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ART HISTORY ON THE WORLD WIDE WEB

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# INTERACTIVE IMAGE ACCESS
# ART HISTORY ON THE WORLD WIDE WEB

By

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## ABSTRACT

## INTERACTIVE IMAGE ACCESS
## ART HISTORY AND THE WORLD WIDE WEB

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This thesis examines the influence of computer network technology on art history. Digital imaging, interactive programs, and computer networks are three innovative elements of the World Wide Web that will change the role of the art historian. The focus of this thesis is on how these three elements will accomplish this task. Digital imaging replaces photography as an important research and education tool. Digital imaging also facilitates the task of managing and conserving fine art object and image collections. Interactive computer programs present images and information in a dynamic manner. Ideally, computer networks provide easy access to these tools. Practically, however, economic and legal issues may limit ease of access. Examples are collected from existing digital imaging projects, interactive computer programs, and current educational art Websites. This study reveals how computer network technology and the World Wide Web create a new mode of communication.

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# INTRODUCTION

With the recent development of computer networks and graphic-intensive World Wide Web browsers such as Netscape, the impact computer technology will have on the arts community is astounding. In some ways it is too early to say anything definitive on the subject as the technology advances every day. Initially, the largest number of art sites on the Web were sites with commercial interests, sites that utilized the marketing potential of the Web. Recently, the art sites with non-commercial interests have caught up in number and sophistication with the commercial sites. These non-commercial art sites are important examples of how computer network technology has changed the role of the art historian.

Non-commercial art sites located on the Web offer three tools important to art history. The first is digital imaging. This is particularly important as art history relies heavily on visual material. Since the development of photography, art history has relied heavily on photographic reproductions of fine art objects.[1] Today, nearly all art history courses use slides, videos, and art books. Digital imaging will eventually replace photographic reproductions, therefore it is important to address the particular qualities of

[1] For a history on art history and the use of reproductions see: Estelle Jussim, *Visual Communications and the Graphic Arts* (New York: R.R. Bowker Company, 1974), Gabriel Weiberg and Laurinda Dixon, eds., *The Documented Image* (New York: Syracuse University Press, 1987), and Maryly Snow, "The Pedagogical Consequences of Photomechanical Reproduction in the Visual Histories: From Photography to Digital Mnemonics," *Visual Resources* 12(1997), 307-331.

digital images. The second tool is interactive capability. The computer language used to create Web pages, HTML, has a built in functionality for layering and expanding information. HTML allows a user to jump from one page to the next effortlessly. The layering of information introduces a flexible way of gathering visual and textual data. This introduces a non-linear approach to teaching and conducting research. The third tool is the network. The Web is a community of computers which allows for seamless jumps to other Websites around the world. A Website can point to an infinite number of sites with related topics. Since photography, side-by-side comparisons of art objects have been a standard art historical practice. A technique of comparing individual works of art goes back to Heinrich Wölflinn's *Renaissance and Baroque*, published in 1888.[2] The Web opens up a whole new world of side-by-side comparisons by increasing the number of comparisons and allowing comparisons to be made at the whim of the viewer. Finally, a community of computers could lead to the democratization of art, in so far as anyone who has access to computer networks can freely gather the information available on these networks. Ideally, computer networks will bring about a future where all information is free and accessible. But in practical terms, not everyone has access to computer networks, and not all information on these networks is free. For this reason, it is important to address the practical issues of economics and copyright that surround computer network technology.

For the purposes of this thesis, an art historian is defined as anyone who works with the visual arts as an educator, researcher, and/or curator. These visual arts

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[2] Snow, 312.

professionals are found in universities, museums, archives, and visual resource libraries. Computer network technology will effect all of these visual arts professionals in a number of ways. First, computer network technology extends the visual memory of educators and researchers and introduces a non-linear mode of thinking. As a result, the dynamics of teaching art history changes. Hypervip is a key example of how an interactive computer program can restructure an art history lecture by replacing lecture-style teaching with a teacher/student interactive learning environment. Next, image databases, such as the Fine Arts Museums of San Francisco Imagebase, allow researchers to track down elusive visual information. Computer network technology is capable of storing large quantities of information that is easy to access from remote locations. Image database search engines are designed to gather information so efficiently that museum curators can spend more time on creating innovative exhibitions rather than searching their collections. Finally, computer network technology will even affect how visual art professionals conduct daily business. Digital images will supplement, perhaps even replace, photographic reproductions in visual resource libraries. Museums and archives will also use digital images to help with their collection management and conservation activities. This heavy use of digital imaging will require libraries, museums, and archives to deal with changing copyright and intellectual property issues, as well as the economic issues, that result from this new technology. Also, museums and archives will consider entering into licensing agreements with commercial digital image venders in order to generate revenue.

The Web and interactive art sites are new tools for the communication of visual art information. In order to understand how this technology is valuable, it is necessary to

examine how computer network technology works by exploring various existing examples of interactive art sites on the Web such as the Getty ArtsEdNet, the Smithsonian Institution Website, and the Fine Arts Museums of San Francisco Imagebase. Also, it is important to examine how various art education, research, economic and legal issues are addressed using this electronic medium. The three tools, digital imaging, interactivity, and networks, will be examined separately, while keeping in mind that these three tools are working together to form a new mode of communication.

This new communication is not a product of the Internet per se; rather, it is the result of the World Wide Web's particular characteristics. The Internet has been in existence for nearly fifty years, used first by the United States Defense Department during the Cold War. The World Wide Web is a more user-friendly manifestation of the Internet that incorporates all the power of the Internet without requiring its users to be computer experts. The Web's popularity is the result of easy to use, free computer applications called Web browsers. A brief explanation of the difference between the Internet and the Web will clarify how the Web, more so than the Internet, provides a new form of communication.

## Chapter 1

## THE INTERNET AND THE WORLD WIDE WEB

An information revolution is how enthusiasts describe this new phenomenon called the World Wide Web. A new world of instantly accessible information is created by a network of computers and databases. First conceived by Ted Nelson of Serious Cybernetics in Melbourne Australia, the World Wide Web is well on its way to becoming the universal library he envisioned where "all human knowledge, all documents, images, sounds, and videos [can] be instantly accessible to anyone who [has] a computer."[3] The World Wide Web's impact on 20th century society has been compared to the printing press's impact on 16th and 17th century societies.

> The widespread creation and distribution of alternative forms of information is already undermining the current hegemony of an oppressive and intensely patriarchal mode of thinking. We are in a situation that is comparable to the sixteenth and seventeenth centuries, when the press made it possible for the disenfranchised to assert their role in political and economic processes - a situation that led to a radical transformation of human society.[4]

Just like the printing press, the Web is a new form of communication that operates as an open forum for the free exchange of information.

Among the Web's many powers is the distribution of images. With its graphical capabilities, the Web can disseminate art images via digitized reproductions, providing

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[3] Steven Vaughan-Nichols, *Inside the Web* (Indianapolis: New Riders Publishing, 1995), 1.
[4] Adam Lucas, "Art, Science and Technology in an Expanded Field," *Leonardo* 26(1993), 344.

revolutionary ease of access to the world's art. Many art institutions and organizations are already exploring the impact electronic technology will have on art history. One example is the J. Paul Getty Trust Art Historical Information Program (AHIP). Since 1983, AHIP "has sought to make art-historical information more accessible through electronic technology."[5] In 1995 AHIP inaugurated the Museum Educational Site Licensing Project. This project explores how computer network technology can be used to facilitate art education and research.

> Digital imaging offers the potential to make our cultural heritage available to a wider audience in ways never before envisioned. Distribution of these images over communication networks is changing the nature of teaching and research.[6]

Electronic imaging and computer network technology such as the Web will change how information about art history is conveyed in two significant ways. First, computer networks are capable of storing massive quantities of data and provide an easy way to access and gather this information. Second, the Web in particular, operates under a hypermedia paradigm that allows for an intuitive, non-linear process of gathering information. Both of these advantages of computer network technology will be discussed in detail later.

In order to understand the Web, first it is necessary to explain something about its technology. The Web runs on the Internet. The Web cannot exist without the Internet

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[5] Getty Art History Information Program, "Museum Educational Site Licensing Project: Fact Sheet," (Santa Monica: Getty AHIP, 1995, photocopied), 1.

[6] James Bower, "News from AHIP," *Visual Resources* (December 1995), 177. The Getty Trust is a private operation foundation dedicated to the visual arts and humanities. The Trust's origin dates to 1953 with the founding of the J. Paul Getty Museum as a California charitable trust. For more background information see The Getty Trust Information Page, *Getty Information Institute* [online]; available from http://www.ahip.getty.edu/gii/trust.html; accessed 13 August 1997.

because it uses the Internet, "like cars over two bridges."[7] The Internet is a communication system designed to work between any two computers no matter what their architecture and operating systems are. A network protocol, Transmission Control Protocol/Internet Protocol (TCP/IP), allows for communication to take place because it

> . . . runs on everything, from the nearly antique 286 PC with its MS-DOS to Delphi on-line services VAX-VMS mini-computers to the National Center for Supercomputing Application's Crays running UNIX.[8]

Therefore the Internet is operating system independent. That is to say, in the world of personal computers, while the PC and the Macintosh use two different operating systems, both can access the Internet and communicate with each other. The impetus behind creating such a network was the Cold War. The father of the Internet, ARPAnet, was created to "keep working even if parts were destroyed in a nuclear war. Data would be lost, but communications could continue."[9] Academia found the Internet as valuable as the military. Scientists, especially physicists, used the Internet to communicate findings with colleagues around the world. The Internet allowed information to be posted faster than the traditional process of publication. As the Internet increased in sophistication, interest grew. The Internet "rapidly evolved into a multimedia delivery system carrying information, entertainment, and services to millions of end users around the world."[10]

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[7] Vaughan-Nichols, 41.
[8] Ibid., 36.
[9] Ibid., 33.
[10] Margaret McLaughlin, "The Art Site on the World Wide Web," *Journal of Communications* (Winter 1996), 54.

The Web works just like the Internet: it is a communication network anchored by computers with databases designated as servers. "In essence, the Web is a worldwide string of computer databases using a common information retrieval architecture. In concept, the Web is a client/server database management system."[11] The common information retrieval architecture is called the Hypertext Transfer Protocol (HTTP) which works according to a hypertext and hypermedia paradigm. This allows for the dynamic linking of information into a seamless whole. Unlike the Internet, the Web has a few added features which makes it easy to use. Information via the Web is available to the user in an uncomplicated manner due to the Web browser. Before the concept of the browser, the user had to be very knowledgeable of computer systems in order to gather information.[12]

The first browser created for a mass audience was Mosaic. Its creator, Marc Andreessen, then went on to design Netscape, which is the most popular browser used today. Both browsers are free to anyone wanting to use them for academic research and internal business purposes.[13] This explains why the Web grew in popularity so quickly. The defining feature of the Web is its use of hypertext and hypermedia. Instead of moving linearly from page one to page two, it lets you leap from one link to another. A link can be a word (hypertext) or sounds, pictures and movies (hypermedia). Therefore, the computer works the same way people think, that is, in jumps rather than linearly. While there is the danger of getting side-tracked, this process remains an excellent way to

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[11] Vaughan-Nichols, 19.
[12] Ibid., 20.
[13] Barbara Pollock. "How much is that Degas in the 'Windows?'" *Artnews* (March 1996), 104.

track down elusive information.[14] The non-linear characteristic of the Web allows for creative problem solving by referencing new combinations of thoughts for "old" problems.[15]

The Web offers art history the power of the computer plus the added advantage of a world of information. Computer programs used as educational programs for art museums already have a well established history. Museums use a number of computer devices such as computer work stations with CD-ROM applications, touch screen systems, videodisks, and virtual reality programs.[16] What is unique about the Web is the opportunity it offers to reach a wider audience. Before computer network technology, art educational programs remained inside the museum's walls. The Web has the power to disseminate our cultural heritage beyond these walls. With its graphic intensive displays and interactive capabilities, the conveyance of art history to the world has a new, dynamic presentation.

