11-1-1994

An Investigation into the development of an interactive archival catalog of art within the Rochester Institute of Technology

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An Investigation Into the Development of an Interactive Archival Catalog of Art Within the Rochester Institute of Technology

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

November, 1994

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Certificate of Approval

Masters' Thesis

This is to certify that the Master's Thesis of

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With a major in Electronic Publishing
has been approved by the Thesis Committee as satisfactory
for the thesis requirement for the Master of Science degree
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September 28, 1994

Acknowledgements

I would like to thank the following people who assisted me with this project.

Professor Frank Romano
Professor A'isha Ajayi
Mr. Jim Bodensteadt
Mr. Philip Potts

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Abstract

RIT has no complete visual and/or factual catalog of the pieces of art presently displayed in public areas. Many pieces of work on campus are in desperate need of repair as well as plaques to identify the work.

Visions, the only known bound record of a selection of artwork on the Henrietta campus, was produced by the RIT Communications Office in 1975. The Archives in Wallace Memorial Library have a small collection of slides of various artworks, however, many works of art are currently missing. Several valuable pieces of work were lost in the move from the city campus to Henrietta, and some pieces have yet to be removed from storage in Physical Plant. RIT is not fully aware of what is currently located in public areas.

This interactive catalog will create a complete visual and factual catalog of the artwork located in public areas on the RIT Henrietta campus. Being interactive, this catalog will include full–color images, sound, QuickTime movie clips and text about the piece of work, its location on campus, the artist, as well as any other relevant information that can be gathered on the work. The catalog will be user–friendly so that anyone with little or no computer experience will have no trouble operating the program. Information on the artwork along with a full–color image of the piece will be displayed on each card.

This interactive archival catalog will be simple for anyone to use. People with or without computer skills or experience with multimedia applications should discover that this catalog is a faster and more entertaining way to retrieve data. This thesis will investigate past, present and future storage methods for information. In addition, this project will research how effective interactive archival storage is.

Upon completion, the Interactive Archival Catalog will be tested by thirty students from the School of Fine and Applied Arts, the College of Photographic

Arts and Sciences, and the School for Printing Management and Sciences. The students will be asked to play with the catalog for at least ten minutes and then answer some questions about it. The questions and responses can be found in Chapter 6, page 35. All comments and suggestions were noted and changes that needed to be made were corrected.

The purpose of this catalog is to introduce the RIT community to the artwork present on campus. Implementing interactive multimedia makes the data search experience an enjoyable and interesting one. If the catalog is successful, people will develop an appreciation of the artwork on this campus as well as an interest in interactive data storage and retrieval systems.

Chapter 1

Introduction

Image storage and retrieval is an important issue. In the past, words and symbols were put on paper. If information was stored in grandma's attic, all you would need to do was find it, dust it off and read it. But what if you knew that you were looking for a specific picture in grandma's attic, how would you find it? You would probably have to dig through boxes and cobwebs. Then take what you found and catalog them in photo albums for future retrieval.

Today, data retrieval has grown in magnitude and complexity. People must now operate computers and have a knowledge of file formats. There are many benefits to new technologies in terms of ease of data storage and retrieval. However, the way storage mediums are changing so rapidly makes one wonder what will happen years down the road. What will happen to data stored on CD if CD players are no longer in existence in the year 2000? How will the images stored on these mediums be retrieved?

Perhaps this will explain why the Kodak Photo CD never really took off as Kodak hoped it would. The Photo CD was intended to be used by the average person to put all of their pictures on. This alleviates the need for shelf space for photo albums. It wipes out the need for film, processing and chemical waste as well. Kodak hoped people would use Photo CD to store pictures and would view them on their TV's just as one would view home movies on VHS tape. The problem with Photo CD was that it was expensive to have the images written to the disk, not to mention the need for a Photo CD Player.

You cannot show the Photo CD to people as you can with photoprints. Photo CD technology is a wonderful way to store digitized images for use in certain applications, however, there are certain qualities about photographs that the intangible digital image can not replace. The fact is, paper—photographs and

written pieces—allows you to retrieve data instantly just by looking at it. CDs only offer instantaneous data retrieval when you have the proper viewing environment, computer, CD player, monitor, etc.

People look for data storage methods according to what needs to be stored. Looking at available technologies and storage mediums, paper still has many advantages over electronic formats. What would it be like reading the morning paper on a computer? If you sit in front of a monitor at work all day, reading and writing to it, paper becomes more and more appealing. Reading text off of a screen is straining to the eye. There is something friendly about the tangibility of a paper document.

The purpose of this thesis project is to investigate the old and new methods of storage and retrieval of data. It discusses the present state of archiving and attempts to determine what will happen to storage in the future. Multimedia, its applications and uses in the way we teach and learn through it, is also addressed. As technology changes, storage mediums change and we must all make wise decisions as to what is the best way to catalog information that will need to be accessed years ahead in the Information Age.

Chapter 2

Information and Knowledge—Language as a Tool

The quest for knowledge and information makes humans unique and superior to all other species on earth. Since man first began to develop methods for communication, he has developed ways to record what he felt was important information to pass on to others.

