12-1-1995

An Investigation of alternative communication methods to face to face interaction between design and client

Tanya Friedman

An Investigation of Alternative Communication Methods to Face to Face Interaction Between Designer and Client Throughout the Design Approval Process

by

Tanya Corinne Friedman

A thesis project submitted in partial fulfillment of the requirements for the degree of Master of Science in the School of Printing Management and Sciences in the College of Imaging Arts and Sciences of the Rochester Institute of Technology

December, 1995

Thesis Advisor: Professor A'isha Ajayi

An Investigation of Alternative Communication Methods to Face to Face Interaction Between Designer and Client Throughout the Design Approval Process

---

December 1995

Acknowledgements

I would like to thank the following people for their support and assistance with this project.

Professor A'isha Ajayi
Michelle Berger
Jill Clayman
Erika Dodge
Tom Finnie
My family
Ewa Skarbinski
Audrey Sumberg
survey respondents
Calvin Viele

Table of Contents

List of Figures

List of Acronyms and Abbreviations

ACK . . . . . .positive acknowledgement
API . . . . . .application programming interfaces
ARPANET . .Advanced Research Project Agency Net
ARQ . . . . . .automatic repeat request
ASCII . . . . . .american standard code for information interchange
ATM . . . . . .Adobe Type Manager or asynchronous transfer mode
AT&T . . . . . .American Telephone & Telegraph
B-ISDN . . . . .basic rate integrated-service digital network
Bps . . . . . .bits per second
BTF . . . . . .binary transfer file
CCD . . . . . .charged couple device
CCITT . . . . .Consultative Committee on International Telegraph and Telephone
CIF . . . . . .common intermediate format
CMYK . . . . .cyan, magenta, yellow, and black
CPU . . . . . .central processing unit
CRC . . . . . .cyclical redundancy check
CVS . . . . . .composite video signal
DES . . . . . .data encryption standard
Dpi . . . . . .dots per inch
EPS . . . . . .encapsulated postscript file
FCIF . . . . . .full intermediate format
FDDI . . . . . .fiber distributed data interface
FTP . . . . . .file transfer protocol or program
Hz . . . . . .cycles per seconds/hertz
IBM . . . . . .International Business Machine
IMX . . . . . .inverse multiplexing
ISDN . . . . . .integrated-service digital network
ITCA . . . . . .International Teleconferencing Association
ITU . . . . . .International Telecommunication Union
JPEG . . . . . .Joint Photographic Experts Group
LAN . . . . . .local area network
LED . . . . . .light-emitting diodes
LZW . . . . . .Lempel-Ziv-Welch
MCI . . . . . .Microwave Communications Incorporated

MCU . . . . . .multiple conferencing unit
MNP . . . . . .Microcom Network Protocol
MNP 4 . . . . .Microcom Network Protocol error correction
MNP 5 . . . . .Microcom Network Protocol data compression
NAK . . . . . .request a retransmission
NTSC . . . . . .National Television Standards Committee
OCR . . . . . .optical character recognition
PDF . . . . . .portable document format
PIP . . . . . .picture-to-picture
PPP . . . . . .point-to-point protocol
PRI-ISDN . . .primary rate integrated-service digital network
QCIF . . . . . .quarter intermediate format
RAM . . . . . .random access memory
RGB . . . . . .red, green, and blue
RSA . . . . . .Rivet, Shamir, and Adleman
SLIP . . . . . .serial line internet protocol
TAT . . . . . .transatlantic cable
TCP/IP . . . . .transmission control protocol internetworking protocol
VCR . . . . . .video camera recorder
V.32 . . . . . .9600bps
V.32bis 14,400bps
V.34 . . . . . .28,800bps, also termed V.fast
V.32 . . . . . .56,000bps
V.42 . . . . . .error-correction standard
V.42bis . . . . .4-to-1 compression
V.FC . . . . . .V.fast or V.34 class 28,000bps
V.fast . . . . . .V.FC or V.34 class
YCC . . . . . .luminance, chrominance, chrominance
WAN . . . . . .wide area network

Abstract

As technology becomes increasingly more sophisticated, means and demand for digital communication are increasing. The geographical expansion of the business world has made communication alternatives critical to working together more effectively. Face to face meetings may not be possible or the most cost and time efficient approach. Also, there is a move towards working at home, telecommuting, by using electronic communication for interaction (Fitzgerald 1993). Thus, electronic correspondence is becoming essential and we are witnessing a move towards higher performance and potential for communication alternatives. Knowing the options and their appropriateness is a competitive advantage. "In a information society dominated by computers and communications, value is increased by knowledge, as well as by the speed of movement of that knowledge." (Fitzgerald 1994).

Graphic designers rely on strong communication with their clients. Clients' needs must be expressed to the designer and designer's solutions must be communicated for approval. This process is repeated at several stages: initial, revision, and final. Traditionally, when face to face meetings were not feasible, comprehensives were mailed to the client. With the current move towards electronic communication, mail carriers' manual transportation are slower and possibly more expensive than electronic correspondence. With technology today, electronic correspondence may also include interactivity, voice, and video.

The purpose of this thesis is to investigate alternative methods to face to face interaction between designer and client throughout the design approval process. The goal being to determine the appropriateness of each transmission application for information interchange of different kind of images and at different stages of the approval process. Appropriateness was to be determined by equipment, economic and time factors, interoperability, security, and aesthetic and communication quality.

Facsimile technology, Adobe Acrobat's portable document formal files, the Internet, and videoconferencing were the vehicles analyzed as an electronic correspondence alternatives to face to face interaction. The vehicles were tested in two parts, through survey and actual transactions with graphic designers. Participants were provided questionnaires to evaluate and compare the visual and non visual aspects of each vehicle.

This thesis did not test specific software or hardware, but rather the validity of the technique for interaction and transmission of data between designer and client throughout the design approval process. The test was in two parts. The first part was a survey sampling of 100 design sites, design firms and advertising agencies, to derive quantitative information on each transmission vehicle Based on the assessment of the appropriateness of each vehicle, determined by survey response in conjunction with background research, Facsimile

technology, Adobe Acrobat, and videoconferencing were deemed appropriate for further testing. The Internet was deemed inappropriate. Three design sites were involved in comparing facsimile technology and PDF files to dye sublimation hardcopy prints. A videoconference was donated, conducted, and videotaped. Participants were asked to evaluate and compare visual and nonvisual aspects of the transmitted comprehensives.

The conclusion of this thesis project is that the technology is here to use for electronic alternatives to face to face interaction between clients. Some adjustments have to be made, though, before these technologies can be embraced completely.

Electronic alternatives are not qualified for final approval because of lack of precision in color, lack of demonstrating production or finishing operations, and the quality of typography on monitors are extremely low causing the aesthetic quality to be extremely diminished.

Second, the designers selected hardcopy as the best option for communicating the tested designs. This indicates the community is not ready to embrace electronic alternatives. This may be due to a lacking of advantage of the electronic option to deem them necessary and/or lack of comfortability with the electronic alternatives. Either reason, electronic alternatives to face to face interaction between client and designer is not, currently, being fully accepted.

As for the vehicles themselves, Adobe Acrobat was found to be a very appropriate product to use between designer and client to communicate design comprehensives for initial and revision stages. Facsimile transmissions are appropriate for initial comprehensives or for revisions of comprehensives already seen at higher quality by the client. The Internet is presently not appropriate for private one-to-one file transfer between client and designer. Its strengths do not outweigh its risks. Videoconferencing is electronic correspondence, not file transfer. It can be used in combination with mail carrier service and file transfer or alone. If the client has been sent appropriate final proofs and the conference is used for verbal and visual communication, it is appropriate for all stages. If the final proof has not been sent, it is very appropriate for initial and revision stages.

In comparison to mail carriers, all electronic options transmission times were significantly faster. All transmissions were under a hour. Additionally, all alternatives except videoconferencing, were less expensive.

Chapter One
Introduction

The Statement of Problem

Graphic designers rely on strong communication with their clients. Clients' needs must be expressed to the designer and designer's solutions must be communicated for approval. This process is repeated at several stages: initial, revision, and final. Traditionally, when face to face meetings were not feasible, comprehensives were mailed to the client. With the current move towards electronic communication, mail carriers' manual transportation are slower and possibly more expensive than electronic correspondence.

Desktop computers and page layout programs have become powerful and prevalent tools in the design industry. Therefore, design comprehensives are being produced as electronic files. It is plausible, then, to correspond electronically at various stages of the approval process.

Today, electronic correspondence is not limited to static transmissions. Interactivity, voice, and video may be included. Facsimile technology is a basic form of electronic file transfer; the availability and inexpensiveness of the technology has made facsimile a commonplace business tool (Wiggins 1995). "Today it is estimated that one-fourth of all business telephone calls carry a fax transmission." (Wiggins 1995). Adobe Acrobat's portable document format files (PDF) allow a higher level of sophistication by providing tools to add interactivity to documents at a higher resolution than fax files (Mitchell 1995). Videoconferencing incorporates video and audio, in real-time, to make a live electronic meeting for groups of participants. The Internet is a global network offering national and international electronic connections in seconds with only an address. File transfer between computers was the founding idea behind the Internet. What is the appropriateness of these options in comparison to each other and mail services?

The purpose of this thesis is the investigation of facsimile, Acrobat's portable document format files, the Internet, and videoconferencing as alternative methods to face to face interaction between designer and client throughout the design approval process. If deemed appropriate for electronic correspondence between designers and their client, the application will be tested. Appropriateness will be determined by equipment, economic and time factors, interoperability, security, and aesthetic and communication quality. Data transmission theories are explained in Chapter Three so that the various transmission medias are understandable regardless of previous knowledge in the area.

Reasons for Interest

As technology becomes increasingly more sophisticated, means and demand for digital communication are increasing. The demand has been fueled by the geographical expansion

of the business world. National and international affiliations are common practice today and new means of communication are critical to working together more effectively. Face to face meetings may not be possible or the most cost and time efficient approach (Abbott 1994). Also, there is a move towards working at home, or telecommuting, by using electronic communication for interaction (Fitzgerald 1993). Thus, electronic correspondence is becoming essential and we are witnessing a movement towards higher performance and potential for communication alternatives. Knowing the options and their appropriateness is a competitive advantage. "In a information society dominated by computers and communications, value is increased by knowledge, as well as by the speed of movement of that knowledge." (Fitzgerald 1994).

The author is interested in this subject because of the implication information technology will have on correspondence in the graphic design industry. Today's technology has produced the ability to electronically correspond in several applications. The author believes an investigation of these applications is important so that there is an understanding of how to evaluate these exciting options. This will help in determining the appropriateness of today's technologies and a basis to understand future applications.

Background Theory

Applying Adobe Acrobat to Design Comprehensives

One problem with the transfer of electronic files is when the receiver has a different computer platform or does not have the originating program to open up the proprietary file. Postscript was suppose to solve many of the problems of cross platform capability with high quality output. It did not completely succeed. Portable document format files are another solution to solve this problem.

Interoperability

Adobe Systems Inc. portable document format file software is the Acrobat group of programs: Acrobat Exchange, Acrobat Distiller, and Acrobat Reader. Any file can be converted into PDF documents, which can be read on any computer with Acrobat Reader. There are Macintosh and Windows versions. Adobe is trying to make PDF format a de facto standard for file conversion by encouraging third-party software developers to work with PDF files. Application Programming Interfaces (API) are allowing developers to create additional functionality for Acrobat. For example, the inclusion of Verity's search engine allows full-text searches of PDF files. This contributes to Acrobat functionality and encourages PDF files to be used for other applications, such as the Internet. The search engine helps in indexing and navigating on the Internet (Rodriguez 1994). Second, Adobe is promoting PDF files' widespread use by contracting Acrobat usage. Currently, Spyglass is creating an

Acrobat-enabled Enhanced Mosaic, to enable browsers of World Wide Web to automatically launch Acrobat Reader when a PDF file is being viewed. Additionally, Apple Inc. has agreed to include Acrobat Reader with new Macintoshes (Seybold 1994). Aldus Freehand and Illustrator announce PDF will be their file interchange format (MacWeek 1994)

Acrobat is not the only option for portable files software. No Hands Software's Common Ground 2.0, Novell's WordPerfect Envoy, and Farallon's Replica are other software programs offering portable files. This thesis is not concerned with comparing software, but the validity of using portable files. Adobe Acrobat has been chosen for Adobe's reputation and the support Adobe is establishing for its product.

Adobe has developed the Acrobat line with the idea of multiple accessing of files. One copy of Acrobat Distiller on a network can support hundreds of users. Adobe Reader's Macintosh and Window 2.0 version and Unix and Dos 1.0 version are in the public domain and, consequently, allow designers to communicate with clients on different platforms. API Trapeze, by Crosswise, allows two Macintoshes to work on the same PDF file at one time through either phone lines or AppleTalk (Seybold 1994). Thus, a form of interactive document conferencing is possible. "Collating notes option" allows all posted notes to be copied into a separate file for review. Name, time, date, and page location of the notes are listed. Color, font, and text can be systematized to distinguish specific people. As notes are changed, they are updated inside the document.

Features of Acrobat Exchange

Acrobat Exchange creates additional features to the PDF files: bookmarks, hypertext links, posted notes, password security options, customized views, and text searching capabilities. The hypertext links make interactive connections to other parts of the file, other documents, or to launch a presentation. Through a combination of these options, value can be added to files by presenting information in a dynamic, sophisticated way: designed for specific navigation and priority, connected by links and bookmarks to external documents or applications, structured for comments, and secured by receiver restriction. The security options for Exchange allow the creator to limit whether the reader can print, change the document, select text and graphics, or add or change notes, thus, maintaining control of the document with the creator. Adobe is working with RSA Encryption to secure PDF files during transmission (http://www.rsa.com 1995). An online, detailed help documentation is supplied within the program to assist in customizing files.

Features of Acrobat Distiller and the PDF Writer

The main issues of PDF file conversion are how well PDF files represent original files, font replication, files size, and the color quality. In Jeffrey Sullivan's review on Acrobat 2.0, he writes, "The compatibility was outstanding with essentially flawless reproductions of our

original work in all cases." (Sullivan 1994). Acrobat Distiller and the PDF Writer, from Acrobat Exchange, generate PDF documents. Distiller is used for higher complex files such as postscript files with encapsulated postscript images (EPS). Type 1, TrueType, and Multiple Master fonts can be embedded into files created by PDF Writer. Distiller embeds Type 1 fonts and creates Type 1 versions of TrueType and multiple masters fonts. With either program, Adobe claims that the designer of a PDF file, if they select to embed fonts, does not have to worry about displaying or printing the file at the receiving site (Adobe Systems 1994). Any font available in Adobe Type Library is permissible to embed without additional permission (Adobe Systems 1994).

With regards to compression, both PDF Writer and Distiller allow for various options. The difference is that Distiller will permit color, grayscale, and monochrome pictures to be compressed differently. JPEG, LZW, CCITT Group 3, CCITT Group 4, and Run Length are meant for different kinds of images and are explained in the online help (refer to chapter two). PDF Writer does not allow the distinction for color and grayscale images; they are compressed the same way. Another option is to compress each file individually in Adobe Photoshop before assembly and conversion in Acrobat.

Compression is important for file size. When transmitting, file size makes a tremendous difference in time spent. PDF files are already smaller than Postscript files. PDF files are defaulted to 8-bit binary files because electronic transfer and network programs may corrupt ASCII PDF files making them unreadable to the viewer (Adobe Systems 1994). American Standard Code for Information Interchange (ASCII) code is the rawest form of text files because there is no platform or software formatting associated with these files. Therefore, they can be opened on any computer. Further compression needs to be figured in accordance to a soft proof on receiver's monitors, 72 dots per inch (dpi), or for a hard proof at an acceptable dpi for the receiver's printer.

QuarkXPress and PageMaker have developed print drivers to create color and customized files not able to be generated by standard printer drivers. These postscript files are created by selecting the Distiller driver option within the program. Adobe adds device-independent color information to red, green, and blue (RGB) files and grayscale to Acrobat, but there are no control settings for specification.

Economic Factors

The cost of using PDF files entails three expenses: cost of software, cost of phone lines during transmission, and modem cost. Transmission charges are dependent on the service price of the telephone carrier. Many current Macintoshes have internal modems and fax software. For approximately $100, a GeoPort adapter will connect the computer to a phone line. Communication software will need to be purchased. Hybrid, digital and analog compliant,

modems cost $700-900 (MacWorld 1995). Analog modems will cost much less. Prices are constantly decreasing as newer technologies emerge.

Appropriateness

Mark Walter states, "One application for which there is intense interest in Acrobat is electronic transmission of ads destined for print . . . . It has added support for font subsets and added a binary file format, thereby reducing the size of the files being transmitted. It has improved the tools for making comments, which facilitates the correction cycle. In the APIs it has made it possible to include Postscript operators that are not supported by the standard Acrobat application." (Seybold 1994).

Figure 1. Adobe Acrobat 2.0

cost of software		
Acrobat 2.0	$195	(Acrobat distiller and Acrobat reader)
Acrobat Pro 2.0	$595	(Acrobat 2.0 plus Acrobat Exchange)
Adobe Workgroup	$1595	(10 Acrobat pro 2.0 licenses)
Adobe Reader	Free	
Upgrade for 1.0	$59	
Upgrade for Pro 1.0	$159	
System requirements		
Macintosh II series/68020 or greater		
System 7 or greater		
2 MB application RAM		
4 MB hard disk space		
Adobe Type Manager (ATM) 3.6 or greater		
(modem for transmission)		

Applying Facsimile Technology to Design Comprehensives

Facsimile (fax) technology is the simplest form of electronic transfer. Facsimile machines convert hardcopy paper into electrical transmissions, while fax software converts and transmits pre-existing binary files. The transmissions are pictures of the original files, not the file itself. Until recently, both technologies were based on analog transmission. Facsimile machines connect to a telephone outlet with standard cables, while fax software transmits through a fax/modem connected to a phone line. An office is best equipped if they have both technologies.

Fax Machines

There are four evolutions of facsimile machines: Group 1, 2, 3, and 4. Group 1 and 2 are older, slower analog machines that are becoming obsolete. Group 3 are the fastest analog machines, reaching 28,800bps. Group 3 machines are internationally standardized to transmit at 203x98 dpi resolution. Group 4 machines, just entering the market, transmit digitally at a significantly higher speed, 64,000 bps, at an increased 400x400 dpi resolution.

Fax machines function as scanners. A light source, the charged couple device (CCD), passes the document, converting the page into electrical voltages dependent on the opacity of an area. Either a black or a white dot is signaled, forming a bitmap image. These voltages can then be transmitted over phone lines. Fax machines have the advantage for hardcopy transmission, since the machine scans the file for transmission. This is the easiest technology for designers to electronically transfer hand-drawn comprehensives or preexisting hardcopy.

Fax Software

Fax software converts binary files into fax readable files and transfers them to the modem for transmission at the speed of the modem. These readable files are bitmaps versions of the original file. Fax software saves the transmitter from the tasks of printing a digital file and rescanning it through the fax machine for transmission. If the fax file receiver has fax software, the file can be received digitally. If they own a fax machine, the machine will produce a hardcopy. If the sender only has fax software and wants to send a hardcopy, a scanner will be needed to digitally convert the hardcopy so that the computer can process the file.

Software features

Different software packages contain different features. At a basic level, software should have naming, scheduling, and reentry specifications at the sending level and notifying, displaying, editing, storing, printing and forwarding at the receiving level (Stone 1994). Scheduling features allow programming of the transmission time, a fax and destination, while reentry will automatically continue to dial busy numbers. Viewing magnification, editability (highlighting, deleting, and searching), adjustability of printing page size, and an automatic log of fax activity is a great advantage over unchangeable, hardcopy faxes. Additionally, software may contain the following capabilities:

Color

Traditional faxes are black and white transmission due to the fact that they are bitmap files. Color faxes are beginning to emerge, but there is no color fax protocol. Color fax software relies on color printers to send and receive color faxes. Many packages require the same software to be at both locations. This is a limitation not present with black and white fax technology. Since these technologies are just beginning to emerge, they need time to mature.

Optical Character Recognition (OCR),

OCR allows incoming faxes to be converted into ASCII text. It is not 100% error free and, therefore, requires proofreading afterwards. OCR is not reliable for numbers or handwriting (Stone 1994).

Binary Transfer File (BTF)

BTF allows actual binary files to be transmitted rather than converting files into bitmaps files (Stone 1994).

Background Reception

Background Reception enables the user to perform other computer activities with fax activity occurring in the background (Miles 1994).

Custom Cover Sheets

Custom cover sheets provide the ability to create personalized cover sheets to commence all faxes (Miles 1994).