The three tools the Web offers art history - digital imaging, interactive computer applications, and network technology - work in combination to create a unique mode of communication. Digital imaging and interactive applications have already been the focus of scholarly inquiry.[17] An added dimension of computer network technology, namely the Web, has yet to be explored in depth. How this new form of communication

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[14] Vaughan-Nichols, 17.

[15] For more discussion on creative problem solving see Jacob Getzel and Mihaly Czikszentmihalyi, *The Creative Vision* (London: John Wiley & Sons, 1976).

[16] For a study on interactive programs in museums see Koester's survey, Stephanie Eva Koester, *Interactive Multimedia in American Museums* (Archives & Museum Informatics, 1993).

[17] For a bibliography on interactive multimedia see Koester, for a bibliography on digital imaging see, Getty Art Historical Information Program, *Electronic Imaging* [online]; available from http://www.ahip.getty.edu/intro_imaging; accessed 2 May 1997.

disseminates visual arts information will have some very profound consequences in the field of art history.

## Chapter 2

## DIGITAL IMAGES

The immediately perceivable difference between the Internet and the World Wide Web is digital imaging. The Web is capable of displaying multimedia items directly. While conversely, the Internet remains a text only display, it is possible to access images through the Internet by downloading the appropriate files onto one's computer. For the Web user, the visual punch of dynamic graphical images is displayed immediately. Websites contain all the visual and audio glamour - the "bells and whistles" - of which computers are capable. Visually stunning high resolution images, movies with sound, and virtual three-dimensional spaces are some of the multimedia items available on a Website. Digital images are the most important element of an art Website because it is by default image intensive. A brief introduction to digital image technology may explain some of the problems associated with image intensive Websites.

Electronic imaging as a process is conceptually similar to film photography, but the resulting image is physically different from a photograph. While the photograph exists only as a physical entity - usually on paper, the digital image is practically a non-physical entity - a product of the computer. A digital image is a collection of electronic dots called pixels (picture elements) compressed and arranged according to a pre-defined ratio of columns and rows. Pixels are very similar to dots on a newspaper photograph or

grains on a photographic print.[18] There are three defining properties of a digital image: dynamic range, resolution, and compression. The dynamic range determines how many colors or shades of gray can be represented in the image. This is measured by a unit number called a bit, the smallest unit of data stored in a computer. In a 24-bit image, also known as a "true color" image, each pixel color comes from one out of 16 million possible colors. In an 8-bit image, there are only 256 possible colors or shades of gray, approximately the same quality as images on television.[19] Resolution is defined by the number of pixels in a selected area and is a measurement of clarity. The resolution is described in the form of an equation representing the number of horizontal pixels by the number of vertical pixels. A common ratio for an image is 1000 x 2000 pixels.[20]

A large amount of computer data is required to create a digital image. As a result, an image intensive Website is slow. Website speed can be a problem because if it is too slow, the viewer will simply skip over the site. Image compression is essential because it reduces the size or the amount of electronic data used to create a digital image. Various methods of compression include abbreviating repeated information or eliminating information that is too difficult to see with the human eye. A common compressed image is the JPEG (Joint Photographic Experts Group), which is compressed by systematically deleting a number of pixels inside the image. For example, every second, third, or nth

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[18] J. Paul Getty Trust, *Getty Information Institute: Introduction to Imaging* [online]; available from HTTP:// www.ahip.getty.edu/intro_imaging; accessed 10 June 1997.

[19] Ibid.

[20] Suzanne Weixel, *Easy PCs,* 4th ed., (Indianapolis: Macmillan Computer Publishing, 1995), p. 75.

pixel is eliminated. The result is a loss in data and therefore a loss in quality.[21] But compression is a necessary evil when dealing with computer network technology.

Image compression is useful, but that alone does not solve the problem of slow Websites. Most computers connect to the Web via modem and telephone lines. Telephone lines were not designed to handle the kind of data transfer that the Web uses. Slowly, improvements in communications technology are remedying this situation. Already the telephone companies, cable television, and other communications businesses have developed better communication lines to perform the more rapid transfer of computer data.

As communications technology improves, so does the attitude toward digital imagery. Digital images are either original works of computer art or reproductions of existing works. Both computer art and digital reproductions have initially received very strong criticism. A. Michael Noll explains the mixed reception his computer art received.[22] In the 1960s, Noll worked at Bell Labs creating computer animation, holography, and three-dimensional force-feedback devices.[23] His experiments were encouraged by his superiors because they believed Noll's work was an important demonstration of the creative power of the computer.[24] At the same time, Noll's supervisors at Bell Labs discouraged publicity of his work because they feared that the Lab would lose funding since computer art might be perceived as a frivolous.[25] Despite

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[21] J. Paul Getty Trust, *Introduction to Imaging* [online].

[22] McLaughlin, 51.

[23] A. Michael Noll, "The Beginnings of Computer Art in the United States: A Memoir," *Leonardo* 27 (1994), 39.

[24] Ibid., 43.

[25] Ibid., 41.

its difficult beginnings, it can not be denied that computer art is making important contributions to our visual culture and is better received today than it was in the 1960s. In the early days of computer art it was thought of more as a scientific investigation into the visual graphic possibilities of computer technology than as a viable artistic expression. The pioneers, such as Noll and David Em worked as scientists in research labs.[26] It was not until the 1970s that computer graphics became computer art.[27]

Digital imaging is also very important for the advancement of art reproduction. Art history relies heavily on reproductions (much to the chagrin of its scholars and professionals) because works created in the more traditional media of painting, sculpture, and architecture are not always easily accessible. Reproductions of existing works of art are inferior substitutes for the original, simply because they do not have the same physical properties as the original. Some media reproduce better than others. Prints and paintings reproduce better than sculpture and architecture but all lack the integrity of the original art work. In a perfect world, the art historian would never have to use substitutes, but unfortunately this is just not possible.

Because of the reproduction's inferior quality, it is easy to understand the cautious reception digital imagery received. Art historians merely extended their distrust of photographic reproduction to include digital ones. It is an old grudge they hold against reproductions - starting with Walter Benjamin's classic essay, "Art in the Age of

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[26] For more information on David Em see David Ross, *The Art of David Em: 100 Computer Paintings* (New York: H. N. Abrams, 1988).

[27] For more information on computer art see: Herbert W Franke, *Computer Graphics Computer Art* (London: Phaidon, 1971); and Cynthia Goodman, *Digital Visions: Computers and Art* (New York: Abrams, 1987).

Mechanical Reproductions." Benjamin accuses reproductions of taking away from a original work of art its precious sense of uniqueness - its "aura."[28]

With the invention of photography, art historians argued about the merits of using photographic reproductions for teaching and research.[29] Maryly Snow explains how photography, once introduced as a viable supplement, quickly changed the nature of the discipline. "The art reproduction has been central to the development of twentieth-century art history curricula in colleges and universities. Photomechanical reproduction encouraged art history to evolve into a separate discipline of academic inquiry."[30]

It is generally agreed that reproductions are useful to research and teaching in a limited capacity. A Getty AHIP study, *Object Image Inquiry*, investigated how art historians worked, including how they used reproductions.[31] This publication quotes the surveyed art historians but keeps their responses anonymous. One scholar interviewed for this project defines the limits of how reproductions should be used. "There are certain things you can do with a bad photograph [work of art], certain things that you can only do with a good photograph, and certain things that you shouldn't do without the original."[32] Scholars are very cautious when relying on reproductions because they may cause an

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[28] Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction," *Zeitschrift für Sozialforschung*, vol. 5, no. 1 (1936); translated by Harry Zohn, in Benjamin, *Illuminations* (London: Jonathon Cape, 1970), 219-253; excerpted in Francis Frascina and Jonathan Harris, eds., *Art in Modern Culture: An Anthology of Critical Texts* (New York: Phaidon Press Ltd.), 300.

[29] Wolfgang M. Freitag discusses how several great art historians of the nineteenth-century, such as Charles Eliot Norton of Harvard, Herman Grimm from the University of Berlin, and Heinrich Wölfflin, responded to the problematic nature of photographic reproductions in "Art Reproductions in the Library," in *The Documented Image*, eds., Gabriel P. Weisberg and Laurinda S. Dixon (New York: Syracuse University Press, 1987), 349-363.

[30] Snow, 318.

[31] Marilyn Schmit, ed., *Object Image Inquiry* (Santa Monica: The Getty Art History Information Program, 1988)

[32] Ibid., 11.

error in judgment while conducting research. One scholar recounts how a colleague fell into this trap.

> I had occasion to point out that certain colors essential to [a Jungian critic's] alchemical argument [about Jackson Pollock's work] . . . are in fact not in the picture at all and she'd obviously seen a bad color reproduction and out of that she'd woven this thing . . . . Art history has become too much a library science . . . . The young scholars dream up ideas and work in libraries.[33]

Cautious as art historians are about reproductions, in some cases research would be impossible without them. The main problem is access to the original, as one scholar points out, "I wrote hundreds of letters to museums to get photographs. I traveled then to see [the paintings], but I didn't see them all because sometimes they were in the basement, on the road, [or] under restoration."[34] Digital imaging is useful not only because the images are more readily accessible than original works of art, but also because the technology surrounding digital imaging is now easy to use and affordable.

The directors of the Getty project, anticipating that the technology would soon become practical, conducted research in 1986, well before digital imagery was a viable resource for those working with visual materials. As soon as affordable digital imaging products were made available to the visual arts professionals, excitement grew over what this technology could do. Digital reproductions could be used for the management and conservation of visual materials, as well as for research in and teaching of art history. But, skepticism about this technology also arose. The concern was that digital imagery

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[33] Ibid., 19.
[34] Ibid., 10.

would replace the original work of art. According to art historian, Russell Kirsch, digital reproductions have no redeeming qualities.

> The symbolic surrogates [digital reproductions] are highly suspect. These images that you look at are not any good. I've been dealing with them for 40 years or so and I know that they're no good. And because some of you feel a little more comfortable with them than others do, that does not mean they're any good. They are not the original objects. They do not have the integrity of the things that museums have to preserve.[35]

The problems art historians have with digital reproductions all stem from the fear that the proliferation of reproduced images will be detrimental to society's ability to critique and appreciate *real* works of art. Howard Besser warns us about the danger of this, "as individuals look at more and more cultural objects on their workstation screens, it is likely that they will begin to confuse the representations with the original objects they represent."[36] The digital reproduction has a slick, seamless quality that could confuse the untrained audience into believing what ever he or she is seeing is real. Lydecker explains how this inability to distinguish what is real is epidemic in our present society, "anyone who has worked in a public capacity in a museum, and answered the question 'is this the real thing?' will know that our culture is often confused about what is means for something to be *real*."[37] It is true that digital reproductions will never have

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[35] James Druzik and others, "Discussion: Potentials and Pitfalls," *Visual Resources* 7(1991) , p. 418.

[36] Howard Besser, "From Internet to Information Super Highway," in *Resisting the Virtual Life: The Culture and Politics of Information*, eds., James Brook and Iain A. Boal (San Francisco: City Lights Books, 1995), 67.

[37] Kent Lydecker, "Observations on Museum Use of Electronic Imaging: Today & Tomorrow," *Visual Resources* 7(1991), 316.

the same integrity as an original work of art; however, it is impractical to completely reject this technology. Just like photographic reproductions, they are a necessary evil.

On a more positive note, some in the visual arts field are enthusiastic about this new technology. Christine Stundt, editor of *Visual Resources'* special issue on digital imagery has a more positive attitude about electronic imaging.

