

30 Exploration of Extending the Communication Range in the Virtual Design Process

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Computer support for collaborative works (CSCW) and recently investigated virtual design studio (VDS) are reviewed. By involving into two design projects and examining the virtual design process, several technical and procedural problems are notified and discussed. A community reconstruction was proceeded in the second project to help local communities to build their network communication. This paper tries to construct guidelines for future virtual design process and addresses the possibilities of extending the communication range to local communities and users.

1.0 INTRODUCTION

Collaborative works between various territories have been supported by computers for many years and made rapid progress. Computers serve as communication media and shared database required in collaborative works by their integrated user-interface, high-performance computing, and high-capacity memories. By using computers, participants may retrieve necessary information, require for particular data sheet, ask questions, record working logs, and achieve asynchronous communication. The extensive use of computers increases the efficiency of the design process. Lately, the advances of network technology broaden the communication range of collaborative works. Not only condition of same place and synchronous but also condition of different place and asynchronous discussion become available [Maher 1994].

Such kind of collaboration involved some issues of communication in design process. Discussion in the conventional design process is in a manner of face-to-face. However, members of collaborative design teams no longer need to face to each other, they usually meet their team members virtually on computers. To study issues of communication of collaborative design, we involved in two projects: first, Virtual Design Studio 96, held by Hong Kong University, intent to inquiry the questions of cross-culture collaboration; second, Total Reconstructions of Communities, including cultural reconstruction and network construction, which will be executed in local communities of Hsinchu, Taiwan. By examining these cases, two main issues are addressed:

- (1) to form a guideline of collaborative design, and
- (2) to explore a specific approach to extend the range of communication to common users under current technical support.

2.0 COMPUTER-SUPPORTED COLLABORATIVE DESIGN AND DESIGN COMMUNICATION

From architectural design to urban design, design cases become more complex and multi-purposed in function. Individual designers with various background are required to accomplish the whole project. Designers communicate with each other to discuss questions of various fields and design concepts to fulfill the goals. Design can be seen as a discipline of constructing complex models [Peng 1994] which contains concept models, physical models, working models according to individual domains, and model space produced in the communication process. All participants will share their information among these model spaces. By means of such sharing activities, the co-operation between different disciplines and different designers becomes possible. The abilities of computers make shared spaces explicit, such as 3D models, images, database, and bulletin board system, in order that participants can provide and share design information more conveniently.

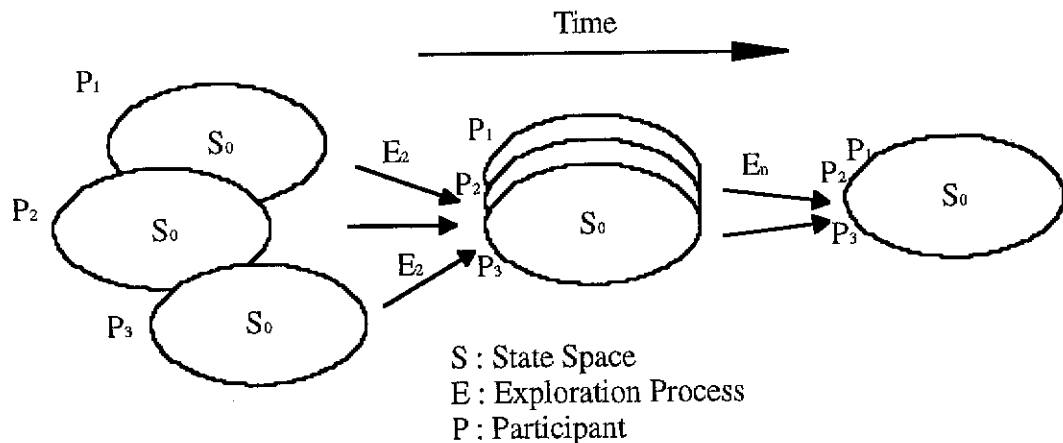


Figure. 1 Model of Shared Understanding

Design projects require a collaboration of individuals and a coordination of information and tasks. Computers support for design has been developed to support a single user through a graphical interface and project teams through distributed data [Maher 1994]. Communication appears to form collaboration and share mutual information. Communication between designers and clients/users is the most important issue in the design process.

3.0 DESIGN PROCESS IN VIRTUAL DESIGN STUDIO

Virtual Design Studio (VDS) is the recent research of collaborative design, which has taken places in major institutions around the world. Distributed teams can work together via network communication to approach design projects [Chiu 1995]. The noticeable achievements of VDS are the co-operation of institutions and the combination of cross-cultural styles. On-line talking, E-mail system, real-time video conference, distributed database, FTP service, and world-wide web are the main technical facilities used by VDS. Though these network services are already used separately for several years, some problems have been happening when they are combined together.