Scanner Support

Scanner support enables direct fax capabilities from a scanner (Miles 1994).

Network Support

Network support enables a fax activity to be connect to a LAN. The software must be on both the network server and the transmitting computer or station (Miles 1994).

Phone Book

Phone books store important names and numbers to be easily accessed (Miles 1994).

Email Support

Email support enables fax and email services to be connected (Stone 1994).

Voice Mail Support

Voice mail support allows voice and fax services to be connected (Miles 1994).

Economic Factors

The cost of facsimile technology depends on the cost of the machine or software/modem and the cost of phone lines during transmission. Transmission charges are less expensive than mail services. Transmission charges are dependent on the service price of the telephone carrier. For approximately $100, a Geoport Adapter will connect Macintosh computers to a phone line. Purchasing software can range from $50-20,000. LAN networks alone range from $200-20,000 (McCusker 1994). The new V.34 Fax 28,800 bps cost $300-600 and V.34 upgrades can be found for under $100 (Wood 1994). Portable fax machines ranging from $800-1200 are available, permitting fax services at any phone location (Seattle Times 1994). Color fax capability are obtainable for Windows for approximately $1,000 (Byte 1995).

Interoperability

Facsimile technology is based on whether sending protocols are compatible. With the standardization of facsimile and modem protocols, compatibility is extremely high.

Security

Facsimile technology is as secure as the transmission lines. It is comparable to the security of a voice call. The shorter the transmission time, the more secure a transaction.

Applying the Internet to Design Comprehensives

The Internet is a global packet-switching network available and run by the public. It was born in 1968 with the Advance Research Projects Agency, a division of the United States Department of Defense Division, developing a "packet switched network" to connect super computers at multiple sites. In 1969, four sites were connected and network was born. The network, project and communication grew with advances in technology. The development of the Transmission Control Protocol Internetworking Protocol (TCP/IP) for packet switching is considered the turning point and beginning of the Internet (Dern 1994). In the 1980's, ARPANET was the portion of the network open to university and corporate research for the internetworking of individual networks into a larger entity. ARPANET is today's Internet.

The global network was brought forth with the goals of education and multi-access. To quote Vinton Cerf, one of the creators of TCP/IP protocol, "My ultimate either dream or nightmare is that every place in which there is a telephone there will be a switching instrument connected to a LAN for the office or household."(Anthes 1994). There are presently millions of Internet users and the numbers are rapidly growing on a daily basis.

Today, the Internet is used for remote login, file transferring, browsing sites, real-time activities, email, newsgroups, and online services. This thesis project is concerned with file transfer capabilities and appropriateness for private one-to-one file transfer.

Connecting to the Internet

In order to have a file transfer session on the Internet, both participants must be connect to the network. A computer may connect to the internet through conventional dial-up, serial line internet protocol (SLIP) or point-to-point protocol (PPP) dial-up access, or by direct attachment. Conventional dial-up is very limiting and is really meant for overviewing the Internet. File Transfer is possible, though. The SLIP or PPP connection is what permits users to access popular Internet services with TCP/IP communications, as if connected directly to the Internet. Users do not have the speed advantages of direct connections; they will use the speed of the underlying link. There is criticism on the inadequate speed and unpredictable performance of these connections (Marion 1995). The best connection option is through direct connection to the network. The most common direct connection is a leased direct

line from a company's LAN to the Internet service provider (Wiggins). This line can range from 56Kbps-1.544Mbps.

Business or individuals must establish an account with Internet service providers. The Internet is a public network, but Internet service providers furnish the TCP/IP software and connects the account to the network. There is an initial start-up fee, a monthly fee, and additional fees when the allotment is exceeded. These fees vary per service and the phone line carriers customers use. Different Internet service provider supply different services at a range of prices. For $20-40 a month, any computer user in the continental United States should be able to receive basic services (Dern 1994). Those interested in Internet service may also contact InterNIC, an organization that provides information about Internet Services 1-800-444-4345 (Gibbs & Smith 1993).

File Transfer Protocol

File transfer protocol is the primary method of transferring files over the Internet. First, the file transfer protocol sets up a TCP connection. Then, it transmits ID and passwords to allow access to specific files. Once this access is approved a second connection is established for file transfer. The data travels between the two sites inside TCP blocks. These blocks are made up of IP-datagrams packets (Fitzgerald 1993).

Files from all over the world can be transferred between computers. This requires either user identification on both sites, a special arrangement established by system administrators, or an anonymous FTP services (http://www.tu-chemnitz.de/docs/Chapter3.html #3.2, 1995). Some systems have dedicated disk space or entire computers to be an Anonymous FTP site and an archival source on the Internet. Anonymous FTP sites are available to anyone on the Internet and anyone can create a FTP connection by logging into the system as an anonymous user. This is not a recommended option for communication between a designer and client because of the vulnerability of the site (Finnie 1995). Because of the concern with the security of using a public, foreign site for file transfer, two computers can connect to one another by direct login into a computer site. To run a FTP session, the host name of the receiving and sending computer, directory name, file name, and accessibility to login are required. FTP etiquette highly recommends that FTP sessions occur after regular business hours because heavy activity takes away the overall performance of the network (http://www.cis.ohiostate.edu/hypertext/faq/usenet/computersecurity/anonymous-ftp-faq/faq.htm, 1995). The Internet is widely used and, therefore, heavily congested.

Security

The vast majority of Internet traffic is not encrypted, therefore, (in theory) anybody can capture file transfers. Any connection of a user's computer to transmission lines or networks has a vulnerability risk attached to that connection. Networks are riskier because they permit

connections. This risk increases with the number of users on the network. Firewalls that prevent outside users from accessing private network or nodes connected to the Internet can be established (Finnie 1995). This will not help for file transfer sessions outside of the private network, unless login access is permitted by network administrators (Finnie 1995). This still does not protect the file while it is being forwarded along the Internet to the node. The question of "how secure is my account?" was answer by a usenet on the privacy of the internet "by default, not very". Potentially every action can be intercepted, records of transactions can be recorded invisible to users, files can be deleted, and FTP sites automatically log commands and records of transactions. (http://www.cis.ohio-state.edu/hypertext/faq/usenet /net-privacy/part1/faq.html,1995). Encryption needs to be established to secure transfers.

Interoperability

Interoperability on the Internet is dependent on all users being connected to the Internet. Second, FTP software has to be at both sites. This comes with most Internet provider packages (Wiggins 1995). One must keep in mind two important facts about the Internet. It is a public entity that no one "owns" or has legal responsibilities to and it is an immature technology. Therefore, there are no guarantees because users are learning together the capabilities and limitation of the technology on free terrain.

Applying Videoconferencing to Design Comprehensives

Videoconferencing is the most encompassing media for electronic correspondence today. It offers the most features and the closest correlation to actual face to face meetings. It is also the most expensive, requires the most coordination and supervision, and encompasses the most factors in consideration of purchase and use.

Behavioral science considers the combination of video and voice to be the most effective form of communication (Angiolillo, Blanchard & Israelski 1993). Live electronic graphics, video cameras, and voice lines allow for live interactive meetings including the transmission of video, voice, and graphics to multiple parties. All participants can share the same information in real-time and provide instantaneous feedback.

Videoconferencing is not a new idea. The technology that became the foundation of commercial television can also be considered the beginning of videoconferencing: a one-way full-motion video call was transmitted from Secretary of Commerce Herbert Hoover in Washington DC to an AT&T executive in New York City (Angiolillo, Blanchard & Israelski 1993). Bandwidth, compression, prices, standards, and general "comfort" with video technology were not appropriate to embrace videoconferencing at that date. To transmit digitized images at broadcast quality, 140Mbps would be required at high cost to users. Recent compression techniques allow the reduction of information to be under 2Mbps,

allowing significantly smaller bandwidth requirements and prices. Standards are being approved for increased interoperability and people have become more accustomed to seeing themselves on video because of camcorders.

Today, group and desktop videoconferencing markets are growing. According to the International Teleconferencing Association (ITCA), in 1993 the teleconferencing industry had a total revenue of $2.3 billion in 1993 with 1.03 billion generated from videoconferencing. 15,000 two-way interactive videoconferencing rooms were operational in North America by the end of year (ITCA 1994). *USA Today* predicts sales of videoconferencing equipment to rise by 30% this year and in 1996 and to double in 1997 (Schmit 1994). Elliot Gold, President of Telespan Publishing Inc., has been following the industry for ten years and expects a tripling of sales of desktop conferencing each year for the next couple of years (Messmer 1995). Videoconferencing is expected to become a standard component of office equipment within the decade.

Videoconferencing benefits over other file transmission media

Videoconferencing's greatest benefit over other file transmission media is the live interaction it provides users. Eyes, face, hands, gestures, and appearance are significant nonverbal indicators of interest, agreement or position, emotional state, thoughts, knowledge, emphasis, and persuasion skills of participants (Angiolillo, Blanchard & Israelski 1993). People remember and base decisions on these indicators. Videoconferencing permits these crucial communication indicators. Beth Stone, President of Euphony (an audio/video teleconferencing and speech/language training company) states that 90% of all communication is non-verbal (Stone 1995). These non verbal messages are not detectable in voice-only communications. Studies by Ochsman and Chapanis, and later by Gale, show that the addition of video does not decrease time of communication but increases "rating" of the communication (Angiolillo, Blanchard & Israelski 1993). Stronger relationships are fostered with visual and audio communications. People remember voices and faces.

Videoconferencing is used to reach agreement with companies and their clients. It is considered highly applicable to designers. "In discussion on a layout proposal, all important decision makers can take part with both the agency and the client. New aspects and suggestions can be incorporated immediately by the graphic designers. Comparisons with the actual product can also be made and any inconsistencies in the proposal can immediately be identify and eliminated" (Hahn 1992). Videoconferencing quality and capabilities are dependent on conferencing equipment and transmission lines.

Group Videoconferencing

Group Videoconferencing has the ability to allow full-room, full view, 2-way interactive video transmission over high speed digital lines at multiple sites. Group Videoconferencing is also available in mobile units. Eastman Kodak's Digital Customer Service Representative, Calvin F. Viele, feels that the greater capacity for participation, faster team processing, and instantaneous response time of customer issues have benefited Kodak's operations (Viele 1994). Decision making, business cycle time, and overall customer satisfaction are improved at a reduced travel expense (Viele 1994).

Group videoconferencing units contain hardware panels, two monitors, cameras, and may be connected to slide projectors, VCRs, still graphic visual projectors, and personal computers or laptops. The hardware panels contain a codec, IMX controller, modem, and a ISDN adapter. The codec is the heart of the unit. Its software algorithm is responsible for the conversion of analog information into digital, compression, transmission, receiving, and decompression of information. Transmission can be up to full T1 capabilities. Encryption is available to secure transmission. The mathematical algorithm will determine the communication parameters and whether there is interoperability of different units (Viele 1995). The IMX controller commands the visual, audio, and keyboard devices, and is run by separate software than the codec. It can combine 56,000 and 64,000bps channels to reach speeds up to 384,000bps. The modem is a stand alone ISDN adapter, which connects the system to ISDN. All units can be separately upgraded. The two monitors allow for picture-to-picture (PIP) communication, with one screen for each site. One screen represents the transmission sent from the site, while the other shows the incoming transmission from the other site. Both parties can see both transmissions simultaneously.

The VCR supplies presentation and recording capabilities to the conference, while the slide projector and visual projector provide capabilities for still graphics: slides, charts, color photographs, design comprehensives, and even three dimensional objects. The camera on the visual presenter is a camcorder camera. Attaching a IBM, Macintosh, or Laptop computer is possible. This is not file sharing. The videoconferencing monitor is not the same technology as a computer monitor. Computers displays to be projected require dark backgrounds for information to be visual on the conferencing monitors (Viele 1995).

Mobile units have the advantages of portability to different locations, less expense, and connectivity to the same external units as group conferencing. The disadvantages are the smaller monitor size, PIP features on one monitor rather than two, a single system, and currently lower transmission speeds of 112kbps. 384kbps units are coming into the market (Viele 1995). The disadvantage of single system is that the units cannot be upgraded separately.

Calvin Viele recommends a camera upgrade since the camera will have a major effect on perceived quality of transmission (Viele 1995). Most videoconferencing units come with a base camera. Kodak upgraded its $3,500 camera to a $6,000 camera and experienced dramatic clarity and color quality difference; the base camera was less sharp and its colors were washed out (Viele 1995). There are two standards for video: The United States and Japan use a 525 line resolution at 30 frames per second and the Europeans use a 625 line resolution and 25 frames per second standard. Videoconferencing cameras and monitors comply with CCIR Recommendation 472-2, specifying 625 line resolution and 25 frames per second (Hahn 1992). Additionally, all cameras must be synchronized.

Color quality

The video camera transmits images with either a RGB synchronized signal or a Composite Video Signal(CVS) which is interpreted into RGB. The RGB signal is converted to one luminance and two chrominance signals (YCC) for digitized transmission (Hahn 1992).

Economic Factors

Group Videoconferencing units range in price of $15,000 -$100,000 for stable units and roll-out models (Schmit 1994). These prices are dropping constantly and transmission costs are lowering. Rooms can also be rented on an hourly basis. Kinkos copier center will charge $150 per hour (Schmit 1994), while companies like Eastman Kodak charge $125 on a hourly basis. In 1993, Kodak office used 357 hours from 174 conferences, saving themselves 239 trips, 7559 hours, and $401,000 in traveling expenses for a total operation cost of $165,000 (Viele 1994). One must compare the cost, number of units, number of participants in one location, and functionality in determining which type of conferencing equipment is appropriate for individual needs.

Interoperability

Purchasing equipment is only a fraction of the work in preparing a videoconferencing service. The complexity of scheduling and ensuring interoperability requires a coordinator. Preparations for running a videoconference take hours. A test run is mandatory to establish interoperability and the needs of those who are calling a videoconference prior to the actual conference. Interoperability is dependent on whether the two units are standardized so that both codecs' algorithms can communicate. If the algorithm of the different codecs can not speak to each other, problems will arise. Therefore, it is imperative that companies become certified with standard equipment. Certification is the registry of equipment, codec, and carriers for each system. If the two systems are compatible, they can directly dial one another and bypass the network services of the carriers. If not, the codec farm of the carriers establishes the connection for the two systems by acting as the translator. Currently the H.320 standard is the standard to have equipment compliance with: "The H.320 standard is having its long

awaited impact on the videoconferencing field in North America and throughout the world. With standards compliant videoconferencing now available from the desktop to the conference room, we are seeing the interoperability necessary for the market to skyrocket" (ITCA 1994).

Once connectivity is confirmed, meetings need to be scheduled and participants familiarized with the use of equipment (Viele 1995). The coordinator is also responsible for any crisis management on-site during the conference. The carriers can provide transmission crisis management, but they are not on-site to assist in with any equipment problems at either site (Viele 1995).

Speed

Group videoconferencing requires access to digital lines with the minimum speed of 112kbps, two 64kbps B channels. (384kbps, six 64kbps B channels, is consider the video quality of television). Group videoconferencing presently has three options for connectivity, the first being an ISDN connection. Charges would include initial installation fees, monthly fees, and additional fees for transmissions outside local areas. These rates will differ for each area and carrier. For example, as of June 14, 1994, the Rockville Maryland installation fee would be roughly $100, a monthly fee of $22-26, and a non-local fee of 40-70¢ per minute (Derfler 1994). Second, one could lease a line from one point to another if there is frequent enough transmission to warrant the flat rate cost. This would depend on distance and bandwidth. A T1 service line (24 64Kbps channels) would cost roughly $10,000 per month, but could be dedicated fractional at a lower rate and cost (Derfler 1994). The third is to establish a switch/fifty-six line to a service carrier and pay its network rate. Domestic rates, one-way, can range from under a $100 to over $200 depending on carrier, location, and bandwidth. International rates range from two $200 to over a $1000 depending on the same variables. When a connection is setup through direct dial-up, only the calling party pays for the transmission; if one transmits through a carrier network, both sites are charged, thus, doubling the price of the call (Viele 1995).

Audio and Video Quality for Group Conferencing

Video does add the additional considerations of video clarity, audio and video synchronization, and smoothness of transmission. To send analog National Television Standard Committee (NTSC) compliant signal with no impairments would require 90 Mbps transmission, thus requiring massive compression to be below the 56 Kbps to two Mbps rate of digital video (Angiolillo, Blanchard & Israelski 1993). The result is a visual blurring of movement on screen. Rate of transmission will affect this disruption. A meeting for presenting page layout, however, may not require significant amounts of movement or fast transitions. Audio and video quality are two separate areas of consideration. Unlike analog, voice communication

systems digitize and compress audio, and most systems run audio on the same line as video. How the unit's bandwidth handles the information will greatly affect the quality of sound, as with video quality. There is a one second delay of video and voice synchronization at 112Kbps transmission.

Multiple sites

Multiple sites conferencing is possible on group conferencing units. A multiple conferencing unit (MCU), universal H.320 standardization, a predetermine conference leader, and etiquette for the meeting needs to be established (Viele 1995).

Desktop Videoconferencing

Desktop videoconferencing is expected to become extremely popular in the next couple of years. Desktop videoconferencing may run on analog phone lines, ISDN digital lines, or local area networks. Quality of transmission will be reflected in which media transmissions are sent due to bandwidth. A video codec, video and sound cards, network interface, speakers, video camera, and computer are the required equipment. An advantage of the Macintosh AV lines is that they contain everything needed but the video camera and a ISDN adapter for high speed communication if one is connected to ISDN (Sherman 1994). With the addition of print-to-video capabilities, the conference can be taped.

Audio and Video Quality for Desktop Videoconferencing

Audio and video quality are major considerations in evaluating desktop units. NTSC television has a rate of 30 frames per second and 640 by 5480 resolutions. The best quality produced by ISDN and some LANs is 12-15 frames per second with a 320 by 240 capability, roughly half the quality of television. Twelve to fifteen rate of frame transmission is needed for reasonably smooth transmission, therefore, if the higher bandwidth options are just reaching that point, the lower speed options are not producing reasonable video transmissions (Sherman 1994). Phone lines transmit three to ten frames per second. One may want to consider document conferencing (real-time sharing of a document), which represents the rewards of collaboration for a fraction of the cost of video systems (Sherman 1994).

ISDN is considered the best route for desktop videoconferencing (Viele 1995). It transmits the best image quality. Unfortunately, it is not widespread. Second, ISDN has the bandwidth advantage to handle multipoint transmissions allowing more than two computers to participate at a time. Older LANs protocols are not fast enough to keep video and audio information in synchronization. Fast Ethernet, FDDI, and ATM will provide higher bandwidth and will benefit LAN transmissions.

Interoperability

As with group conferencing, standardization is very important for interoperability. The new T.120 standard is expected to be approved this year and promises to maintain data-sharing

capabilities for desktop videoconferencing (Messmer 1995). Most present videoconferencing have problems with interpretability between vendors, especially platforms.

Economic Factors

Desktop conferencing ranges from $1,500-10,000 depending of the sophistication (Sherman 1994). Transmission charges depend on the service price of the carrier.

Chapter Two

Review of the Literature in the Field of Study

Data Transmission

Data Description: The difference between analog and digital information

Data is the material content, or raw bits, of a file. Different processes require data in different description methods for processing. Data transmission can either be analog information or digital information. Analog transmission describes data by a continuous carrier wave. The amplitude is changed by either raising it high enough to indicate a 1, or lowing it to indicate a 0. Digital transmission uses distinct "on" or "off" pulses to store information as binary 1's or 0's. Computers process binary information. Currently, many transmission media require analog information. Therefore, for file conversion from computer to transmission, a conversion device is needed.

Modems: Analog and Digital Conversion

A modem is a modulator/demodulator. Modulation is the conversion of digital information to analog, while demodulation is the reverse process. Digital modems are necessary to convert terminal digital signals to a more accurate digital signal for transmission. "Class 1" modems allocate the workload to the computer's hardware and fax software. "Class 2" modems process the work in the modem's hardware. "Class 1" modems are easier to upgrade by simply upgrading software, while "Class 2" modems have a higher performance by relieving the computer from the workload (Wood 1994).

Modems can either be internal or external. Internal modems have the microprocessor chip built into the the circuit board of the computer, while an external modem has the chip in a outside device. External modems require a RS-232 cable to connect the modem to the Serial I/O port in the computer. Both modems require a RJ-11 plug to connect to the phone lines. The microprocessor chip converts the parallel signal of the computers central processing unit (CPU) into a serial stream of bits for the serial port. The modem than converts the bitstream into analog signal. The receiving station has the reverse process.

As with most technologies, the sophistication of equipment is a result of the sophistication of hardware and software. Therefore, careful purchasing of modem is a very important. Design, speed, reliability, interoperability, and software are features that need to be considered when choosing a modem model.