> The digital image is, in fact, one of the most important imaging accomplishments since television entered our living rooms some forty years ago. To some, the step from transparency, or print file to digital file is a quick and efficient solution for a very costly and demanding visual resource facility.[38]

The accuracy of digital reproductions is an important consideration when dealing with reproductions of works of art. High quality reproductions are essential to the areas of conservation and collection management. However, the technology that creates high quality reproductions is usually impractical. Two important projects have reconciled digital accuracy with practicality: VASARI (Visual Arts System for Archiving & Retrieval of Images), and MARC (Methodology for Art Reproductions in Color). Both of these projects were part of the $10 billion dollar European program named ESPRIT (European Strategic Program of Research in Information Technology) that was initiated in the early 1980s to make Europe's computer industry competitive with Japan and the United States.[39]

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[38] Christine Stundt, "Editorial: Reshaping Life and Culture Digitally," *Visual Resources* 10(1994), vii.

[39] Anthony Hamber " The VASARI Project," in *Hypermedia and Interactivity in Museums: Proceedings of an International Conference*, ed. David Bearman, (Pittsburgh: Archives & Museum Informatics, 1991), 277.

The aim of VASARI was to demonstrate a practical system for the acquisition, storage and retrieval of high resolution digital images. VASARI produced high quality images and a workable computer display system that would meet the needs of real life "users" of art and art history. As a result, a sophisticated scanner was created that could produce extremely high quality reproductions of existing works of art.

A "colorimetric" scanner system creates digital reproductions of existing works of art. This system, in fact, provides higher color accuracy than conventional film. A digital camera is placed on the scanner that moves to different areas of the painting to capture details which are later "mosaiced" together into one high resolution image.[40] The camera can move on the scanner slightly forwards or backwards to allow for automatic focusing; this keeps the resolution the same for each detail. Three scanners are currently being used. The first one was developed by the VASARI project for the National Gallery in London. This scanner is able to produce images with a resolution of 20 pixels per millimeter. This level of accuracy is important for scientific analysis and conservation, including the study of surface texture and color change. Under-painting analysis is made possible by a second scanner built for the Doerner Institute in Munich which is capable of infra-red imaging. Infra-red imaging detects images that have been painted over. This allows art historians to look at what is underneath a painting without destroying it. A third scanner is located in the Uffizi Gallery.[41] These scanners create very accurate

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[40] Birkbeck College Art History Department, *Information on VASARI* [online]; available from HTTP://www.hart.bbk.ac.uk/vasarilab.html; accessed 10 June 1997.

[41] Ibid.

image, but this accuracy has its price. The image files are so large, up to 800 *megabytes*, that they require special optical disc storage and powerful image processing software.

In order to keep the VASARI project practical, the developers created various uses for the scanned images. First, the images are composed of smaller details. These sub-images are less cumbersome for museum staff to work with.

> The creation of sub-images from the original VASARI image files will enable all those professionals involved in the running of museums and galleries to have access to both image and text databases which should have a significant effect on the productivity and efficiency levels.[42]

Next, the VASARI digital images can be used for profit. Museums and galleries are "the repositories of cultural heritage which is increasingly being exploited."[43] These institutions can earn a significant income by charging fees for reproductions. The ease of digital imagery file transfer to printing houses "greatly speeds up the process of printing hard copy images and significantly improves hard copy image quality."[44] Also, the VASARI images could be used for the museum's educational programs. "One of the aims of the VASARI project is to carry out research into computer-aided learning in the visual arts."[45] Therefore the project created a workable delivery platform of CD-ROM drivers and quality low-cost PC systems to display the digital files. Finally, the VASARI images work well with computer networks making the Web another workable delivery platform. The project created compressed images and graphical user interfaces which are

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[42] Hamber in *Hypermedia and Interactivity in Museums*, 286.
[43] Ibid.
[44] Ibid.
[45] Ibid., 285.

standards for the Web. At present, Web users can only sample the quality of these VASARI images from a Website located at Birkbeck College in England. Two details or sub-images are illustrated at this location. One shows a detail from the *Adoration of the Kings* by the Master of Liesbon.[46] The other is a detail from Rogier van der Weyden's *Magdalen Reading.*[47] The Magdalen detail is so precise that one can make out the words in Mary's book. With these four useful applications of the VASARI digital images, the project successfully balanced high quality digital imaging with practicality.

The MARC project is another example of how accurate digital imaging technology was developed with practicality in mind. The MARC project was a three year endeavor that ran from December 1993 to May 1996. Like VASARI, it was an offspring of the ESPRIT project and developed techniques to scan high resolution images directly from paintings. It produced an ultra-high resolution camera and created a catalog of paintings from a Munich museum to demonstrate the quality of its digital images. To correct a shortcoming of the VASARI scanner, the MARC camera is portable and provides very accurate images, with a resolution capacity of up to 20,000 x 20,000 pixels. With VASARI's sub-images and MARC's portable camera, these two projects successfully balanced accuracy with practicality. The digital images created by these two projects are accurate enough to be useful for collection management and conservation purposes and practical enough to be useful for both profitable and educational enterprises.

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[46] Birkbeck College, *Master of Liesbon's Adoration of the Kings* [online]; available from http://diana.ecs.soton.ac.uk/~km/liespic.html.

[47] Birkbeck College, *Rogier van der Weyden's Magdalen Reading* [online]; available from http://diana.ecs.soton.ac.uk/~km/magpic.html.

While high resolution digital images are useful to art institutions housing valuable visual collections, low resolution digital images are also useful for art historical research and teaching. This is especially true when the images are coupled with computer network technology. Because digital images are computer images, all the power of the computer can be utilized. Through the computer and network technology, images of art can easily be accessed by anyone with a computer. The dissemination of art takes on a new, dynamic form. With the basic idea that art belongs to everyone, making art accessible to the world is a valuable thing. Yet, is providing access to reproductions the same thing as providing access to the original work of art? In a way, yes.

Digital reproductions, when combined with computer network technology provide a new form of information and a new means of conveying this information. Visual information contributes to a better understanding of our visual cultural heritage. A better understanding of this heritage leads to a powerful experience described as the "aesthetic experience." According to cognitive psychologists Mihaly Czikszentmihalyi and Rick Robinson, the aesthetic experience is defined as the "awe and exhilaration people feel upon seeing or hearing something beautiful."[48] Czikszentmihalyi and Robinson interviewed a group of art museum professionals in order to establish how the aesthetic experience takes place when one is looking at art.

These authors feel some sort of visual skill is necessary in order to produce an aesthetic experience. This skill can be innate or cultivated. While the interviewed museum professionals denied explicitly that the aesthetic experience was solely the

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[48] Mihaly Czikszentmihalyi and Rick Robinson, *The Art of Seeing: An Interpretation of the Aesthetic Encounter* (Malibu: J. Paul Getty Trust Office of Publishing, 1990), 5.

product of an education in art history, they agreed that a kind of visual skill was necessary. The relationship between a perfected skill and an aesthetic experience is also key to the author's previous study of skilled athletes and game players, *Beyond Boredom and Anxiety*.[49] Czikszentmihalyi studied rock climbers, chess players, and basketball athletes who were highly skilled in their fields.

> The goal was to focus on people having peak experiences, who were intrinsically motivated, and who were involved in play as well as real life activities, in order to find out whether [Mihaly Czikszentmihalyi]could detect similarities in their experiences, their motivation, and the situations that produced enjoyment.[50]

The enjoyment they felt was coupled with what they described as a "loss of ego" or a "loss of self-consciousness" and a "fusion with the world."[51] They all shared a similar cluster of related sensations that was termed as "the flow of experience" or more simply "the flow." What is interesting is that both studies reveal that the same enjoyment is experienced regardless of the specific activity. By studying the visual arts professionals, it became clear for Czikszentmihalyi and Robinson that a special visual skill or knowledge was a necessary ingredient to the aesthetic experience. Just as rock climbers or chess players experience "the flow" after they have mastered their game, the same can be said of appreciating art. But, what this skill is in relation to art is debated by many museum professionals.

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[49] Mihaly Czikszentmihalyi, *Beyond Boredom and Anxiety: The Experience of Play in Work and Games* (San Francisco: Jossey-Bass, 1975).

[50] Czikszentmihalyi and Robinson, vii.

[51] Ibid., vii

One interviewee denied that a knowledge of art history was necessary; he even went so far as to suggest that this disciplined knowledge is detrimental. "I would even argue that there are many art historians who don't have aesthetic experiences. They respond to the object intellectually, but they often aren't moved by the beauty of a work of art. In many ways, it becomes an intellectual exercise."[52] But, there seems to be, more often than not, a consensus from the museum professionals that art historical knowledge constitutes at least one element necessary for the aesthetic experience. "I think the experience that people have depends enormously on what they are bringing to the work of art and what they are looking for. And to a certain extent that means knowledge."[53] There is an agreement that the knowledge is visual in nature - an ability to think or be motivated visually is essential. All of the arts professionals interviewed for the study at some point expressed the visual basis of their kind of thinking. They described themselves as visual people. An ability to turn their memory into a visual storehouse that could be accessed and utilized deepened their sense of enjoying a work of art.

> One has to have a storehouse. One has to learn to do that. Visual baggage in order to begin to appreciate other things, because it's the interconnections between things, the serendipitous connections that one can make that really begins to get you interested in looking at more things, this whole fabric begins to develop.[54]

Just as with any enjoyable experience, the more background one has with it, the deeper the experience is. In the case of an aesthetic experience, enjoyment stems from one's ability to connect what he or she is seeing with larger implications.[55]

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[52] Ibid., 151.
[53] Ibid.
[54] Ibid., 153.

The role digital reproductions play in all of this is the dissemination of art historical knowledge that adds to one's "visual baggage." This knowledge will facilitate the aesthetic experience. The digital image offers a technologically advanced form of reproducing existing works of art - a high quality image that surpasses the resolution of film photography. More significantly, digital images are part of the computer matrix. They can be linked to computer applications as part of an interactive learning environment.

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[55] Historical aesthetics address these various issues. However such a discussion would take the topic beyond the scope of this thesis. For a good introduction to aesthetics see George Dickie, *Aesthetics: An Introduction* (New York: Pegasus, 1971),1-46, who provides an excellent introduction to historical aesthetics of Plato, Aristotle, and Kant. See also Ruth Saw, *Aesthetics: an Introduction* (New York: Anchor Books, 1971), 219-221, who lists the important works on historical aesthetics and art theory in her bibliography.

## Chapter 3

## INTERACTIVITY

Interactivity is simply the "free-ranging manipulation of textual and visual material according to the will of the user as well as of the program designer."[56] This manipulation is made possible through two dynamic elements, hypertext and hypermedia. Hypertext, not a new concept, has been around for over fifty years. In 1945, Vannevar Bush wrote an article for the *Atlantic Monthly* titled, "As We May Think," in which he explains that the computer could be used to retrieve information in the same way people retrieve information from their memory. Bush believed that the computer could be a tool that would enhance human memory and thinking.[57] Ted Nelson and Doug Englebert extended Bush's ideas in the 1960s.[58] The term "hypertext" was coined by Nelson, who envisioned a future where literature would not be constrained to a linear form. Instead, words would be linked together, and jumps from one section of text to another would follow the natural flow of human thinking.[59] Englebert developed large-scale computer systems that would "augment the human intellect."[60] After hypertext, the next logical step is hypermedia. It involves the same concept as hypertext, but uses "objects"

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[56] Lydecker, 312.

[57] Kristina Hopper, "HyperCard: A Key to Educational Computing," in *Learning with Interactive Multimedia: Developing and Using Multimedia Tools in Education*, eds. Sueann Ambron and Kristina Hopper (Redmond, WA: Microsoft Press, 1990), 9.

[58] Ibid.

[59] Ibid.

[60] Doug Englebert; quoted in Hopper, 9.

