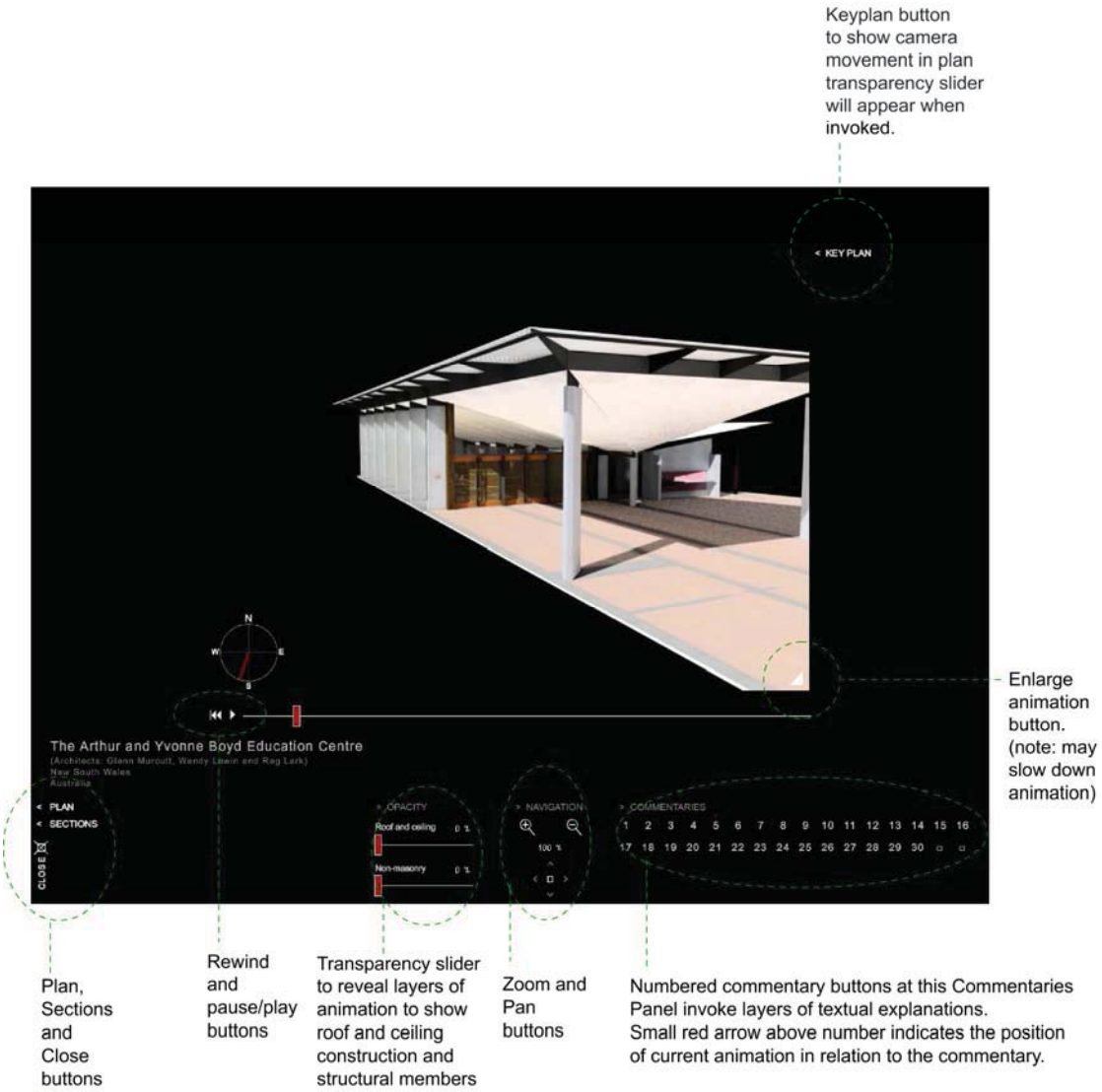

Figure 5.7 *Basic interface overview – main page*

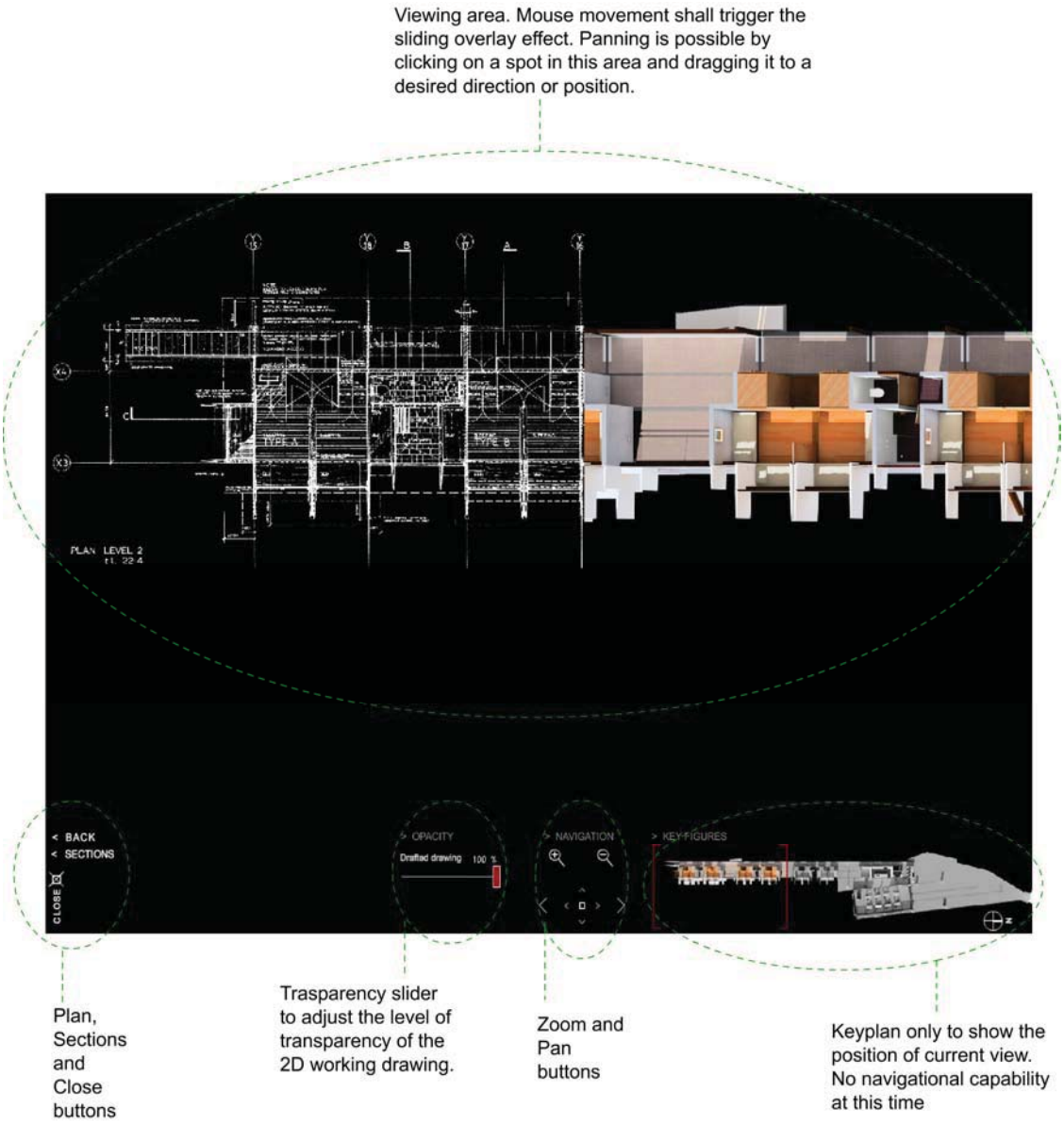

Figure 5.8 *Basic interface overview – 'Plan' page (Note: 'Sections' page is similar)*