Speed

Speed is referred to as baud or bits per second (bps). When transferring digital images, transmission speeds of 9600bps or higher should be used because of time consumption. The longer a file takes to transfer, the greater the risk of error, phone lines being occupied, and

work time being paused. A one megabyte file contains 1,048,576 bytes or 8,388,608 bits. A 4800 baud modem would take 29.1 minutes to transmit; 9600 baud modem, 14.5 minutes; 14,400 baud modem, 9.7 minutes; and 28,800 baud modem, 4.8 minutes. If a user connects to a higher speed network, only the speed of the modem is maintained. If the modem is faster than the system, the system will not be able to process the information fast enough; this is referred to as "bottleneck" (Wood 1994). Digital modems for integrated-service digital network (ISDN), a digital system replacing phone lines, have been developed with speed reaching 115.6Kbps (MacWorld 1995). These modems are four times faster than the fastest analog modem, thus decreasing time spent by a factor of four. The telephone companies are promising to convert all their analog lines to digital lines in the near future (Wood 1994). Until then, hybrid models will additionally enable conventional analog connection at 14.4Kbps.

Reliability and Interoperability

The ability of a modem to connect to other modems of a different brand, or reliability of connecting to the same brand, is essential. Interoperability will depend on communication setting capabilities of the modem. The implementation of standards helps to ensure compatibility. The V class standards refer to digital to analog connections. The following standards from the International Standards Committee, will aid in understanding modem model descriptions:

Figure 2. - Definition of V class standards

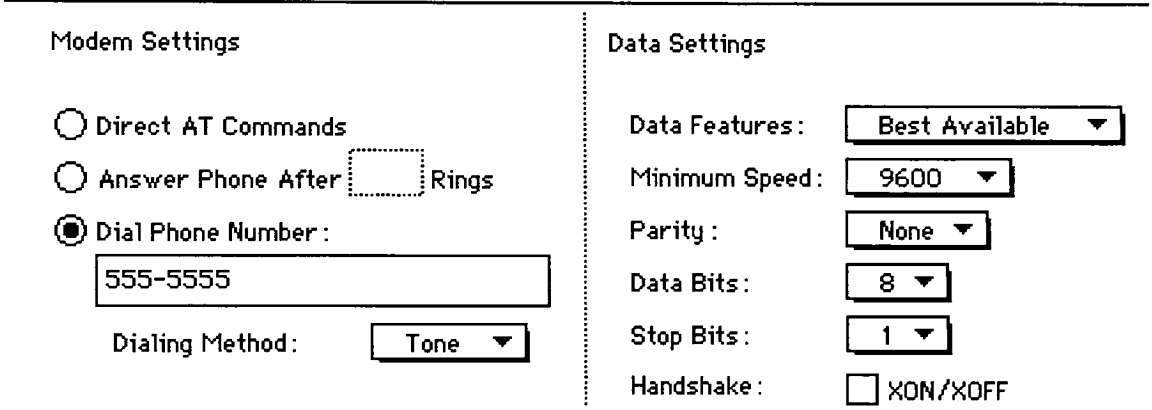
V.32	9600bps
V.32bis	14,400bps
V.34	28,800bps, also termed V.fast
V.32	56,000bps
V.42	error-correction standard
V.42bis	4-to-1 compression
V.FC	V.fast or V.34 class 28,000bps

The V.fast or V.34 class refers to a chip manufactured by Rockwell International Corporation. Error correction, V.42, ensures that data has been precisely and completely transmitted. This is done through matching mathematical operations on both the sending and receiving modem. Data compression, V.42bis, uses a mathematical algorithm to decrease the size of the file for transmission. Microcom Network Protocol (MNP) has created an alternative series of transmission standards that are commonly used. MNP 4 is an error correction standard, while MNP 5 is for data compression. Modems of different speeds will fallback to the slower modem's speed.

To establish a connection communication parameters: speed, bit rate, stop bits, parity, and flow control data settings must be identical. Bit-rate is the number of bits in a character,

while stop bits is the number of bits in between characters. Bit rate is usually eight (one byte), but can be set at seven. Stop bits is usually set at one, but can be set at two. Parity is a type of error correction that counts the 1's it the bitstream for either odd or even matching. This works, if only one bit is wrong, but will not detect an error if two bits are erroneous. It is not widely used because it considered 50% accurate. Flow control, or handshaking, is a mechanism for regulating data flow. The settings usually provide the option of using XON/XOFF. XON/XOFF is a mechanism that was not designed to use for computer to computer transfer. A XON message acknowledges the the receiver modem is ready for transmission. XOFF means that the receiving modem is busy and to wait. XON/XOFF is not recommended for binary transfer. It can cause more confusion between the modems than assistance (Fitzgerald 1993).

Figure 3. - Example of Connection Setting



For file transfer, the receiving and transferring modem must use the same file transfer protocol. Protocol is a formal set of conventions governing the format and control of sending and receiving between two communicating devices (Fitzgerald 1993). It defines the syntax, semantics, and timing of the transmission. Common protocols are the following:

XMODEM (Standard)

XMODEM sends data in the following block sequence: a start header, one byte block number, 128 bytes of data, and a one byte checksum error checking. The checksum uses automatic repeat request (ARQ), an one byte ASCII message. After a block is sent, the receiver site will send a message of positive acknowledgement (ACK) or request a retransmission (NAK).

XMODEM-CRC

XMODEM-CRC is 95% more accurate than standard XMODEM. It uses Cyclical Redundancy Check (CRC), ascii decimal value, rather than checksum error detection.

XMODEM-1K

XMODEM-1K sends 1,024 bytes on data in its block sequence and uses CRC. It additionally handles batchmatching capabilities to execute multiple file transfers in one operation.

WXMODEM

WXMODEM sends four packets, "a window", before receiving an acknowledgement.

YMODEM

YMODEM is XMODEM with CRC-16 error checking. This is a two byte (16 bit) long CRC.

YMODEM-G

YMODEM-G use their error controlling modems to detect errors and retransmission orders instead of the computers. It uses a streaming protocol; the entire block is sent before acknowledgement.

ZMODEM

ZMODEM was designed to overcome the problems of error checking in packet switching transmissions. ZMODEM is more powerful than XMODEM and uses a CRC-32, continuous ARQ error checking. The file is continuously sent without acknowledgement unless a NAK message is sent. Then, just that packet is resent instead of the entire block.

KERMIT

KERMIT is an RS-232 based communication which only requires asynchronous serial connection and KERMIT software. This makes the protocol both popular and slow. It is popular because its simplicity allows a high capacity for connectability. It is slow because the protocol transmits the data as if to a "dumb" terminal and sends the serial bitstream as a plain asynchronous, back to back transmission.

Software and Features

Different software has different sophistication. Some versions have voice recognition, fax capability, and optical character recognition. It is important for the software to be upgradable and support a variety of standards, newer and older (Wood 1994).

Software packages may offer the capability to capture files. This is not to be confused with file transfer. File capture writes a file from the memory buffer, instead of actually transferring the file to the original file. Therefore, it is not an identical copy of the file, but an recreation.

Since a modem uses the phone line, a user has two options: to establish two phone lines, one for voice and one for the data, or to connect a switch which will navigate the signals to the appropriate receiving device. Even the difference between digital and fax files can be determined; the tonal quality of the transmission is discernable (Fitzgerald 1992). The long term goal of phone companies is to eliminate analog lines and make all phone lines digital, which will eliminating the need for modems (Wood 1994).

Physical Medium for Transmission

The physical link between transmission devices will greatly impact the transmission. Different physical mediums have different capacities for information. Bandwidth is the capacity to carry information. The higher the capacity, the more information can be sent simultaneously, thus affecting speed of the transmission. This can be expressed in cycles per seconds (hertz/HZ) or in bits per second (bps). Speed, cost, and error rate will vary dramatically between physical mediums.

Wired Cables/Twisted pair

Wired cables are the most basic form of cabling and point-to-point transmissions. Twisting wire pairs together to form a cable is referred to as twisted wire, or pair. These cables are common and are already in most buildings. They are susceptible to noise and are inexpensive. Existing wire cables are either being utilized in networks or being replaced by more efficient transmission media, depending on the user's system needs (Fitzgerald 1993). Wired cables are consider narrow band and can transmit data from 300-56,000Kbps, depending on distance and construction (Ajayi 1994)

Coaxial Cable

Coaxial cables are made of insulated copper and provide point-to-point transmissions. The cables are bundled together with an additional conductor under the shell of the cable. Coaxial cables have a higher transmission quality than twisted pair, due to less distortion and error loss. Second, they have a wider bandwidth than twisted pair, allowing faster and higher data capacity transmissions. Coaxial cables are measured in ohms, resistance and support frequencies up to 300 or 400 megahertz (Fitzgerald 1993).

Fiber Optic Cable

Fiber optic cables are made of very fine silica fiber in bundles around a metal core and perform point-to-point transmissions. Between terrestrial carriers (cables), fiber optic cables have the highest entry threshold, the highest capacity to transmit or receive, (billions of bits of data per seconds), and the longest distance capacity (Datapro 1990). Lasers or light-emitting diodes (LED) generate light-carrier information and optical detectors to retrieve it. Optical energy is not subject to electrical interference, therefore, fiber cable can be used in areas of high electrical noise without the noise interfering (Datapro 1992).

There are two modes of fiber optic cables, single and multiple. Single-mode fibers are for long-distance interchanges and local loops. The core diameter of the fiber is small providing a nearly straight path for the wavelength of electromagnetic radiation being sent resulting in efficient travel. Multimode fibers are for short distances. They have a larger core size and fiber size.

There are two different types of application: local area network (LAN) and obtained carrier services such as AT&T, MCI, British Telecom, Deutsche Telecom, Cable & Wireless, etc (Datapro 1990). International transmissions abroad are sent fiber-optically through obtained carriers who have a transatlantic cable (TAT).

Microwave

Microwave transmissions are direct atmospheric transmissions. Atmospheric transmission have higher regulatory risk, security risk, noise interference, and error rate than terrestrial carriers (Datapro 1990). They are relay devices. Microwave transmissions have wavelengths of 18-23 gigahertz and need repeater stations roughly every 30 miles. Microwave transmission offers speed and capacity, but is inflexible and highly susceptible to interference from noise activity or objects in its path.

Satellites

Satellite communication may be point-to-point, multipoint, or broadcast atmospheric transmissions. There are three segments to this: the space segment (actual satellite), the signal itself, and the ground segment (earth station). The satellite is a communication device which receives a signal from an earth station, amplifies it, and sends it to another earth station which is capable of receiving that transmission. The path from earth to the satellite is called the uplink frequency, while broadcasting to the receiving earth station is called the downlink frequency. A footprint is the area a satellite can transmit to receiving stations (Datapro 1994). A typical satellite transponder offers 36 megahertz bandwidth at frequencies ranging from 4-6 gigahertz. Satellites carry 12 transponders, totaling 432MHz, or 24 transponders, totaling 864MHz.

Satellites are 22,300 miles from earth or 44,600 total-path miles. This distance causes problems with interference, attenuation, and delay. Traveling at the speed of light, signals have approximately a 0.125 second delay one-way. Because of the delay, sending stations must periodically send acknowledgments. While these acknowledgments are in transit, the original transmission is not being sent, extending delay times. All signals experience attenuation, which is weakening over distance.

There are also limitations on orbital slots that can be utilized by United States markets: limitations on frequencies available, allocation of uplinks, and a rising cost in launching satellites. As a result, satellites are losing the competition over point to point transmissions to terrestrial carrier paths (Datapro 1990). An alternative to private ownership of a satellite system, is to lease a path through other companies.

Advantages to satellite communications are stable costs, high bandwidth, geographically dispersed locations, and the provision of the only point-to-multipoint option. The cost of transmission is the same regardless of the number of receiving earth stations and distance; for one price and one uplink, data can be sent to multiple places at a variety of locations.

It is the ideal solution for mobile communications and areas inaccessible by cable or fiber (Datapro 1990).

Protocol Variables and Technology

Transmission format is delegated by the protocol. Therefore, if the the variables are dissimilar, connectivity will not occur; transmission devices will not be able to talk to each other. Bit order and direction of the transmission are important variables. These differentiation are important to the architecture of transmissions systems and will be used to describe them (Fitzgerald 1993).

Asynchronous/Synchronous Transmissions

Asynchronous transmissions are sent character-by-character with a start and a stop bit. Computers process bits asynchronously. Synchronized transmission sends characters continuously. It is faster, but more expensive (Fitzgerald 1993).

Simplex Half-duplex and Full-duplex Transmission.

Simplex transmission may only go in one direction, either sending or receiving. Half-duplex may send or receive, but only one direction at a time. Full-duplex may send and receive simultaneously. Dial-up connections are half-duplex because they are routed on two-wire circuits. Higher capacity connections are full-duplex because of four-wire circuitry (Fitzgerald 1993).

Packet-switching and Circuit-switching Technology

Circuit-switching technologies establish and clear a direct route for the signal, so that there are no interruptions in the transmission. Packet-switching technologies do not rely on direct paths. Instead synchronized packets of equal length are separately sent to the destination to be reassembled. The packets are sequential so that they are regrouped in the correct order (Fitzgerald 1993). With packet-switching, individual packets may take any route open by storing and forwarding the data packets, rather than requiring a open direct route for the entire transmission.

Networks: Connecting Transmission Devices

File transfers are sent over networks. These networks may be local area networks (LAN) or wide area networks (WAN). LANs use common cable to connect equipment in one building or buildings in a short vicinity. For longer exchanges they need to be connected to WANs. WANs may utilize terrestrial and/or atmospheric physical mediums. They connect geographical disbursed areas. LANs connected to a WAN are referred to as nodes. The following is a guide for the speeds of the common communication alternatives utilized by networks (Jurgen 1992).

Figure 4. - Speed of Communication Alternatives

Conventional telephone	.3-56Kbps
Fundamental bandwidth unit of telephone company	56Kbps
Integrated-service digital network (ISDN)	64Kbps-1.5Mbps
T1 carrier	1.5Mbps
Ethernet LAN	10Mbps
T3 carrier	45Mbps
Fiber Distributed Data Interface	100Mbps

Telephone Companies

Telephone companies are major service providers for communications. They utilize all of the physical mediums that were described to transmit audio, video, and, data to customers. To do this, they utilize both analog circuits and digital circuits. Newer technologies are requiring the speed and error rate advantages of digital services. Digital signals require 56,000bps, but 64,000bps are used for synchronized signals (Fitzgerald 1993). Telephone companies are able to establish 56,000bps connections on demand with Switch/56 circuits.

Integrated-service digital network (ISDN)

ISDN is a digital communication circuit standard proclaimed by communication companies to replace traditional phone services (Fitzgerald 1993). ISDN at a basic rate offers two 64,000bps B channels for digital transmission and one 16,000 channel D (B-ISDN). Primary rate offers Twenty-three 64,000bps channels for digital transmission and one 16,000 bps channel (PRI-ISDN).

T-carrier

T-carrier lines are leased digital lines reaching speeds of 1.544Mbps. The most common is the T1 carrier. It contains Twenty-four 64,000bps B channels. The FT1 are fractional T-carrier lines with less channels for small to mid-size businesses unable to afford or utilize an entire T1 line. Voice, video, and data signals only require one channel each. The T3 is equivalent to Twenty-eight T1. Fiber optic technology is best suited for T-carrier lines.

Ethernet

Ethernet is the most common local area network. It utilizes Coaxial cable and twisted pair cables to transmit data. It is a packet-switching technology. Standard Ethernet reaches speeds of 10Mbps, with FastEthernet reaching 100Mbps.

Fiber Distributed Data Interface (FDDI)

FDDI provides higher speeds, higher reliability, and less noise interference because of its use of fiber optic cables. High speed Networks will include a FDDI to take advantage of large bandwidth and connect slower LAN to a single network (*Datapro* 1990). Macintosh computers

cannot take advantage of the speed capacity of FDDI; they need to be incorporated in a slower LAN (Ajayi 1994).

ATM

Asynchronous Transfer Mode is communication switch designed to transport data, graphics, voice, and video. It multiplexes data streams onto the network backbone by using a cell relay technique (Fitzgerald 1993). ATM can handle traffic at 45-600Mbps.

Data Compression

The purpose of data compression is to decrease the file size through mathematical algorithms. Compression may be termed lossy compression, loss of data during compression, or losseless compression, no data loss during compression. Lossy compression will sacrifice quality of an image; with lower amounts, the loss may not be visibly noticeable. Compression may be proprietary to a particular system, a supported standard for general purpose interoperability, or a certified standard. There is always an array of compression choices, and the majority of users are not well versed in compression opinions. The best choice is to use the compression option most supported to guarantee the ability to decompress and view the image at the receiving site. The following compression schemes are mentioned in previous chapters.

Consultative Committee on International Telegraph and Telephone (CCITT) Group 3

CCITT Group 3 is a losseless compression produced for facsimile transmission. It compresses monochromatic images one row at a time. The results are questionable (Adobe Systems 1994).

Consultative Committee on International Telegraph and Telephone (CCITT) Group 4

CCITT Group 4 is a losseless compression for monochromatic images. LZW and Run Length compression are recommended to use over CCITT Group 4 (Adobe Systems 1994).

International Telecommunication Union (ITU)H.320

H.320 is a losseless, umbrella standard that supports videoconferencing. Two of its standards are digital video coding H.261(Px64) and digital audio coding G.711, G.722, and G.728. H.261(Px64) supports quarter intermediate format (QCIF), common intermediate format (CIF), and full intermediate format (FCIF) spatial resolution (Jurgen 1992).

Joint Photographic Experts Group (JPEG)

JPEG is a losseless compression that is the widest used compression option for continuous tone, still image compression. It is supported by International Organization for Standardization (ISO) (Jurgen 1992). JPEG is controllable by applying different quality settings for varying amount of compression. Quality of image is inversely proportional to the amount of compression. It handles full color or grayscale images and photographs well, but does not work well with simple linework and letters (http://www.cis.ohiostate.edu /hypertext/faq/ usenet /jpegfaq/faq.-html, 1995). JPEG is not a standard algorithm, therefore, JPEG variable may compress

differently with different programs at each quality setting. To have the best results with JPEG, run a test of all steps with each independent JPEG supporting program.

Lempel-Ziv-Welch (LZW)

LZW is a losseless compression. It is best for solid color illustrations and patterns, not continuous tone images (http://www.cis.ohio-state.edu/hypertext/faq/usenet/jpeg-faq/faq.html,1995).

Run Length

Run Length is a losseless compression for monochromatic images best suited for images with large blocks of solid black or white (Adobe Systems 1994).

Data Encryption

Encryption secures files during transmission by scrambling files with an algorithm. Decryption occurs through use of a key by the receiver. There are two primary encryption methods used today: Data Encryption Standard (DES) and RSA, named after its inventors Rivet, Shamir, and Adleman. DES is a traditional secret-key system, developed by the United States Government and IBM in the mid 1970's, and widely used by government, businesses, and banks for their encryption needs. The transmitter and receiver both know the secret key to encrypt and decrypt messages. DES provides security, but does not provide authentication of the users. RSA is a new method and relies on a public and private key system to solve this problem. Each individual has a public and a private key. The public key is used to encrypt messages only for the private key. This verifies the authenticity of the receiver, since only that private key can decode the message. The transmitter uses his/her private key to make a digital signature on the document so that their authenticity is established. DES is faster than RSA, so sometimes they are used in combination for larger documents. The document is encrypted with DES for file security and with RSA for file transfer security; this is called RSA digital envelop (http://www. rsa.com/faq/, 1995). Neither method is 100% secure. This is more likely a result of key identification discovery, rather than the breaking of the algorithm.

Chapter Three

Project goals

The purpose of this thesis is to investigate alternative methods to face to face interaction between designer and client throughout the design approval process. Facsimile technology, Adobe Acrobat's portable document format files, the Internet, and videoconferencing will be the vehicles investigated for electronic correspondence between designer and client The goal is to determine the appropriateness of each transmission application for information interchange of different kind of images and at different stages of the approval process.

Chapter Four

Methodology

This thesis did not test specific software or hardware, but rather the validity of the technique for interaction and transmission of data between designer and client throughout the design approval process. Facsimile technology, Adobe Acrobat's portable document formal files, the Internet, and videoconferencing were the vehicles analyzed as electronic correspondence alternatives to face to face interaction. The test was in two parts. The first part was a survey sampling of 100 design sites, design firms and advertising agencies, to derive quantitative information on each transmission vehicle (see Appendix A for a copy of the questionnaire). Based on the assessment of the appropriateness of each vehicle, determined by survey response in conjunction with background research (see Chapter One), the second phase was implemented. Facsimile technology, Adobe Acrobat, and videoconferencing were deemed appropriate for further testing. The Internet was deemed inappropriate. Three design sites were involved in comparing facsimile technology and PDF files to dye sublimation hardcopy prints. A set of instructions and evaluation forms were provided. A videoconference was donated, conducted, and videotaped. A nearly identical survey, different only in questions about transmission vehicle and identical dye sublimation hardcopy prints were used.