(images, sounds, and text elements) as links. Hypermedia allows for the dynamic linking of databases that contain images and sounds as well as text.[61]

The first extensive use of hypermedia was through a popular end-user programming language called HyperCard. When it was released in 1987, it was the "ideal software for controlling external multimedia devices such as video-disc and CD-ROM players."[62] HyperCard's popularity was due to its user-friendly design. Its creators believed that anyone could use this language. The most appealing feature of HyperCard is that it allowed for an easy access to highly visual and acoustic presentations, thus encouraging a wide range of individuals to use the computer for interactive programs.[63] Ten years ago, HyperCard was considered an easy computer language to work with, compared with the other options available. By today's standards, it is rather cumbersome. The World Wide Web, and HTML editors have proved to be even more user-friendly. For example, anyone with a computer can create his or her own Website.

Hypermedia and interactivity are new technologies that will indeed have a significant impact on the field of art history. However, where the changes will take place is still under debate. So far interactive computer programs have made their mark in the areas of research and education. Academic research in art history has very specific requirements. The process of art historical research evolves around a kind of inquiry idiosyncratic to this field. The art historian is able to maintain a mental image database, that is to say, he or she can internalize a large amount of visual information. The

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[61] David Bearman, "Implications of Interactive Digital Media for Visual Collections," *Visual Resources* 5(1989), 313.

[62] Hopper, xii.

[63] Ibid., 10.

accomplished art historian can also recall this visual information at will and use it to attribute significance to similar objects. Computer network technology does facilitate the art historian's mental image database by artificially extending his or her memory. Whether or not computer applications are sophisticated enough to accomplish this task is debatable. Oleg Grabar and Richard Brilliant offer some insight in how interactive computer technology may (or may not) be valuable to this scholarship.

Oleg Grabar defines the unique processes used by a scholar conducting research within the humanities and finds that the existing computer technology does not significantly aid this process. Working with three scholarly databases: the *Perseus Project*, *The Census of Antique Art*, and *Architecture Known to the Renaissance*, Grabar is unable to find a meaningful task for these programs.

> I could not think of anything but contrived questions to ask of [the Perseus or Census applications] . . . . I knew in what book or article in my own library to look for answers to my questions or directions for further work. The point may be important precisely because these programs do not deal with topics of scholarly concern to me, but with that particular area of knowledge that lies somewhere between scholarship and a general culture.[64]

Grabar also addresses the use of CAD-based computer applications for archeological research. He is involved with a project to recreate the early medieval city of Jerusalem from archeological and written documents. While he is a bit more enthusiastic about this project, he still is cautious about its shortcomings. The main problem is that some of the "facts" used are educated guesses. When these guesses are incorporated into a computer

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[64] Oleg Grabar, "The Intellectual Implications of Electronic Information," *Leonardo* 27(1994), 140.

program, they appear real. As a result, "a cardinal rule of humanistic scholarship has been broken, as fact and fancy are no longer separate, even if the later is plausible."[65] For Grabar, computer technology may not be sophisticated enough to aid scholars.

Richard Brilliant is more optimistic about how computer technology will facilitate art historical research. To him, the most important contribution is the proliferation of visual resources: "[laser disc technology, digitized color processing, computer aided design functions] and other developments will surely extend the visual memory of all art historians (who have access to them) in unprecedented ways, since the hunger for images is ultimately insatiable."[66] Brilliant is more positive about the advantages of computer technology because he believes that the technology can be manipulated to work very much the same way art historians think and the way in which they construct a visual memory. He explains how the art historian does this:

> Once the object has qualified as an artwork, the scholar's memory comes into play, and it has two different directions of activity. Primary is the internalized memory of like objects in whole or in the part which gives rise to mental images or the revisualization on command from the observer's trained experience.[67]

Brilliant then continues to explain that the visual memory alone is not enough. There is a second, more essential mental process that engages art historical thinking. The second process is attributing significance to the image.

> Art historians may act like art critics in grasping the visual properties of objects, but they act like historians in surrounding the artifacts with causes, effects, and

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[65]Ibid., 139.

[66] Richard Brilliant, "How an Art Historian Connects Art Objects and Information," *Library Trends* 37(1988), 125

[67] Ibid., 121.

circumstances - the ingredients of significance.[68]

The visual memory is internalized with ideas of significance. Not only can art historians re-visualize similar objects, they can also think about the relationships of compatible concepts. Brilliant is describing a non-linear mode of thinking. Mihaly Czikszentmihalyi's study on the creative processes of art students adds insight into non-linear thinking used by creative individuals.[69] Czikszentmihalyi defines this different mode of thinking as problem finding rather than problem solving.[70] The truly creative problem finder is able "to raise new questions, new possibilities, to regard old problems from a new angle, requires creative imagination and makes a real advance in science [and the arts]."[71] Problem finding and non-linear thinking is the very thing interactive computer applications were designed for, as Vannevar Bush had envisioned and as HyperCard and HTML have accomplished.

Like Grabar, Brilliant believes that computer technology has a very limited role in the facilitation of academic research. Much more promising is the advantage this technology can offer education. Art history is taught in two fields connected with the visual arts. The first is through art museums, the second is through a university study of art history. The former has a less established tradition of standard practices than the latter, because of a long standing belief that the appreciation of art and beauty is innate.

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[68] Ibid., 125.

[69] Jacob Getzels and Mihaly Czikszentmihalyi, *The Creative Vision: A Longitudinal Study of Problem Finding in Art* (London: John Wiley & Sons, 1976).

[70] Ibid., 171.

[71] Einstein quoted in Czikszentmihalyi, *The Creative Vision*, 82.

The problem museum professionals have with defining the rules and practices of appreciating art is that they do not believe that these standards exist. Instead, they have held that if people are left alone in a quiet place, devoid of distractions, then the beauty of art objects will make itself known.

> For quite some time . . . museum education was based on a belief that people could and should use their access to artifacts that museums contain as a way to educate *themselves*. Kenneth Hudson referred to this as 'open-education' where the only educational responsibility of the museums was to provide the opportunity for learning to take place by collecting and displaying the objects during scheduled hours.[72]

The theoretical basis for an "open-education" is still very much dominant in the minds of some art museum professionals. In describing the perfect environment for observing a work of art, the modern museum or gallery is what is expected. "More often than not, for the general public as well as for museum professionals, the encounter with a work of art takes place with in the context of the modern art museum or gallery: the 'clean, blank, spacious environment which is made for art.'"[73] This environment works extremely well with this the notion of an "open-education" and the idealistic belief that "if works of art are allowed to express their natural eloquence, the majority of people will understand them; this will be far more effective than any guidebook, lecture, or talk."[74]

While it is true that the modern museum works well for some visitors, it does not work for all. Several studies indicate that art museums are in general intimidating to the

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[72] Stephanie Eva Koester, *Interactive Multimedia in American Museums* (Archives & Museum Informatics, 1993), 6.

[73] Czikszentmihalyi and Robinson, 140.

[74] F. Schmidt-Degener; quoted in Vera L. Zolberg, " An Elite Experience for Everyone" in *Museum Culture*, eds., Daniel J. Sherman and Irit Rogoff (Minneapolis: University of Minnesota Press, 1994), 52.

uneducated visitor. Kenneth Hudson describes art museums as having "remarkable powers of making the uneducated feel inferior," because these museums "have become temples of scholarship." [75] According to Hudson, the majority of museum visitors are not scholars or intellectuals. The majority of visitors are ordinary people who find the austere museum atmosphere intimidating.[76] Vera Zolberg confirms Hudson's observations with her survey on museum visitors. She finds that the level of the visitor's education works significantly as an indicator of how comfortable the visitor will feel.[77] The highly educated were "quite knowledgeable about what works were in the collection, . . . planned their visit to focus on specific works, . . . felt at ease, remained longer than other visitors, preferred being far from the crowds and tended to visit alone . . . . [and] avoided docents and museum handouts and pamphlets."[78] As much as the highly educated avoided educational information provided by the museum, the middle-level occupational background visitors were eager to use such tools. Zolberg describes this group as having a "high level of intellectual aspiration" and wanting to make the most of their visit by "reading guidebooks, learning from docents, and absorbing information."[79] In comparison, the least educated group felt the most ill at ease. Zolberg finds that this third group "felt intimidated by the solemnity they attributed to the surroundings, were unprepared for the esoteric quality of the works . . . . [and did not dare] to ask questions for fear of exposing their ignorance."[80]

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[75] Kenneth Hudson, *Museums for the 1980s: A Survey of World Trends* (New York: Holmes & Meier Publishers, 1977), 8.

[76] Ibid.

[77] Vera Zolberg, 52.

[78] Koester, 57.

[79] Ibid.

[80] Ibid.

The "open-education" attitude works well only for the highly educated in Zolberg's study. Better museum education models are available that are built on a less antiquated premise than the "open-education." Kent Lydecker offers a more democratic model, which is based on providing access to art -- both physical and intellectual access.

> I think it can be said that the educational purpose of an art museum is to provide access to art. This means physical access - getting to the stuff so you can see it - and more importantly, intellectual access . . . . There are many levels of what I have just called intellectual access, from knowing the simple fact that Picasso died in 1973; to the aesthetic appreciation of *Les demoiselles d'Avignon*; to the philosophically complex and open-ended process of understanding Picasso's place in 20th-century art.[81]

Lydecker attributes to technological developments the possibility of providing access to art. Physical access, or at least access to images of art, is possible through digital reproductions, and intellectual access through computer applications that provide an interactive challenge to the user. The reason why interactivity will facilitate the intellectual access to art is because it teaches the user how to think art historically. The same intellectual processes that take place inside the art scholar's mind can be recreated in an educational computer program.

Interactive applications work well as educational programs because they are built on a premise of active learning - the idea that participating is the best way to learn. Hopper, in an introduction to educational interactive computer applications, explains why active learning is the best teaching method, "A critical prescription for learning - more often stated than followed - is that of active learning. The basic proposition is that "to

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[81] Kent Lydecker, "Observations on Museum Use of Electronic Imaging: Today & Tomorrow," *Visual Resources* 7(1991), 311.

do" is to understand, that active involvement by students in manipulating information is key to their success in learning."[82] Simply stated in a Chinese proverb, active learning is the path to true understanding, "I hear and I forget. I see and I remember. I do and I understand."[83] Art institutions such as museums and galleries can use interactive programs and the Web to provide the public with greater access to the visual culture they house. This idea of access is discussed fully in the next chapter.

Art history taught in a university setting can also benefit from interactive computer technology operating under the premise of active learning. Hypervip is such a pilot project, created at the University of Victoria, Canada. It is a visual database that can display several images at once, "[keeping] the focus on relationships rather than individual species."[84] Its creators, Victoria Wyatt, an art historian, and Ged McLean, a mechanical engineer, created a multiple image, palette-based system that would encourage spontaneous and flexible classroom interactions. An instructor can set up this system in the classroom and use the palette of images during his or her lecture. Students are encouraged to participate in class discussion because the system creates and projects "new palettes spontaneously in response to student questions."[85] According to Wyatt and McLean, Hypervip provides a more egalitarian classroom "by giving students direct access to images."[86] This system is also based on active learning. "When the instructor

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[82] Hopper, 14.

[83] Chinese proverb, used as a motto for the Children's Museum in Boston; quoted in Koester, 79.

[84] Victoria Wyatt, and Ged McLean, "Imaging Databases in Research and Teaching: Global Perspectives and New Research Technologies," *Visual Resources* 10 (1994), 43.

[85] Ibid., 45.

[86] Ibid., 46.

projects a palette, students make selections from the palette, thus thinking actively and creatively rather than simply receiving information from the instructor."[87]

A popular format for interactive educational computer applications is the CD-ROM. These discs are portable and have enough memory to house large multimedia files. Digital images and sound files use a large amount of computer memory. If the application is located on a CD-ROM, the user can run the program without installing it onto the computer's hard drive. In short, CD-ROMs are very practical.

