DIGITAL MEDIA IN ARCHITECTURE: DIGITAL MEDIA AND INTERACTIVE DESIGN COMMUNICATION SYSTEM IN DESIGN PROCESS FOR ARCHITECTURAL PRACTICES

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Abstract. At present in most architectural practices, the way architectural design is presented involves computer-aided design to describe architecture for different purposes. Digital media has been employed for a creative proposal to achieve efficient communication. Although architects conduct and navigate design information, communication can be more efficient if architects convey exact messages. This paper investigates the way that architects communicate with stakeholders exploring their needs, including in digital media design to suggest new approaches that exploit capability of digital interactive media and networking. There is a clear need for a design process that ensures accurate communication, where both professionals and stakeholders can interact while the architectural design process is in progress. All stakeholders, not just architects need to be able to navigate the process. Finding a communication system through a website or application is recommended for this study.

Keywords. Communication; Design; Architecture; Digital media.

1. Introduction

Architectural practice has been transformed by the advances in hardware and software technologies to the point where both the workflow and the design process are changing rapidly. These technologies have also impacted on the methods of presenting and communicating design work. Currently design work is presented using a combination of 2D and 3D computer generated drawings and rendered images as well as 3D animations. While these tools are useful, they suffer from two major drawbacks. The large number of design packages and tools available makes it impossible for users to communi-
cate the design to each other if they are using different packages. Any attempts to even imagine a “standard” design package for all architects to use is impossible. The second major drawback of current design tools is the inability of non-specialist stakeholders to contribute to any design consultation without time consuming investment in learning these packages. The thesis attempts to address the issue of viable alternative methods of communicating design. The work presented here aims to revisit the conventional methods of communicating the design work between various interested parties in any given design project (specialist designers, clients, other stakeholders etc…). It aims to outline what may become a system that allows the communication of design work and the input from various stakeholders regardless of their ability to use the various design packages used by individual design specialists who input to the design project. The three guiding principles that would inform the development of such a system are: Interaction that allows fast input and feedback, Independence of the system from any particular design software and Inclusivity that allows both specialists and lay persons to use the system.

2. Digital Media in Architecture

In the design process, architects need tools to convey architectural information to stakeholders. The different tools have different purposes, therefore architects are significantly concerned with employing digital media. There is always a combination of architectural presentation tools. Asut (2008) stated digital medium, as a drawing has effectively expressed the architect’s ideas through photo-realistic renders and fly-through animations. Nada (2007) supported that the medium is supposed to enhance the understanding of design. Furthermore, CAD technology was introduced in the mid-1990s and is still useful (Kalay 2004).

Today, many software developers try to improve their products to respond to workflow. Moreover, social media has influenced communication. This paper reviews how existing technology has been employed by architectural practices. It also explores how new digital media not currently used by architects can influence communication so that design can become more life-like. 2D drawing has long been employed and has become a basic tool for communication. CAD has been developed for collaboration and BIM is the significant subject that can capture interaction within architectural practices. Digital media are used for drawing and 3D rendered images which illustrate the designer's idea and design concept. The content is provided from the designer’s perspective and tries to demonstrate the project to the viewer before it has been built. Therefore, the visualisor works hard to get the image as close to realistic as possible. The resulting image is very important to moti-
vate clients (Gueorguiev and Georgieva 2008). Although 3D rendering images have been proven to be a far more efficient tool for communication, it is difficult to communicate information from computers to humans, who lack the intelligence and the ability to interpret messages, unless they are coded in a completely unambiguous manner” (Kalay 2004).

Animation is the most attractive tool for advertising. It can capture the viewer’s attention, and it selects views of the camera that the designer wants to show. Zeinal-Saati et al (2012) describe that architects use moving images to document, and to communicate data and experiences. Those techniques are always included in architectural communication. However, this paper investigates the areas that can contribute to the design process. It explores using all existing tools with new media and seeks opportunity of a new platform. Therefore, this research orients digital media which design from stakeholders’ backgrounds and experiences. Currently architectural presentations done by the architects are based on stakeholders’ opinion. However, knowing stakeholders requirements and allowing them to input their own information would be beneficial in the communication between the architects and the stakeholders.