Participants were asked to evaluate and compare the following aspects of the transmitted comprehensives:

Visual Aspects

1 - typography

2 - illustrations and solid shapes

3 - continuous tone imagery

4 - color

5 - overall aesthetic quality

Non visual Aspects

1 - ease of use

2 - time

3 degree of interaction

4 - overall satisfaction with vehicle

The following aspects were additionally evaluated

5 - equipment requirements and cost

6 - transaction cost

7 - interoperability

8 - security

9- procedure

Equipment

Facsimile technology

1 - Express Fax/Modem for Power Macintoshes

2 - GeoPort Telecom Adapter for Power Macintoshes

3 - Power Macintosh 6100/AV

4 - Telephone outlet

5 - Apple Multiple Scan 15 Display monitor

6 (receivers' facsimile technology)

Portable Document Format technology

1 - Adobe Acrobat Pro 2.0

2 - Express Fax/Modem for Power Macintoshes

3 - GeoPort Telecom Adapter for Power Macintoshes

3 - Power Macintosh 6100/AV

4 - Telephone outlet

5 - Apple Multiple Scan 15 Display monitor

6 - (receivers' computer)

The Internet

1 - Rochester Institute of Technology Internet account

2 Rochester Institute of Technology Internet connected terminal

3 Eastman Kodak Unix workstation

Videoconferencing

1 - CLI Rembrandt IIVP Gallery System

2 - CLI Eclipse 486 System

3 Elmo Visual Presenter 308

4 - AT&T ISDN carrier

Chapter Five

The Results

Survey Questionnaire

The survey was sent to 100 design sites to derive quantitative information on each transmission vehicle. The following are the in eleven cities the survey was sent to: Boston, MA; Charlotte, NC; Chicago, IL; Denver, CO; Minneapolis, MN; New York, NY; Philadelphia, PA; Portland, ME; Portland, OR; Rochester, NY; Seattle, WA. 21 surveys were returned (see Appendix A for a copy of the questionnaire).

Figure 5. - Survey Questionnaire Results

The majority of the design sites that responded were small creative departments.

1. Employee size

elements	#	% of total responses
1-10	15	71%
15-20	2	10%
20-35	1	5%
35-50	1	5%
50+	1	5%
no answer	0	0%

Almost all of the responses answered under 250 transactions per month. The majority 25-100 with a fourth each for 0-25 and 100-250.

2. Number of transactions per month

elements	#	% of total responses
0-25	5	24%
25-100	8	38%
100-250	5	24%
250-500	1	5%
500+	0	0%
no answer	2	10%

There was a wide range of percentages in both 3 & 4. In theory, they should be inversely proportional. They were not. In fact,

3. Percentage of the design process at design site

elements	#	% of total responses
0-20%	6	29%
20-40%	3	14%
40-60%	4	19%
60-80%	3	14%

they were very similar. This means that not all of the communication during the design process is was done by face to face interaction at either the design or client site. Other means are being implemented.

80-100%	4	19%
no answer	1	5%

4. Percentage of the design process at client site

elements	#	% of total responses
0-20%	8	38%
20-40%	1	5%
40-60%	3	14%
60-80%	5	24%
80-100%	5	14%
no answer	1	5%

5. Mail services used for transactions

The majority of the respondents are using mail services to communicate with clients. Of the respondents utilizing mail services, *FedEx* was the primary carrier used. *Often* was the primary frequency. Percentages were high for all design stages with a strong emphasize on final and revision stages.

elements	#	% of total responses
yes	17	81%
no	4	19%
no answer	0	0%
services used		
elements	#	% of the 17 yes responses
FedEx	15	88%
US Postal	1	6%
UPS	4	24%
other	4	24%
no answer	0	0%
frequency		
elements	#	% of total responses
always	3	14%
often	9	43%
sometimes	2	10%
occasionally	2	10%
never	(4)	19%
no answer	1	5%
design stages		
elements	#	% of the 17 yes responses
initial	9	53%

revision	13	76%
final	13	76%
no answer	1	6%

6. Facsimile technology used for transactions

elements	#	% of total responses
yes	20	95%
no	1	5%
no answer	0	0%

frequency

elements	#	% of total responses
always	2	10%
often	8	38%
sometimes	4	19%
occasionally	6	29%
never	(1)	5%
no answer	0	0%

design stages

elements	#	% of the 20 yes responses
initial	11	55%
revision	16	80%
final	6	30%
no answer	0	0%

type of facsimile technology used

elements	#	% of the 20 yes responses
fax machine	14	70%
fax software	0	0%
both	7	30%
no answer	0	0%

speed of the facsimile technology

elements	#	% of total responses
4800 bps	1	5%
9600 bps	6	30%
14400 bps	3	15%
14400+	1	10%
no answer	9	45%

Facsimile was almost unanimously used by the respondents. All of the facsimile users own fax machines, while a third additionally own fax software. No one owned just fax software. The frequency varied with *often* and *occasionally* holding the majority. Facsimile was used by the majority at the *revision* stage. This implies the technology was used to show corrections to design comprehensives that were already viewed by the client. Additionally, a large portion used facsimile for *initial* comprehensives. Half the respondents did not know the speed of their equipment, an important data transmission parameter.

A third of the respondents have Adobe Acrobat with more than half of them using it to communicate designs. Half the users responded *often* and there was an equal response to the stages.

7. Portable documents services used for transactions

elements	#	% of total responses
yes	4	19%
no	14	67%
have Acrobat	3	14%
no answer	0	0%
frequency		
elements	#	% of total responses
always	0	0%
often	2	10%
sometimes	1	5%
occasionally	1	5%
never	(17)	80%
no answer	0	0%
design stages		
elements	#	% of the 4 yes responses
initial	2	50%
revision	2	50%
final	2	50%
no answer	0	0%

A fourth of the respondents are connected to the Internet. Only one respondent used the Internet to communicate with a clients. They answered *sometimes* and at all stages.

8. Internet services used for transactions

elements	#	% of total responses
yes	1	5%
no	12	57%
connected	5	24%
no answer	3	14%
frequency		
elements	#	% of total responses
always	0	0%
often	0	0%
sometimes	1	5%
occasionally	0	0%
never	(20)	95%
no answer	0	0%

design stages

elements	#	% of the 1 yes responses
initial	1	100%
revision	1	100%
final	1	100%
no answer	0	0%

9. Videoconference services used for transactions

elements	#	% of total responses
yes	4	19%
no	13	62%
no answer	4	19%

frequency

elements	#	% of total responses
always	0	0%
often	0	0%
sometimes	0	0%
occasionally	4	19%
never	(17)	81%
no answer	0	0%

design stages

elements	#	% of the 4 yes responses
initial	2	50%
revision	3	75%
final	1	25%
no answer	0	0%

Two fifths of the respondents have held a videoconference with half of them using the technology to communicate designs with clients. They all responded *occasionally* with the majority at the *revision* stage. This implies the technology is used to show corrections to design comprehensives that were already viewed to the client. Half answered the *initial stage.*

10. Interest in transmission options

fax

elements	#	% of total responses
yes	3	14%
no	10	48%
no answer	8	38%

portable document format files

elements	#	% of total responses
yes	11	52%

A third of the respondents did not respond to the interest part of the survey elements. This could imply no interest or indecisiveness. Half of the respondents were

not interested in learning more about facsimile, a fifth were not interested in learning about the Internet and PDF files, and less than a third were not interested in videoconferencing.

	no	4	19%
	no answer	6	29%
	the internet		
	elements	#	% of total responses
	yes	11	52%
	no	4	19%
	no answer	6	29%
	videoconferencing		
	elements	#	% of total responses
	yes	8	38%
	no	6	29%
	no answer	7	33%

Although this is only a sampling of design sites, some importance can be gained. First, there is interest from the design community about alternative transmission options for face to face interaction. Second, a fraction are already utilizing some of the alternatives. Third, the samplings' knowledge of information technology could be improved.

File Sizes and Parameters

File size is an important consideration for data transmission. The speed of the alternative is a combination of the speed of the transmission media, the amount of data that needs to be sent, and the protocol. Although the design comprehensives were chosen for their visual elements, the diversity of size and complexity of the images enabled additional nonvisual conclusions to be drawn (see Appendix B). All comprehensives were in the form of QuarkXPress documents with either Adobe Illustrator or Photoshop EPS files incorporated. Within QuarkXPress, the Adobe Acrobat driver was selected for the print driver and the files were saved as Postscript files. These files were then converted into PDF files within Adobe Distiller, rather than PDF writer, because Distiller is recommended by Adobe for complex graphics (Adobe Systems, 1994). In Distiller, text and graphics were compressed with LZW compression and grayscale and color images were down sampled to 72 dpi with medium JPEG compression applied. The additional dpi would not be viewable and, therefore, not necessary. All fonts were embedded. When files were made into postscript files from the laserwriter driver, not the Acrobat driver, some of the visual elements were lost. For example, the graphics on the *Identity Manual* were lost. Only the black background and typography remained. The Acrobat driver maintained all elements, but added a white border to the pages. Second, the pages were slightly under 100% the original size. The following figure

shows the various file sizes. The numbers in parenthesis were shown for comparison but these files were not actually used in the tests.

Figure 6. File Size

	Original	Postscript	PDF files	Fax File
Identity Manual	586kps	459kps	63kps	586kps
Illustration Calendar	828kps	239kps	36kps	828kps
Illustration Poster	4,141kps	4,190kps	131kps	4,141kps
Photographic Image	9,144kps	(4,766kbps)	(131kps)	(9,144kps)
(grayscale file)	923kps	(522kps)	(117kps)	923Kps
(color JPEG file)	451kps	824kps	95kps	(451kps)

Interestingly, PDF file size and the postscript files are not proportional to the size of the original file. Postscript file size is in accordance to the size and complexity of the EPS files incorporated within the design. Postscript files with photoshop pixel based EPS files were larger than documents with illustrator vector based EPS files. The same is true for PDF files. Although the *Illustration Calendar* is a larger file than the *Identity Manual*, the postscript and PDF files are smaller. The *Photographic Image* is double the size of the *Illustration Poster*, but the postscript files are similar in size and the PDF file sizes are identical.

Because the *Photographic Image* was a 9.14Mbps file, the EPS was additionally reduced in photoshop from a 200 dpi, 8.6Mbps image to a 72 dpi, 1.11Mbps image. This reduced the file by a factor of eight The image was than compressed 63% of the compression capability, reducing the file to 50Kbps (referred to as *Color JPEG File*). There was not a visible difference in the PDF file at this percentage of compression. As higher percentages of compression were applied to the noncompressed image, there was noticeable visual damage. This additional compression only made a significant difference in the postscript file size. It was reduced by almost a factor of six. The postscript file of the *Color JPEG File* was almost double the size of the originating file. This is not unusual because postscript descriptions incorporate a description of all the elements assembled within the document. Illustrator EPS files are not raster (pixel) description images like Photoshop images, but vector algorithms descriptions of the shapes, so they cannot be reduced in dpi. Illustrator does not offer compression options for their files.

For facsimile testing, the *Photographic Image's* EPS was additionally changed to a grayscale image at 100 dpi for two reasons, to test how grayscale files were handled by facsimile technology and to reduce the size of the file. The rest of the files were unaltered for facsimile transmission.

Adobe Acrobat

The following are results of three tests with design sites and the designer's answers to the questionnaire (see Appendix A).

Non visual Aspects

Figure 7. - PDF Transmission

	Speed	Time	Protocol	Platform	Flow Control
Test one	14,400bps	37:24 min	KERMIT	DEC/VAX	none
Test two	14,400bps	6:06 min	ZMODEM	IBM	XON/XOFF
Test three	14,400bps	12:32 min	XMODEM	MAC	none

Procedure

To establish a connection, specific settings must be identically set on both modems: speed, bits per character, stop bits, parity, and flow control (handshaking). For all of the tests, bits per character were set at eight, stop bits were set at one, parity was set at none, and speed at 14,400bps. Flow control was the only variable. After both parties agree on identical settings, the sending modem commences the connection by dialing the receiving site's number. The receiving modem activated the answer/waiting for connection setting, so that it answered the sending modem's call and establish the connection.

To file transfer, protocol and file type need to be established. Between computer to computer, both participants selected a pre-negotiated protocol. Test one used KERMIT because it was sent to a terminal account and the procedure with be explained in the text following. Test two used ZMODEM because it is considered better than the XMODEM and YMODEM protocols. Test three used XMODEM standard because it is oldest of the XMODEM, YMODEM, and ZMODEM protocols and would be the other end of the range from ZMODEM in test two. The procedure for test two and three involved the receiving modem activated the receive function of the software. The sender selected binary format to transfer the PDF binary file, activated the sending function, delegated the file to be sent, and then commenced the transfer.

For test one, between computer and terminal, the connecting computer must command the terminal. This is not difficult. After connection, type "q" to quit any menu to be able to directly type operating system commands. A prompt sign $ will begin the next line. Type "**Kermit**" to establish protocol. A kermit prompt, "**kermit>**" will appear. Type "**set file type binary**" to prepare the terminal to receive a binary file. Type "receive" to prepare the the terminal for the transfer. The sender then commenced the transfer through their communication software. Type "**bye**" to end the session.

After the file is sent to the terminal, there are a couple of options for retrieving the file. The receiver, may either send the file through a modem to another computer or retrieve

a copy of the file from the terminal to another destination. To send the file, type "send (name of file)" and commence the receive mode on the receiving modem. To copy the file, type "copy (original file name) (new file name)". If copying to a new directory type, "copy (original file name) {(directory name)}(new file name)". If copying to a disk type "copy (original file name) (disk name){(directory name)}(new file name)". Several files can be copied at once by typing them in a series with commas. Software, for example Aldus Fetch, will perform the same function. Aldus Fetch is a database application.

Ease of use

The Reader was very easy to install and no problems occurred during installation. For both Macintosh and Windows versions, the designer simply clicked on the installing file. The program self install.

The Adobe Acrobat programs were very easy to use. The graphic user interface of the programs were designed very user friendly. For creation of the file, the manual accompanying Acrobat Exchange and Distiller clearly explained how to operate the program. Additionally, there was an online help function within the program to explain how to operate the program. The testing designers were provided with a reference guide for the reader and rated the program very easy to use (see Appendix E).

As far as the actual transmission, the ease or difficulty was dependent on the communication software. All recipients had never received a file through their modem before. There were two parts to the file transfer to work through, actually establishing the connection between the two modems and the file transfer. Time to successfully accomplish both functions ranged from minutes to hours. This was dependent on the user friendliness of the receiving software and/or the recipients familiarity with their software.

There was only one problem that occurred during the connection phase of transfer. The receiver modem was unable to answer the sending modem's call resulting in a "no carrier" message at the dialing site. The receiving modem was operating through the fax software, not the communication software. The fax software will not answer the sending modem's call because it has a different call than fax software. The tonal qualities of the transmissions are distinctive. Once the receiving modem was operating through the communication software, a connection was able to be established.

File transfer, however, had many problems and was found not easy to use. First, designer one was initially sent an unreadable file, do to the fact that the "set file type binary" command was not sent. Once this command was discovered by typing "send help" after the prompt, readable files were able to be sent to the terminal. Second, each communication software had a different interface to become familiarized with and some were easier to work with than others. During a preliminary test run, the file transfer was only successful when

the receive function was activated after the modem connected. If not, as soon as the file transfer began, the modems disconnected. It took time to discover the solution. In test two, a similar problem occurred, but was not solved by the same solution. The disconnected occurred when the modems were handshaking. This implied the parameters were not compatible. The communication software did not provide a way to set parameters. Two separate hour conversations were spent, trying to discover this basic and necessary setting menu. A second communication software was implemented, used for the test, with success after mere minutes of parameter establishment. The file, however, was damaged. It would not accept the password and open. Repeated attempts at transmissions, with the same parameters at several occasions, were unsuccessful. Attempts with different parameters were additionally unsuccessful. Third, test three's file transfer would not work with a XON/XOFF connection. The connection did not disconnect, though. File transfer was successful as soon as a connection was established without flow control. In theory, the time and effort spent to figure out the successful procedures for connecting and file transferring between computers would only occur once. Afterwards, the same procedure would be implemented.

Time

The time involved to make the PDF files were in several steps: time to make the postscript files to convert in Adobe Distiller, time to convert the postscript files into PDF file, and time to add the features. The time spent making the postscript file was dependent on the complexity of the image. Files containing Photoshop EPS files took longer than files containing Illustrator EPS files because it takes longer to describe each individual pixel than an a vector algorithm. The *Illustrative Poster* and *Photographic Image* took considerably longer than the other files because they contained Photoshop EPS files. The times were not proportionally based on the size of the original file. The same held true for PDF conversion. The following is a comparison of the size of files and the time it took to convert them.

Figure 8. - File Conversion time

	Original size	to Postscript	Postscript	to PDF file
Identity Manual	586kps	1:17min	459kps	0:16secs
Illustration Calendar	828kps	0:35secs	239kps	0:09secs
Illustration Poster	4,141kps	13:26min	4,190kps	0:53secs
Photographic Imagery	9,144kps	(19:52min)	(4,766kbps)	(1:24secs)
(grayscale file)	923kps	(3:48min)	(522kps)	(0:20secs)
(color JPEG file)	451kps	0:56secs	824kps	0:17secs

The longest time being spent was adding the features to the PDF files in Acrobat Exchange. This time was dependent on the amount of features added. Because of the different

sizes of the design pages and the fact that QuarkXPress does not allow pages of different sizes in one document, each QuarkXPress document was separately converted into a PDF file. Then thumbnails were created of each file, allowing pages in be dragged into one PDF documents. Dragging of pages into different documents can only be done with thumbnails. The pages were cropped to have no borders, notes were added, bookmarks created, links established, introduction page added and security restrictions implemented. Total time spent was one hour.

The final size of the PDF file after assembling all pages, including an introduction page, and adding features was 437kps which is substantially less than 14.70Mbps, the combined total of the original files. It would have taken 33 times as long to send the original, uncompressed files.

The time spent during file transfer was dependent of the protocol used. During the test, all connections were established at the same speed (14,400), but there was a 28:17 minute time discrepancy between the fastest and slowest transmission. Different protocols sent data in different arrangements (refer to Chapter Two). Packet arrangement, multiplexing groups of packets, and error correction effected the transmission times. The length of packets and multiplexing decreased transmission time by sending data together. The frequency of error checking slowed transmission because while, the sending modem is waiting for acknowledgments, it is not sending data.

Degree of interaction

Although the sender and receiver were not interacting with one another directly, the interactivity added to the file: thumbnails, notes, links, go to icons, and word search capabilities were found to be beneficial to the communication of the design comprehensives.

Equipment

Sender

Adobe Acrobat Pro 2.0
Express Fax/Modem for Power Macintoshes
GeoPort Telecom Adapter for Power Macintoshes
Power Macintosh 6100/AV
Telephone outlet
Apple Multiple Scan 15 Display monitor
Communication software

Receiver

To protect the anomite of the designer's and their work environment, brand names will not be listed.

receivers' computer

receivers' modem
communication software
Acrobat Reader

Cost

The sender had two costs, the $595 to buy Adobe Acrobat Pro 2.0 and the cost of long distant transmissions. As with voice calls, there were no cost for the local transaction. The long distance transmission of test two cost $1.36 for the actual PDF transfer. However, this particular test had difficulties and had the additional cost of $34.62 for three hours of combined voice and transmission attempts. The per minute rate to Boston, MA is 17-27¢ depending on the time of day. The receiver had no expenses because the Reader is free to distribute.

Interoperability

There were no problems with interoperability. Problems with file transfer were based on the communication software, not the modems or the computers. Successful connection and file transfer occurred with all equipment tested. The transmitted file was able to be read in both Macintosh and Windows environments successful even though it was created on a Macintosh computer, using the Macintosh and Windows versions of the reader.

Security

The security features: inability to make changes, save, or print files, were found *highly beneficial* because it maintained the control of the file with the sender. The receiver could view the file and add notes. The ability to change or add notes can be additionally denied but was not restricted because the purpose of communication between designer and client is to get feedback on the comprehensives. As of present, encryption is not possible, so it was not implemented.