A CD-ROM program, *American Identity Explorer*, is presently being used at Michigan State University to augment undergraduate course work.[88] This computer program teaches the history of American immigration and migration through period photography, citations from literary sources, and contemporary accounts. The user decides the flow of inquiry by selecting which immigration group or American city she is interested in. Throughout the exercise, the user is able to place bookmarks and add notes which can be saved and returned to later.

A commercially available CD-ROM, *Escher Interactive*, teaches the life and history of artist, M.C. Escher.[89] The program contains a history of the artist which includes still photographs of the artist and his family, as well as short movie clips of the artist at work. Throughout the program, sound clips narrate the personal story of the artist or instruct the user how to use the program. A comprehensive collection of digital

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[87] Ibid.

[88] Michigan State University, *American Identity Explorer: Immigration and Migration* [CD-ROM] (East Lansing: MSU Communications Technology Laboratory and The McGraw-Hill Companies, 1997).

[89] M.C. Escher Foundation, *Escher Interactive* [CD-ROM] (New York: Harry N Abrams and Eyeware Interactive, 1996).

reproductions of Escher's work is available in the program's gallery section. The gallery includes a "select-a-year" time line and a word search engine. The user can type in a word or combination of words like, "skull and still life", and the appropriate reproductions are made available. The program's interactive nature is most prevalent in its "arts workshops." The user can create his or her own Escher-inspired Tessellations or morphed designs, which in turn can be saved as a computer file or printed on paper or textile.

CD-ROM educational programs are very entertaining and exciting because they utilize all the power and glamour computers offer. As appealing as they are, they are lacking in one area that computer network technology excels in - world connection.

> Although CD-ROMs excel in logically linking information together, they do not come close to equaling the resources that are available on the Web. CD-ROMs are produced by artists, authors, and editors all working together to form complete works of art. The World Wide Web, on the other hand comes from the efforts of thousands, each adding their own strands of information to the Web.[90]

The CD-ROM is an important computer aided learning device. But, as Vaughan-Nichols points out, it is a fixed entity. Its limited resources cannot equal those of the World Wide Web. The Web is an open entity. New Websites are constantly being created and old Websites are being up-dated. As a result, new information on the Web is grows continuously. A CD-ROM can be up-dated as new versions are created, but the cost and inconvenience of replacing the old discs with new

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[90] Vaughan-Nichols, 19.

ones creates a problem. Websites can up-date their information without any added cost or inconvenience to the user. For the computer-aided learning of art history, the development of computer network technology has an incredible effect on how art images will be accessed. A network of computers provides a new world connection to a world of information. Access is the most significant contribution computer network technology offers art history.

## Chapter 4

## ACCESS

Many members of the arts community maintain art sites on the Internet or the Web. A list of those who are creating art related sites is large and expanding daily: museums, galleries, universities, art institutions, artist groups, and individual artists are all working with computer networks in some capacity. The implication is that the amount of art information available online is immense and continues to grow. This is very significant because the more information available, the more the Internet and the Web become a viable resource for education and research in the visual arts. As more visual arts information becomes accessible through the Web, the artificial memory of the art historian increases, as discussed earlier.

Open access to visual arts information is the most important contribution computer network technology offers the field of art history. Kent Lydecker, as mentioned earlier, defines access as the primary goal for education in art museums. Academic research is also profoundly effected by open access to visual arts information. The scholars interviewed for the Getty AHIP project, *Object Image Inquiry*, again and again name open access to knowledge as the one thing that would dramatically alter the

discipline.[90] Knowledge needed to conduct research would be freed from academic rivalry.

> The major thing is really . . . open access . . . to different kinds of information - free, if possible. Internecine academic rivalry could be gotten around if people had equal access to books, because access is power.[91]

For one scholar, access is accomplished by electronic means because computer technology offers a way to manipulate information.

> I would like access to visual traditions . . . and to me that means electronic and computerized, so that you can slice the pie there and get different permutations and combinations [making] images accessible according to iconography, time, region, artist, and owner.[92]

Access, to yet another scholar, means saving precious time by eliminating some of the tedious tasks necessary for gathering information.

> Gathering information is a long-winded business . . . . If we really did have . . . electronic availability . . . wouldn't it be wonderful to have access to . . . some sort of network reaching to the major museums and to find out what the museums' holdings were . . . . It would save months and months of work.[93]

The scholars interviewed for the Getty project have different conceptions of access, but all agree access is the most important contribution this technology offers. The reason is simple, access to knowledge equals power. If access is free and open, the effect is the democratization of knowledge. Even Oleg Grabar, who dismissed proposed scholarly use

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[90] Marilyn Schmitt, general ed., *Object Image Inquiry* (Santa Monica: The Getty Art History Information Program, 1988).

[91] Ibid., 105.

[92] Ibid., 51.

[93] Ibid., 52.

of computer technology, acquiesces to the power of accessibility. "Electronic information, far from being the privilege of the rich, like research libraries or museums were and still are, could be a factor in the democratization of knowledge."[94] This is the promise of computer network technology. There is a sense of hope brought on by the possibilities of connecting together an entire world of knowledge.[95]

Not everyone is optimistic about this new technology. One skeptic, Howard Besser, warns that this is a misguided admiration of network technology. He compares the current optimistic excitement to that placed on cable television in the early 1970s. Besser argues that just as one hundred additional television channels did not actually change society as was originally hoped, computer network technology is also full of empty promises. Technology, on its own, never creates social benefits. Instead, "both technology and social benefits are shaped by social forces that operate on a much broader level."[96] Besser believes, in fact, that computer network technology is capable of some negative social changes. For one, the proliferation of "high quality representations of cultural objects (and accompanying explanatory information) on the home computer" will keep visitors away from museums.[97] Computer network technology will also lure people away from real experiences in favor of "virtual" ones. These "computer-based 'virtual' experiences ( including 'virtual sex') will provide us with experiences that are more predictable, less serendipitous, and less interesting than human interaction."[98] Ann Mintz

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[94] Grabar, 137.

[95] A good source that addresses the issue of the democratization of knowledge is Richard Lanham, *The Electronic Word: Democracy, Technology, and the Arts* (Chicago: University of Chicago Press, 1993).

[96] Besser, 59.

[97] Ibid., 67.

[98] Ibid., 70.

agrees with Besser, as she explains that the best educational experiences take place physically inside the art museums. She describes an experience that could not possibly take place on one's home computer:

> My vivid memories of childhood museum experiences include the electrifying moment when I realized that a human being had built the Egyptian tomb at the Metropolitan Museum of Art, and that I could touch the same stone. No computer could provide this sudden sense of connection and continuity across the millennia.[99]

It is the physical, real life connections that create the most meaningful aesthetic experiences. Mintz's electrifying moment simply cannot be reproduced, no matter how innovative the interactive computer program, because these computer programs use reproductions rather than original works of art. The concern here is that a proliferation of digital images will result in a loss of interest in the real objects. Howard Besser predicts that digital images will keep visitors away from museums. The main problem with Besser's reasoning is that he assumes that the proliferation of digital images will have different consequences than a proliferation of photographic reproductions. Fine art photographic reproductions have already been incorporated into popular culture for many years. Yet, statistics prove that fine art museums have remained as popular or have grown in popularity since the invention of photography.[100] What should be focused on is how digital images will change the meaning of art objects. In this regard, digital images merely continue what photography has already started. Since the advent of photography, the uniqueness of an art object is no longer tied to its underlying image. Because the

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[99] Ann Mintz, "Techno-Logic," *Museum News* (July/August 1992), 45.

[100] American Association of Museums, *Museums Count* (Washington D. C.: American Association of Museums, 1994), 63-64.

underlying image can be reproduced many times, its meaning changes. As John Berger explains, the original's "meaning multiplies and fragments into many meanings."[101] The only possible consequence of the proliferation of digital images will be an additional multiplying and fragmentation of meaning. This is a different consequence than a loss of interest. More attention should be paid to how digital imaging on the Web conveys art information.

In order to understand how art information is best conveyed on the Web, it is necessary to examine the most innovative and educational Internet and Websites created.[102] Looking first at the earliest exhibitions created for the Internet, these exhibitions tend to have more of an educational presence than today's Websites. Three projects stand out from the rest: the Smithsonian photograph collection and two online exhibitions from the Library of Congress. These three Internet exhibitions were created with a particular educational mission or lesson in mind. The Smithsonian's mission was the ". . . increase and diffusion of knowledge."[103] The two Library of Congress exhibits "consist of selected photo images from physical exhibits at the library and numerous documents and bibliographies to help put the images in their historical context."[104] The first is a Soviet document exhibition consisting of documents dating from the Cold War. This online exhibition provides an introduction to Soviet Union foreign and domestic

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[101] John Berger, *Ways of Seeing* (London: The British Broadcasting Corporation, 1972), 19.

[102] Due to the ever-changing nature of computer network technology, it is impossible for this thesis to be completely up-to-date. Innovations in educational art Websites are created on a daily basis.

[103] From the Smithsonian chapter; quoted in Jim Wallace, "Project Chapman: the Direct Delivery of Digital Smithsonian Photographic Images Via the Internet," *Visual Resources* 10 (1994), 58.

[104] Adam Gaffin, "Visiting Museums on the Internet," *Internet World* 5(1994), p. 24

policy. The second Library of Congress exhibit is a collection of images from the Vatican Library that compares different biblical texts.

The Smithsonian Institution was one of the first organizations to develop an image database. The Smithsonian Office of Printing and Photographic Services scanned images from its collection and made them "available to academic and non-profit audiences served by the Internet."[105] The motivation behind this project was to provide access to the Institutions resources. The Internet provided them with a means to reach a broader audience. They were especially interested in reaching "those who cannot come to Washington to visit the museums."[106] The Internet site is a collection of digital images that the user can download onto his or her computer. There is not much information in connection with these images except for some embedded descriptions. The quality of the images are adequate. They are 24-bit images in a 640 x 480 pixel PICT format, compressed into a JPEG. Selecting this level of quality was intended to discourage misuse and copyright infringement. "These images will provide a high quality presentation on computer screens, but will not have sufficient resolution for commercial publication."[107]

The exhibitions from the Library of Congress, like the Smithsonian, provide digital reproductions, but also enough additional information to constitute a complete and direct educational experience. The Soviet document exhibition is comprised of digital reproductions of the original documents with English translations. Documents include a

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[105] Wallace, 57.
[106] Ibid., p. 58.
[107] Ibid.

"directive from Lenin ordering the death of anti-Communist farmers" and "documents related to the Cuban missile crisis and the Chernobyl meltdown."[108] The documents presented at this site form an open discussion of the Soviet Union domestic and foreign policy during the Cold War. This open dialog is best featured in the transcript of an "online discussion between Librarian of Congress, James Billington, his Russian counterpart, and users of America Online service."[109] The library's second exhibit provides a collection of original biblical texts, including copies of the Dead Sea Scrolls. The exhibit's goal is "to illustrate the chain of transmission of the biblical text." In order to do this, the creators of the exhibition "have placed alongside the two-thousand-year-old Dead Sea Psalm Scrolls, a facsimile of the tenth century Aleppo Codex (which until the Dead Sea Scrolls was the earliest known Hebrew Bible manuscript) and the first Hebrew printed edition of the Psalms from 1477 - both from the Vatican Library Hebraic collections."[110] These two exhibitions demonstrate the educational power of online projects by including reproductions of original documents, supporting information, and online discussion.

Art sites created for the Web, in general, have less of an educational lesson and more of an innovative thrust than their earlier counterparts from the Internet. Interactive multimedia links and instantly accessible visual graphics are some of the elements of a Website. Unfortunately, most art Websites do not utilize this interactive capability. Instead, they offer only the most mundane information. The largest number of art

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[108] Gaffin, p. 24
[109] Ibid., 25.
[110] From the exhibition catalog, quoted in Gaffin, 25.

Websites are from art museums. "Almost every museum in the world now has a Web page, although they vary in content . . . many museum pages function mainly as brochures and offer only the basic information for visiting the home museum."[111] The better art Websites are the few that include some element of interactive applications.

