Introducing and Developing Virtual Design Environments: An Effective Platform for Collaborative Design Projects in Academia

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SYNOPSIS

The very nature of design allows for natural implementation of Computer Supported Collaborative Work (CSCW). CSCW can offer many benefits to a discipline that calls for input from various sources. Benefits within education can include the input from geographically separated personnel at different stages of the design process, such as market analysis and detail design.

1 INTRODUCTION

Advancement in the educational arena has been facilitated by various collaborative academic projects. Icon (1) (Institutional Collaboration Over Networks) was a joint design project involving Glasgow University/Glasgow School of Art and Strathclyde University run in June 1997 and investigated the feasibility of design collaboration over the network. The academic institutions were supported by Clyde Virtual University (2) (CVU); a Scottish Higher Education Funding Council (SHEFC) funded online initiative charged with providing multimedia learning materials to students across Scottish Higher Education institutions. Four pairs of students (one from each institution) worked on a common design brief without coming into physical contact. The weeklong project involved only, the use of network technologies, appropriate software and communication tools.

1.1 Aims and Objectives of the Paper

This paper aims to provide a brief appraisal of the structure, findings and conclusions of Icon2, the second in the series of collaborative design projects by the above institutions. Icon2 made use of the Clyde Virtual Design Studio (3) (CVDS).

2 THE CASE STUDY

Icon2 involved the partnership of four pairs of students from each academic institution. Three teams were constrained by the use of network technologies to complete the brief. A control team was also nominated who could meet as they wished and were allowed to use any means of communication with the notable exception of audio and video conferencing. The project

lasted for ten days and a project timeline can be found in figure 1. The project was split into two main phases. Phase 1 comprised a sacrificial project that allowed the students to get used to the technology at the same time as conducting research for phase 2. The required deliverables from this part of the project comprised a Product Design Specification and a Theme Board. Phase 2 started with the presentation of a design brief. This was as follows:

A portable syringe driver is the "Walkman" of the medical services industry. The small, now pocket-sized devices are connected by a thin flexible tube to an intravenous cannula in the patient. The objective of the project is to investigate and propose a new visually, ergonomically and technically advanced appropriate design which meets the complex procedural medical, clinical user and patient demands of such a product.

Each team was to develop a product to meet the brief and to present their chosen concept using a product layout drawing using CAD tools, a rendering/graphic of the product using 3D Studio or a similar package and supporting analysis using appropriate computer tools such as

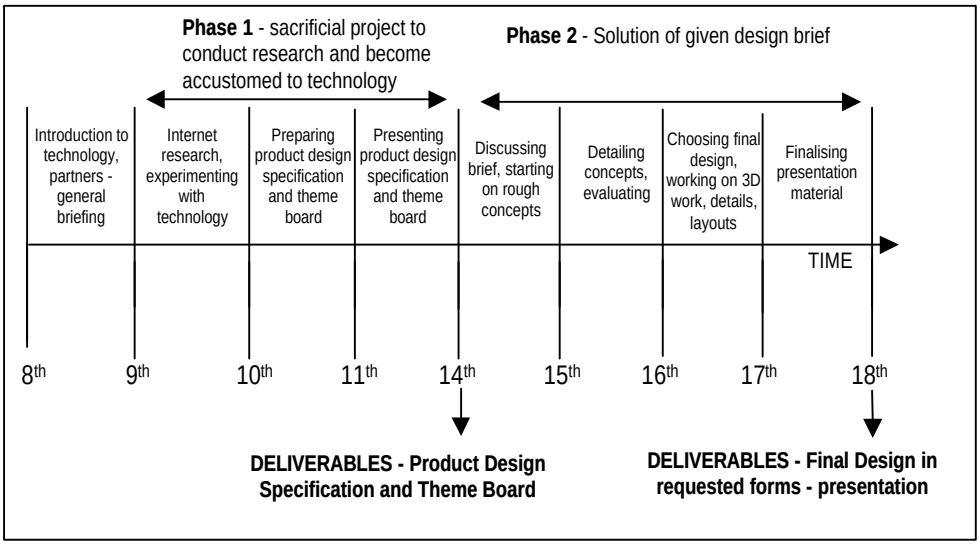

Fig. 1 Project Timeline

PeopleSize and spreadsheets. The Clyde Virtual Design Studio (CVDS) was used as the basis for tackling the brief. The CVDS integrated the set of tools/facilities that were required for the successful completion of the project. The CVDS is split into four areas as follows:

Data Management **Reference Area**
Communications Suite **Local Applications**

A crucial factor in the project was to record as much information as possible. This would then allow for a retrospective analysis, resulting in many (findings) which were not anticipated.