30,000 years ago, cavemen began painting images of humans and animals on cave walls. Many of these drawings were done so far underground that they had to have been created by firelight. By noting the location of the images, we can conclude that they were not merely meant to be decorative. "The pictograms were the cavemens' way of communicating. Images of a hunt may have been their way of praying for a successful hunt; the pictures may have been a way of communicating with the spirits." (Salmoral, Manuel Lucena, "America 1492: Portrait of a Continent 500 Years Ago,"p.15)

When cavemen went out hunting, they quickly realized that killing a bison or ox would be nearly impossible alone, but with a group, hunting became more efficient and group communication became necessary. At this point, humans began developing ways to communicate verbally, because body language was fairly useless after dark. Before any of these issues can be dealt with, we must have an understanding of what information, knowledge and data is (Bowman, Elizabeth, "Pictographs and Ideograms," p. 31, Colliers Encyclopedia, Vol. 19, 1994).

What is the difference between information, knowledge and data?
On the new Information Superhighway—the Internet—one can ask what is really being passed along the lines? Is it information that is being passed along? Information is what humans process from facts or data given to them in raw form. Processing the information further helps us develop a level of knowledge

that can be applied in any way we wish. Perhaps a more appropriate name for the Information Superhighway is the Data Superhighway.

Information is defined as sensory visual, audio or textural feedback that imparts a higher level of understanding. Data is discontiguous random pieces of fact. Knowledge is an awareness of how to apply information and data. Each of these terms takes on a higher level of meaning. Data becomes information only when it is read. When we read it, we comprehend the data and at this point, it becomes information. As we apply and understand the information it becomes knowledge.

Some computers have artificial intelligence. This allows the machines to perform simple tasks requiring decision making abilities. This raises the question: can computers have artificial knowledge? If computers had artificial knowledge, would they be able to recognize the difference between an image and text or even between one image and another? Could they make wise choices without human intervention?

Oral Archives

Stories were the first way humans passed on information from one generation to the next. As each person passes a story on, the facts become less and less accurate, and often, information is forgotten. Cavemen, as we know, lived in groups known as clans. Frequently, information and stories were kept within the clan. When a member of the clan or the entire clan died, the information—religious and cultural—left with its deceased members. Oral communication is effective, however, accuracy becomes a major issue. Clearly, archiving data for any length of time with no known written methods while maintaining factual integrity is impossible.

Visual Communication

As we later discovered, cavemen also communicated visually as noted in the images found in the cave at Lascaux, France in 1940. The pictograms discovered

were images of humans hunting large animals. These drawings convey messages about how humans lived, hunted, and survived thousands of years ago. Drawings were more than a way to communicate thoughts and ideas to others; they were created as a way to communicate. For example, a drawing of a dead animal may have been a way to let the gods know that the clan prayed for a successful hunting season.

These cave drawings are the first known recorded methods man had of communicating and "storing information." Drawings were ideal, for anyone could understand the concepts the drawings were trying to convey.

Communication now requires a degree of literacy—and not just in one or two languages. To be an effective communicator and information gatherer, we must be able to read and write, have a basic education and have a general knowledge of computers and technology in order to excel in a world where power comes to those who obtain accurate information faster than the competition.

Today, visual communication is one of the main ways we gather information on people and events. We are constantly bombarded by the media with visuals and advertisements. Consequently, we are exposed to thousands of pictures each day. Not all of them of course are advertisements. Visual communication includes body language too. We can tell how a person feels by the way he/she reacts with facial expressions and postures. Visual communication allows us to express ourselves with more than just words. For example, by looking at a picture of a person in a cardboard box on the street, we can deduce that the person is homeless and has little money. If you turn on a television set and hit the mute button, you can usually figure out what is going on in the program, be it newscast, soap opera or cartoon. Images play a large role in the way we communicate to other people and to the world.

Manuscript

The next stage in the evolution of information storage was in manuscript form. Manuscripts date back thousands of years. Ideograms and pictographs—symbols representing words and elements of the language were a breakthrough invention for ancient cultures. Most recorded information was about ceremonial rituals, kingdoms, and the great power of its ruler.

The Rosetta Stone, a manuscript detailing a piece of ancient history, dates back to 196 B.C. and was written under Ptolemy Epiphanes. Ptolemy ordered documentation of the kingdoms history. Fortunately, the Rosetta Stone was written in three languages: "first in hieroglyphs, the sacred characters of the priesthood; then in demotic, the popular cursive writing of the day, and third in Greek." (John Howard Young, Colliers Encyclopedia, V.20, p.221-222 "The Rosetta Stone") Jean Champion assumed that the three languages on the stone were all saying the same thing. Greek scholars translated the Greek portion of the stone and then, from this translation, the other languages were deciphered, and the once mysterious Egyptian hieroglyphics were translated. The discovery and translation of the Rosetta Stone was a breakthrough for mankind for the mysteries of past events could be understood.