5.3 | The Digital Presentation

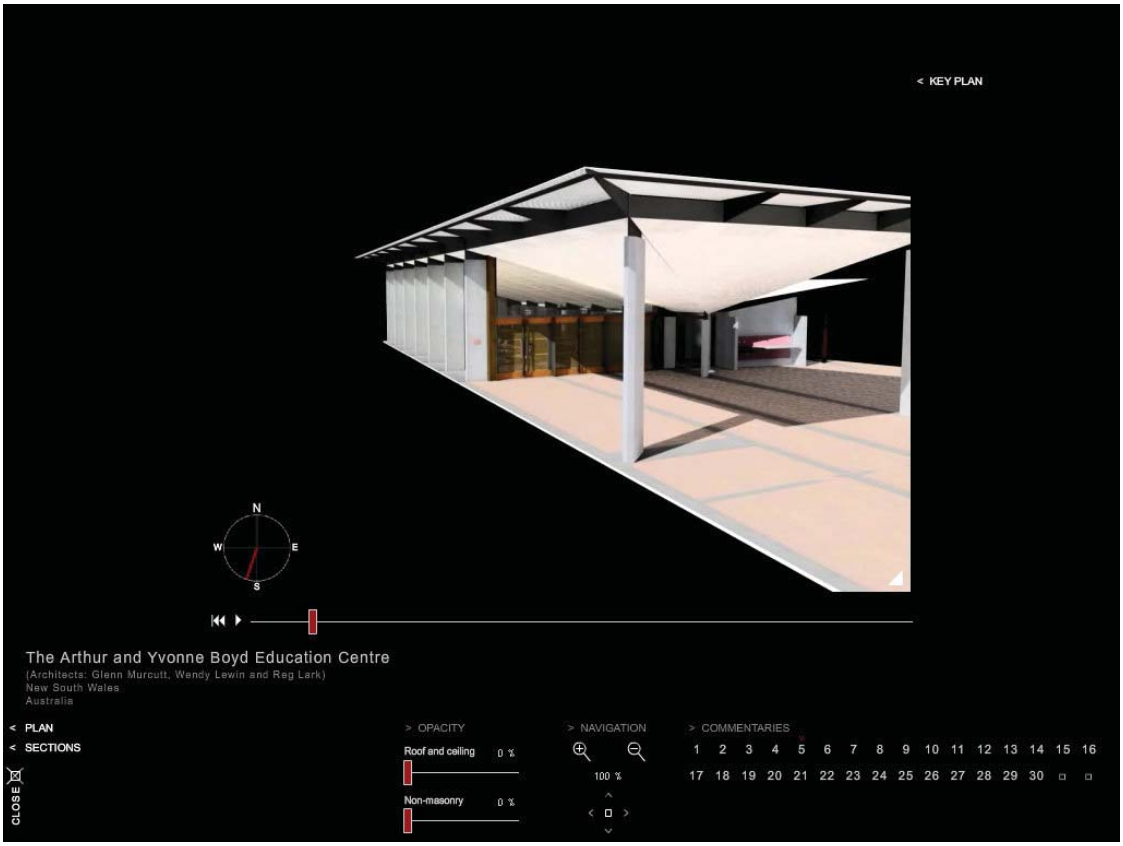

Figure 5.9 *Digital Presentation – Screenshot*

Instructions:

A brief understanding of the formal arrangement of the building through a view of the complete animation is recommended if this is the first time that a user is exposed to the work/design.

The compass at the bottom left-hand corner of the animation indicates the view direction of the camera.

You may restart the animation at any stage by clicking the rewind button ⏮.

Note: Since the animations are graphically intensive, it is not advisable to scrub through the animation using the animation slider when the hardware configuration does not permit smooth transition.

An animation sequence is selected as the central medium to which other related media are anchored. It is thus placed in the highest position on the hierarchical structure of media used.(Figure 5.10) A second layer of information in the form of an animated directional compass is attached to this architectural animation to specify the bearing of the view direction.
As in most digital movies, standard navigations are provided. Unlike them, however, additional modifiers are added. These include the zooming and panning buttons and transparency sliders. The magnification here is restricted due to the resolution of the original movie clip which had to be relatively low to allow for speed of display (Figure 5.9).

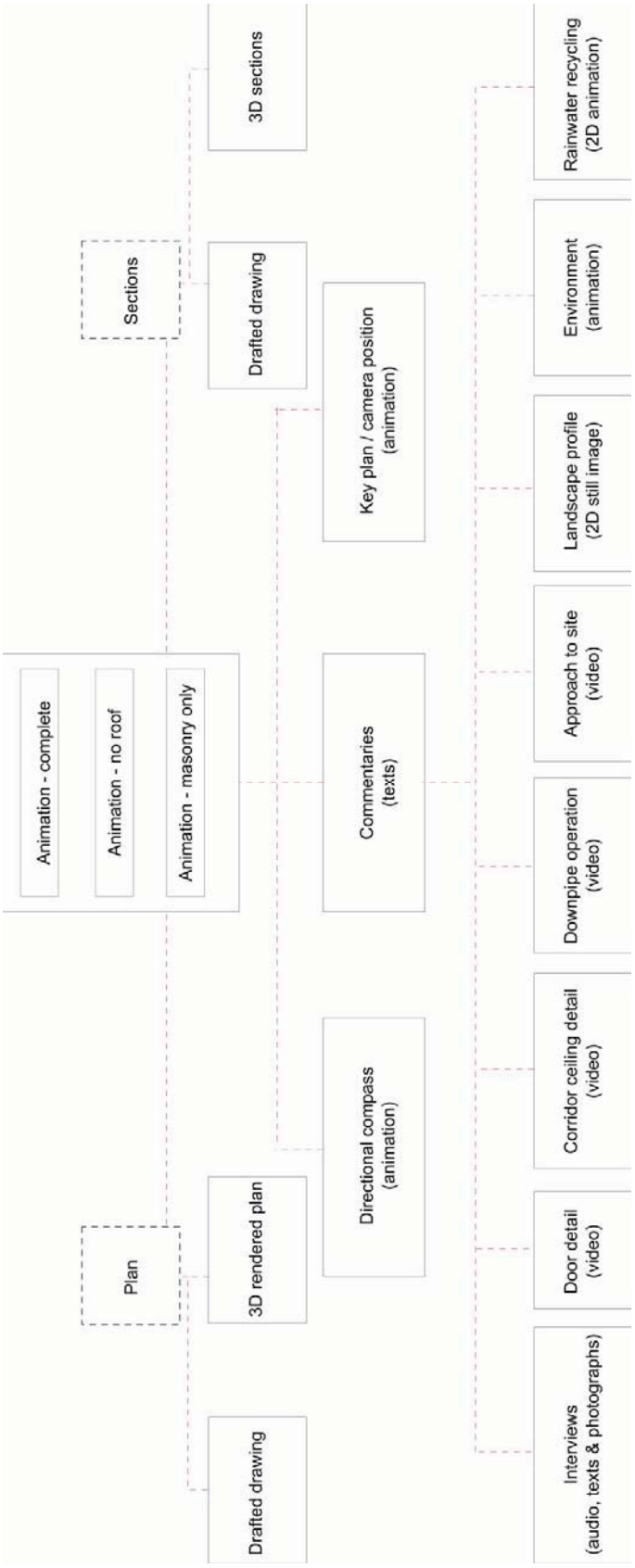

Figure 5.10 *Hierarchical structure of components in the digital prototype*

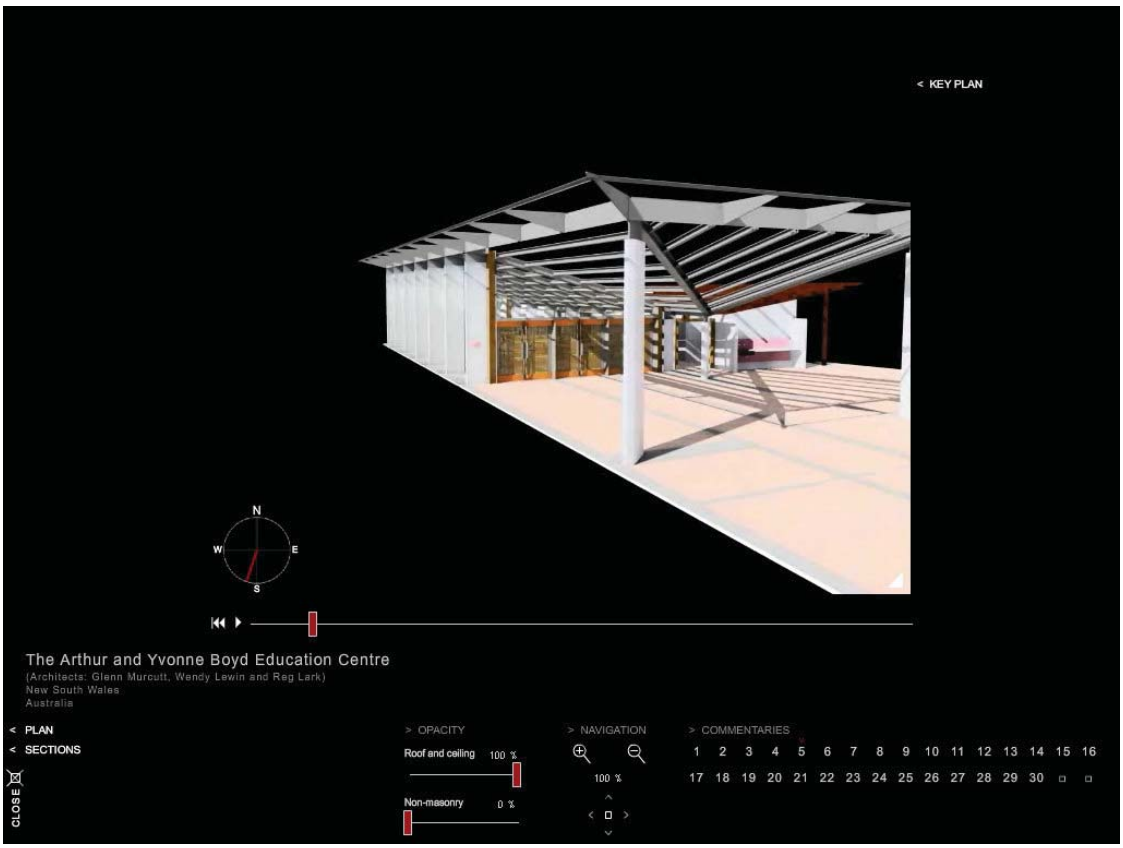

Figure 5.11 *Digital Presentation - Screenshot*

Instructions:

As the animation runs, you may adjust the transparency slider of the roof and ceiling to reveal the skeletal roof structure. This can be apparent only when the roofs are within view.