The "art museum brochure" type of art Website is by far the most common and the least interesting type. One site worth mentioning is from the Louvre.[112] This site offers very little commentary, but includes such "treasures" as the Mona Lisa and provides interesting views of the building.[113] Not all Websites are related to physical art museums or institutions, but rather, exist only as electronic entities. One example is the OTIS project. This site offers a variety of art and art related information and is on the cutting edge of online medium.[114] An interactive component of the OTIS site is its collective art projects. These projects allow site visitors to contribute artwork to the location. One fascinating collective project is the "Gridcosm." This project allows artistically inclined visitors to add pieces to an existing image grid. The visitor reserves a spot on the grid, then has a few hours to produce an integrated piece. Non-participating visitors observe the changing image. A Gridcosm discussion forum allows artists and visitors to discuss the changing image. The brochure type of Websites connect the world to the major museums, and offer access to some of the great works of art, such as the Mona Lisa. The purely electronic sites, such as OTIS, offer creative, interactive opportunities for those who wish to create art images or participate in online discussions.

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[111] David Noack, "Visiting Museums Virtually," *Internet World* 6(1995), 88.
[112] *Louvre*[online]; available from http://meteora.ucsd.edu/~norman/paris/Musees/Louvre.
[113] Noack, 89.
[114] *OTIS* [online]; available from http://sunsite.unc.edu/otis/otis.html; accessed 13 August 1997.

Three art Websites warrant particular attention due to their innovative and educational natures. The Smithsonian Institution Website, the Getty ArtsEdNet, and the Art Imagebase from the Fine Arts Museums of San Francisco.[115] All of these sites offer interactive elements, ways in which the user can become directly involved with the Website or manipulate its information.

The Smithsonian Website represents all of the diverse museums that comprise the real-world Smithsonian Institution. It was launched, May 8, 1995, in order to combine, on the Web, individual museum's and project director's explorations of electronic communication for the Internet.[116] The site is visually stunning, easy to use, and provides online tours of its various museums. The strength of the Smithsonian site is its images. The same image catalog that is available through the Internet, is accessible from the Website.[117] The Institution's reputation as an innovative online image resource is carried on at the National Zoo with its use of Web cameras. The most recent camera is in place at the Zoo's elephant house.[118] The "Updating Elephant Cam" provides live images for the Web that refreshes every twenty seconds. Site visitors watching the elephants on their computer monitors experience a real time connection with the Zoo and have a sensation of being there. After watching the elephants, site visitors are asked to send a message to the program manager.

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[115] *Smithsonian* [online]; available from http://www.si.edu/; *ArtsEdNet* [online]; available from http://www.artsednet.getty.edu/; and *Art Imagebase* [online]; available from http://www.thinker.org/imagebase.

[116] Noack, 91. For more background information see, *Smithsonian* [online]; available from http://www.150.si.edu/chap13/thirteen.htm; accessed 13 August 1997.

[117] *Smithsonian Photograph Project* [online]; available from ftp://photo1.si.edu.

[118] *Smithsonian Zoo Photographs* [online]; available from http://www.si.edu/organiza/museums/zoo/photos.

The Getty offers a Website that focuses on art education. "ArtsEdNet is designed specifically for K-12 arts educators and general classroom teachers who incorporate the arts into their curriculum."[119] This Website contains an expanding database of materials useful to arts education. There is also an online discussion center, ArtsEdNet Talk, that allows teachers to connect and discuss various topics with other educators from around the world. ArtsEdNet Talk also schedules special guests to participate in the online discussions.[120] Teachers learn from this site, then incorporate the lessons into their own classes. The ArtsEdNet Talk opens a dialog between site visitors and guest experts. Each site visitor has a unique use for the information provided.

The Imagebase from San Francisco is the most interactive site among these three. The Fine Arts Museums of San Francisco, the De Young Museum and the Legion of Honor, are in the process of digitizing their entire collections and to making them available online through the Imagebase. Presently, they have over 65,000 works from their graphic arts collection available on an image database. An Imagebase "tour" gives the user an inside look art how the museums' curators access the database while creating an exhibition. This is accomplished by a program that simulates how Karin Breuer, an associate curator of the Achenbach Collection for Graphic Arts, uses the Imagebase to select objects for an exhibition on color woodcuts of California landscapes.[121] The online version of the image database uses the same search engine that easily finds appropriate works depending on the designated search parameters. It is the museums' mission "to

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[119] Candace Borland, "ArtsEdNet: Arts Education Resources on the Internet," *School Arts* (January 1996), 12.

[120] Ibid., 13.

behave more like a resource and less like a repository."[122] They established this Website to serve "students and educators, art lovers and scholars."[123] The Imagebase is very significant because it allows anyone to try his or her hand at being a curator. San Francisco Imagebase, though not complete, it is the very thing wished for not too long ago by the art historian who wanted to reduce the tedium of "long-winded research."[124] In this light, San Francisco Imagebase is a very significant contribution to art history. However, do all museums to have the same resources as the Museums of San Francisco had in order to produce their comprehensive database? Economic and legal problems that surround computer network technology are two very real hindrances to a successful use of this technology. The next chapter will cover these issues.

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[121] see Imagebase Tour, Fine Arts Museums of San Francisco, *Art Imagebase* [online]; available from HTTP:// www.thinker.org/imagebase; accessed 13 August 1997.

[122] Fine Arts Museums of San Francisco, *Art Imagebase* [online].

[123] Ibid.

[124] Schmitt, 52.

## Chapter 5

## ECONOMIC AND LEGAL ISSUES OF THE WORLD WIDE WEB

The economic and legal problems that surround computer network technology are intertwined. The possibility of profiting from the Web brings to the foreground questions regarding the rights of copyright holders and fair use. At the core of the confusion is the conflict of interest between commercial and educational uses of the Web. While the legal issue surrounding commercial interest of the Web is straightforward, anyone wishing to create an educational art site for the Web must first wrestle with the vague copyright issues connected with this new technology. The most difficult aspect of creating an educational art site for the Web has to do with copyright infringement. An art site on the Web naturally uses many digital reproductions of works of art. Contemporary art objects are usually protected by copyright laws. Even the doctrine of fair use, which allows special consideration for educational projects, does not address the unique problems of Websites. In looking for some guidelines for using digital reproductions on the Web, a variety of sources are available. Most of these sources are not up to date and none give any sort of definite answer to this topic.

For basic information about copyright law in general, the best sources are available online. The United States Copyright Office maintains a Web site that spells out

the most current laws and acts relating to copyright.[125] The Copyright Office will also answer correspondences and provides forms which one can download. Other sources on copyright law are books published by legal scholars who offer their interpretations on the law. These books, better known as "horn books," are written in legalese and are intended to inform attorneys on the chapter and verse of copyright law. [126] There are also sources helpful for the less legal minded reader; these are self-help books created by attorneys to educate the general public.[127] These books are very easy to read and usually illustrated. Unfortunately they rarely explain the subject in depth.

For more information specific to copyright law and the World Wide Web, the most current sources are found on the Web itself. There are a large number of Websites dedicated specifically to this topic. The best is a site maintained by an intellectual property attorney, P.J. Bennedict O'Mahoney. His site is appropriately named *The Copyright Website.*[128] O'Mahoney presents copyright issues in a clear and interesting manner. He includes current information on the Clinton administration's Information Infrastructure Task Force (IITF), which is presently working on copyright and Internet issues. Technical issues dealing with copyright law and the Web can be found in trade journals such as *PC Magazine* and *MacWorld.* One noteworthy article covers the issue of

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[125] The United States Copyright Office, *Copyright Web Site* [online]; available from http://lcweb.loc.gov/copyright; accessed 18 March 1997.

[126] Three popular "horn books" include; Benjamin Kaplan, *An Unhurried View of Copyright* (New York: Columbia University Press, 1967); William F. Patry, ed., *Latman's The Copyright Law*, 6th ed. (Washington D. C.: Bureau of National Affairs, 1986); Melville B. Nimmer, *Nimmer on Copyright: A Treatise on the Law of Literary, Musical and Artistic Property, and the Protection of Ideas* (Albany: Matthew Bender, 1963.)

[127] Here are two fine examples, Don Glassman, *Writers' and Artists' Rights* (Washington DC: Writers Press, 1978); William S. Strong, *The Copyright Book: A Practical Guide*, 4th ed. (Cambridge, MA: The MIT Press, 1993).

[128] P.J. Bennedict O'Mahoney, *The Copyright Website* [online]; available at HTTP://www.benedict.com; accessed 18 March 1997.

copyright and computer art.[129] This article is an excellent source for graphic artists who want to create derivative works from copyrighted images. The author includes a very interesting section displaying five derivative works that are examples of copyright infringement. Scholarly journals, such as *Visual Resources* and *Journal of Communication* address the theoretical as well as technical issues surrounding copyright law, digital reproductions, and the Web. A special issue of *Visual Resources* is devoted entirely to copyright law as it effects those who work with visual materials.[130]

From these sources it is possible to gather some general information relating to the specific problems of reproducing works of art for an educational Website. Online sources offer the most current information, but, as it now stands, policy regarding the Internet and the Web is in the process of being made. The sources available today will not be accurate for tomorrow.

There are two key legal issues particular to the Web. The first issue is a need to clarify the rights of copyright and copyright holders. This is important to those wishing to license digital images commercially on the Web. The second issue is a need to redefine fair use. The Web has brought this ambiguous doctrine to the minds of those creating Websites. It is unclear what can be claimed as the fair use of digital images on the Web. The Clinton Administration has responded with proposed guidelines outlined in the "White Paper." The United States Commerce Department has also responded by initiating the Conference on Fair Use, CONFU.

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[129] Majorie Bear, "Copyright and the Visual Arts," *MacWorld* (October 1996), 163-167.
[130] Robert Baron, "The Great Image Debate," special issue, *Visual Resources* 12 (1997).

The current laws of policy on the rights of copyright and copyright holders define who owns these rights and what these owners are legally permitted to do with copyrighted images.[131] For example, when a museum or a gallery licenses images to commercial venders, the museum or gallery retains some level of control over the underlying image. Retaining control over the image is important for protecting the interests of these visual arts institutions. They need to protect both their economic interests and the integrity of the art objects - while at the same time, they need to provide public access to this cultural heritage.[132]

Public access can be defined in many different ways. When a copyrighted object is reproduced as a digital image, the question arises whether or not certain uses of this digital image is protected under the doctrine of fair use. The problem at hand is that this doctrine was deliberately left ambiguous. The Supreme Court stated that issues of fair use must be considered on a case-by-case basis; using four factors in determining whether the use is fair.[133] Barbara Hoffman, in an article on copyright and CONFU, lists the four factors:

> (1) the purpose and character of the use, including whether for commercial or nonprofit educational purposes; (2) the nature of the copyrighted work; (3) the amount and substantiality of the portion used; and (4) the effect of the use upon the potential market for or value of the copyrighted work.[134]

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[131] For an in-depth discussion see Barbara Hoffman, "Fair Use of Digital Art Images and Academia: A View from the Trenches of the Conference on Fair Use (CONFU)," *Visual Resources* 12 (1997), 373-392.

[132] David Bearman and Jennifer Trent, "Museums and Intellectual Property: Rethinking Rights Management for a Digital World," *Visual Resources* 12 (1997), 269.

[133] The United States Copyright Office, *Copyright Web Site* [online].

[134] Hoffman addresses each one of these factors as they specifically relate to digital imaging and the Web, see page 379.

The ambiguous nature of the doctrine allows for many different interpretations of what can be considered fair use. For example, Stephen Weil proposes that any museum use of an image is always fair use.[135] Karlene McLaren disagrees with Weil. She advocates a stringent adherence to copyright law at the expense of fair use; believing that copyright is designed to protect and promote creative activities.[136] Both Weil and McLaren derive different ideas from the same ambiguous doctrine.