Overall satisfaction

PDF files were found by the designers to be appropriate for initial and revisions and only appropriate for final proofing if designed for screen not print. Hardcopy was chosen over PDF files as their preferred means of receiving files even though "both [fax and PDF] were better than the proof for legibility [typography]".

Visual Aspects

Typography

In general, the typography in the PDF files were found *acceptable* or *almost identical* in comparison to the color proofs. Font embeddment was successful, so there were no problems with typeface distortion or font substitution. Any aesthetic problem, stemmed from 72 dpi resolution of the computer monitor. All the typography on the PDF file were found to be "more chunky and bitmapped than on the fax" and hardcopy due to the low resolution of the monitor. With smaller sizes, there were problems with legibility, and serif typefaces lost

the clarity of the serifs at 10pt. For san serifs, legibility problems began occurring at 9 pt. The only typography found not acceptable was the reversed, italic, 10pt, serif paragraph on the *Photographic Imagery.* To quote the response on the questionnaire, "the italic font at a small size was tough to read. Width of the type was a hindrance." Magnification increased legibility, but made the typeface more noticeably bitmapped. Larger sizes were found not as aesthetically pleasing because the jagged edges of the type were noticeable. Bolding, italicizing, coloring, reversing the type out of color, and overlapping with imagery caused no additional hindrances to the legibility of the typography.

Illustrations and solid shapes

Most illustrations and solid shapes were found almost identical to the colored proofs, while line work was found identical. There were two exceptions. The light colored lines, in the *Identity Manual,* were acceptable when reversed from black and were not acceptable against white. Shapes of the logo were acceptable at larger size but barely acceptable at the smaller size because of the smaller shapes within the logo lost their clarity.

Continuous tone imagery

The continuous tone imagery, was found acceptable. As with typography, the low resolution of the monitor was a hindrance to the clarity of the photographic image. The image was not as crisp, as viewing the EPS in Photoshop. Photoshop "decompresses" compressed images when they are opened. PDF files do not "decompresses" and, therefore, appear choppy in comparison to Photoshop.

Color

Since monitors display colors by transmitting combinations of red, green, and blue light (additive color theory), it is a RGB color device. The dye sublimation printer is a CMYK color device which separates color information for cyan, magenta, yellow, and black pigments (subtractive color theory). Each pigment absorbs one of the RGB colors, thus, subtracting it from the colors reflected by the paper. RGB and CMYK describe colors through different color theory, thus, RGB and CMYK color devices will not describe or interpret colors the same. CMYK colors have a more limited color range do to the limitation of the pigments. Therefore, the colors on the monitor were not identical to the colors of the proof. Additionally, the monitors were not calibrated (adjusted) to match one another and were not viewed under the same lighting conditions. Both the monitors and dye sublimation prints were only approximations of the colors intended for final production, not exact representations.

"Hues", "coverage", and "color differentiation" were found *acceptable* to *identical* for the majority of the responses. There was one *not acceptable* response for the *Photographic Imagery* on "hue" and "coverage" and one for the *Illustration Poster* on hue on differentiation. To quote the written responses on the poster "PDF colors more vibrant - more violet than

red and more grass green than pea soup color. . . . very misleading since 99% of all clients are not visually literate. They need to see everything." The color substitute for the color substrate was found acceptable but the "texture of the paper was lost".

Overall aesthetic quality

Overall, PDF files were rated as "very close approximations" of the hardcopy, color proof made from the originating files. Its limitations were a result of monitor resolution, differences color scheme, and the impossibility of actually viewing the substrate. Additionally, there is no way to change PDF files. Changes must be made in the original file and reconverted. Since this is not a very difficult or time consuming process, it is not a drawback.

Facsimile

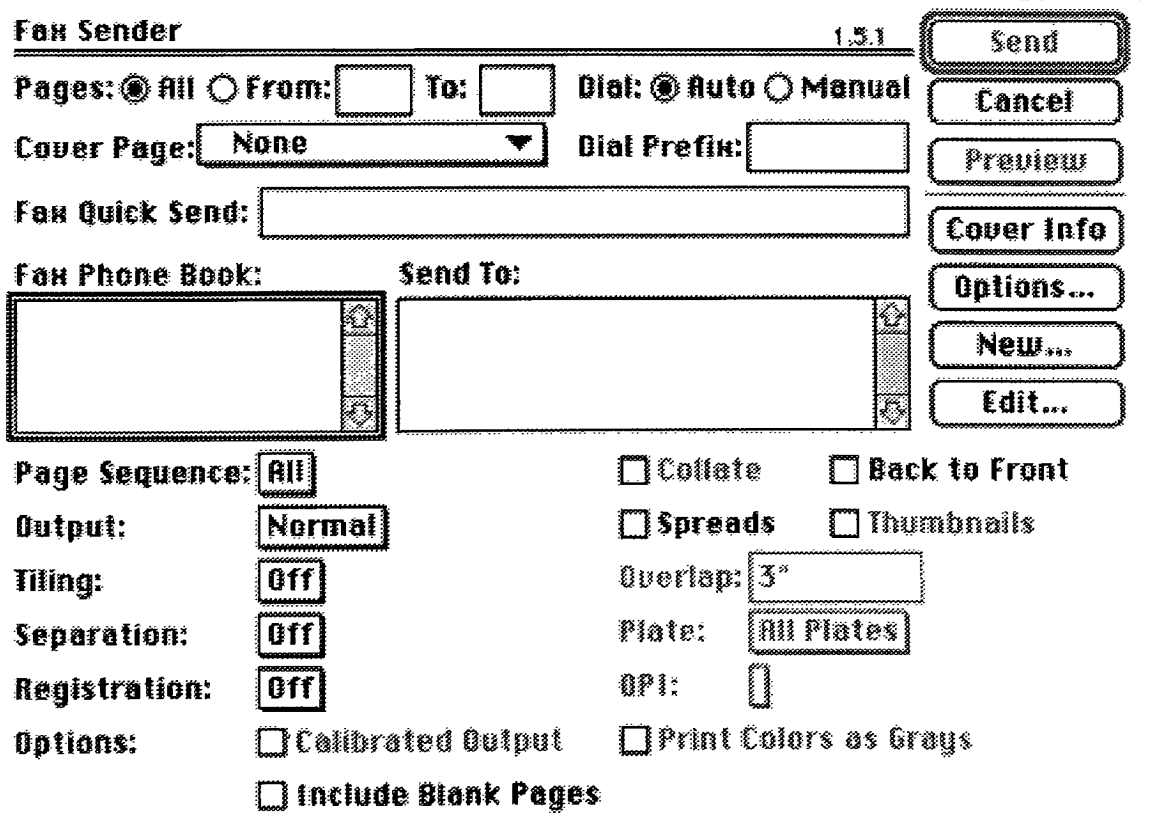
Non visual Aspects

Procedure

The faxes were sent from fax software. The fax sender driver was selected from the Chooser control panel. Then within QuarkXPress, the fax setup window was opened, paper size selected appropriately, percentage set appropriately, image quality set at fine, and orientation set appropriately.

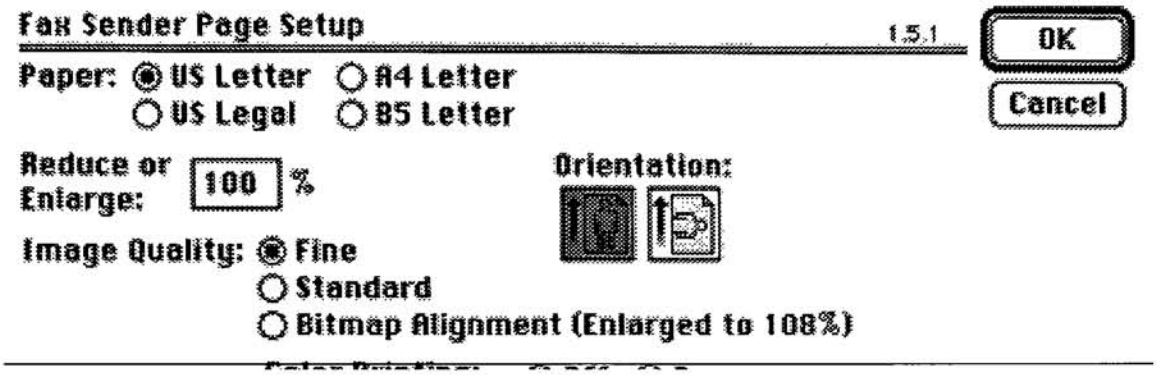
Figure 9. - Fax Sender Page Setup

Then, fax function of the QuarkXPress menu was activated. The number was correctly



typed and the fax was sent. No special features were activated. Each comprehensives document was sent separately.

Figure 10. - Fax Sender



Ease of use

Facsimile is the easiest of the electronic transmission alternatives to use, "physically easy although had poor image quality." The recipients merely turned on their computer or fax machine. No problems occurred in sending facsimile transmission.

Time

The time of the transmission was dependent on the file itself and the baud of the facsimile technology. Interestingly, the facsimile that took the longest time was the most complex, the *Color JPEG File*, not the largest, the *Illustration Poster*; It was the third fastest in transmission time. The *Identity Manual*, was not the most complex image, but it had multiple pages. The transmission time divided by the number of pages, shows each individual page was sent faster than the other files.

Speed played a larger part in transmission time. To send complex imagery, a baud of at least 9,600bps is required to have reasonable time consumption. The distance of the transmission did not appear to have a significant effect on the transmission times. Test two and three were different by seconds even though one call was local and one was long distance to Boston, Massachusetts. The telephone company incorporates several transmission media so that distance does not effect voice calls. It is the same lines that carry the fax transmission.

Figure 11. - Facsimile Transmission Time

	Test one	Test two	Test three	
	2,400bps	9,600bps	9,600bps	
Identity Manual	7:14 min	2:26 min	2:44 min	(three pages)
Illustration Calendar	2:30 min	1:00 min	1:08 min	(one page)
Illustration Poster	3:17 min	1:05 min	1:13 min	(one page)
Photographic Imagery	23:25 min	5:57 min	6:13 min	(one page)
total time spent	**36:26 min**	**10:28 min**	**10:18 min**	

Test one took significantly longer than the other faxes due to its low transmission speed. As a result, noise interference in the communication lines distorted the files. They were all vertically elongated when they printed.

Degree of interaction

There was no interaction between designer and client with facsimile transmission.

Equipment

Sender

Express Fax/Modem for Power Macintoshes

GeoPort Telecom Adapter for Power Macintoshes

Power Macintosh 6100/AV

Telephone outlet

Apple Multiple Scan 15 Display monitor

Receiver

receivers' facsimile technology

Cost

As with voice calls, local fax transmissions have no additional fee to the phone charges. The long distance fax transmission cost $1.87 for all four faxes and was at the expense of the sender.

Interoperability

The faxes originated on fax software and tests were sent to both receiving hardware and software. No problems occurred.

Security

There were no security precautions during transactions for three reasons. First, the quality of the facsimile imagery are not of high enough quality to be very usable. Second, it was not likely to be intercepted. Interception is possible, though. Fax lines operate over voice lines, so sending a fax is as risky as calling a person with one exception. A security breach would have occur if the fax was sent to the wrong person or the wrong person retrieved the

fax from the machine or computer. This did not happen. Third, there were no security options built into the sender's facsimile technology.

Overall satisfaction

Facsimile files were found by the designers appropriate for some *initial comprehensives.* Hardcopy was chosen over facsimile as their preferred means of receiving files.

Visual Aspects

Typography

Overall, facsimile only handled black typography on a white background well. Smaller sizes, especially serif typefaces, and color were found to have significant problems with legibility, while the larger sizes were rated at almost identical to the hardcopy. Colored typography on colored backgrounds were not legible because of lack of tonal differentiation. The exception was the large type on the cover of the *Identity Manual.* It appeared as white even though it was originally gray. Black type on background color was not legible for smaller sizes, but legible with larger sizes. The type reversed out from the *Photographic Image* was found unacceptable quality due to the italic style of the serif typeface, but it was visible. When the file was sent as a color file in preliminary tests, only the typography overlapping the image was visible. The reversed type over the gray background was completely lost.

Illustration and solid shapes

Facsimile did not handle most illustrations and solid shapes at an acceptable quality. Only the solid black, gray, and red lines; the gold borders of the text boxes in the *Illustration Calendar;* and dark colored logo on *Identity Manual Page 2* were found acceptable. All were over clear backgrounds. Interestingly, the same gold colored lines were *not acceptable* because they became white and were only legible where they overlapped with the illustration. These voice lines were wider than the border, but were part of the Illustrator EPS, while the border of the text box was part of the QuarkXPress file. The smaller version of the logo on the *Letterhead,* was found unacceptable because it lost the clarity of the smaller shapes. The visual resolution, detail, and color differentiation was found unacceptable for all illustration. The colored shapes and lines reversed out of the black background were not visible. The same color typography was legible implying it was the width of the line that was the problem.

Continuous tone imagery

If the photographic image was not changed into a grayscale image prior to faxing, it would have been completely illegible. The detail of imagery would be lost, the differentiation of shape and the typography over the solid gray background would be lost. It was still found not acceptable because the bitmap resolution of the facsimile file is not high enough to reasonably display the complexity of detail. Bitmap images lose the continuous frequency of analog information, causing jagged edges. The facsimile, though, has enough detail to portray

the layout of the design. This would not have been the case if the file was not converted to grayscale before the transmission because not all of the elements would be discernable.

Color

None of the facsimile technologies used had color capabilities. The faxes sent from the grayscale file were received as grayscale faxes with tonal variations. The faxes originating as color files became bitmap faxes and with three tonal values: black, white, and gray. The coverage of solid areas were not acceptable because the resolution was lower than the printer and the coverage was spotted.

Overall aesthetic quality

Overall, facsimile has low quality output. It was found unacceptable for the majority of visuals elements. The nature of bitmap imagery does not allow high resolution detail. In addition, unless the image was already a grayscale image, tonal variations was lost. As a result, facsimile handled typography better than imagery. Even then, only when the typography was a dark color over a clear background. Because test one had significantly longer transmission times, there were aesthetic problems. The files became vertically stretched. Consequently, the quality of the faxes were even lower. Documents greater in size than US letter, had to be sent at a reduce percentage to fit on US letter paper. This hindered the legibility of the typography significantly.

Internet

File Transfer on the Internet

Procedure

The actual file transfer process is easy. It is based on unix commands. The following are the file transfer procedure to ftp and a list of some important file transfer commands.

Figure 12. Internet File Transfer session

to start, type	ftp (hostname/the computer you want to retrieve from)
at login, type	(account name) or anonymous
type in password	(password) or if anonymous, type (email address) as password
to list directories	dir
to change directory	cd (directory name)
to list file names	ls
for file kind, type	binary or ascii
to get file, type	get (file name)
	if you need to change directories type cd
to send files, type	putt (file name)
when done, type	bye

Figure 13. - Useful Commands for Internet File Transfer

ascii	set FTP to ASCII MODE
binary	set FTP to binary MODE
bye	quits FTP program
cd	changes directory of remote site
close	ends FTP to ASCII MODE
dir	displays a listing of files in the directory
get	retrieves files
ls	list files
mget	retrieves multiple files (use * to specify files)
ascii	Set FTP to ASCII MODE
put	sends files
pwd	list name of current directory
?	will provide help on UNIX commands

Concerns With the Appropriateness of the Internet

The author's concern with the appropriateness of the Internet is not the capability of the Internet to file transfer; it is a foundation of the network. Rather, the appropriateness of using the network for direct, private business file transfer.

Ease of use

Problems occurred in file transfer tests, were not the ease of use of the Internet, but were the denial of access to the remote site. Sites were down, access was denied due to over capacity, and addresses were unlocatable. The other way to FTP, is by clicking links on an Internet Browser, such as Netscape's Mosaic. Although this is easier than using unix commands, the author found more problems occurred with access. More control over establishing connections is possible without the browser because the user is commanding the operating system and entering the site's address.

Time

FTP Etiquette highly recommends that FTP sessions occur after regular business hours because heavy activity takes away the overall performance of the network (http://www.cis. ohio-state.edu/hypertext/faq/usenet/computer-security/anonymous-ftp-faq/faq.htm, 1995). The Internet is widely used and, therefore, heavily congested. The author has frequent been denied connections or experienced slow progress due to heavy traffic on the network. With the Internet growing daily, consideration in resource usage needs to be practiced network wide so everyone's bandwidth needs can be accommodated. Direct, private business file transfer

during business hours may not be proper usage of Internet services when a direct transfer from a modem is more secure, more direct, and less congested. Time spent is not consistent.

Degree of interaction

The sender and receiver are not interacting with one another directly. The degree of interactivity is dependent on what kind of file is sent and whether there is interactivity within the file that is transferred.

Equipment

Both sites need to be connected to the Internet and have FTP transfer software. Less than a third of the sampling were connected to the Internet. With portable documents, both sites only need a phone line or network access, which an Internet user would also need for their Internet service. The reader is free to distribute in either case.

Cost

The cost of file transfer on the Internet is the cost of having Internet services. There is no addition cost for file transfer regardless of the distance. This is one advantage for using the Internet instead of directly sending files over the modem. A disadvantage is that one is still charged an Internet service fee regardless of destination.

Interoperability

Basically any file is transferable over the Internet. PDF files are still the best option for computer interoperability and are used heavily on the Internet. Transferring the files via the Internet does not harm the files. It does not add to the interoperability of the files either, but decreases it with denied connection over congestion or temporary unavailability of the site. There is no single Internet authority to control and permit activity. Internet rules change and network connections or service providers may change services (Dern 1994). Consistency cannot be guaranteed.

Security

There is concern over using the Internet for business transactions because of the lack of security and authentication of users. According to Peter Sevick, a Principal at Northeast Consulting, "We don't trust the network enough to transmit sensitive information. Your taking risks by sending sensitive information over unsecured networks. . . . You're literally handwriting your entire network and computer system upon to the interoperable world, where any one can try and break in." (Dern 1994). Security breaches can result from unintentionally errors or from malicious intent. Therefore, encryption needs to be established to secure transfers. Encryption does not guarantee security. When encryption is utilized, transmitting passwords across a network voids the protection on encrypting the file. Second, encryption does not block intruders access into systems.

In addition to the risk of users activities being tracked and the potential for intruders gaining access to your files, viruses may be introduced into your system (Dern 1994). Scanning downloaded files for viruses is a necessary safety precaution.

Second, until RSA private keys are established on the Internet, there is no secure way to guarantee authentication on the Internet; individuals, not address, need to be identified (Datamation 1995, 39). According to Craig Partridge, Research Scientist BBN Systems and Technologies, it is comparatively easy to gain unauthorized or inadvertent access to data, masquerade as another user or program, or deny other's transmissions (Dern 1994). Even if there is not a concern over authentication, there are basic problems with today's Internet protocols affecting identification on the Internet: legitimate addresses bounce, names on addresses are frequently change, addresses are not resolved when computers crash, and problems with associating updated addresses (http://www.cis.ohiostate.edu/hypertext/faq/usenet/net-privacy/part1/faq.html,1995).

Overall Satisfaction

It is for the above mentioned reasons, that the Internet was found inappropriate at present for an alternative transmission to face to face interaction between designers and clients. Only one of the sampling respondence answer to occasionally sending designs over the Internet. This may change as the technology matures. Until then, the Internet is still a wonderful tool to access or post information to the Internet community. One of the top worldwide advertising agency (left anonymous upon their request), expressed their success with using the Internet as an advertising media. They were able to count how many times the site was hit (accessed) and how many time the various product's information were hit. This may be a more appropriate use of the technology. Experts predict that it will be five to seven years before the internet is a common transaction platform (Marion, 1995).

"We started out in the Internet with the theory that anyone should be able to talk to anyone else. But in the business world complete promiscuity is not desired. What one really needs is the ability to differentiate between the private resources of the corporation, which may be very geographically dispersed, and ones that one wants to make accessible to public or to other organizations. In data communications environment we tend to have either a network that is completely private or completely public; we actually need something in between."(Anthes 1994) Presently, the Internet is a successful tool for accessing public information and has many resources to offer. For the purpose of this thesis project, file transfer over the network does not add advantages to sending files directly over a modem, but on the contrary offers disadvantages of Internet service charges, vulnerability, competition for network resources, inconsistency, and Internet services requirements at both sites.

Videoconferencing

Calvin J.Viele, Digital Customer Service Representative, generously donated a videoconference at Eastman Kodak building 20, 4th flour, conference room C & E. The identical dye sublimation prints and visual aspects questionnaire (see Appendix D) were used as with the facsimile and PDF testing. The conference was videotaped. The following are the results.