The sequence of animation permits adjustable transparency, revealing a separate layer of corresponding animation below that indicates the roof constructions of the building and how these construction elements relate to the whole (Figure 5.11).

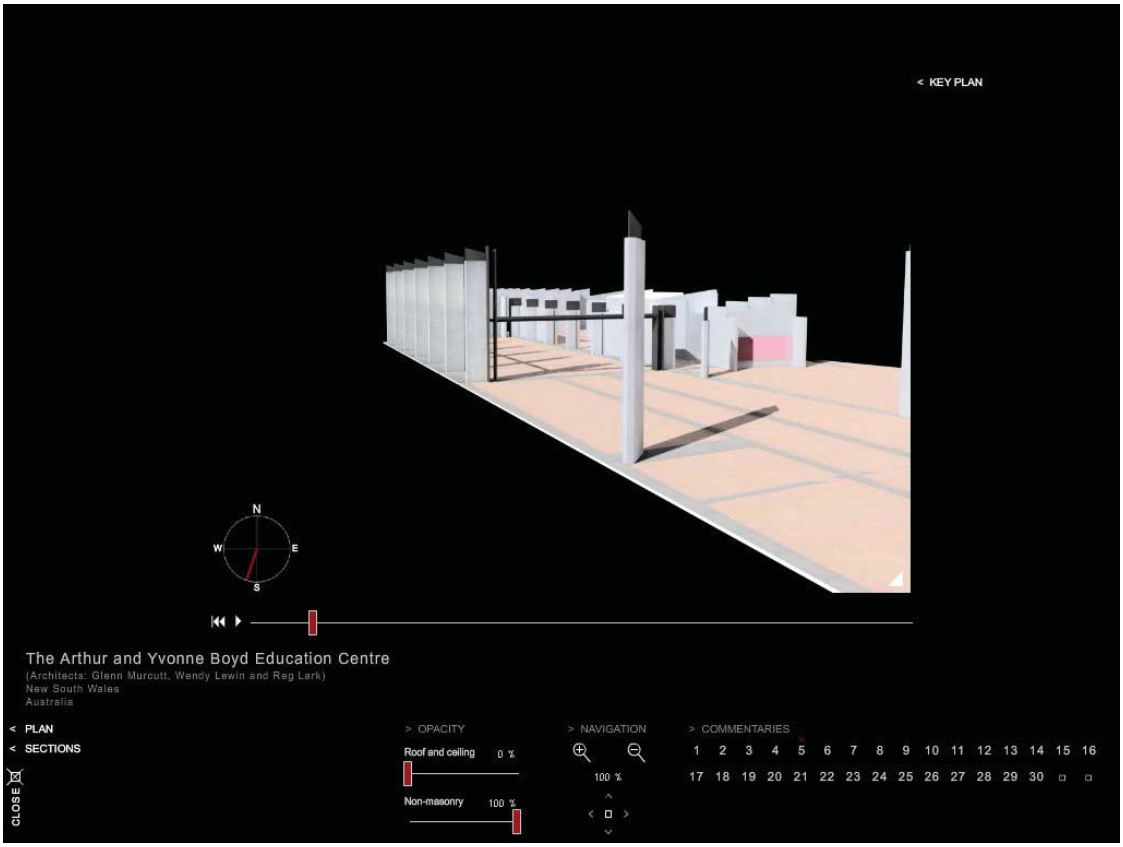

Figure 5.12 *Digital Presentation – Screenshot*

Instructions:

Adjusting the transparency slider under 'Non-masonry' will hide all non-structural elements. Try running the animation again with the transparency level adjusted to 100% and experience the marked difference in the spaces of the building.

In order to understand the structure components of the building, another layer of animation is located beneath the other two layers of animations (Figure 5.12). All layers of animations run concurrently and with uniform sequence. Adjusting the transparency of the middle layer may affect the transparency of the top layer.

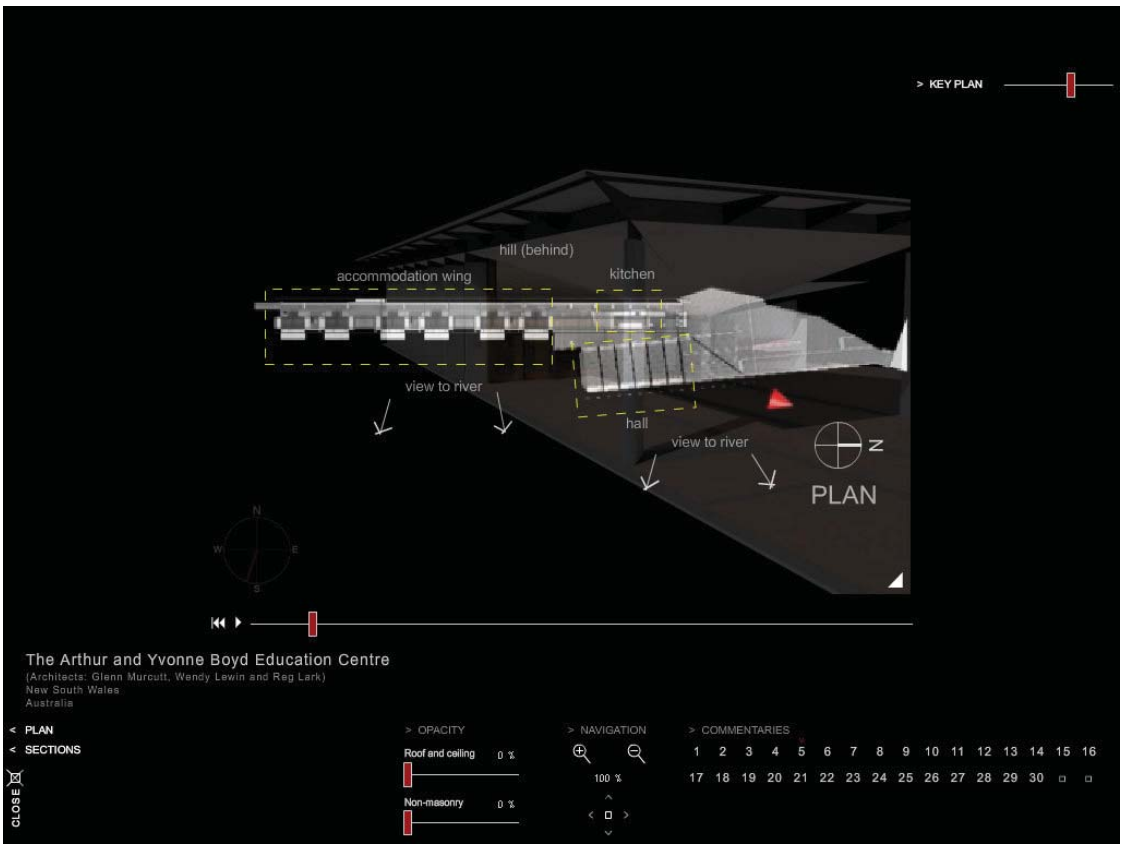

Figure 5.13 *Digital Presentation - Screenshot*

Instructions:

Click the '< KEYPLAN' button to evoke a plan that includes the position of the camera with a view cone shown in red. For clarity, the transparency of this plan may be adjusted through the slider besides this button. At semi-transparent state, it is easier to see how the movement of the camera relates to the view shown in the running animation.

Another layer of animation that indicates the position of the camera in relation to the building plan may also be revealed (Figure 5.13).

Adjustable transparency is significant in allowing the visual connection between the various animations with each carrying its own particular information.

