



## COLLABORATIVE DESIGN COMMUNICATION: THE INTERNET AS A PROJECT MANAGEMENT TOOL

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Published in *DesignIntelligence*, September 15, 1998

Collaboration is central to the practice of architecture, although some popularized fictions of design have built powerful images to the contrary. Many the architect has noted that project quality improves from better collaboration - indeed, as Kathryn Anthony reported in *Design Juries on Trial*, Charles Moore went further and reminds us that "Rejecting any sort of attitudes of secrecy or doing work in isolation is important. And speaking out against the attitudes in *The Fountainhead* every chance one gets is important."

The commissioning of projects in distant places is not new. At the turn of the last century, Edwin Lutyens successfully ran a practice in London that built not insignificant projects in South Africa and India. As more practices expand to work outside commutable distances and as specialist consultants from afar become a norm, the need for better communications will become more crucial. Increasingly, practices collaborate closely on projects with team members in distant time zones. No one today is willing to put up with Lutyen's norm of a two-month turn-around in project communications. Our options for communication for design collaboration today are numerous and varied but the choice of technologies is not clear. Indeed, the marketing enthusiasm surrounding the issues make decisions difficult to make. Since Lutyens' time, we have been fortunate to have access to telephones. Simple but limited in their capabilities, these devices have changed the nature of practice. Authorities and responsibilities have broadened within a project team in ways that could not have occurred if team members could not be reached easily at their desks. Now that phones are no longer tied to location, some practices are finding the allocations of responsibilities change again, sometimes being re-concentrated to those now constantly accessible, other times redistributed to those previously inaccessible.

Recent developments in the Internet and computing have created new opportunities for the execution of projects and several practices are now taking advantage of these new tools to increase collaboration. Some see this as a substantial and revolutionary shift in the way we will practice in the future. No longer is information tied by location or time; no longer are you limited in accessing information by your ability to contact someone during times convenient to them. Some practices have Web pages on which project monitoring information is readily and constantly available to appropriate members of the project team, including the client, the consultants, and project staff. These pages show financial data, have video camera links to the site to monitor progress, and have bulletin board discussions of project progress.

Everyone on the team can be informed of the project at the individual's own convenience, as often as they need.

These uses of the Web are comparatively straightforward and are proving to be of high value. One of the most challenging and potentially more beneficial developments in network communication is the ability to bring together the members of a project design wherever they are. With the development of computer-based video conferencing systems and Internet telephone tools, it is suggested that project teams will be freed from their desks. A project manager can call up the office and together resolve a design problem which had been discovered while on a site visit, even if that site visit is 3,000 miles from the office.

These capabilities are not only limited to professional practice settings. Architecture schools are taking them up rapidly. The first collaborative design studios with multiple schools participating were held in 1993 between Harvard University, Hong Kong University, and the University of British Columbia. Today, it is a common event, and there are many schools that include virtual design studios as part of the curriculum. Virtual universities exist too; students "meet" on the Internet with the faculty members typically unaware of the real location of any member of the class. Just what technology is needed to make this a reality? Is it expensive? Can it be used for design collaboration?

Since the 1960's AT&T has been trying to persuade us that videophones are the way to go; grandma just can't live without the grandchildren, and your boss just can't live without seeing your face. Although the early desktop systems never succeeded, room-based systems such as Picturitel have been developed and are now commonly available with large screens and fairly good sound quality. For example, a one hour video-conference call from the U.S. to Hong Kong (including all room and line charges) is about \$870. Two problems with these telephone-based video conferencing systems are their transportability and their cost. When you are on site, Picturitel is not an option. If you are planning to use the connections for extensive collaboration, the cost is a major problem.

If you are willing to go down-scale and use a computer-based video system, there are cheaper alternatives. All you need is a telephone line to your Internet Service Provider (ISP) and you are in business. Establishing an account is not expensive; most ISPs in the U.S. now offer access from around \$20 per month. The quality of your connection, however, can be much influenced by the way you connect to it, and there are some important technological developments being made at the moment.