Non visual Aspects

Procedure

As explained in Chapter One, the process of establishing connectivity with remote sites is not simple. The videoconference service coordinator must establish interoperability prior to actual conferences, train personnel on how to run a conference, and to trouble shoot any problems occurring during a conference. From previous videoconferences, Calvin Viele had programmed both specific equipment and modes (pre-established set of standards and settings) into the controller. The connection was established by selecting the unit and the desired mode and waiting for the two systems to connect. The visual projector was controlled by a magnification and zoom button on the device. The VCR was controlled by the control board.

Ease of use

For the participants of the videoconference, the equipment was easy to use. The control panel is a high complexity remote control. By simply pressing buttons, all required actions were initiated.

Time

A previous test conference established test connectivity. The time involved will depend on the units trying to be interoperable. Additionally, a half-hour leeway between conferences is necessary to prepare for the conference. When the conference commences, there is a 1-2 minute convergence, while the units establish the call. The actual conference lasted a half-hour.

Degree of interaction

The degree of interaction is extremely high. The video and audio were rated *highly beneficial* to the communication of the design comprehensives. The visual projector was additionally rated *highly beneficial* due to the ability to projected, magnify, and focus the comprehensives almost instantaneously.

Equipment

CLI Rembrandt IIVP Gallery System

CLI Eclipse 486 System

Elmo Visual Presenter 308

AT&T ISDN carrier

Cost

There are three costs to a videoconference: the equipment, transaction coat, and coordinators wage. These will vary. Videoconference is a substantial investment, but the savings in travel cost, lost work time, and instantaneous live communication are advantages to consider. The equipment used in this test cost approximately $135,000 and involved two hours of Calvin Viele's time. The line used was a dedicated line, so there was not an hourly rate charge to this conference.

Interoperability

Both videoconference units were certified. This particular conference was established with CTX+/ H.320, Audio G711-MU, and NTSC standard compliance. Both units were CLI units, which helped in their connectivity (each unit had several software modes to choose, so connectivity between certified systems is usually possible). It was not a problem to establish a connection between mobile and group systems with significantly different bandwidth capabilities. The transmission rate will be dependent on the capacity of the slower unit.

Security

It is possible to DES encrypt the transmission from the controller box. Participants would simply have to agree on a numeric code and punch them into the keyboard. This option was not implemented in this incidence. No actual file is being sent with videoconferencing; the encryption is for the signals.

Overall satisfaction

The visual clarity, interaction capabilities, and security benefits of videoconferencing, and the documentation ability to videotape the conferences, were highly rated. The ability to videotape is beneficial to legal aspects of electronic correspondence. The video tape can record from the local site, remote site, and visual projector. In combination, a thorough record of a business transaction is possible if legal action is ensued. Additionally, the documentation can be reviewed for strong client relations.

Visual Aspects

Typography

Size was a very important issue in legibility. Without the adjustable magnification functionability of the visual projector, the majority of the typography would not be legible. Only the larger type was legible without magnification. The smaller type was legible after magnification. There were no problems with clarity of typography shapes, whether serif or sans serif, italic, plain, bold, overlapped over imagery, or reversed from a color. Interestingly, there was no color differentiation between the red and the black typography on the *Calendar Illustration*. The red was seen as very dark, thus, losing its tonal differentiation. The gray

color on *Identity Manual Page 2* of the *Identity Manual* required more magnification due to its light color. Prior to magnification, the letters were not even visible.

Illustrations and solid shapes

The only line that was indiscernible was the gray line on *Identity Manual Page 2* of the *Visual Manual.* The light color required magnification to even see the line. All other lines were legible without magnification. The solid shapes had even coverage and in most cases required no magnification to discern the detail of the shapes. The exceptions were the rigid pointed shapes of both the arrow triangle shapes on the left side of the *Calendar Illustration* and the zigzag shapes of the inner diamond illustration. They were clearly defined, however, after magnification. The *Illustration Calendar* was found to be *almost identical* to the color proof.

Continuous tone imagery

The detail of the imagery came across well. The *Photographic Image* was found to be *almost identical* to the color proof.

Color

The color of the monitor is RGB, so it can never be identical to the CMYK gamut of the dye sublimation print. The hues, in general, were darker than the original. They lightened when magnified. For example, prior to magnification, the green dragon on the *Illustration Poster* seemed dark gary. Upon magnification, the green hue became closer to the color print. As stated earlier there was no color differentiation between the red and the black typography on the *Calendar Illustration* until magnification and that the light gray hue on the *Identity Manual* were not even detectable until magnification.

Overall aesthetic quality

Overall, videoconferencing was found as an acceptable alternative to communicate design comprehensives at all stages of the approval process. Although the video is visually less focused than a television video transmission, there were no visual element, with or without adjustment, that were unattainable at reasonable legibility. The visual projector provided higher quality as analog signals on the host screen, than the digitally converted signals on the receiver's screen. Additionally, the visual projector had a limit of viewable size and magnification capacity. Comprehensives larger than US letter were unable to be fully viewed on screen even at the farthest magnification. Third, the video signal is a mirror image of actual events and it can take a moment to adjust when viewing one's own video signal.

This conference was at a 112kps rate on BRI-ISDN line. Due to the low bandwidth, the visual and audio quality were rated at *moderate* quality. There was a obvious 1-2 second delay in the audio and the video was noticeably under television quality (384Kbps). Sudden movements, like the waving of a hand, were out of focus, but did not interfere with the communication of the design comprehensives. *visual* quality will improve with higher

bandwidth. The higher the bandwidth, the more frame change per second. This is the highest rate capability of the eclipse unit, but not of the group unit with full T1 potential. Therefore, the group unit has capacity for higher visual quality. Desktop videoconferencing, through phone lines, would be considerably slower and have lower visual quality unless connected through ISDN lines.

Chapter Six

Conclusions

"We see businesses moving away from a face-to-face physical meeting environment to a PC-to-PC connection, collaborating real-time on projects, using links to outsourcing companies, and generally moving to a more distributed corporate environment. What we are talking about here is a fundamental change in the way businesses operate" – Brian Baum, Atlantic Bell (Wilson 1995).

The conclusion of this thesis project is that the technology is here to use for electronic alternatives to face to face interaction between clients. Some adjustments have to be made, though, before these technologies can be embraced completely. The following results are based on this thesis project's test results, therefore, the conclusions are only valid for this thesis' test group.

None of the electronic alternatives are appropriate for final color approval. Calibration is a problem for several reasons. First, in order for the designer and client to view the same color on monitor, their monitors need to be calibrated to produce the same RGB colors and be under the same lighting conditions. Second, monitor viewing (referred to as soft proof) will not show the exact colors of CMYK final output regardless of calibration. Third, in order for the designer and client to view the same colors on printing hardcopy, the color printers need to be of the same quality output and calibrated to print the same colors. Fourth, unless the color printing technology is calibrated to the machine producing the final product, the file will not be accurate to the color of the final production. Even if the calibration settings were provided, establishing calibration to show the exact colors of the final output would be an extremely difficult to nearly impossible task.

Electronic comprehensives cannot test production or finishing operations. Many mistakes can occur during production and finishing operations if the product is not designed in accordance to equipment producing the product.

By nature of monitor resolution, the quality of typography on screen is extremely low and the aesthetic quality is extremely diminished.

Therefore, color proofs provided by the companies producing the final output, calibrated to the actually equipment, with high resolution typography, and with finishing operations performed are the only appropriate proof for final approval. Electronic alternatives are not qualified for final approval.

Lastly, the designers selected hardcopy as the best option for communicated the tested designs. This indicates the community is not ready to embrace electronic alternatives. This

may be due to a lacking of advantage of the electronic option to deem them necessary and/or lack of comfortability with the electronic alternatives. Either reason, electronic alternatives to face to face interaction between client and designer is not, currently, being fully accepted.

Adobe Acrobat

Before PDF files can be fully embraced, designers and clients need to become more fluent with their modems and communication software. They are not fundamentally difficult devices to use, but many problems occurred during testing due in part to the quality of the communication software and the users' familiarity with the product. As users become familiarized with the products and the process of using the technology, they will be able to make educated purchases of communication software and easily file transfer. Additionally, as communication software improves it will be easier to solve compatibility problems that made successful file transfers difficult.

As for Adobe Acrobat itself, it is a very appropriate product to use between designer and client to communicate design comprehensives for initial and revision stages.

Strengths

PDF files are almost identical to the original file
- of alternatives tested, it handled the reproduction of imagery the best
- fonts can be successfully embedded
- highly beneficial, interactive communication features
- files can be restricted to maintain control with the creator

PDF files are significantly smaller than originating files

cross-platform interoperable

no cost to the client and minimal cost to designer

programs are easy to use

API can be used for individuals needs

almost identical color representation

Weakness

- no calibration settings
- typography is worse than the original file

PDF files cannot be changed, only interactive features can be changed

currently, cannot encrypt file
- can not show finishing operations

cannot be used for final printing color approval

Facsimile

Facsimile transmissions are appropriate for initial comprehensives or for revisions of comprehensives already seen at higher quality by the client. Faxing grayscale files is significantly better than faxing color files, because fax file conversion will not interpret the tonal differences of hues. Therefore facsimile is only a good option to show element placement, text, and solid dark colored shapes.

Strengths

- extremely easy to use
- extremely high interoperability
- cross-platform capability
  electronic and hardcopy can be sent
- handles dark colors typography over a clear background acceptably
- handles dark colored shape definition over a clear background acceptably
- no cost to the client and minimal cost to designer
- frequent incorporated in office equipment

Weaknesses

- low quality output
- does not handle tonal variation for color files
- black and white technology
- does not handle imagery well
- typography is worse than the original file
- currently, cannot encrypt file
  can not show finishing operations

Internet

The Internet is presently not appropriate for private one-to-one file transfer between client and designer. Its strengths do not outweigh its risks.

Strengths

- no file transfer cost regardless of distance
- worldwide network
- any file format can be sent

Weaknesses

immature technology

- unsecured network
- risk access to users network/computer
- inconsistent performance

- inconsistent connectability
- requires internet connections on both side
- congested network
  no calibration settings
  cannot show finishing operations
  inconsistent fee for Internet access cost
- cannot be used for final printing color approval

Videoconferencing

As for the technology itself, videoconferencing is electronic correspondence, not file transfer. This is an important distinction. It can be used in combination with mail carrier service and file transfer or alone. If the client has been sent appropriate final proofs and the conference is used for verbal and visual communication, it is appropriate for all stages. If the final proof has not been sent, it is very appropriate for initial and revision stages.

Before videoconferencing files can be fully embraced, designers and clients need to weigh its costs against savings. Videoconferencing is an extensive and expensive investment and will not be worth the investment in every case. If the designer and client relationship results in frequent travel or frequent long distance communication, it may be well worth the implementation. For occasional use, it may be worth renting the service or using an alternative option mentioned in this thesis project.

Strengths

- live correspondence
- instantaneous feedback
- video and audio capability
- can include many participants at either locations
  multi-conferencing capabilities
  moderate to high video quality
  moderate to high audio quality
- utilizes the highest bandwidth
  can be videotaped
  can attach graphic projection equipment
  can show proof from company producing the final output
  transmission encryption

Weaknesses

extensive equipment requirements
- expensive

- requires a coordinator
- requires extensive preparation
- no calibration settings
- lower quality monitor technology than computer monitors

In Comparison to Mail Carriers

This thesis project is not concerned with comparing different carriers. Federal Express was chosen for example due to the fact it was used by the majority of survey recipients (see Chapter Five). A US Letter package, 8 oz ranges from $10-15.50, in the continental United States depending on whether it is delivered in the morning or afternoon. Additional weight or dimension raise the price. With either delivery time, all electronic options transmission times were significantly faster. All transmissions were under a hour. Additionally, all alternatives except videoconferencing, were less expensive.

Suggestions for Further Study

Since this thesis has covered several technologies, more indepth studies of the individual technology would further help to determine and promote the use of electronic correspondence within the design community. The following are the authors suggestions:

- color calibration to help ensure Adobe Acrobat PDF file's color representation
- color facsimile technology
- group four facsimile technology
- security on the internet
  desktop videoconferencing units
- file sharing
- electronic transfer of designs destined for softcopy final output

Bibliography

Bibliography

Abbott, Mike, "Personal Conferencing on Your Computer.", *Michigan Lawyers Weekly*, 8 August 1994, sac. A, 5.

Aboba, Bernard, "How the Internet Came to Be Vinton Cerf, as told to Bernard Aboba." *The Online User's Encyclopedia.* USA: Addison-Wesley, 1993 ISBN o201-62214-9

"Adobe Acrobat Online Guide", Adobe Acrobat version 2.0, Adobe Systems, Inc., Mountain View, CA, 1994.

"Adobe Corporation" [online], February 1995, February 1995, Adobe Systems Inc., Available: http://www.adobe.com, 23

Angiolillo, Joel S., Blanchard Harry E., Israelski, Edmond W., "Video Telephony.," *AT&T Technical Journal*, May/June 1993, 7-12.

"Anonymous FTP" [online], January 1995, Available: http://www.tu-chemnitz.de/docs/Chapter-3.html#3.2.

"Anonymous FTP; Frequently Asked Questions" [online], February 1995, available: http://www.cis.ohio-state.edu/hypertext/faq/usenet/computer-security/anonymous-ftp-faq/faq.htm,

Anthes, Gary "Interview with Vinton Cerf." *ComputerWorld*, 7 February 1994, 121-125.

Ajayi, A'isha, 1994, *Electronic Communications*, class notes, Rochester Institute of Technology, Rochester, NY.

"International Satellite Communications: Overview", *1994 Datapro Management of International Communications*, Delran: McGraw-Hill, 1994.

Booker, Ellis and Mohan, Suruchi, "AT&T launches multipoint", *ComputerWorld*, 4 July 1994, 55.

Byran, John "Pumping Up Ethernet", *Byte*, August 1993, 121-126.

"Communications Alternatives - Building Tomorrow's Networks Today" *1990 Datapro Reports on Communications Alternatives*, Delran NJ: McGraw-Hill 1990.

Defler, Frank J. Jr., "Making the Connection", *PC Magazine*, 14 June 1994, 8.

"Delivering documents through digital media.", *The Seybold Report on Publishing Systems*, 26 October 1994 v24 n3 , 22-28.

Dern, Daniel P., *The Internet Guide for New Users.* USA: McGraw Hill, Inc. 1994

Edward, Stephen E., Neef, David, , Rosanne and Tribut, Andrew "Nexpo, II: electronic delivery, output, digital photography, image databases" *The Seybold Report on Publishing Systems*, 15 August 1994 v23 n22 , 3-58.

"Fiber Optic Cabling", *1992 Datapro* Management of International Telecommunications Delran NJ: McGraw-Hill, 1992.

"Faxes on the Color LaserJet.", *Byte*, January 1995, 242.

Finnie, Tom, Manufacturing Research and Engineer Systems Division, interview by author, January 27, Rochester, Ny, notes, *Eastman Kodak* Rochester, Ny.

Fitzgerald, Jerry *Business Data Communications: Basic Concepts, Security, and Design.* New York NY: John Wilet & Sons, Inc. 1993

Gibbs, Mark and Smith, Richard, *Navigating The Internet.* USA: Sams Publishing, Inc. 1993

Hahn, Nobert, "Applying Videoconferencing." *Telecommunications*, August 1992, 27-30.

"Identity, privacy, and anomite on the Internet" [online], February 1995, http://www.cis.ohiostate.edu/hypertext/faq/usenet/net-privacy/part1/faq.html,

International Teleconferencing Association, news release, 19 June 1994

"ISDN Modems", *MacWorld*, 15 January 1995, 147.

"JPEG Image Compression: FAQ" [online], February 1995, available: http://www.cis.ohio-state.edu/hypertext/faq/usenet/jpeg-faq/faq.html, 23

Jurgen, Ronald K., "Digital Video: Television, communication, and computer specialists are working to unsnarl the exchange of material in any video format.", *IEEE Spectrum*, March 1992, 24-30.

Marshall, Patrick "Pulling away from the hard fax.", *Government Computer News,* 29 August 1994, 93-98.

McCusker, Tom "Manage your LAN fax software.", *Datamation,* 15 July 1994, 70-77

Messmer, Ellen "PictureTel zooming in on desktop video.", *InfoWorld*, 22 August 1994, 58-62.

Miles, J.B., "Desktop fax software." *Government Computer News,* 29 August 1994, 93-98.

"Publishers discover the digital world", *The Seybold Report on Publishing Systems,* 22 April 1994 v23 n15 , 83-71.

"RSA Corporation" [online], February 1995, RSA Corporation, available: http://www.rsa.com

Rodriguez, Karen "Vendors show off tools for Internet", *InfoWorld,* 7 November 1993, 56.

Schmit, Julie "Videoconferencing boom/high-tech tool changing way firms work." *USA Today,* 20 July 1994, sec. B, p.1.

Sherman, Lee "New Systems Provide Virtual Meetings At Your Desktop." *New Media,* November 1994, 49-54.

Spenser, Steven "Car office merge onto highway- cellular phone, laptop team with printer, fax make mobile workstation complete.", *The Seattle Times,* 6 November 1994 sec. K, p. 4.

Stone, Beth "The Speaker's Solution", *ITCA Connections,* February 1995, 4

Stone, David A., "When is a fax not a fax?", *PC magazine,* 13 September 1994, 229-234.

Sullivan, Jerry, "Acrobat 2 soars to new height", *MacWeek,*28 November 1994, 1-5.

Sutherland, Joe and Litteral, Larry "Residential Video Services" *IEEE Communications,* Magazine July 1992.

"The World Wide Webb: Internet Boomtown." *Datamation,* 15 January 1995, 37-41.

Finnie, Tom, Manufacturing Research and Engineer Systems Division, January 27,*Eastman Kodak*

Viele, Calvin J., Digital Customer Service Representative, demonstration, 14 October 1994, Rochester, NY, notes, *Eastman Kodak*, Rochester, NY.

Viele, Calvin J., Digital Customer Service Representative, demonstration, 7 February 1995, Rochester, NY, notes, *Eastman Kodak*, Rochester, NY.

Viele, Calvin J., Digital Customer Service Representative, interview by author, 3 March 1995, Rochester, NY, notes, *Eastman Kodak*, Rochester, NY.

Marion, Larry, "Who's Guarding the Till at the Cybermall?" *Datamation*, 15 February 1995, 38-41.

Walter, Mark "Acrobat 2.0: Adobe Moves UP Market, Beyond AD Hoc Document Delivery", *The Seybold Report on Desktop Publishing*, 12 September 1994 v9 n1, 3-10.

"What's New; Hardware.", *Byte*, January 1995, 242

Wiggins, Richard W,. *The Internet for Everyone: a guide for users and providers.* USA: McGraw-Hill, 1995

Wilson, Carol "Telecommuting: interactive access is booming..", *Interactive Week*, 27 MArch 1995, 30.

Wood, Lamont "V.fast Class Modems.", *InfoWorld*, 11 July 1994, 72-80.

Appendix A

Appendix A

Survey Questionnaire

Name/Title _____

Company _____

Address _____

Telephone # _____

Email _____

Please read every question carefully and check the accurate response.