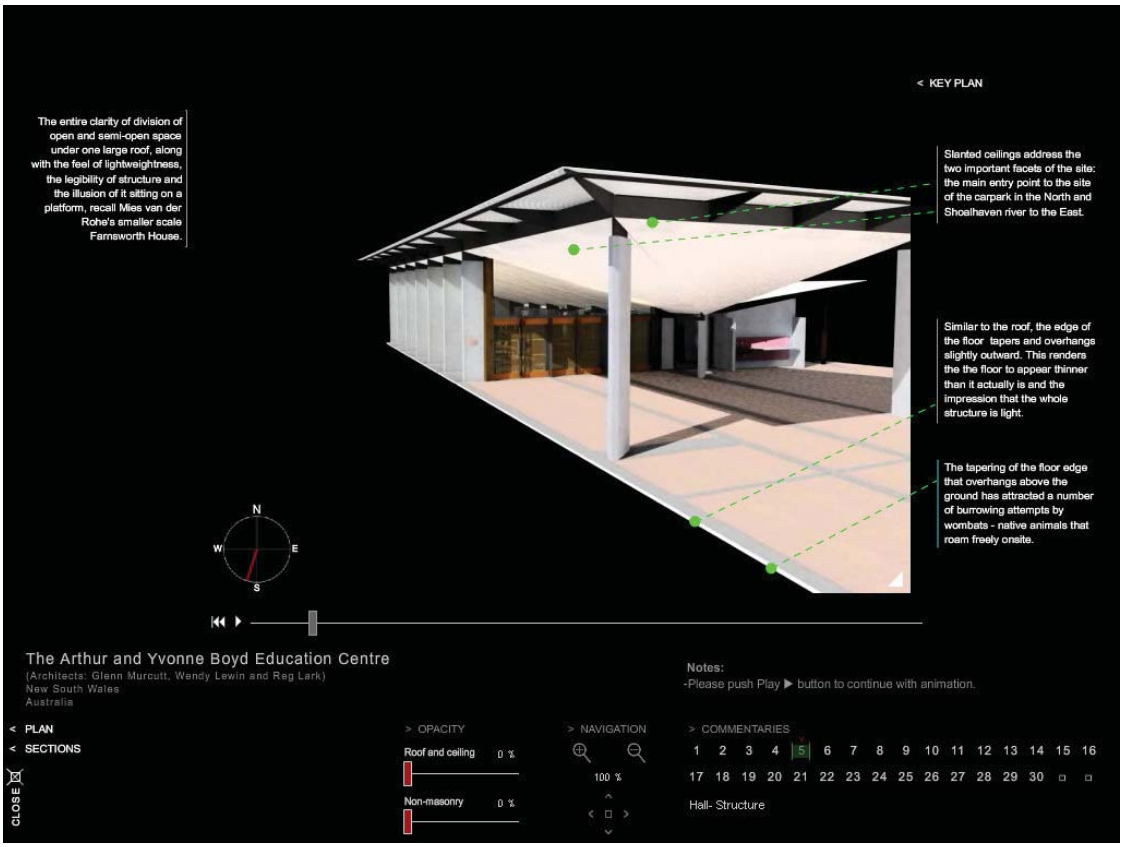

Figure 5.14 *Digital Presentation - Screenshot*

Instructions:

As the animation is running, you may notice a tiny red arrow above one of the numbers at the commentaries panel. This arrow indicates the relevant explanations relating to the current animation view and will jump to the next number during the play of animation. Despite the arrow, any of the commentary buttons maybe pressed at any given time throughout the animation sequence.

Without clicking, move your mouse over each of the numbers. A brief explanation of the content of each button is revealed at the bottom of the panel. The above screenshot shows the image on the screen when commentary button 5 is pressed.

To return to the animation, click the Play button ▸.

A non-visual, textual layer may be evoked to add to the information content (Figure 5.14). This medium is contextualised in relation to its visual counterpart and line indicators are attached wherever applicable to increase the explicitness of the textual referents.

Figure 5.15 *Digital Presentation – Screenshot*

Instructions:

Click commentary button 1. The texts on the left and right-hand side of the picture (above) explain how the landscape influences the design of the building. On the left-hand side, you will find capitalised texts enclosed in square brackets.

In some instances, where the level of legibility from the visual component is inadequate, additional media are introduced. In Figure 5.15, within the layer of non-visual information, an additional medium of line graphics/sketch is used to clarify the textual explanation.

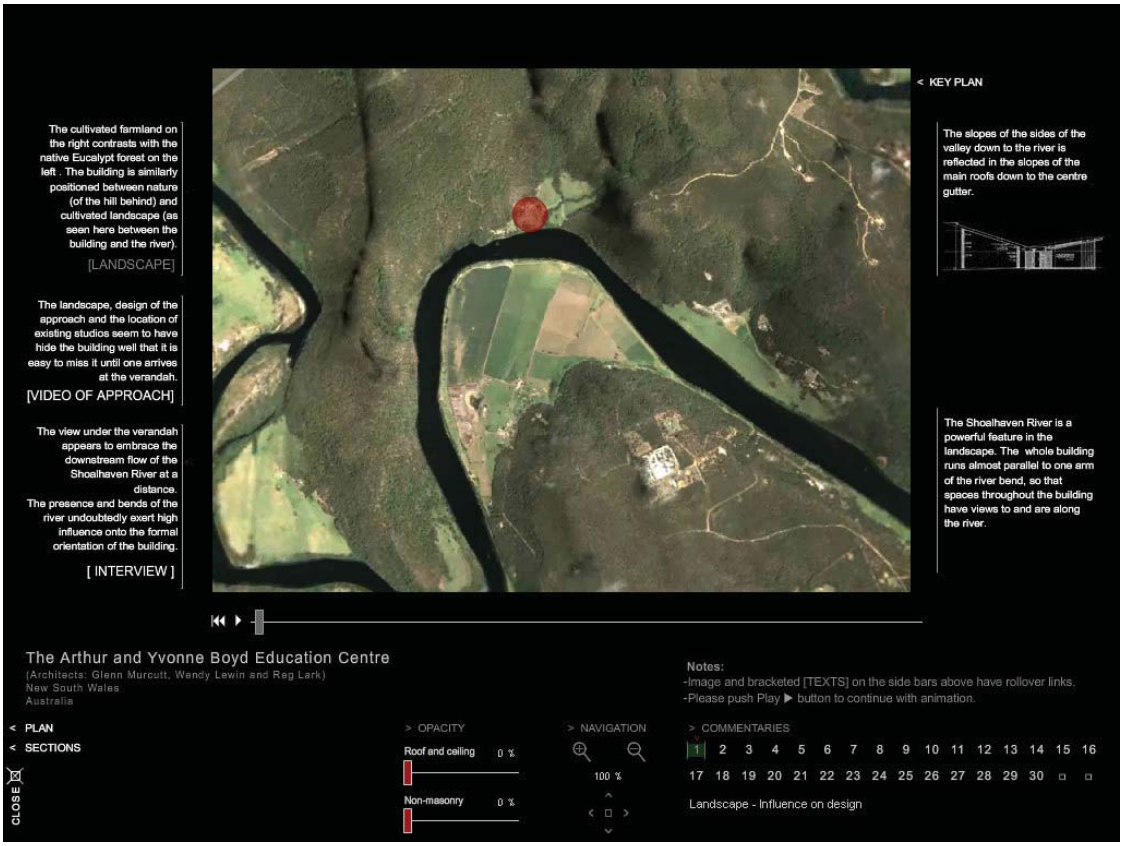

Figure 5.16 *Digital Presentation - Screenshot*

Instructions:

Without clicking, move your mouse over '[LANDSCAPE]' and leave the pointer there. This will invoke a 3D animation of the landscape to visually support the texts. The above animation will appear. A movement of mouse outside the bracketed texts will remove the called animation.

Any bracketed capitalised texts shall invoke another medium accompaniment.

Reflecting the versatility of the text medium which often tends to reference external ideas, the embedment of visual components within the texts to illustrate the message becomes necessary to increase legibility. Figure 5.16 exemplifies the necessity of a site animation to narrate the condition of the surrounding landscape. Satellite images used in the animation above have been obtained through screenshots procured through Google Earth which are later mapped onto a three-dimensional model of the landscape. A three-dimensional model of the building is rendered according to the similar camera path and layered upon the final animation of the landscape through image compositing.

Figure 5.17 *Digital Presentation - Screenshot*

Instructions:

Read the second paragraph on the left. Now, place your mouse over 'VIDEO OF APPROACH'. A video screening above will play showing the journey through the winding road from the entrance of the compound to the building.

Understanding the strengths of each medium is imperative in the choice of narrative vehicle. Figure 5.17 illustrates the use of digital video recording to provide the impression of the winding journey from the gate of the property to the building compound. There is no compelling advantage in using an animated model.

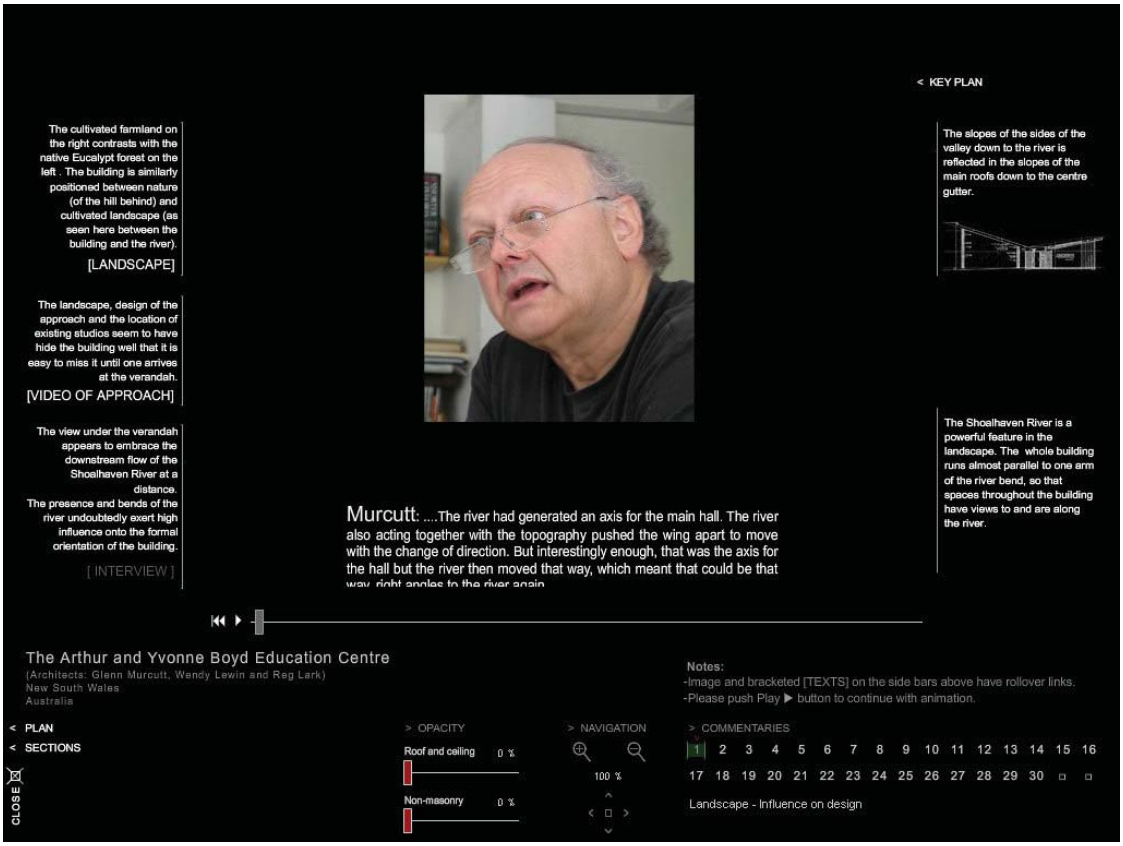

Figure 5.18 *Digital Presentation - Screenshot*

Instructions:

Under the third paragraph on the left, an interview excerpt of the architects may be invoked by placing your mouse over '[INTERVIEW}'. This audio/text explanation may help further clarify and add to the existing texts in this paragraph.

Direct explanations from the designers (Figure 5.18) may be desired at certain junctures. This not only validates the textual explanations, but also addresses the needs of affirmation required by the audience as indicated in the survey.

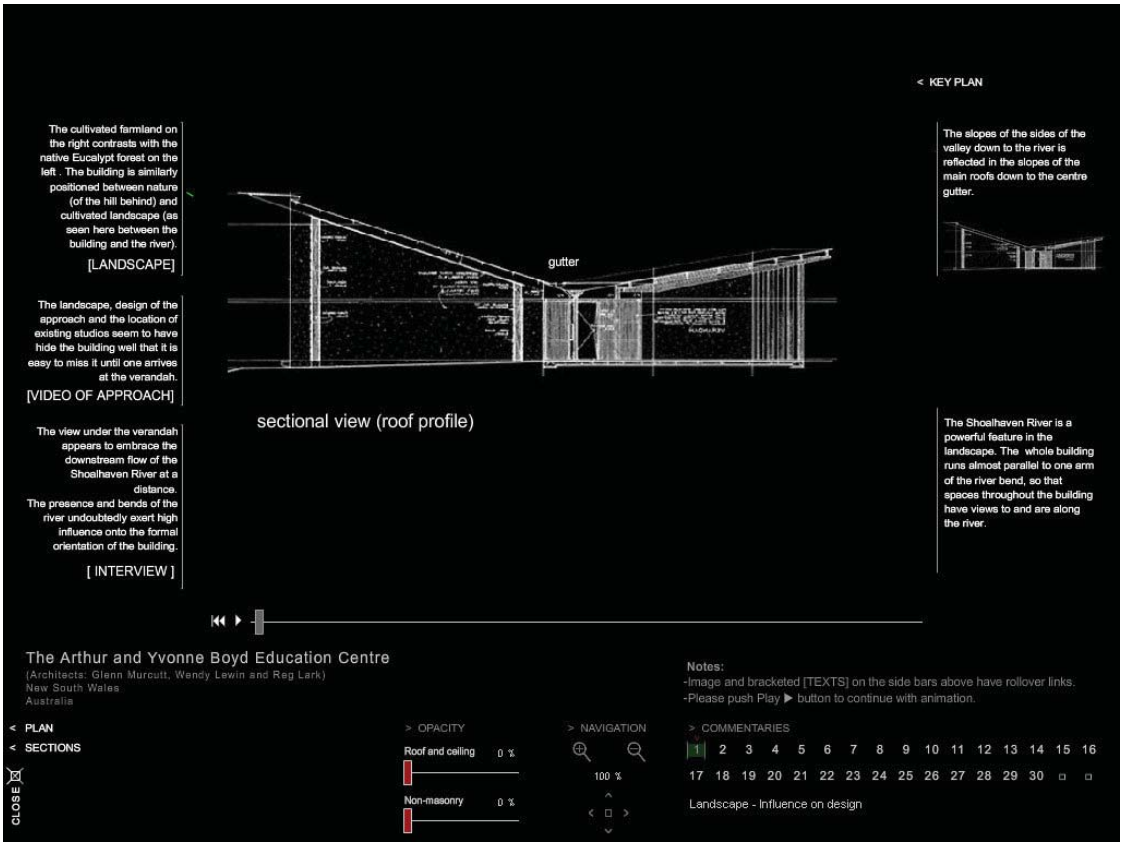

Figure 5.19 *Digital Presentation - Screenshot*

Instructions:

Read the text explanation about the influence of the landscape has on the roof profile (first paragraph on the right-hand side). A mouse over the diagram below the texts shall reveal a larger sectional view for better clarity.

When textual references are made to particular details of the building that may not be obvious through onsite photographs, animations or video recording, the architects' drawings become the only reliable source of dependable illustration (Figure 5.19).

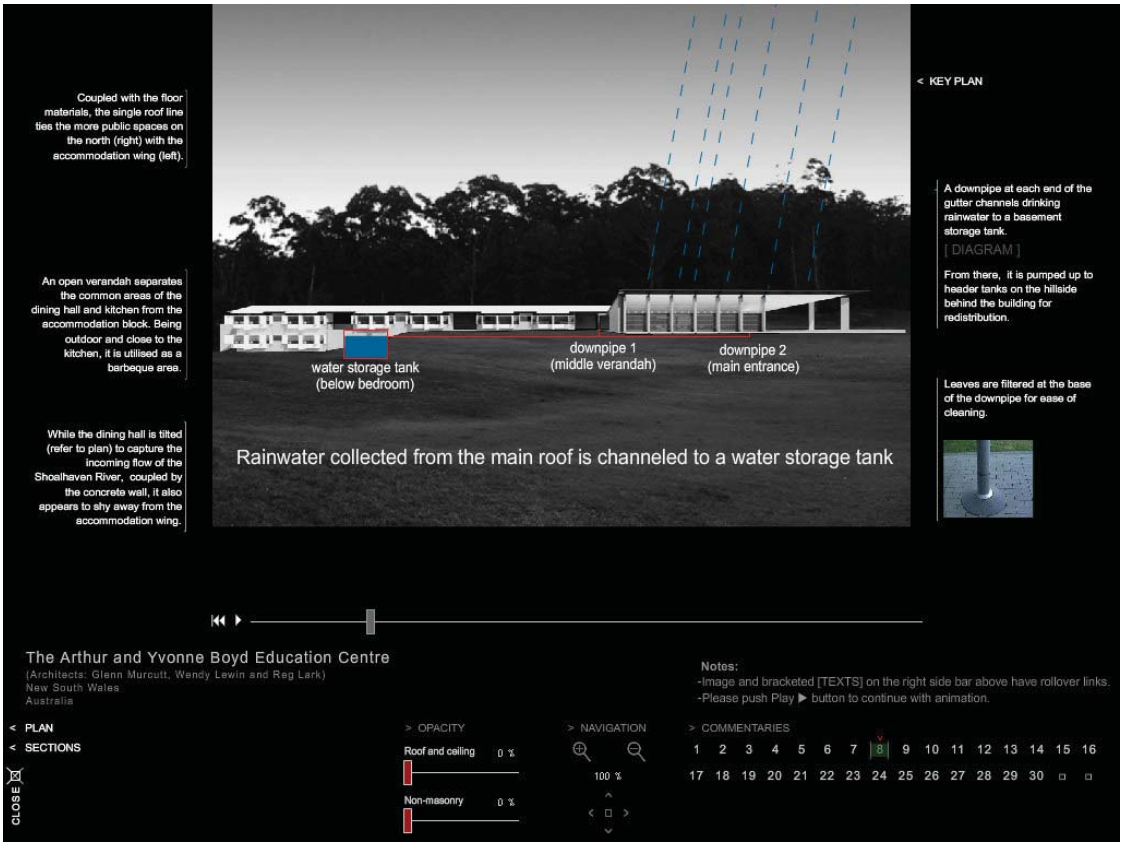

Figure 5.20 *Digital Presentation - Screenshot*

Instructions:

Click commentary button number 8. Accompanying the texts on the right-hand side are a two-dimensional diagram of rainwater channel from the main roof to the underground water storage (first paragraph) and a video footage of downpipe cleaning procedure (third paragraph). Both may be invoked by placing the mouse over the bracketed capitalised text and the picture of the downpipe.

You may explore the rest of the commentary buttons at this stage.

Two-dimensional animations are also another medium type that might be necessary to best illustrate the textual content. Figure 5.20 shows the portion of roof that receives rainwater that is channelled to the underground storage tank, while indicating the locations of the components in relation to the elongated facade.

Figure 5.21 *Digital Presentation – Screenshot*

Instructions:

After going through the animation and commentaries, click '< PLAN' button to view the plan of the building in two and three-dimension. Set the transparency level higher by clicking and dragging the slider to the right.