3. Digital interactive media and networking in architecture

In general, providing interactive media, the designer would know about the audiences and what they require to see in the media. Investigating stakeholders’ working approaches would give significant data to study. However, dealing with lots of information the designer has to make complex data less complicated by structuring, organizing and categorizing and these need the support of design theory (Lowgren and Stolterman 2005). One example is application on a mobile device named iVsit 3D which has introduced a new interactive tool. This tool was developed for architects and designers. It presents virtual world that allows users to view a panorama rendering which users can pan, zoom in or out of, and pull what they seek. The real environment which people can imagine they walking through or flying through in the virtual world is showed in figure 1. The introduction of tools which users can interact with, such as gaming modules can also help user visualise the space and have been developed for multiple platforms. For example, the project of NAVA has employed game engine software to collaborate with engineers and construction workers. According to those involved, “It is easy to take for granted the fact that this type of 3D content is available; video games have been doing this for years already. Developers at NVYVE believe that soon, 3D content will be the new standard across all industries, challenging the perception of what is possible, and redefining the way that we experience, learn, and share”(Simonar 2014). Website is another interac-
tive media discipline and works effectively with networks. The shift of high speed internet and development of networking, social media or storing data via cloud enable people to create opportunities for information management and working globally (Kalay 2004).

![Sequence images show simulate environment, from iVisit 3DS](image)

Literature reviews show that viewers agree that interactive media will be useful for future development. Nevertheless, interactive presentation sometimes is hard to access by other professionals due to limited technological skills. Easy access to media will make presentation are communicated more efficiently. Professionals in built environment work on different software available. Therefore, it would be ideal to work on general software. The file would be displayed through general software such as internet web browsers.

This is the ultimate challenge for this research to find a solution to propose a dynamic communication system for designing interactive media and employing networking to contribute to the design process. However, the new approach would explore technological skill and background experience of stakeholders. In order to achieve this knowing stakeholders’ background is essential as they are media users.

4. Stakeholder interviews

In the design process, there is participation between stakeholders. This paper particularly focuses on key stakeholders in the design process, including architects, engineers, planners and clients. 20 participants were approached and asked how they were traditionally involved and how they would like to
be involved with digital media in the future. Semi-structured interviews were used to enable flexible conversation. This method enables unexpected data to inform up to conversation (Silverman 2005). Moreover, there is an opportunity to identify critical issues by exchanging experiences between the interviewer and the interviewee.

The interview questions are tools for collecting data. They were designed for 4 sets, the same structure but different questions. The questions were developed to identify (1) the participants’ architectural backgrounds and experiences and organisational background to acknowledge the various sizes of the practices and how they communicate within the practice and external communication (2) architectural information that the participants give and seek from design packages (3) experience of using digital media and relevant issues (4) whether or not they employ interactive design media for communication. Consequently, asking stakeholders’ opinions about difficulty in communication seeks the problem to address the contribution of this project eventually will be the possibility of employing interactive media such as website or mobile application to use in communication in the design process.

The data was then analysed and synthesised using a visual experience diagram. These visualisations provided context for understanding to identify problems, benefits and suggestions for interactive communication design (see figure 2, 3).

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Figure 2. Visual experience diagram showing benefits and problem of employing digital media in design communication from stakeholders’ points of view.
Patterns of answers were identified through categorising the data collected. Gaps were identified and show areas for possible solution. For example in figure 3 “showing information” was identified as a suggested improvement by all participants. The lines on the visual experience diagram link “sharing information to all stakeholders”. However, “showing isometric model” is an improvement suggested by only one engineer. Figure 4 shows the numbers of participants who agree with each suggestion. Patterns of data were found which the first is showed what they wanted in presentation package. They wanted to retain drawings, plans, elevations and sections. The second data pattern shows they concerned cost including time, money and ef-
The third data pattern showed stakeholders wanted new technology to enable communication, modeling, rendering, outsourcing and networking. Some key topics emerged:

- Experience has driven requirements and understanding: participants experience architecture from the presentation tool and understand the tool differently. Clients do not quite understand 2D drawings, they prefer 3D perspective. Nevertheless, planners always require 2D drawing. Engineers and architects usually work on both dimensions. Engineers and planning officers have similar requirements and views of understanding graphic and content. This is unlike the architects’ points of views, which focus more on cost, time and skills. Participants’ data included comments about their experiences of using digital media.