1. How many employees presently work in the design department?
( ) 1-10 ( ) 15-20 ( ) 20-35 ( ) 35-50 ( ) more than 50

2. How many transactions does your department have per month?
( ) 0-25 ( ) 25-100 ( ) 100-250 ( ) 250-500 ( ) greater than 500

3. What percentage of the design process exchange with clients is done at your location?
( ) 0-20% ( ) 20-40% ( ) 40-60% ( ) 60-80% ( ) 80-100%

4. What percentage of the design process exchange with clients is done at their location?
( ) 0-20% ( ) 20-40% ( ) 40-60% ( ) 60-80% ( ) 80-100%

Mail Services

5. Do you send designs through the mail?
( ) yes (*go to 5a, 5b, 5c)* ( ) no

5a. *If yes,* how?
( ) FedEx ( ) U.S. Postal ( ) UPS

5b. *If yes,* how often?
( ) always ( ) often ( ) sometimes ( ) occasionally ( ) never

5c. *If yes,* for which stages of the design process? (*may check more than one)*
( ) initial concepts ( ) revisions comprehensives ( ) final comprehensives

Fax Services

6. Do you send designs by fax?
( ) yes (*go to 6a, 6b, 6c, 6d)* ( ) no

6a. *If yes,* how?
( ) fax machine ( ) fax software ( ) both

6b. *If yes,* how often?
( ) always ( ) often ( ) sometimes ( ) occasionally ( ) never

6c. *If yes,* for which stages of the design process? (*may check more than one)*
( ) initial concepts ( ) revisions comprehensives ( ) final comprehensives

6d. *If yes,* the speed of your fax is?
( ) 4800 bps ( ) 9600 bps ( ) 14000 bps ( ) greater than 14000 bps

Portable Document Services

7. Do you transmit designs as Portable Document Files (PDF)?
( ) yes (*go to 7a, 7b)* ( ) no ( ) no, but have Adobe Acrobat

7a. *If yes,* how often?
( ) always ( ) often ( ) sometimes ( ) occasionally ( ) never

7b. *If yes,* for which stages of the design process? (*may check more than one)*
( ) initial concepts ( ) revisions comprehensives ( ) final comprehensives

Internet Document Services

8. Do you transmit designs via the Internet?
( ) yes (*go to 8a, 8b)* ( ) no ( ) no, but connected to the Internet

8a. *If yes,* how often?
( ) always ( ) often ( ) sometimes ( ) occasionally ( ) never

8b. *If yes,* for which stages of the design process? (*may check more than one)*
( ) initial concepts ( ) revisions comprehensives ( ) final comprehensives

Videoconference Services

9. Do you ever communicate designs with clients by holding a videoconference?
( ) yes (*go to 9a, 9b)* ( ) no ( ) no, but have held a videoconference

9a. *If yes,* how often?
( ) always ( ) often ( ) sometimes ( ) occasionally ( ) never

9b. *If yes,* for which stages of the design process? (*may check more than one)*
( ) initial concepts ( ) revisions comprehensives ( ) final comprehensives

General

10. **Are you interesting in learning more about the following transmission option?**

fax	( ) yes	( ) no
Portable Document Files	( ) yes	( ) no
the Internet	( ) yes	( ) no
Videoconferencing	( ) yes	( ) no

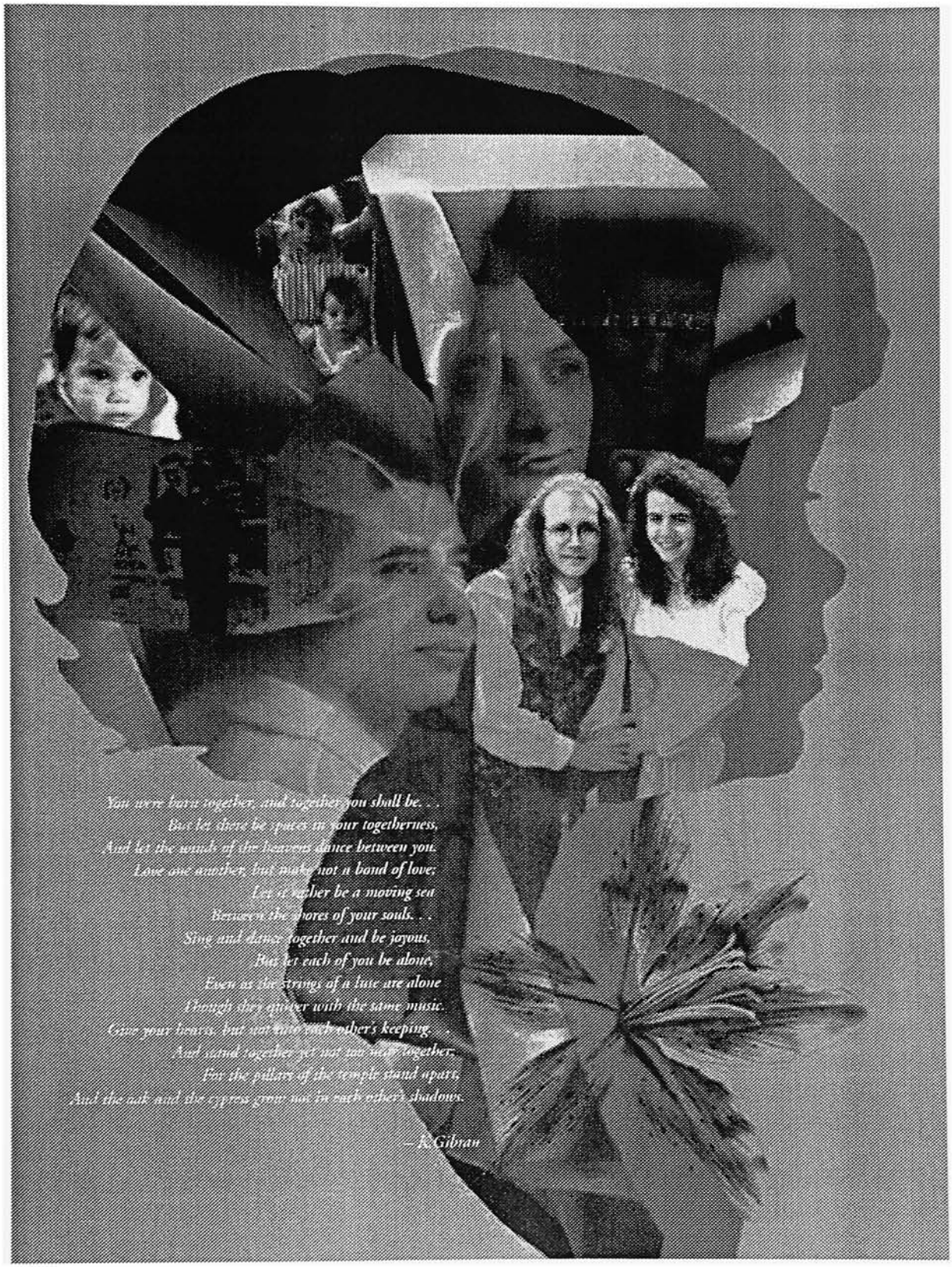
11. **Are you willing to receive a couple transmission through the previously mentioned option and answer a short evaluation questionnaire?**

( ) yes ( ) no

Thank you for you time.

Appendix B

Appendix B



Photographic image - 85%

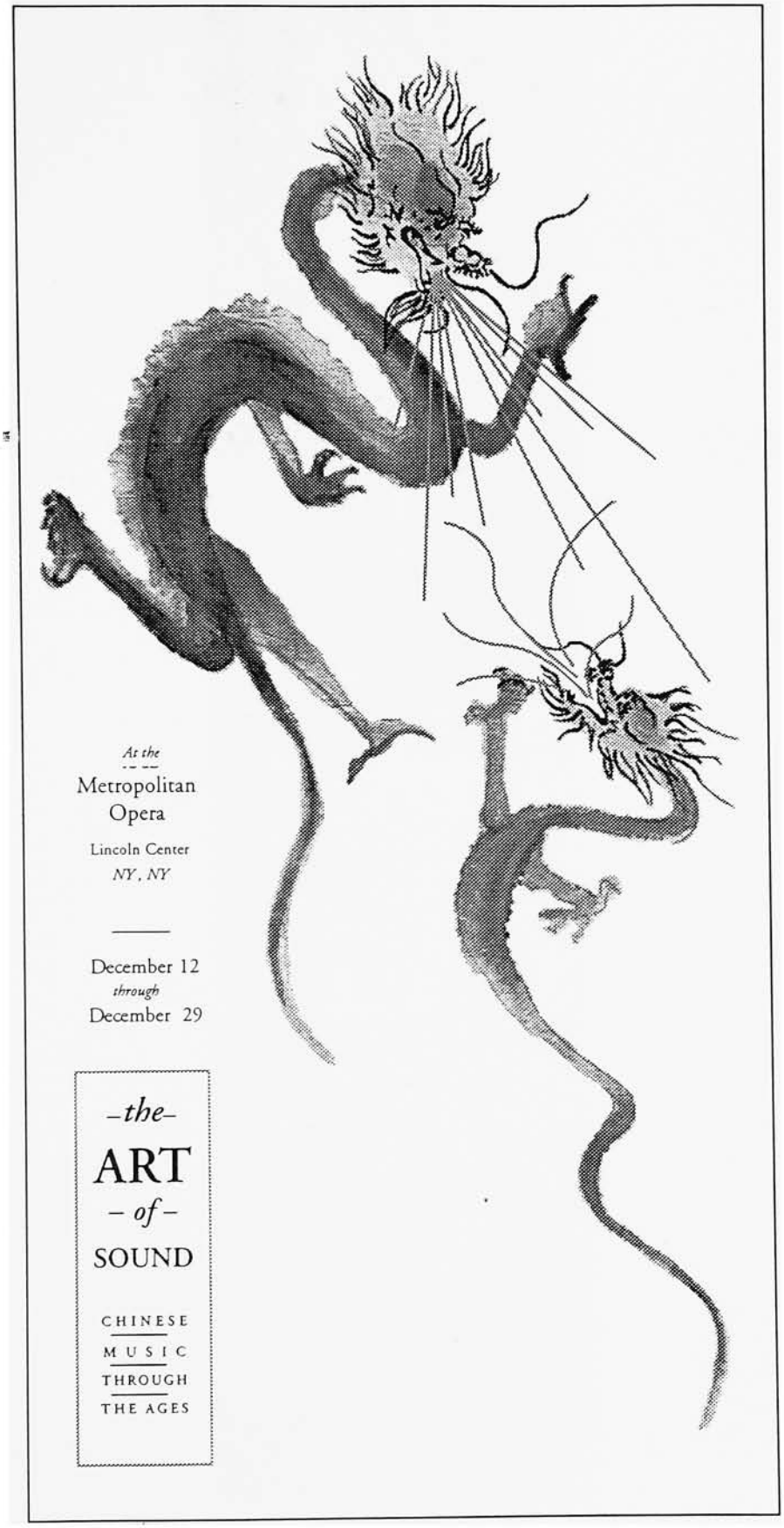


Illustration Poster - 70%

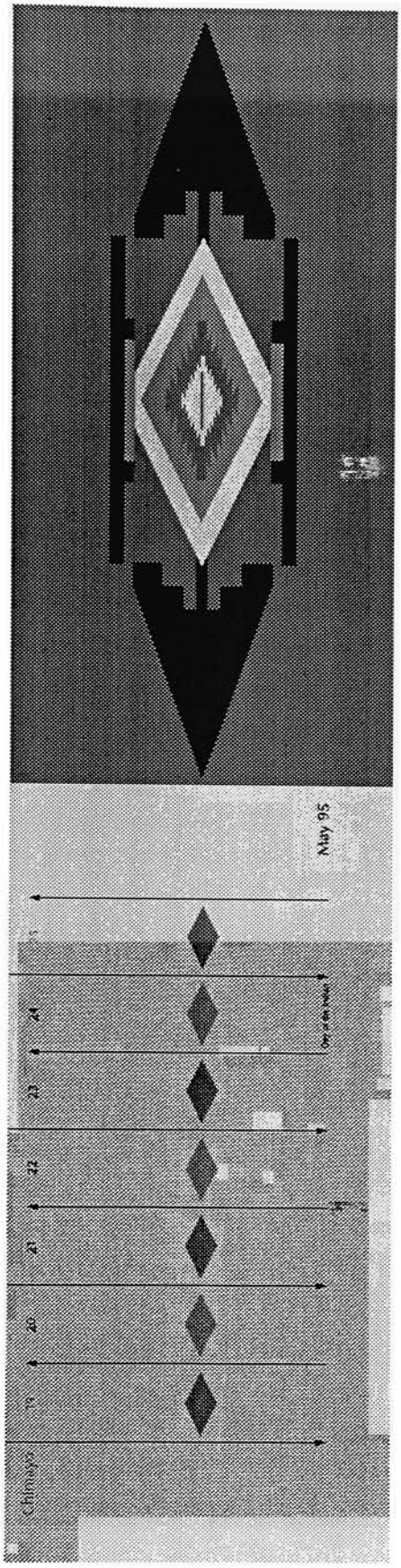
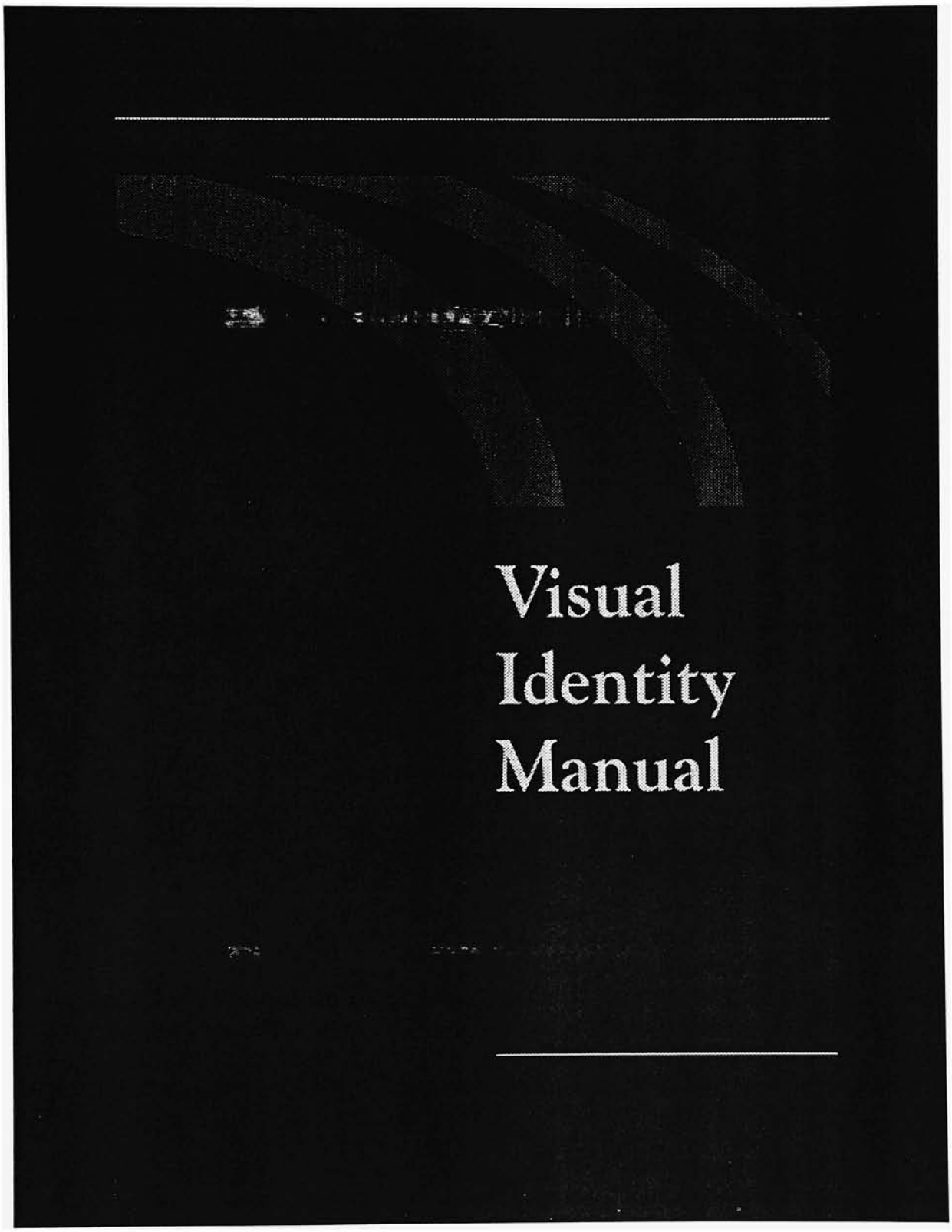
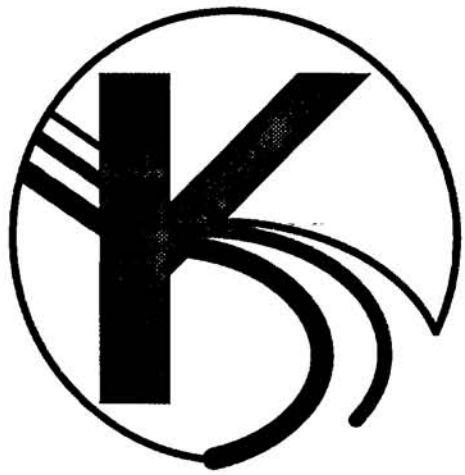


Illustration Calendar - 45%



Identity Manual Cover - 75%

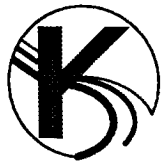


East Kodman Company

Kodman's new identity plays on the idea of light rays and the alterations the company's technological advancements provide.
The rays enter the k straight and change to curves. The curved lines show motion and enhancement. The overall round shape is symbolic of the past, present, and future. Both camera lense and the world are circular.

Red and gray are contemporary versions of Kodman's previous corporate colors. The symbol is exciting and new, but still visually connects to its predecessor.

Identity Manual Page 2 - 75%



East Kodman Company

Kodman Customer
Customer's Company
Customer's title
555 Inside address

Month/00/00

Dear Kodman Customer:

Graphic designers rely on strong communication with their clients. Clients' needs must be expressed to the designer and designer's solutions must be communicated for approval. This process is repeated at several stages: initial, revision, and final. Traditionally, when face to face meetings were not feasible, comprehensives were mailed to the client. With the current move towards electronic communication, mail carriers' manual transportation are slower and possibly more expensive than electronic correspondence.

Today, electronic correspondence is not limited to static transmissions. Interactivity, voice, and video may be included. Facsimile technology is a basic form of electronic file transfer; the availability and inexpensive of the technology has made facsimile a commonplace business tool (Wiggins 1995). "Today it is estimated that one-fourth of all business telephone calls carry a fax transmission." (Wiggins 1995). Adobe Acrobat's portable document format files allow a higher level of sophistication by providing tools to add interactivity to documents at a higher resolution than fax files (Mitchell 1995). Videoconferencing incorporates video and audio, in real-time, to make a live electronic meeting for groups of participants. The Internet is a global network offering national and international electronic connections in seconds by merely knowing addresses. File transfer between computers was the founding idea behind the Internet. What are the appropriateness of these options in comparison to each other and mail services?

Sincerely,

Kodman Employee
EmployeeTitle
East Kodman
Specific Branch
555 Address
City, State, Zip

Identity Manual Letterhead - 75%

Appendix C

Appendix C

Name/Title _____
Company _____
Address _____
Telephone # _____
Email _____

original size 7.5x10
fax 100%
PDF 100%

Please read every question carefully and check the accurate response.