Figure 5.21 shows how by applying dynamic layering of a working drawing with adjustable transparency over the sectional model and relating the two-dimensional coded architectural symbolism to its corresponding three-dimensional illustration, an interactive overlay provides richer information to each medium. Apart from the ability to understand the component, their sizes, finishing and materials within each of the rooms and spaces through the architectural labels of the working drawing, reciprocally, the technique adds visual qualities to the more abstract descriptions of the drawings. In addition, similar to some CAD applications, a key plan is added at the bottom of the screen to situate the viewed portion within the overall scheme.

Overall, this visualisation technique shifts a degree of responsibility to the readers in exploring the materials closely and forming their own analysis without relying on the author's interpretation. More texts, of course, could be added to offer this interpretation, if required.

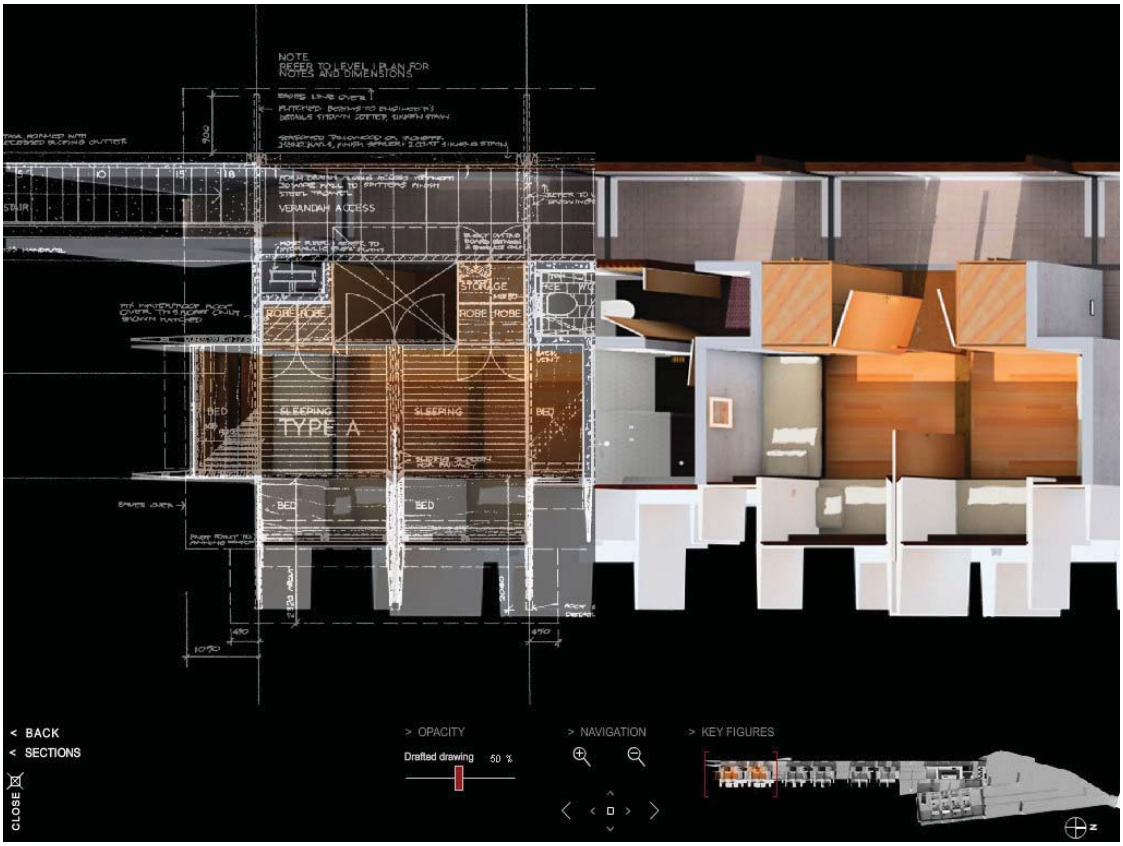

Figure 5.22 *Digital Presentation - Screenshot*

Instructions:

To be able to read the components written on the two-dimensional plan, click and hold the zoom-in button. To pan, click and drag the viewing area or use the panning buttons provided under the zoom buttons.

The area of view is reflected on the key plan on the bottom right-hand corner. This key plan only indicates area of view and does not provide navigational capability at this time.

Due to the limited space of the screen, a zooming technique is applied while still maintaining the overlay capability (Figure 5.22). This helps increase the readability of the texts within the high-resolution digital

architectural documentation. By clicking and dragging the display area, the images may be panned. This is in addition to the panning buttons provided.

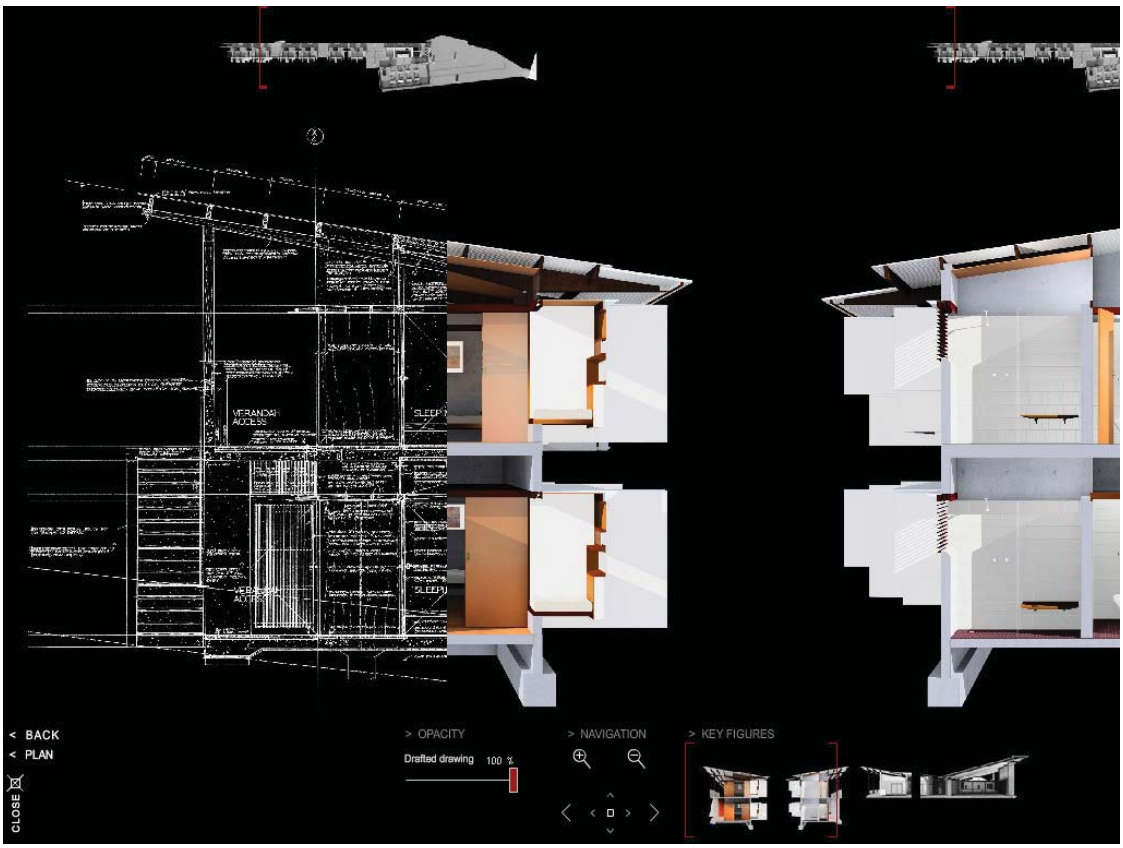

Figure 5.23 *Digital Presentation - Screenshot*

Instructions:

You may click '< SECTIONS' button to view the sections in a similar manner as the plan above. Additional key plans are provided above each section to indicate the 'cutting' positions and view directions.

To exit at any point of the digital presentation, you may click 'CLOSE' button.

A similar mode of presentation as illustrated for the plan above is applied to view the various sections throughout the building (Figure 5.23). Apart from providing a spatial depth appreciation to the two-dimensional sections, it is aimed to give a clear insight into the vertical arrangements of the building components.

5.3 | Summary

The online survey and the collection of information of *the Arthur and Yvonne Boyd Education Centre* components of this research (outlined in detail in Chapter 3 and 4) are interlinked and provide the foundation for the production of the proposed illustrative digital presentation of the building. Careful research into and selection of information to be presented as subject matter are still crucial in the overall presentation. The illustrative prototype shows that not only does streamlining information types become a necessary activity or component within the presentation process, but that it affects the decisions about the structural hierarchy of the media within the overall presentation itself.

The illustrative prototype also indicates that the opportunity afforded by the computer platform is vast considering its ability to facilitate multiple layering of information in the form of texts, still images, two and three-dimensional animations, videos and drawings. In contrast to the traditional technique of presentation in existing architectural publications, the prototype proposes the use of information relying on largely visual media as an integral component to explain the building and better support the textual or soft information content. The emphasis of play with visual layering techniques is apparent in the proposed approach. Meanwhile, understanding and addressing the limitations of the computer screen size is an integral exercise in the process.