VDS 96, held by Hong Kong University (HKU), University of British Columbia (UBC), Cornell University (CU), Massachusetts Institute of Technology (MIT), and National Chiao-Tung University (NCTU), was take place in February and March 1996. The topic of VDS 96 is the international competition of "Monument for 1997." We have found several new problems on preparing and performing collaboration and treated them as technical and procedural problems.

3.1 Technical Problems

The technical problem comes from the limitation of network communication. In the case of using ISDN teleconferencing, most communication demands are different. Technicians must know the transmission protocol, type of switch software, and video conference software to be used. Though there are kinds of integrated solutions, for example PictureTel, for video conference can be rented from telephone companies and do solve the technical problems. The expensive costs of long distance communication are still the main reasons that makes widely use of ISDN difficult. As for the network video conference via Internet, the facts of almost free of charge and identical communication protocol encourage people to use it. On the other hand, the limitation of network bandwidth is the worst effect to real-time transmissions. Most of the countries in Europe and North America are already or undertaking plans of upgrading the primary network bandwidth to T3 or ISDN standard. However, countries in other continents are not that lucky. In Taiwan, for example, central pathway of the island is T3 cable and the connection between universities and colleges are T1 cables. Most companies and organizations, however, only have 64K of transmission rate or even below. Only few families can afford ISDN lines. Moreover, there are only two T1 lines to US that bears the heavy transmissions from the whole island! These problems are not only caused by the rapid improvement of network services, but also by the construction of communication that can't meet the need.

3.2 Procedural Problems

The procedural problem contains coordination and methodological problems. Coordinate problems are related to the coordinators and directors, and methodological problems are related to all members of collaborative projects.

3.2.1 Coordination Problems

Coordinators and directors are the most important persons on controlling the procedure of collaborative projects. They are in charge of the following noticeable tasks:

(1) Time difference:

Participants may live in different countries, that is, possibly in different timezone. If it does, the time difference is a primary problem in the collaborative process. In planing the schedules of video conference, coordinators should consider the time difference for each participants. Make sure to inform each one by asynchronous media like E-mail before meeting. That is, use asynchronous communication to arrange synchronous communication to match each one's time.

(2) Schedule:

A detailed schedule that lists specific beginning and ending date for the project will help members to know their progress. It also plays a role to urged members to achieve their jobs.

(3) Pre-training:

We've found that almost half of the participants are not familiar with the tools we use to communicate. It will cause the participants frustrated by use of communication tools. Then, some members would reluctantly to communicate with others. Such situations mostly happened on synchronous, hard-to-use tools like real-time talk and video-conference applications. So good pre-training for all participants should greatly help collaborative works.

3.2.2 Methodological Problems

During the process of the collaborative projects, several methods could be used to enhance the co-operation between participants. Both coordinators/directors and participants should know the importance and influences of these issues:

(1) Selection and using of communication media:

Due to the limitation of network bandwidth, conferencing tool with high compression rate in data transmission is better than high-quality but high-bandwidth required tools. However, to accomplish face-to-face high-quality teleconferencing, high-end integrated teleconferencing systems with ISDN connection is worth to consider for short term needs. Beyond the estimation of communication costs, the ability of multimedia representation is required to offer participants various choices of presentation. Of course, taking good use of every communication tool is better than asking for a multi-function application. We don't know when the ideal communication tools will be developed to satisfy our needs, but it's important for now to seek a solution for temporary facilities.

(2) Interaction between participants and coordinators:

A coordinator in a collaboration team is as important as a project leader. The coordinator is in charge of the arrangements of meeting schedule, appointments of jobs, technical instruction, and supervising the progress of a team. Interaction between participants and coordinators is required to ensure the progress of a project. By a good interaction, the coordinator can easily handle the whole tasks and movements of each member; and individuals will acquire more helpful instructions from the coordinator.

(3) Interaction among participants:

Naturally, interaction among individuals is our main concern in collaboration activities. Most of the participants of VDS would be students or designers. They're likely to present personal points of view and cultural backgrounds into their works and discussions. With the same reason, they may disagree with each other's opinion. Communication of design concepts through external design representations is difficult when the communication partners come from different workplace culture [Ostwald 1995]. Each individual should learn to accept others' ideas and to discuss them.

Issues of design process discussed above should be the important references on planning successful collaborative works, especially in virtual design studio. There is no indispensable item for all cases, since the conditions of each case are various.