3 FINDINGS

The main report on Icon2 concluded with 51 recommendations (4) for future projects. These recommendations were split into areas such as *Teaching Methodology*, *Design Process* and *Psychological Considerations*. In order to produce these guidelines certain elements were examined in close detail. A cross-section of these is now covered.

3.1 Synchronous v Asynchronous Communication

There is much debate with regards to the effectiveness of synchronous (real-time communication such as the telephone) and asynchronous (communication that involves a time

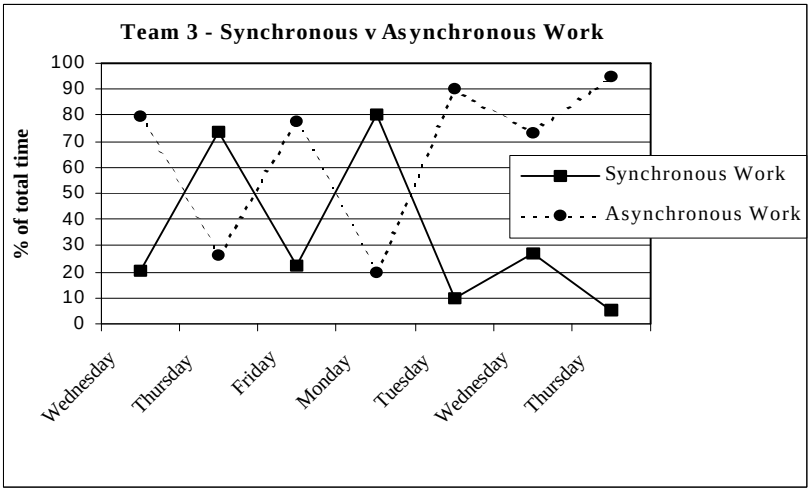

Fig. 2 Team 3 Daily Synchronous/Asynchronous split

lag such as mail) working practices (5). What is clearly evident is that both types of communication are required in projects such as Icon2 where physical contact is either not possible or not desirable. Questions remain regarding which balance maximises benefits. The overall split for all the teams in Icon2 was 68% asynchronous/32% synchronous. The level of synchronous work is relatively high and this was the general trend across the groups. This may be attributed to the fact that the project was of short duration and that the students didn't know one another personally. Therefore, a high level of synchronous work was required in order to make sure that the design was moving in the right direction, especially with tight deadlines looming. Other factors may include the ability of the tools to facilitate synchronous communication and the perseverance of the students, an attitude that was, perhaps, expected of them.

It follows that the next stage in investigating this aspect of the project should involve an investigation to how the combination of synchronous and asynchronous work happened throughout the ten days. Each of the three networked teams displayed very different patterns. Figure 2 shows how team 3 collaborated.

3.2 Tools Usage

It is important to only include tools in the CVDS that are going to be of use. Including ineffective tools will only waste time. The students began by using many tools before adopting their own approach characterised by their own preferences. Figure 3 shows which tools were used the most by all the teams.

3.3 Work Modes and Habits

From examination of the personal log and on-line diaries it became apparent that the participants on the whole, displayed the same work mode at various stages. By examining this it may be possible to maximise benefits and ease teething trouble in future projects. To this end, figure 4 is proposed.