- Logistic problem solving: One of the engineers used 3D animation to find the problems of moving the flow of people and luggage in a public project such as an airport project.

- Realistic visualisation: The participants did not think that realistic visualisation was worth including in the design process. They could understand 3D graphic but it could be extra work if the architect does not cost too much.

- Too much detail: Clients and planners explained that sometimes the architect put too much shadow which hid important detail making it difficult to understand the depth of the building.

The answers from participants were extracted from repeated answers, similar experiences. These were unanticipated. The key idea of having interactive media supports author’s proposal. The system was design by considering traditional system and adding the dynamic dimension of interactive media capabilities. The system was inspired by both websites and social media.

5. The proposal of interactive communication platform

This paper particularly focuses on designing a scheme of interactive communication for the design process. Interactive Design Communication Management system (IDCM) is the interactive system that works on internet connections for communication between architects, engineers, planners and clients in design process in architecture. This system has been designed from stakeholders architectural requirements and media users behaviors. Diagrams were sketched and reviewed by the author and architects’ discussions. In order to develop the diagram the author reviewed websites, applications, framework in a wide sense, not solely focusing on the relating to architecture. This was essential to develop IDCM system so that it would become a fully functioning platform for interactive communication in the future.
The IDCM system includes paths and relationships of communication. However, architectural presentation tools themselves are the medium of communication. IDCM provides the structure of system and also recommended types of architectural presentation for each stakeholder depending on their requirements. The design took place in response to the research and as it unfolded. Idea and design for how interactive communication should work base on data analysis so that the design itself was interactive and dynamic. The recommendation of feature of the digital media in communication that supposed to be included in the IDCM system and this to be addressed;

Figure 5. Traditional system of the design process

Figure 6. IDCM system of the design communication process
The IDCM has built on traditional existing communication system. The main different is capability of interactively involving all stakeholders in the design process. This is shown in figure 5 and 6 above. Figure 5 shows the limitation of stakeholder input into the design communication process. Figure 6 shows the gather capacity for stakeholder to interact and contribute to the design communication process. IDCM is a more dynamic communication system and uses the three guiding principles:

**Interaction** allows fast input and feedback. This research developed interactive modelling which users can engage with walk through, rotate, and zoom in and out of to explore the architectural design and understand its complexities design. The interactive model should enable stakeholders to consider the design information by themselves rather than architect pushing all information at them.

Working collaboratively through social media offer people connects people around the world. However, in the built environment we have not found an explicit way of using this advanced technology for communication in the design process. A digital platform to create communication within this context is needed to connect the design process with stakeholders for the whole period of the project. This is also an interactive community within the workflow. The powerful capability of interactive media via internet the network can connect information from all stakeholders. Working on the internet network stakeholders can easily share the idea or information and this was valued by all research stakeholder participants as it significantly affects the workflow. The benefit of this finding is not only sharing the information within the members on the IDCM system, but also be able to share information from other websites.

**Independence** of the system from any particular design software is important. The problem people experience is difficulty of opening files to access the media that professional such as architects send to them. The reason for the problem comes from a lack of technological skill and software available. This issue also happens between professionals such as architects, engineers and planners. Therefore, convenient access is crucial. Solving this issue would involve employing a web browser so that anyone who has web browser application and internet connection can access.

**Inclusivity** allows both specialists and lay persons to use the system. Archiving especially is a focus of this research. In the design process, collaboration among stakeholders is needed to review and solve problems that might occur. The architect needs to change the design and by that time there might be many revisions of design drawings which may be needed for reference. This research focuses on revisions that have been issued and which are used for external collaboration rather than internal communication. The IDCM system tracking of design process so that users can see full history in the ar-
chive when they select a document. Although in the current communication can be accessed but the process is manual not automatic. Therefore, IDCM system would benefit the workflow.

6. Conclusion

In summary this study presents a review of digital media as a tool for communication. Exploring existing tools integrated with internet technology has enabled this study to locate a gap in communication. The study suggests using interactive media with an architectural presentation package where the user can be interactive rather than being passive. Collecting data from stakeholders was necessary to design communication system and media content for the new approach. The systematic analysis identified attributes of interactive media. Consequently, IDCM system was designed to be based on a fully working platform for design communication in the future.

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References