There are still much content to be included and user interface improved in the future of the prototype. The example is meant to illustrate the

concept of visualisation possibilities more than to propose a definitive method of digital visualisation or presentation.

Chapter 6 | Discussions and Conclusions

6.1 | Background

The contention of this thesis that there are needs and ways for improvements in architectural publications to be accomplished in the digital platform is clear. We cannot dismiss the counter argument that the level of quality found in current publications is sufficient for its value in evoking our imagination for what their discussed buildings could be instead of what they are. To a stratum of audience and for some purposes, that may be justifiable. Therefore, the coffee-table publications likened to fictitious novels are neither challenged nor replaced. However, if we were to embrace the belief that these publications are sufficiently designed for students to easily gain deeper understanding of an architectural project, we are dismissing the bigger

opportunities that the instrument could provide – to teach and possibly to inspire with clearer message and more appropriate 'massage'.

The outlined processes in designing and constructing digital presentations of notable buildings are not prescriptive for content designers to follow and may change in the future or be modified to suit the changing circumstances. For example, the *Architecture | Media | Representations* survey has been done to gauge the position of architectural publications viewed from the perspective of end-users specifically at this point in time. It contains several factors to note - factors which should only serve as a directional guide for future publications seen from the perspective of the present moment. It is perhaps appropriate at this point to reiterate that all the components of this research are factor and time specific and will need to be re-evaluated and improved constantly in the changing environment and user needs. There is a need for continued assessment and investigations to anticipate further steps to be addressed. In his book *Qualitative Analysis*, Douglas Ezzy verifies that 'truth is always historical, cultural and socially created' (Ezzy 2002 p.2).

This chapter outlines some additional reflections and considerations in assessing the applicability of results and proposals in this thesis while evaluating their possible future impacts.

6.2 | Additional Considerations and Evaluations

'Architecture | Media | Representations' Survey

In the creation of other similar digital presentations, content creators or authors may need to study closely some of the factors from the survey results with regards to aspects of interest, quality of delivery as well as opportunities. Judging from the survey responses, there is a higher expectation of various aspects of architecture to be presented than most current resources provide. There seems to be a need for publications

with explicit architectural content and improved delivery to facilitate better understanding of particular architectural works. Although the current digital platform and its technologies do possess the potential to deliver architectural content, most publications are still carried out in the traditional printed media; whether this is a denial of the technological capital or merely a transitional phase of significant shifting in the dominant medium remains to be seen. The internet phenomenon of Wikipedia, for example, as a growing information source may be an indicator of a future of internet or digital dependency.

The survey has shown the opportunities that need to be investigated further as far as presenting architectural precedents are concerned. They encompass the improvement in media use and qualities. The information depth of the building being studied needs to be adequate to facilitate better understanding of the subject, while the overall presentation of the information needs to be constantly assessed. Ultimately, the aim is not merely to understand architectural precedents but also to help students with their own design works by understanding them well.

Information of 'The Arthur and Yvonne Boyd Education Centre'

Much of the information gathered, analysis and observations are well-supported by the statements from the designers and individuals involved in the building design and construction process. It is through the interviews that many of the initial observations evolved and were clarified (see Appendix A for interview transcripts).

The availability of the above individuals and the accessibility to the building premises in 'near-new' condition ensure the reliability of data and information collected. This is significant in terms of the preservation aspect of building information for use in further research and educational purposes. Much of the data collected have been recorded in the digital format which facilitates lossless quality of reproduction. Should delivery

techniques and platforms change, as is likely the case, these data would serve as a dependable information source for other scholarly research projects related to the building.

Presentation Prototype of 'the Arthur and Yvonne Boyd Education Centre'

The initial general impression obtained through international conference presentations of this material has been encouraging and positive. Despite the effort and thought given into the production process, the learning material is not without inadequacies. It is still incomplete and has yet to take advantage of all the investigations and data collected of the building outlined in Chapter 4. Furthermore, the current digital presentation is factual, describing components in detail. More interpretative descriptions could also be similarly included. While it currently only proposes computer animation as the main medium to which other media are anchored, other media could assume this role. This has to be assessed on a case-to-case basis. As previously stipulated, overall, the prototype serves as a conceptual springboard more than a complete publication. Therefore some discretion must be exercised in assessing this material as it is now.

In order that some indication of the quality of as well as interest in this delivery mode may be gathered, a focus group assessment was implemented among a small group of undergraduate and postgraduate architecture students. Because the system is only illustrative and there is an absence of comparable work to benchmark it against in terms of content and delivery techniques, this small group assessment should only be considered preliminary. However, the results provide an indicative response to this digital approach.

Almost all of the group members agreed that they do understand the building better after exploring the digital material. Despite this, as in the earlier survey, some have stronger preference for books. The desire to feel or touch physical objects seems to be the underlying reason.

When asked to describe what existing publications they have strong preference for, similar to the *Architecture | Media | Representations* survey, one respondent indicated fictions with immersive storylines attached to descriptions of buildings. There appears to be an element of 'experiencing through a character' that is inherently valued. Two respondents commented that the traditional blue prints were an easy static object to look at. Could this preference have been shaped by habits? Will the presence of more digital educational materials like this alter the perception of end-users?

A respondent remarked that a digital platform is still unable to convey the 'poetics' of the building design which can only be experienced onsite. The pattern of apprehension in embracing a new system is clear. This can be illustrated by similar experiences during the introduction of a digital drafting system, for instance. In its initial phases, many professionals and academics alike had a strong unwavering preference for manually produced working drawings. This view has almost become a non-issue as far as the delivery of information for construction aspect is concerned. Readers have looked past the medium and concentrated on the message or content. This should also ideally be the case as far as educational materials are concerned.

From the focus group responses, there is a positive indication of interest in similar digital resources for other buildings if they were made readily available in the future. Although this is encouraging, this response may exhibit merely an interest to learn more about notable buildings.

6.3 | Final Words and Challenges

In architectural communication, as Yehuda Kalay appropriately sums up: 'There is, of course, no single mode of communication that is superior to all other: if there were, there would be not so many' (Kalay 2004, p.117). This cannot be more clearly illustrated than by the peculiar phenomenon

in linguistics whereby particular established languages are able to express the subtleties of ideas and feelings more than others. This often lead to the 'localisation' of once-foreign communication instruments. In the realm of visual representation, through digital technology, the assemblage of suitable media with appropriate narrative strengths enables the escape from traditional specificity found in the present architectural presentations and publications.

The research has aimed to provide a proposal for displaying architectural information through computer screens. To some extent and specific to the needs of the study, the case model has suggested a basis for techniques which could be deployed for improved clarity of information delivery. The complexity of a presentation, however, may likely be matched only by the design intricacy of the building itself, and the possibilities are unlimited and independent of the building it narrates. It is apparent that technological opportunities are still broad and expanding in the current scenario as far as presenting architectural information is concerned. Not one medium, not even an onsite visit could facilitate a complete understanding of a building. There are not only strengths and limitations associated with each medium that must be understood, but also there is the issue of how it could be implemented to reciprocally compliment other media in order to capitalise on their strengths within the existing limitations.

More investigations and works on visualisation of architectural information and analysis of notable architecture will need to be carried out to be able to evaluate applicable systems in tandem with the rigour of research into the architectural work itself. Projects like *Aalto on the Internet* (Madrazo and Andreas 2001) are excellent platforms for research into design and analysis, but like any other publications, the component of presenting the findings in ways easily digested by a larger audience who may be of different backgrounds has appeared to be overlooked. As more techniques and systems are developed and made

available, presentation patterns specifically for the presentation of architectural knowledge should emerge.

The success of digital architectural resources or publications like the illustrative prototype taking advantage of the internet as a popular means to access digital information, relies on several conditions:

- *The availability of user-friendly technologies* to facilitate the authoring of these digital resour*ces*. The lack of such a system is apparent and has been a considered a hindrance to the production of similar work for publication.

- *The 'standardisation' of content depth or rigour*. A set of guidelines will need to be in place to monitor the quality of content. Beacham, Richard, Hugh Denard, and Franco Niccoucci, for example, are proposing a visualisation standard for heritage work presentation (Beacham, Denard, and Niccoucci 2006). A similar charter should be set up to guide and to ensure a certain depth and quality of information in future architectural publications.

- *User accessibility* which may translate to the standardisation of user interfaces, among many other factors. Recent research into user interfaces and their effects seem to be lacking. Technical issues such as the access speed, transmission of data, system platform, etc, may affect speedier communication and accessibility. This would inevitably impact on the quality of delivery as well.

The success of architectural publications, could be measured by the popularity of its usage or the ultimate impact to architectural design. In their paper, Akin et al. observe that the use of computers has not improved design quality as much as it has succeeded in augmenting the quality of architectural presentation and visualisation.

In order to achieve a possible improvement in design quality, it should again be emphasised that attention should be focused on the presentation of precedent studies. As Akin et al. have noted:

> Masters of architecture, who in the past, served in the design studios of notable schools have been replaced by academics who do not and cannot sustain exceptional design practices. Thus, the student's learning in the design studio is based to a large extent on the understanding of important historical precedents or designs generated by those outside of academia. (Akin et al. 1996, p.123)

It appears that tremendous responsibility has been placed on the teaching faculty as a source of knowledge. In a design discipline like architecture, it would be inexcusable to limit students' exposure to a single source – even if that source was the master himself. With stronger reliance on secondary sources for design knowledge, computers may fill the gap even more by assuming the role of the 'masters'.