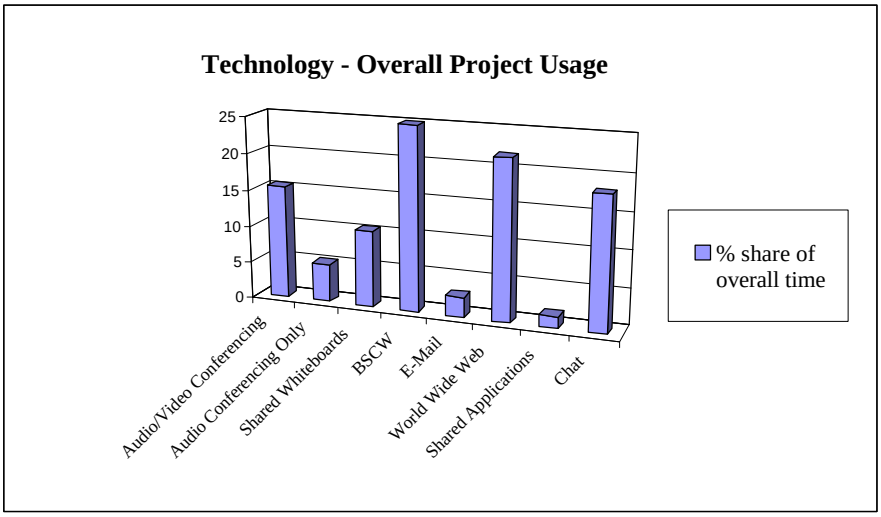

Figure 3 Technology Usage of Icon2 participants

Stage	(1) INDUCTION	(2) FAMILIARISATION	(3) EXPERT
Attitude	Keen	Content	Frustrated/Stressed
Tools Usage	USING A LOT	NARROWING USAGE	WHATEVER APPROPRIATE TO DELIVERSABLES
Attitude to tools	"open to anything"	"open to what works"	"nothing works"
Level of back-up	TOOLS INSTRUCTION NEEDED	SOFTWARE SUPPORT ONLY	MODERATE SOFTWARE SUPPORT

Less Tolerance

Time

Figure 4 Apparent Work-modes and Attitudes during Icon2

This figure is basically a summary of the work practices and attitudes of the Icon2 participants. The students picked up the technology relatively quickly and used only what was useful after a while. Other results included a decrease in the need for technical support although most students agreed that constant support would always be welcomed. One aspect of the model that could be improved is the participants' tendency to become less tolerant as the project goes on. As one evaluator mentioned, " . . . *the more it goes well, the more annoying it is when the odd thing goes wrong."* Certainly, the author's own experiences in the original Icon project included fewer frustrations and more difficulties. These end of project frustrations can be attributed, partly, to the tight time-scale of the project. Additional training and experience of using such a system should result in minimal frustrations and less detraction from the design process. We may not be able to change the fact that participants become less tolerant as the project progresses (this may not be a bad thing, participants will not settle for mediocre performance) but if we can manage the project effectively this may not matter as much. Additionally, other measures such as on-line tutorials may substitute the need for software support.

4 CONCLUSIONS/RECOMMENDATIONS

As mentioned previously the output of the main Icon2 study came in the form of 51 recommendations. It is clear from some of the elements shown here that some of the conclusions include the most useful elements of a Virtual Design Studio, effective approaches

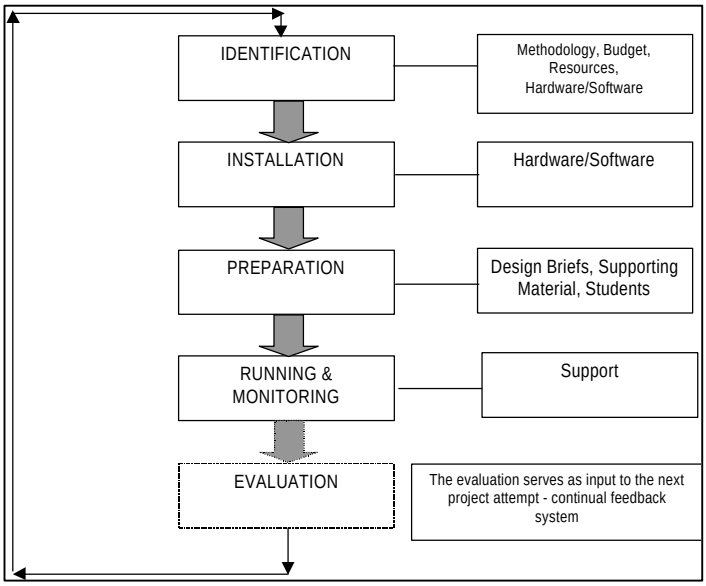

Figure 5 - Recommended approach for future collaborative projects

to project management and an understanding of some of the psychological characteristics associated with virtual design. A crucial part of the set of recommendations included an overall teaching methodology, a model on which approaches to future collaborative virtual design projects in academia could be based to the benefit of all concerned. Another important need was that of *setting up* future projects, ensuring that any preparation is completed as economically and effectively as possible. To this end figure 5 is offered as a guide. It is clear that this, and other such outputs will only be tested thoroughly by future collaborative efforts.

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