In order to establish some guidelines for fair use, as it relates to computer network technology, the Clinton Administration presented the "White Paper," and the Department of Commerce initiated CONFU. The "White Paper" has been declared defective because it does not accurately address specific technical issues of the Web. For example, the paper does not successfully distinguish between downloading and copying.[137] The "White Paper" has also been criticized as being too pro-commerce. Caron Carnahan explains how the papers proposed guidelines protect commerce to the detriment of educational interests.[138] She is concerned that if these guidelines are adopted, they will phase out fair use.[139] Fair use is not only placed in danger by the "White Paper," but also by the direction CONFU is heading. Virginia Hall explains how conservative positions

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[135] Stephen Weil, "Fair Use/Museum Use: How Close is the Overlap?" *Visual Resources* 12 (1997), 353.

[136] Karlene McLaren, "Copyright: Fair Use or Foul Play," *Visual Resources* 12 (1997), 343.

[137] O'Mahoney explains this more in detail, see his Website, O'Mahoney, *The Copyright Website* [online].

[138] Caron Carnahan, "The Visual Surrogates as Intellectual Property: The Clinton Administration's 'White Paper' and its Implications for Visual Resources Collections," *Visual Resources* 12 (1997), 405.

[139] Ibid., 407.

taken during the proceedings of CONFU challenges long-standing practices of fair use.[140] Hall is very pessimistic about the future of fair use:

> Will there be no such thing as fair use in the NII [National Information Infrastructure]? Given the current conservative legislative trend on the issues, this may be a question that the courts will be addressing for years to come.[141]

Ideally, computer network technology, as manifested in the Web, will lead to the democratization of information by providing a world of knowledge freely accessible to all. The dissemination of art will be part of this democratization of information. However, practically speaking, the democratization of visual information assumes that everyone will have access to computer networks and that the institutions who manage visual materials will be able to provide this service. It is one thing to imagine what is possible, and another to deal with what is practical. Even though digitizing programs such as MARC and VASARI tried to keep their projects affordable and practical, it is unlikely all museums will be able to afford such applications. Finally, given the conservative tendencies demonstrated in the "White Paper" and at CONFU, it is likely that commercial interests will prevail over educational ones when policy and law is finally established regarding the Web.

Expense, and the possibility of legal conflict, do keep some art institutions from initiating new Web-related educational projects. Nevertheless, the few truly innovative

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[140] Virginia Hall, "Fair Use and Digital Image Archive: A Report on the National Information Infrastructure Conference on Fair Use," *Visual Resources* 12 (1997), 399.

[141] Ibid.

art Websites lead the way to the future. Major art institutions continually upgrade their Websites, and the number of new art Websites increases daily. [142]

[142] New examples of innovative educational Websites are found daily. One example is the image database. As I began research, the Imagebase from San Francisco was the only online example of an art image database. Now these databases are becoming more common. For example, the Detroit Institute of Arts has just launched its own image database. Detroit Institute of Arts, *Diamondial Image Database*, [online]; available from http://www.dia.org; accessed 13 December 1997.

# CONCLUSION

Digital imaging and interactive programs accessible via the World Wide Web have the potential of democratizing information. Art historical information, especially digital reproductions of fine art is part of this information. Interactive programs present this information in a non-linear way, inspiring creative approaches to problem solving or problem finding. The key to the democratization of information is open access. Ideally, computer network technology will create an open forum for the free exchange of information. However, in practical terms, open access is hindered by economic and legal problems. That is to say, there is a confusion of what is legally free, and there is the simple problem of the cost network services.

Despite economic and legal problems, innovative art Websites have made their way onto the Internet. The sites provide the public with stunning digital reproductions, interactive programs, and accessible image databases. The Website visitors learn from these sites by using and manipulating the information in ways meaningful to them. Computer network technology also provides the art historian with new education and research tools. High quality digital reproductions, such as those from the MARC and VASARI projects, are more accurate imaging tool than photography. This improves fine art conservation and collection management efforts. Computer networks provide an access to these digital images and interactive programs. Access facilitates academic

research and provides educators and students the opportunity to connect and share information outside of the classroom.

It is the possibilities of computer network technology that will lead to a more dynamic use of human knowledge. Economic and legal problems will remain troublesome only today because the technology is still new. Once standards of legal practice have been established, the creation of educational art Websites will be less confusing. The cost of implementing this new technology will also become less of an issue. Computer technology has always followed a particular trend: as the technology becomes more sophisticated, it becomes more affordable. For example, as the average personal computer becomes more sophisticated over the past twenty years, the cost of purchasing this computer remains affordable. The democratization of art is a very noble idea, and leading the way is computer network technology. The future may find us a truly democratic society where the entirety of human knowledge is freely accessible.

## BIBLIOGRAPHY


Addiss, Stephen, and Mary Erickson. *Art History and Education.* Urbana and Chicago: University of Illinois Press, 1993.

Akiyama, Karen A. "Rights and Responsibilities in the Digital Age." *Visual Resources* 12 (1997): 261-267.

Alexander, Victoria. *Museums and Money: The Impact of Funding on Exhibitions, Scholarship, and Management.* Bloomington and Indianapolis: Indiana University Press, 1996.

Allison, David K., and Tom Gwaltney. "How People Use Electronic Interactives." In *Hypermedia and Interactivity in Museums: Proceedings of an International Conference*, ed. David Bearman, 62-73. Pittsburgh: Archives & Museum Informatics, 1991.

Ambron, Sueann, and Kristina Hopper, eds. *Learning with Interactive Multimedia.* Redmond, WA: Microsoft Press, 1990.

American Association of Museums. *Museums Count.* Washington D. C.: American Association of Museums, 1994.

Bakewell, Elizabeth, William O. Beeman, Carol McMichael Reese, and Marilyn Schmitt, eds. *Object Image Inquiry.* Santa Monica: The Getty Art History Information Program, 1988.

Baron, Robert A. "The Great Image Debate." Special issue, *Visual Resources* 12 (1997).

Bear, Majorie. "Copyright and the Visual Arts." *MacWorld* (October 1996): 163-167.

Bearman, David, ed. *Hypermedia and Interactivity in Museums: Proceedings of an International Conference.* Pittsburgh: Archives & Museum Informatics, 1991.

_____. "Implications of Interactive Digital Media for Visual Collections." *Visual Resources* 5 (1989): 311-323.

Bearman, David and Jennifer Trent. "Museums and Intellectual Property: Rethinking Rights Management for a Digital World." *Visual Resources* 12 (1992): 269-279.

Benjamin, Walter. "The Work of Art in the Age of Mechanical Reproduction." *Zeitschrift für Sozialforschung*, vol. 5, no. 1 (1936). Translated by Harry Zohn, in Benjamin, *Illuminations*. London: Jonathon Cape, 1970, 219-253. Excerpted in Francis Frascina and Jonathan Harris, eds., *Art in Modern Culture: An Anthology of Critical Texts*, 297-307, New York: Phaidon Press Ltd., 1992.

Berger, John. *Ways of Seeing*. London: The British Broadcasting Corporation, 1972.

Besser, Howard. "Imaging: Fine Arts." *Journal of the American Society for Information Science* 42 (September 1991): 589-596.

_____. "The Information Superhighway: Social and Cultural Implications." In *Resisting the Virtual Life*, ed. J. Brook, 59-70. San Francisco: City Lights Press, 1995.

_____. "Visual Access to Visual Images: The UC Berkeley Database Project." *Library Trends* 38 (1990): 787-798.

Birkbeck College. *MARC Project* [online]; available from http://www.hart.bbk.ac.uk/vasarilab.html; accessed 2 May 1997.

_____. *VASARI Project* [online]; available from http://www.hart.bbk.ac.uk/marc.html; accessed 2 May 1997.

Borland, Candace. "ArtsEdNet: Arts Education Resources on the Internet." *School Arts* (January 1996): 12-13.

Brilliant, Richard. "How an Art Historian Connects Art Objects and Information." *Library Trends* 37 (1988): 120-129.

Burd, Stephen. "Carnegie Mellon Researcher Invites You on a Trip to 'Virtual Reality.'" *The Chronicle of Higher Education* (September 1994): A48.

Carnahan, Caron L. "The Visual Surrogates as Intellectual Property: The Clinton Administration's 'White Paper' and its Implications for Visual Resources Collections." *Visual Resources* 12 (1992): 401-408.

Caroll, Terry. *Frequently Asked Questions About Copyright* [online] (Terry Caroll,1994); available from http://www.eff.org/pub/Intellectual_property/coroll_copyright_faq; accessed 1 May 1997.

Cassedy, Susannah. "The High Tech Museum: Exhibits." *Museum News* (July/August 1992): 41-41.

Chadwick, A. F. *The Role of the Museum and Art Gallery in Community Education.* Nottingham: Barnes & Humby Ltd., 1980.

Chapin, David, and Stephan Klein. "The Epistemic Museum." *Museum News* (July/August): 60-76.

Clotfelter, Charles. *Government Policy Toward Art Museums in the United States.* Durham: Duke University, 1989.

*Copyright and Educational Media: A Guide To Fair Use and Permissions Procedures.* Washington DC: Association for Educational Communications and Technology and the Association of Media Procedures, 1977.

Cox, Jennifer. "Images on the Internet: Enhanced User Access." *Database* 17 (August 1994): 18-22, 24-26.

Czikszentmihalyi, Mihaly. *Beyond Boredom and Anxiety: The Experience of Play in Work and Games.* San Francisco: Jossey-Bass, 1975.

_____. *Creativity: Flow and the Psychology of Discovery and Invention.* New York: HarperCollins, 1996.

Czikszentmihalyi, Mahaly, and Rick Robinson. *The Art of Seeing: An Interpretation of the Aesthetic Encounter.* Malibu: J. Paul Getty Trust Office of Publications, 1990.

DeLoughry, Thomas. "Museums Go High-Tech." *The Chronicle of Higher Education* (September 1994): A47, A49.

Detroit Institute of Arts. *Diamondial Image Database*, [online]; available from http://www.dia.org; accessed 13 December 1997.

Dickie, George. *Aesthetics: An Introduction.* New York: Pegasus, 1970.

Dierking, Lynn D., and John H. Falk. "Redefining the Museum Experience: The Interactive Experience Model." In *Visitor Studies: Theory, Research, and Practice*, eds., A. Benefield, S. Bitgood, and H. Shettel, 173-176. Jacksonville, AL: Center for Social Design, 1992.

Druzik, James, Andrew Eskind, Paul Kahn, Russell Kirsch, and Marilyn Schmitt. "Discussion: Potential and Pitfalls." *Visual Resources* 7 (1991): 411-423.

Efland, Arthur D. *A History of Art Education: Intellectual and Social Currents in Teaching the Visual Arts.* New York and London: Teachers College Press, 1990.

Electronic Frontier Foundation. *Intellectual Property Online: Patent, Trademark, Copyright Archive* [online]; available from http://www.eff.org/pub/Intellectual_property; accessed 1 May 1997.

Ester, Michael. "Digital Images in the Context of Visual Collections and Scholarship." *Visual Resources* 10 (1994): 11-24.

_____. "Image Quality and Viewer Perception." *Leonardo* 23 (1990): 51-63.

Feldstein, Martin, ed. *The Economics of Art Museums.* Chicago: The University of Chicago Press, 1991.

Field, Thomas G. Jr. *Copyright in Visual Arts* [online] (Franklin Pierce Law Center, 1995); available from http://www.fplc.edu/TFIELD/CopyVis.htm.

Fisher, John. "mUSEms." In *The Idea of the Museum*, ed. Lars Aagaard-Mogensen, 45-59. Lewiston, NY: The Edwin Mellon Press, 1988.

Fishman, Stephen. *The Copyright Handbook: How to Protect and Use Written Works.* Berkeley: Nolo Press, 1995.