4.0 EXTENDING THE COMMUNICATION RANGE

In the present, research regarding virtual design process takes places in institutions due to the limitation of resources and facilities. There is no application for real "users," meaning residents of communities. We learned by empirical studies that unexpected problems will happen in the accomplishment of virtual design process [Kalay 1995]. For such reason, we proposed to extend the approach to practical design projects which happened in several community activities. The information and experiences of VDS will be introduced to the communities. Lots of college students and researchers will help the residents of communities to construct their network communication.

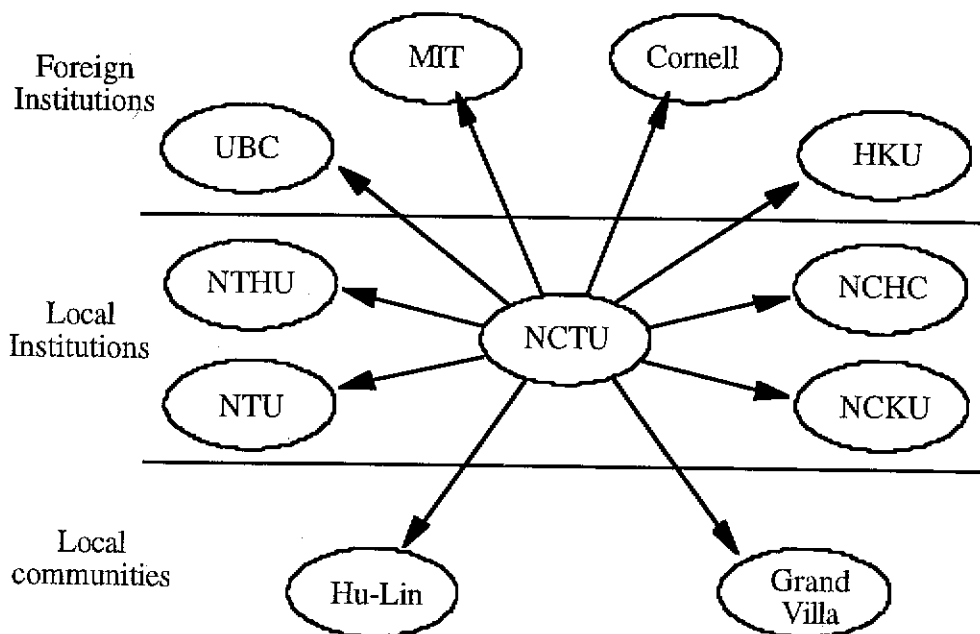


Figure 2. Extend Communication Range of Virtual Design Studio

In the first community, Hu-Lin, which is a traditional community of crafts production of colored glaze. Due to the lack of the activity center in community, local government plans to rebuild a discarded primary school into the center for community activity and demonstration center of colored glaze. Besides, a video-conferencing system and world-wide web service were also built for cross-community information exchange.

In the second community, National Grand Villa, which is a newly constructed community, most of the residents are engaged in technology-related career, teachers or government administrators. The community is an orderliness, systematic management, and active community. However, though National Grand Villa is an advanced community among other conventional communities, there is no high-

technology applications in their daily life. The most effective and rapid improvement is to construct a local network system and connect to Internet for information sharing. Basic structure of the current plan is a local area network connected through each floor, and gathered into a central control system. The network line is ISDN or T1 cable to provide high bandwidth. Another construction is a video-conferencing system in the activity center like Hu-Lin community has.

These two projects are under execution. The network connection, video-conferencing reflector and network services, like BBS and WWW, are built and managed by Architectural Studio of Chiao-Tung University. That is, the Architectural Studio is the information exchanger and maintainer for these communities. The main issue we're interesting in is the communication between community residents and the studio members. We'd like to study the difference between college-to-college and college-to-community collaborations. The goal of this paper is to approach the possibilities of extending the communication range of virtual design process. Network constructions of these two communities will be accomplished by June 1996. The complete paper of this research will be done by July and further report of these projects will be published in the end of this year. To widely-use network among communities, Architecture Studio of National Chiao-Tung University and Hsinchu Cultural Center will lead the entire project to apply to other communities in Hsinchu.

5.0 CONCLUSION

A noticeable contribution of this paper is to point out the relation between the virtual design process and the communication range. This paper proposes a framework of guidelines to clarify the virtual design process and intends to classify the whole processes. Virtual design process is still an "ill-defined" development in which various approaches can be followed. By involving into local community reconstruction projects, this paper will examine the process to extend the communication range from college-to-college to college-to-community and will make some discussion for further study. After constructing the network, these two communities will connect to the Internet and will establish communications between them to share their activities and information.

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