Most people can get access using a high-speed (56kbps) modem on a telephone line. Priced at around \$100, these modems are able to give you access to the Web with reasonable immediacy. It is not unusual to have voice and image disconnected by up to a minute when using these systems over busy networks. Better access can be had over cable modems, ISDN lines, or digital subscriber lines (DSL). As the access improves, the cost escalates. Cable modems are typically rented for \$30 per month (if you have a cable hookup). Cable companies will talk about access speeds of 3 megabits per second (3 mbps), but you are likely to find it is really around 96kbp.

ISDN takes the cost up higher. Lines cost \$75 to \$125 per month; ISDN modems cost \$200 to \$500 to purchase. Access on these lines is 56kbps to 128kbps, depending on the connection. In some phone company territories, ISDN is very well supported and inexpensive; others will make it virtually impossible for you to have a connection made to your office.

A new technology may replace ISDN. Digital Subscriber Lines (DSL) are being widely tested and have the backing of many technology and Internet companies. DSL modems can be purchased for \$500 and the monthly line fee then costs between \$30 to \$300, depending on where you live and how many lines you need (businesses will need more than one line). Higher speed access to networks means more data can be pushed back and forth between users in the same time. This higher transmission is called higher bandwidth.

What these prices show is that high speed access is possible and increasingly affordable. Will all this access bring you into the world of digital design studios? What we are finding is that functionality of video conferencing has not improved much since the first videophones. Video images are very demanding of bandwidth, consisting as they do of a large amount of data in even a small image. As the video image gets bigger than a postage stamp, the amount of digital data being transmitted escalates dramatically. Audio transmission is a little better, the files being somewhat smaller. Commercial video-conferencing links use two high-bandwidth (128k) ISDN lines just to support the audio and video feeds; computer connections require extra lines. Even then, the video image is grainy and periodically falls out of synchrony with the audio feed.

In addition to video and audio, designers have to use other tools. At its simplest, drawings can be shared either by sending CAD files back and forth. Several CAD packages are now coming out with sophisticated database tools to track multiple users sharing drawings simultaneously, with the database system ensuring that no one overwrites files from someone else. Some of these tools will even help in coordination and data verification. If you want to draw on the same drawing, you have the option of using a whiteboard (a crude paint program) or tools like Timbuktu which allow a user to control a remote

system. These drawing tools can be used to supplement the audio, video or typed discussions.

All is not lost if you don't have multiple ISDN lines. While it is easy to assume that designers working together across a network need to make it seem like they are in the same place, research in a variety of settings has found that this is not the case. What we are finding through a number of research projects is that designers working together don't need to see each other to have effective communication. Almost every study I have reviewed (and these are many) concludes that the finished design product where there has been no video communication is no different to that when there has been video communication. Some studies go even further: If the participants can only type messages back and forth in a chat window, the resulting designs are indistinguishable from those completed using audio and video connections (and in some instances, better).

This tells us that we don't need to wait for high bandwidth connections to start designing together over the Net. Indeed, what seems to be the really critical factor is how good the participants are in design. If they are good at what they do, they can conclude a successful collaboration with even just e-mail, that is, with only asynchronous communication. The only major benefit of video-based collaborations is in appreciation; those with video appear to enjoy the process of communication more than those without, but even then only if the video is real time and there are no time lags experienced. As soon as even the slightest time lags appear, the value of the connection drops away quickly. Whether this translates into better designs over time is highly speculative.

In some instances the video connection is used not to communicate specific information but provides the ambient visuals to make the context more friendly. You may find it interesting to know whether it is daylight or night at the remote location. You might find it useful to be able to look and see if someone is sitting at the desk in the remote location before you start typing your chat message. For these uses, the video can be a very small image and infrequently updated. When the designing starts, the video does not contribute to the communication in any way.

So, if you want to take your office into the next level of net-based practice, don't be held back by bandwidth. Instead of investing in video telephony over the net, invest in good staff. The higher costs of videophone links will probably not bring you any immediate benefits.