Franke, Herbert W. *Computer Graphics Computer Art.* London: Phaidon, 1971.

Freeman, Carla Conrad. "Visual Media in Education: An Informal History." *Visual Resources* 11 (1990): 327-341.

Freitag, Wolfgang M. "Art Reproductions in the Library." In *The Documented Image*, eds., Gabriel Weisberg and Laurinda Dixon, 349-363. New York: Syracuse University Press, 1987.

Gaffin, Adam. "Visiting Museums on the Internet." *Internet World* 5 (1994): 24-29.

Glassman, Don. *Writers' and Artists' Rights.* Washington DC: Writers Press, 1978.

Getty Art Historical Information Program. *Electronic Imaging* [online]; available from http://www.ahip.getty.edu/intro_imaging; accessed 2 May 1997.

_____. *Getty Information Institute* [online]; available from http://www.ahip.getty.edu; accessed 13 August 1997.

_____. "Museum Educational Site Licensing Project: Fact Sheet." Santa Monica: Getty AHIP, 1995. Photocopied.

Getty Center for Education in the Arts. *The Imagination Machines*. 60 min. Santa Monica: The J. Paul Getty Trust, 1991. Videocassette.

Getzels, Jacob W. and Mihaly Czikszentmihalyi. *Creative Thinking in Art Students: An Exploratory Study*. Chicago: The University of Chicago, 1964.

_____. *The Creative Vision: A Longitudinal Study of Problem Finding in Art*. London: John Wiley & Sons, 1976.

Goodman, Cynthia. *Digital Visions: Computers and Art*. New York: Abrams, 1987.

Grabar, Oleg. "Intellectual Implications of Electronic Information." *Leonardo* 27 (1994): 135-141.

Hall, Virginia M. G. "Fair Use and Digital Image Archives: A Report on the National Information Infrastructure Conference on Fair Use." *Visual Resources* 12 (1992): 393-399.

Hamber, Anthony and James Hemsley. "The VASARI Project." In *Hypermedia and Interactivity in Museums: Proceedings of an International Conference*, ed. David Bearman, 276-288. Pittsburgh: Archives & Museum Informatics, 1991.

Heid, Jim. "Optimizing Web and CD-ROM Graphics." *MacWorld* (June 1996): 129-131.

Hoffman, Barbara. "Fair Use of Digital Art Images and Academia: A View from the Trenches of the Conference on Fair Use (CONFU)." *Visual Resources* 12 (1992): 373-392.

Hudson, Kenneth. *Museums for the 1980s: A Survey of World Trends*. New York: Holmes & Meier Publishers, 1977.

_____. *Museums of Influence*. Cambridge: Cambridge University Press, 1987.

Irvine, Betty Jo. *Slide Library*. Colorado: Libraries Unlimited, 1979.

Jacobson, Linda, ed. *Cyberarts: Exploring Art & Technology*. San Francisco: Miller Freeman Inc., 1992.

Jensen, William S. *VLA Guide to Copyright For Visual Artists*. New York: Volunteer Lawyers for the Arts, 1979.

Jussim, Estelle. *Visual Communication and the Graphic Artist: Photographic Technologies in the Nineteenth Century*: New York: R.R. Bowker Company, 1974.

Kaplan, Benjamin. *An Unhurried View of Copyright*. New York: Columbia University Press, 1967.

Kennedy, John B., and Shoshana R. Dweck. "Publishers, Authors Battle Over Electronic Rights." *The National Law Journal* (October 28, 1996): C17-C18.

Kessler, Benjamin R. "Electronic Images in Visual Resources Collections: Some Strategic Questions." *Visual Resources* 10 (1994): 1-10.

Koester, Stephanie Eva. *Interactive Multimedia in American Museums*. Pittsburgh: Archives & Museum Informatics, 1993.

Lanham, Richard. *The Electronic Word: Democracy, Technology, and the Arts.* Chicago: University of Chicago Press, 1993.

_____. "The Implications of Electronic Information for the Sociology of Knowledge." *Leonardo* 27 (1994): 155-163.

Leighton, Howard B. "The Latern Slide and Art History." *History of Photography* 8 (April-June 1984): 107-118.

Levi, Stuart D. "Web-Site Hypertext Links Raise Issues of Control." *The National Law Journal* (August 12, 1996): B12-B15.

Lovejoy, Margot. *Postmodern Currents: Art and Artists in the Age of Electronic Media.* New Jersey: Prentice Hall, 1997.

Loveless, Richard L., ed. *The Computer Revolution and the Arts*. Tampa: University of South Florida Press, 1989.

Lucas, Adam. "Art, Science and Technology in an Expanded Field." *Leonardo* 26 (1993): 353-344.

Lydecker, Kent. "Observations on Museum Use of Electronic Imaging: Today & Tomorrow." *Visual Resources* 7 (1991): 311-317.

Lynch, Clifford, and Lois Lunin, eds. "Perspectives: Advanced Applications of Imaging," special issue. *Journal of the American Society for Information Science* (September 1991).

MacLaughlin, Margaret L. "The Art Site on the World Wide Web." *Journal of Communications* (Winter 1996): 51-79.

Malina, R. F. "Postmodern Currents: Art and Artist in the Age of Electronic Media." *Leonardo* 24 (1991): 247-248.

Mann Jeff. "The Matrix Artists' Network: An Electronic Community." *Leonardo* 24 (1991): 230-231.

McLaren, Karlene M. "Copyright: Fair Use or Foul Play." *Visual Resources* 12 (1997): 343-352.

Mintz, Ann. "Techno-Logic." *Museum News* 71 (1992): 44-45.

Newsom, Barbara Y., and Adele Z. Silver, eds. *The Art Museum as Educator: A Collection of Studies as Guides to Practice and Policy.* Berkeley, Los Angeles, and London: University of California Press, 1978.

Nimmer, Melville B. *Nimmer on copyright; a treatise on the law of literary, musical and artistic property, and the protection of ideas.* Albany: Matthew Bender, 1963.

Noak, David R. "Visiting Museums Virtually." *Internet World* 6 (October 1995): 86-91.

Noll, A. Michael. "The Beginnings of Computer Art in the United States: A Memoir." *Leonardo* 27 (1994): 39-44.

O'Mahoney, P. J. Bennedict. *The Copyright Website* [online]; available from http://www.benedict.com; accessed 1 May 1997.

Parsons, Michael J., and H. Gene Blocker. *Aesthetics and Education.* Urbana and Chicago: University of Illinois Press, 1993.

Patry, William F., ed. *Latman's The Copyright Law,* 6th ed. Washington D.C.: Bureau of National Affairs, 1986.

Pennsylvania State University College of Arts and Architecture School of Visual Arts. *The History of Art Education: Proceedings from the Penn State Conference.* Pennsylvania State University, 1985.

Pennsylvania State University College of Arts and Architecture School of Visual Arts. *The History of Art Education: Proceedings from the Second Penn State Conference.* Pennsylvania State University, 1992.

Pickover, Clifford, ed. *Visions of the Future: Art, Technology and Computing in the Twenty-First Century.* New York: St. Martin's Press, 1992.

Pollack, Barbara. "Art & the Computer." *Artnews* (March 1996): 96-105.

Rosett, Richard. "Art Museums in the United States: A Financial Portrait." In *The Economics of Art Museums*, ed. Martin Feldstein, 129-168. Chicago: The University of Chicago Press, 1991.

Ross, David. *The Art of David Em: 100 Computer Paintings.* New York: H. N. Abrams, 1988.

San Francisco, Fine Arts Museums of. *Imagebase* [online]; available from http://www.thinker.org/imagebase; accessed 5 May 1997.

Saw, Ruth L. *Aesthetics: An Introduction.* New York: Anchor Books, 1971.

Scherer, Patrick. "Art's Global Village." *Art and Antiques* 8 (April 1991): 8, 21.

Schildt, Göran. "The Idea of the Museum." In *The Idea of The Museum*, ed. Lars Aagaard-Mogensen, 85-97. Lewiston, NY: The Edwin Mellen Press, 1988.

Serrell, Beverly, and Britt Raphling. "Computers on the Exhibit Floor." *Curator* 35 (1992): 181-189.

Sheridan, Sonia L. "A Personal Electronic Museum." *Leonardo* 26 (1993): 179-180.

Sherman, Daniel J., and Irit Rogoff, eds. *Museum Culture*. Minneapolis: University of Minnesota Press, 1994.

Smithsonian Institution. *Chapman Project* [online]; available from ftp://photo1.si.edu/images; accessed 27 May 1997.

_____. *Zoo Photos* [online]; available from http://www.si.edu/organiza/museums/zoo/photos; accessed 27 May 1997.

Snow, Maryly. "The Pedagogical Consequences of Photomechanical Reproduction in the Visual Histories: From Copy Photography to Digital Mnemonics." *Visual Resources* 12 (1997): 307-331.

Stam, Diedre. "Imaging vs Imagining." *Visual Resources* 7 (1991): ix-x.

_____. "Pondering Pixeled Pictures: Research Directions in the Digital Imaging of Art Objects." *Visual Resources* 10 (1994): 25-39.

Stam, Diedre, and Angela Giral, eds. "Linking Art Objects and Art Information," special issue. *Library Trends* 37 (Fall 1988).

Stanfield, Rochelle. "Connected Classrooms." *National Journal* (July 1995): 1885-1889.

Stefanac, Suzanne. "Copyright Ain't Dead...Yet." *MacWorld.* (June 1996): 137-138.

Strong, William S. *The Copyright Book: A Practical Guide.* Fourth Edition. Cambridge, Massachusetts: The MIT Press, 1993.

Stundt, Christine L. "A Visual Resources Advocacy Statement." *Visual Resources* 12 (1197): 297-306

_____., ed. "Issues in Electronic Imaging," special issue. *Visual Resources* 10 (1994).

_____. "Editorial: Reshaping Life and Culture Digitally." *Visual Resources* 10 (1994): vii-ix.

Taylor, Patricia. "By Line Drawings Ye Shall Know Them: Consequences of Barriers to Digital Reproduction." *Visual Resources* 12 (1997): 333-341.

Temin, Peter. "An Economic History of American Art Museums." In *The Economics of Art Museums*, ed. Martin Feldstein, 179-192. Chicago: The University of Chicago Press, 1991.

The United States Copyright Office. *Copyright Website* [online]; available from http://lcweb.loc.gov/copyright; accessed 1 May 1997.

Valauskas, Edward J. "Digital Images Over the Internet: Rome Reborn at the Library of Congress." *Database* 17 (April 1994): 57-60.

Wallace, Jim. "Project Chapman: The Direct Delivery of Digital Smithsonian Photographic Images Via the Internet." *Visual Resources* 10 (1994): 57-60.

Wallis, Brian. "Selling Nations: International Exhibitions and Cultural Diplomacy." In *Museum Culture*, Daniel J. Sherman and Irit Rogoff, eds., 265-281. Minneapolis: University of Minnesota Press, 1994.

Walsh, Peter. "Art Museums and Copyright: A Hidden Dilemma." *Visual Resources* 12 (1997): 361-372.

Weil, Stephen E. "Fair Use/Museum Use: How Close is the Overlap?" *Visual Resources* 12 (1997): 353-359.

Weisberg, Gabriel P. and Laurinda S. Dixon, eds. *The Documented Image: Visions in Art History*. New York: Syracuse University Press, 1987.

Williams, Frederick. *The New Communications*. Belmont, CA: Wadsworth Publishing Company, 1984.

Wyatt, Victoria, and Ged McLean. "Imaging Databases in Research and Teaching: Global Perspectives and New Research Technologies." *Visual Resources* 10 (1994): 41-48.

Zolberg, Vera L. "An Elite Experience for Everyone." In *Museum Culture*, Daniel J. Sherman and Irit Rogoff, eds., 49-65. Minneapolis: University of Minnesota Press, 1994.