The evaluation of design improvement that is especially attributed to the existence of more explicit architectural publications is another issue. The complexities of this kind of evaluation are recognised by Oxman (Oxman 1999). Coupled with the lack of quality materials and methods in the analysis of architecture as also highlighted by Uddin (Uddin 2001), the task of evaluating the outcome of digitally-assisted precedent-based learning is problematic. It would be presumptuous to assume that we could assess the impact that changing architectural publications and presentations would have on the architectural discipline in general and design quality in particular. However, it is equally presumptuous to dismiss this possibility.

Visual media have too long been used as a secondary support to educational texts that attempt to explain buildings. Within the current period of digital transition, visual representations may and should take a

more active, primary role. As Jeff Kowalski in his presentation at *Autodesk World Press Day* notes, "it's easy to see how extending the visual representation of a design extends the reach of understanding" (Kowalski 2007). CAD manufacturers have been largely active in investigating ways to present designs which will help designers show their products to customers. Many of the technologies available now could well be extended and applied to foster a larger role that will link designers and their designs with design students in their educational pursuits. This opportunity is currently still untapped. Could an architect, for example, insert a simple video/audio explaining the rationale for using a certain material for the façade cladding of his building and attach this to his digital drawing which is readily layered with a three-dimensional representation and animation of it? As such, visual architectural documentation would take on a role not only as a construction document and graphical presentation in isolation from other related information as it is now; it could be integrated with other media and be forwarded eventually to students to assist them in understanding the process and thoughts of the designers in that specific project. Learning exactly how an experienced architect design by studying appropriate visuals and explanations may raise a student's awareness of design principles. It may provide stronger basis for their 'reflection in action' in design process and ultimately assist them in forming their own approaches. As a result, this deeper understanding may indirectly affect the quality of students' design work. For the wider public, gaining this understanding may lead to higher demand for quality in design.

6.4 | Future Work Possibilities

There are some immediate further works that might stem from this research project:

1. Extending the dimensions of digital presentation of architectural works could be made at several levels:

- Adding a timeline or frame number would facilitate the referencing and communication of extra information by readers through a web log. Facilitating the addition of commentaries to visuals is also a sub-area to investigate.

- Linking this type of educational material to popular public applications such as Google Earth, where it is currently possible to add only three-dimensional models without detailed explanations.

- A system of presentation may also be derived that could directly extract information from CAD models to facilitate speedier authoring instruments. This will consequently lead to faster and more effective dissemination of information.

2. Akin to the notion of a pattern language in design, as presentation methods or vocabularies of architectural information and analysis delivery develop and are used, there could be observable syntax and patterns and thus grammar to digital delivery and its techniques as well. As explorations continue, we are inadvertently involved in the process of constructing vocabularies of digital presentation methods through which architectural designs could unfold.

3. The educational value of digital presentation works requires a further study, especially in its effect or contribution to the field of architectural education. Assessment of this approach can only be done well when criteria guidelines – which may include content depth or rigour and delivery modes – are clearly established.

4. Tuncer, et. al. note that "the study of important historical precedents or designs plays an important role in design instruction and in the students' design processes. While there is no doubt that the most effective outcome of such a study would be achieved when the student does the entire study him-/herself, students also benefit

from a collaboration with peers, where they form groups to do an analysis of various aspects of a same building or over a group of buildings" (Tunçer, Stouffs, and Sariyildiz 2001a, p.114). The benefit of collaborative learning in enhancing individual learning is also highlighted by David Nicol and Simon Piling (Nicol and Piling 2000, p.17). In the development of future educational materials, peer-assisted learning could also be investigated. Taking digital architectural publications further, they could include, for example, online live forums and chat rooms where users could share findings, opinions and knowledge.

5. In line with the above, considering a viewer's experience might be enhanced through an onsite tour, it might pose a separate opportunity to investigate the possibility for integrating real onsite visitors and those behind the screen equipped with such digital presentation of the building. It may allow a distant learning of experiences through a site viewed from another person's perspective as an added dimension.

6. Further to Oxman's *Think-Map* (Oxman 2004) which is currently largely text-based, a similar operative mechanism could be deployed for visual content. However, more than just structuring data, another step is to further consider the incorporation of controllable elements that have been illustrated in this paper. This not only opens up the opportunity for ease of content contribution, but also for presenting the material in a visually coherent manner.

7. E-learning of architectural precedents has largely been confined to the 'traditional' modes of text and static images. The popular Blackboard application used by educational institutions to post lecture notes, etc could be extended to cater for full-fledged visual presentations. Although visual, graphic-intensive content at present may not be widely accessible through the internet, there is still the

possibility of incorporating such materials through e-learning within specific institutions.

8. As suggested earlier, traditional architectural concept presentations and documentations could be revamped to take advantage of digital presentation possibilities. This would not only assist in ensuring that built structures adhere to the intentions of the designers as much as possible during construction, but it would also facilitate the ready availability of educational materials for learning use.

6.5 | Conclusions

It has been more than a decade since Bermudez raised a similar stance in the use of technology in architectural design and practice: 'Thus an essential issue before us today is how the representational techniques and technologies of the information age do and will affect architecture. Eluding this question means to fall trap in an uncritical utilization of the new tools of depiction' (Bermudez 1995, p.140). However, his argument took the unfortunate turn into trying instead to investigate the simulation of real architectural experience. We need to acknowledge the apparent properties of current architectural representations. Working with those properties, it is now overdue that we should critically assess the approach of delivery techniques, media and technologies in the presentation of architectural information. The stakes and implications may be higher than they first appear.

The community still has vast opportunities ahead in presenting architectural ideas and analysis facilitated by the digital platform. Despite the improvement in the area of digital graphics, unfortunately and ironically, the trace of this improvement has been popularised in the form of printed media. Instead of taking advantage of the digital platform, competition works (like the one shown in the introduction of this thesis), architectural monographs (which are now often prepared digitally), students' presentation and all other similar materials are still

continuously reverted to printed presentations. More ironically still, some of these printed materials are again presented in its digital form as they are disregarding the un-/appropriateness of the media conduits. This is clearly illustrated in most of student portfolio works presented in the SOM Foundation website (S.O.M. 2003). It is interesting to note how this habit forms the acceptance that the two different vehicles – prints and digital – are equal and interchangeable in function, capabilities and influence when they are not.

Admittedly, there are still gaps to be filled by technology to improve the ease of architectural presentations in the third order worthy of the design works they are attempting to deliver. The design of methods of digital delivery including the selection of media and the contextualisation of them is similar to any design process and takes time – process and time which at present are not helped by the lack of user-friendly, comprehensive presentation digital tools.

In summary, this thesis has presented the current performance and issues of available media and explored the audience requirements as far as the delivery of architectural contents is concerned. In the process of achieving the aims of this study, it has also highlighted the current needs:

- To assess architectural publications as an educational instrument in precedent studies primarily in terms of depth and degree of accessibility.

- For architectural publications with explicit information content to decrease the degree of abstraction of used representations and consequently recognise their inevitable role as a substitute for an onsite visit.

- To heighten the role of visual media in such delivery by investigating methods of integrating visual representations well with their textual counterparts.

- For an approach of delivery that redefines the existing ones to address the increasing popularity of presenting on and sourcing information from the digital platform.

There are several main factors that facilitate the gravitation to a greater effectiveness of digital resources for the visualisation of architectural information for education:

- *The availability and acceptance of the technology.* We are still in a period of transition where familiarisation to a particular new system is constantly taking place resulting in some conflicting demands and preferences. This is hinted at from some of the survey participants' answers to the open-ended questions. Technology is still evolving and its direction is often dictated by its use and demand.

- *The availability of content providers or authors who would be willing to explore methods of delivery*. The print mode of delivery possesses technical limitations and the digital counterparts could help in addressing some of these shortcomings.

- *The availability of reliable materials.* Currently, digital content on the internet may be less controlled in its quality than in print publications. However, the platform does facilitate a larger volume or quantity of sources due to the less restrictive nature of its publication. Currently, coupled with the instant access, the quality issues appear to be regarded as an acceptable trade-off. As earlier chapters suggest, a deeper awareness of the subject is imperative to maintain a degree of quality of information acceptable for educational materials.

The proposed techniques of contextualising media presented in the visualisation of *The Arthur and Yvonne Boyd Education Centre* are only meant to suggest different concepts that future digital architectural monographs could investigate. If we understand the position of representations, contrary to the fear that some may instill, we should understand too that the media will not lead to the demise of architecture. The proliferation of efficient delivery methods for architectural information will not only result in the unveiling of many architectural mysteries, but they will also further heighten architectural interest and true appreciation. This has been historically proven by the traditional media. However, a substantially improved presentation of architectural knowledge in visual clarity may further prove a long-awaited revelation to the field – in education and thus practice. As noted in the beginning of the thesis, 'The only way to see it is to see it' – Edward Tufte (Doernberg 1997).

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