	Facsimile	PDF file
1. In comparison to the proof, the clarity or "visual resolution" of the photographic image was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
2. In comparison to the proof, the coverage of the solid areas of color were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
3. In comparison to the proof, the hue of the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
4. In comparison to the proof, the differentiation between the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
5. In comparison to the proof, the legibility of the typography was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
6. Were the following a hindrance to the legibility of the typography?		
size	( ) yes ( ) no	( ) yes ( ) no
overlap with image	( ) yes ( ) no	( ) yes ( ) no
color	( ) yes ( ) no	( ) yes ( ) no
7. For overall aesthetic quality, which application is best suited to evaluate this design?	( ) color hardcopy	( ) PDF ( ) Fax

80 %

original size 6.5x13
fax 85%
PDF 100%

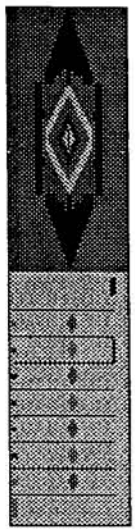
	Facsimile	PDF file
1. In comparison to the proof, the clarity or "visual resolution" of the illustrative image was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
2. In comparison to the proof, the clarity of the solid lines of color (voices) were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Were the following a hindrance to the clarity of the voice lines?		
width	( ) yes ( ) no	( ) yes ( ) no
overlap with image	( ) yes ( ) no	( ) yes ( ) no
color	( ) yes ( ) no	( ) yes ( ) no
3. In comparison to the proof, the hue of the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
4. In comparison to the proof, the differentiation between the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
5. In comparison to the proof, the legibility of *"At the "* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no
6. In comparison to the proof, the legibility of *"Metropolitan Opera"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no
7. In comparison to the proof, the legibility of *"Lincoln Center"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no

80 %

original size 6.5x13
fax 85%
PDF 100%

	Facsimile	PDF file
8. In comparison to the proof, the legibility of *"December 12"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no
9. In comparison to the proof, the legibility of *"the"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no
10. In comparison to the proof, the legibility of *"art"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no
11. In comparison to the proof, the legibility of *"sound"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no
12. In comparison to the proof, the legibility of *"Chinese music through the ages"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no
13. For overall aesthetic quality, which application is best suited to evaluate this design?	( ) color hardcopy	( ) PDF ( ) Fax

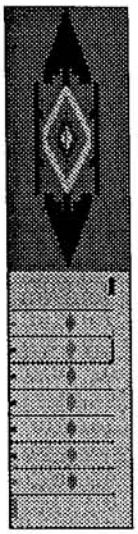
80 %



original size 5x20
fax 55%
PDF 100%

	Facsimile	PDF file
1. In comparison to the proof, the clarity or "visual resolution" of the illustration was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
2. In comparison to the proof, the detail of the shapes in the illustration were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
3. In comparison to the proof, the clarity of the solid lines were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
4. Was the width of the lines a hindrance to their clarity?	( ) yes ( ) no	( ) yes ( ) no
5. In comparison to the proof, the hue of the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
6. In comparison to the proof, the differentiation between the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
7. In comparison to the proof, the legibility of *"Chimayo"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Were the following a hindrance to the legibility of the typography? size color	 ( ) yes ( ) no ( ) yes ( ) no	 ( ) yes ( ) no ( ) yes ( ) no
8. In comparison to the proof, the legibility of *"19 & 25"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Were the following a hindrance to the legibility of the typography? size color	 ( ) yes ( ) no ( ) yes ( ) no	 ( ) yes ( ) no ( ) yes ( ) no

80 %



original size 5x20
fax 55%
PDF 100%

	Facsimile	PDF file
9. In comparison to the proof, the legibility of *"Day of the Indian"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
10. Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no
11. In comparison to the proof, the legibility of *"May 95"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
12. Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no
13. In comparison to the proof, the legibility of *"20-24"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
14. Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no
15. The color substitute for the colored substrate was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
16. For overall aesthetic quality, which application is best suited to evaluate this design?	( ) color hardcopy	( ) PDF ( ) Fax

80 %

original size 8.5x11
fax 100%
PDF 100%

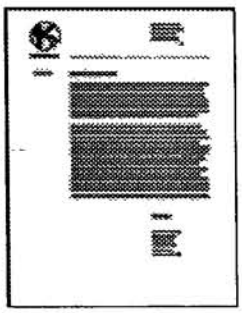
	Facsimile	PDF file
1. In comparison to the proof, the detail of the shapes of the graphic were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
2. In comparison to the proof, the clarity of the lines were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Was the width of the lines a hindrance to their clarity?	( ) yes ( ) no	( ) yes ( ) no
3. In comparison to the proof, the hue of the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
4. In comparison to the proof, the differentiation between the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
5. In comparison to the proof, the legibility of *"Visual Identity Manual"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Were the following a hindrance to the legibility of the typography?		
size	( ) yes ( ) no	( ) yes ( ) no
color	( ) yes ( ) no	( ) yes ( ) no
6. For overall aesthetic quality, which application is best suited to evaluate this design?	( ) color hardcopy	( ) PDF ( ) Fax

80 %

original size 8.5x11

			with magnificatio
1. In comparison to the proof, the detail of the shapes of the logo were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
2. In comparison to the proof, the clarity of the lines were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Was the width of the lines a hindrance to their clarity?	( ) yes ( ) no		
3. In comparison to the proof, the hue of the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable		
4. In comparison to the proof, the legibility of *"page 2"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Were the following a hindrance to the legibility of the typography?			
size	( ) yes ( ) no		
color	( ) yes ( ) no		
5. In comparison to the proof, the legibility of *"East Kodman Company"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no		
6. In comparison to the proof, the legibility of the body of text was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no		
7. For overall aesthetic quality, is videoconferencing suitable to evaluate this design?	( ) yes ( ) no		

80 %



original size 8.5x11
fax 100%
PDF 100%

	Facsimile	PDF file
1. In comparison to the proof, the detail of the shapes of the logo were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
2. In comparison to the proof, the clarity of the lines were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Was the width of the lines a hindrance to their clarity?	( ) yes ( ) no	( ) yes ( ) no
3. In comparison to the proof, the hue of the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
4. In comparison to the proof, the legibility of *"555 Inside address"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no
5. In comparison to the proof, the legibility of *"East Kodman Company"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no
6. In comparison to the proof, the legibility of *"Month/00/00"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no
7. In comparison to the proof, the legibility of the body of text was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	( ) yes ( ) no
8. For overall aesthetic quality, which application is best suited to evaluate this design?	( ) color hardcopy	( ) PDF ( ) Fax

80 %

1. How beneficial are Adobe Reader's thumbnails and bookmarks to the evaluation of the designs?
( ) highly beneficial
( ) beneficial
( ) slightly beneficial
( ) not beneficial

2. How beneficial is Adobe Reader's notes to the evaluation of the designs?
( ) highly beneficial
( ) beneficial
( ) slightly beneficial
( ) not beneficial

3. How beneficial is Adobe Reader's ability to link pages to the evaluation of the designs?
( ) highly beneficial
( ) beneficial
( ) slightly beneficial
( ) not beneficial

4. How beneficial is Adobe Reader's "go to" icons to the evaluation of the designs?
( ) highly beneficial
( ) beneficial
( ) slightly beneficial
( ) not beneficial

5. How beneficial is Adobe Reader's ability to word search to the evaluation of the designs?
( ) highly beneficial
( ) beneficial
( ) slightly beneficial
( ) not beneficial

6. How beneficial is Adobe Reader's ability to secure files to the evaluation of the designs?
(secured against printing, selecting, and changing)
( ) highly beneficial
( ) beneficial
( ) slightly beneficial
( ) not beneficial

	Facsimile	PDF file
7. How easy were the technologies to use for transmitting the designs?	( ) very easy to use ( ) easy to use ( ) usable ( ) not easy to use	( ) very easy to use ( ) easy to use ( ) usable ( ) not easy to use
8. How easy were the technologies to use for viewing the designs?	( ) very easy to use ( ) easy to use ( ) usable ( ) not easy to use	( ) very easy to use ( ) easy to use ( ) usable ( ) not easy to use

9. For which stages of the design process would you use each application for?	Facsimile		PDF file	
initial stage	( ) yes	( ) no	( ) yes	( ) no
revision comprehensives	( ) yes	( ) no	( ) yes	( ) no
final comprehensives	( ) yes	( ) no	( ) yes	( ) no

80 %

Appendix D

Appendix D

Videoconferencing Questionnaire

Name/Title _____
Company _____
Address _____
Telephone # _____
Email _____

original size 7.5x10

Please read every question carefully and check the accurate response.

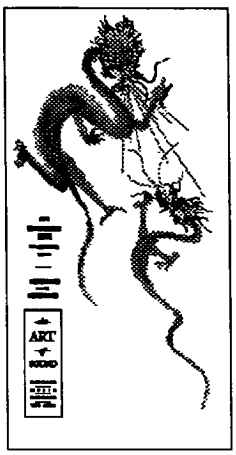
		with magnification
1. In comparison to the proof, the clarity or "visual resolution" of the photographic image was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
2. In comparison to the proof, the coverage of the solid areas of color were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	
3. In comparison to the proof, the hue of the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	
4. In comparison to the proof, the differentiation between the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	
5. In comparison to the proof, the legibility of the typography was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
6. Were the following a hindrance to the legibility of the typography?		
size	( ) yes ( ) no	
overlap with image	( ) yes ( ) no	
color	( ) yes ( ) no	
7. For overall aesthetic quality, is videoconferencing suitable to evaluate this design?	( ) yes ( ) no	

80 %

original size 6.5x13

		with magnification
1. In comparison to the proof, the clarity or "visual resolution" of the illustrative image was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
2. In comparison to the proof, the clarity of the solid lines of color (voices) were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
Were the following a hindrance to the clarity of the voice lines?		
width	( ) yes ( ) no	
overlap with image	( ) yes ( ) no	
color	( ) yes ( ) no	
3. In comparison to the proof, the hue of the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	
4. In comparison to the proof, the differentiation between the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	
5. In comparison to the proof, the legibility of *"At the "* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	
6. In comparison to the proof, the legibility of *"Metropolitan Opera"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	
7. In comparison to the proof, the legibility of *"Lincoln Center"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	

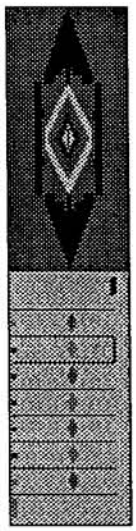
80 %



original size 6.5x13

		with magnification
8. In comparison to the proof, the legibility of *"December 12"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	
9. In comparison to the proof, the legibility of *"the"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	
10. In comparison to the proof, the legibility of *"art"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	
11. In comparison to the proof, the legibility of *"sound"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	
12. In comparison to the proof, the legibility of *"Chinese music through the ages"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no	
13. For overall aesthetic quality, is videoconferencing suitable to evaluate this design?	( ) yes ( ) no	

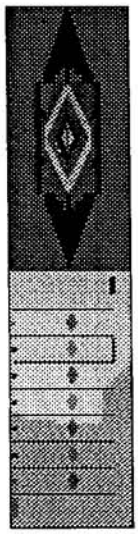
80 %



original size 5x20

		with magnification
1. In comparison to the proof, the clarity or "visual resolution" of the illustration was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
2. In comparison to the proof, the detail of the shapes in the illustration were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
3. In comparison to the proof, the clarity of the solid lines were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
4. Was the width of the lines a hindrance to their clarity?	( ) yes ( ) no	
5. In comparison to the proof, the hue of the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	
6. In comparison to the proof, the differentiation between the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	
7. In comparison to the proof, the legibility of *"Chimayo"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
Were the following a hindrance to the legibility of the typography? size color	 ( ) yes ( ) no ( ) yes ( ) no	
8. In comparison to the proof, the legibility of *"19 & 25"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes ( ) no
Were the following a hindrance to the legibility of the typography? size color	 ( ) yes ( ) no ( ) yes ( ) no	

80 %



original size 5x20

			with magnification
9. In comparison to the proof, the legibility of *"Day of the Indian"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no		
10. In comparison to the proof, the legibility of *"May 95"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no		
11. In comparison to the proof, the legibility of *"20-24"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
12. Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no		
13. The color substitute for the colored substrate was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable		
14. For overall aesthetic quality, is videoconferencing suitable to evaluate this design?	( ) yes ( ) no		

80 %

original size 8.5x11

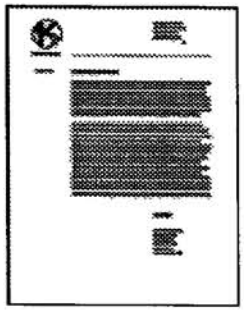
		with magnification	
1. In comparison to the proof, the detail of the shapes of the graphic were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
2. In comparison to the proof, the clarity of the lines were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Was the width of the lines a hindrance to their clarity?	( ) yes ( ) no		
3. In comparison to the proof, the hue of the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable		
4. In comparison to the proof, the differentiation between the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable		
5. In comparison to the proof, the legibility of *"Visual Identity Manual"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Were the following a hindrance to the legibility of the typography?			
size	( ) yes ( ) no		
color	( ) yes ( ) no		
6. For overall aesthetic quality, is videoconferencing suitable to evaluate this design?	( ) yes ( ) no		

80 %

original size 8.5x11

		with magnification	
1. In comparison to the proof, the detail of the shapes of the logo were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
2. In comparison to the proof, the clarity of the lines were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Was the width of the lines a hindrance to their clarity?	( ) yes ( ) no		
3. In comparison to the proof, the hue of the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable		
4. In comparison to the proof, the legibility of *"page 2"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Were the following a hindrance to the legibility of the typography?			
size	( ) yes ( ) no		
color	( ) yes ( ) no		
5. In comparison to the proof, the legibility of *"East Kodman Company"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no		
6. In comparison to the proof, the legibility of the body of text was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no		
7. For overall aesthetic quality, is videoconferencing suitable to evaluate this design?	( ) yes ( ) no		

80 %



original size 8.5x11

		with magnification	
1. In comparison to the proof, the detail of the shapes of the logo were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
2. In comparison to the proof, the clarity of the lines were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Was the width of the lines a hindrance to their clarity?	( ) yes ( ) no		
3. In comparison to the proof, the hue of the colors were?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable		
4. In comparison to the proof, the legibility of *"555 Inside address"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no		
5. In comparison to the proof, the legibility of *"East Kodman Company"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no		
6. In comparison to the proof, the legibility of *"Month/00/00"* was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no		
7. In comparison to the proof, the legibility of the body of text was?	( ) identical ( ) almost identical ( ) acceptable ( ) not acceptable	( ) yes	( ) no
Was the size of the typography a hindrance to the legibility?	( ) yes ( ) no		
8. For overall aesthetic quality, is videoconferencing suitable to evaluate this design?	( ) yes ( ) no		

80 %

1. How beneficial is videoconferencing's audio to the evaluation of the designs?
   ( ) highly beneficial
   ( ) beneficial
   ( ) slightly beneficial
   ( ) not beneficial

2. How was the quality of videoconferencing's audio?
   ( ) very high
   ( ) high
   ( ) moderate
   ( ) low

3. How beneficial is videoconferencing's video to the evaluation of the designs?
   ( ) highly beneficial
   ( ) beneficial
   ( ) slightly beneficial
   ( ) not beneficial

4. How was the quality of videoconferencing's video?
   ( ) very high
   ( ) high
   ( ) moderate
   ( ) low

5. How beneficial was the videoconferencing's adjustable camera to the evaluation of the designs?
   ( ) highly beneficial
   ( ) beneficial
   ( ) slightly beneficial
   ( ) not beneficial

6. The overall satisfaction videoconferencing's for the evaluate of design is?
   ( ) very high
   ( ) high
   ( ) moderate
   ( ) low

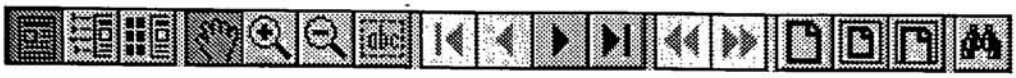
7. For which stages of the design process would you use videoconferencing for?

initial stage	( ) yes	( ) no
revision comprehensives	( ) yes	( ) no
final comprehensives	( ) yes	( ) no

80 %

Appendix E

Appendix E



page only
closes thumbnail and bookmark areas

bookmarks and page
displays bookmarks

thumbnails and page
displays thumbnail

hand
scrolls through window

zoom in
magnifies page view

zoom out
reduces page view

select text
selects text

first page
displays first page of document

previous page
displays previous page

next page
displays next page

last page
displays last page of document

go back
displays previous page view

go forward
returns from **go back**

actual size
displays page at 100%

fit page
displays whole page

fit width
scales page to the window width

find
finds text

window splitter
adjust the width of the overview and document areas

page number box
displays current page number and lets you go to a specified page

magnification box
display the current page magnification and lets you select various magnifications

page size box
displays the current page size

Appendix F

Appendix F

Facsimile	PDF	Videoconference	
Photographic image			
1. (3) not acceptable	(2) acceptable (1) almost identical	almost identical	no magnification
2. (2) not acceptable (1) acceptable	(2) acceptable (1) not acceptable	almost identical	
3. (3) not acceptable	(2) almost identical (1) not acceptable	almost identical	
4. (3) not acceptable	(2) almost identical (1) acceptable	almost identical	
5. (3) not acceptable	(2) acceptable (1) not acceptable	identical	magnification
(3) yes	(3) yes	yes	
(2) yes (1) no	(3) no	no	
(3) yes	(3) no	no	
7. (3) color hardcopy		suitable	
Illustration poster			
1. (3) not acceptable	(2) almost identical (1) acceptable	almost identical	no magnification
2. (3) not acceptable	(2) almost identical (1) identical	almost identical	no magnification
(2) no (1) yes	(3) no	no	
(2) no (1) yes	(3) no	no	
(3) yes	(3) no	no	
3. (3) not acceptable	(2) almost identical (1) not acceptable	acceptable	
4. (3) not acceptable	(2) almost identical (1) not acceptable	acceptable	
5. (2) acceptable (1) almost identical	(3) acceptable	almost identical	magnification
(2) no (1) yes	(2) no (1) yes	yes	
6. (2) acceptable (1) almost identical	(2) acceptable (1) almost identical	almost identical	magnification
(2) no (1) yes	(3) no	yes	
7. (2) acceptable (1) almost identical	(3) acceptable	almost identical	magnification
(2) no (1) yes	(3) no	yes	
8. (2) acceptable (1) almost identical	(1) almost identical almost identical	(2) acceptable	magnification
(2) no (1) yes	(3) no	yes	
9. (2) acceptable (1) almost identical	(2) acceptable (1) almost identical	almost identical	magnification
(3) no	(3) no	yes	
10. (2) almost identical (1) acceptable	(2) acceptable (1) almost identical	almost identical	no magnification

(3) no	(3) no	no	
11. (2) almost identical (1) acceptable	(2) acceptable (1) almost identical	almost identical	no magnification
(3) no	(3) no	no	
12. (2) acceptable (1) almost identical	(3) acceptable	almost identical	magnification
(2) no (1) yes	(2) no (1) yes	yes	
13. (3) color hardcopy		suitable	
Illustration Calendar			
1. (3) not acceptable	(3) almost identical	almost identical	no magnification
2. (3) not acceptable	(2) almost identical (1) identical	almost identical	no magnification
3. (1) acceptable (1) almost identical (1) identical	(2) identical (1) almost identical	acceptable	no magnification
(2) no (1) yes	(3) no		
4. (3) not acceptable	(3) almost identical	almost identical	
5. (3) not acceptable	(2) almost identical (1) identical	almost identical	
6. (3) not acceptable	(1) acceptable (1) almost identical (1) identical	almost identical	magnification
(2) yes (1) no	(3) no	yes	
(2) yes (1) no	(3) no	yes	
7. (3) not acceptable	(2) almost identical (1) identical	almost identical	magnification
(1) yes (1) no	(2) no	yes	
(2) yes	(2) no	yes	
8. (2) acceptable (1) not acceptable	(1) acceptable (1) almost identical (1) not acceptable	almost identical	magnification
(2) yes (1) no	(3) no	yes	
9. (3) acceptable	(2) acceptable (1) identical		magnification
(2) yes (1) no	(2) no (1) yes	yes	
10. (3) not acceptable	(1) acceptable (1) almost identical (1) identical		magnification
(1) yes (1) no	(3) no	yes	
11. (3) not acceptable	(2) acceptable (1) almost identical,	almost identical	
12. (3) color hardcopy		suitable	
Identity Manual Cover			
1. (3) not acceptable	(2) almost identical (1) acceptable	almost identical	no magnification

2. (3) not acceptable	(2) acceptable (1) almost identical	almost identical	no magnification
3. (1) yes (1) no	(3) no	no	
3. (3) not acceptable	(2) acceptable (1) almost identical	almost identical	
4. (3) not acceptable	(2) almost identical (1) not acceptable	almost identical	
5. (2) acceptable (1) identical (3) no (3) no	(2) acceptable (1) identical (3) no (3) no	almost identical no no	no magnification
6. (3) color hardcopy		suitable	
Identity Manual Page 2			
1. (2) acceptable (1) almost identical	(3) acceptable	almost identical	no magnification
2. (2) acceptable (1) not acceptable (2) no (1) yes	(2) acceptable (1) not acceptable (2) no (1) yes	not acceptable no	no magnification
3. (3) not acceptable	(3) almost identical	almost identical	
4. (2) almost identical (1) acceptable (3) no (3) no	(2) acceptable (1) identical (2) no (1) yes (2) no (1) yes	not acceptable yes yes	no magnification
5. (2) acceptable (1) almost identical (2) no (1) yes	(2) acceptable (1) almost identical (3) no	almost identical no	no magnification
6. (2) acceptable (1) almost identical (3) no	(3) acceptable (3) yes	almost identical yes	magnification
7. (3) color hardcopy		suitable	
Identity Manual Letterhead			
1. (2) acceptable (1) almost identical	(3) acceptable	almost identical	no magnification
2. (1) acceptable (1) almost identical (1) identical (3) no	(2) acceptable (1) identical (2) no (1) yes	almost identical yes	no magnification
3. (3) not acceptable	(2) almost identical (1) identical	almost identical	
4. (3) acceptable (2) no (1) yes	(3) acceptable (3) yes	almost identical yes	magnification
5. (2) acceptable (1) almost identical (3) no	(3) not acceptable (3) yes	almost identical yes	magnification
6. (2) acceptable (1) almost identical	(2) acceptable (1) not acceptable	almost identical	magnification

(2) no (1) yes	(3) yes	yes	
7. (2) acceptable (1) almost identical	(3) acceptable	almost identical	magnification
(3) no	(2) yes (1) no	yes	
8. (3) color hardcopy		suitable	
conclusion pages			
1. (1) highly beneficial		highly beneficial	
(1) slightly beneficial	(1) beneficial		
2. (3) beneficial		moderate	
3. (3 beneficial		beneficial	
4. (2) beneficial (1) highly beneficial		moderate	
5. (1) highly beneficial		highly beneficial	
6. (3) highly beneficial		high	
7. (2) very easy	(1) very easy	yes	
	(1) easy	yes	
	(1) not easy	yes	
8. (2) very easy (1) usable	(3) very easy		
(2) yes (1) no	(3) yes		
(1) no	(3) yes		
	(2) no	(1) no	