One of the main problems with written languages being pictograms was that different cultures expressed thoughts differently. For example, if there was a battle lasting five days, one group could express the passage of five days by drawing five suns over the picture of a battlefield. (Colliers Encyclopedia, "Lascaux Caves") In another culture, the same event could be represented by a group of captives near a man holding up five fingers representing the five day battle. The concept in both instances is the same, however, it makes translations of the ideograms and pictographs difficult.

Writing Systems

The real key to communication was developed at some unknown point in time when symbols began replacing commonly used graphic drawings to represent

actions. The oldest known writing system is cuneiform, which was established around 3100 B.C. and lasted as a language until the beginning of the Christian Era. Cuneiform was developed by the Sumerians of Mesopotamia.(Libraries as Communication Systems, J.M. Orr, p.23) Sumerians recorded their stories on clay tablets with reed stylus' as writing instruments. The written language was made up of three basic elements that when arranged in different formations made up words. (Encyclopedia Brittanica, "Cuneiform") This new tangible form of storage allowed for the accurate recording of data. It was a great breakthrough for civilization because records could be kept and referenced to find out what had happened in the past—politically, economically, culturally, religiously, and socially. Information was written on papyrus, a paper substance made from reeds, and clay tablets in the cuneiform style of writing. The main problem was that so few knew how to read and write in this language. Data recording and retrieval was limited to the educated and skilled within the culture.

Many pieces of recorded information have been discovered in more places than in caves and on clay or stone tablets. Information was recorded on pieces of pottery, on tools and weapons, jewelry, and off of metal work, such as shields.

The Printed Word

"Evidence of the first example of printing from movable type was discovered in 1908 by an Italian archaeologist on the island of Crete." (Pocket Pal, 1992, International Paper, p.8) But type characters made from clay were being developed in 1041 by Pi-Sheng, from China. In 1440, Johannes Gutenberg "...introduced to the Western world his invention of printing with ink on paper, using movable type mounted on a converted wine press. Until Gutenberg's invention, all books were laboriously handwritten by scribes." (Pocket Pal, International Paper, 1992 p.8). At this point in history, the beginning of the Renaissance and modern history began.

It is important to note that hundreds of years before Gutenberg developed moveable metal type, the Chinese were mass—producing printed manuscripts in

a similar fashion. These block prints were carved in wood or stone, inked and had paper applied to the surface. The problem with this printing method is that the stone is no longer useful after printing the desired quantity of copiēs. The characters were etched into the block, and could not be removed or re-positioned for the next manuscript. Stones were constantly being re-carved, making this inefficient in terms of makeready time for printing.

Once the printing industry took off after the invention of movable type, manuscripts, books and newspapers became available to the public. There became a need to educate the public to teach people how to read and write. A database became established with this new invention and there was now a need to gather and store this data. Archives began to be developed to store important printed works.

"Libraries became established as printed works became available in quantities. Early libraries have been classified into four categories: Temple Collections, Government Archives, Business Records, and Family or Genealogical Records. "(History of Libraries, Johnson, P. 8 from Libraries as communications Systems, by J.M. Orr, p.35, 1977) Written words on tangible, lightweight paper brought data and the communicated word into the hands of everyone. Gutenberg's invention brought us the ability to duplicate information in mass quantities inexpensively. The printing press coupled with movable type allowed us to write a document and copy it as many times as needed. Having a scribe copy a document hundreds of times would have taken so long that only the most important documents would reproduced. The press allowed us to mass produce information. Duplication of documents in such quantities allowed us to distribute information around the world. Books became translated into foreign languages and sold around the globe allowing us to share information with everyone, everywhere marking the beginning of the Renaissance.

At this time, books and newspapers encouraged literacy because history was being recorded and preserved. Books, when they were first available, were

expensive and only the wealthy could afford them. Books were treasures that were passed down through generations. What books did for people was to communicate information—stories, data, pictures, knowledge—in a transportable form to be shared as a form of educating and entertaining the reader. The only requirement needed in order to comprehend the book, was that the reader needed to be literate.

Multimedia plans to do for us what books did in the 17th century. The only difference being that the data is distributed electronically, viewed on a computer monitor and requires more than turning a page to get information. Multimedia will also offer sound which can be used to narrate stories along with color images and QuickTime movies. Interactive multimedia allows the user to seek out information in a non–linear format. The benefit is that data can be retrieved faster and in a more entertaining manner.

Electromechanical Data

In the electromechanical age, data is read and recorded on computers. The introduction of the *Lisa* by Apple Computer in 1982, and the Macintosh in 1984 put electronic publishing in the hands of everyone. Digital imaging involves the use of a computer. The basis for digital imaging requires the processing and storage of data in binary form; in series' of numbers one and zero. The concept for the operation of computers is on or off, on is represented by the number one, off is represented by zero. The on and off concept is the same one used in scanners to record image data.

Binary code allows computers to communicate with each other. Every time you stroke a key on a keyboard, it is recording each character as a bit. "Bits are organized into bytes (today, 8 bits to a byte is standard) which contain significantly more information. In digital computing, bits and bytes form the underlying infrastructure for memory, data storage and actual computing." (Pocket Pal p.47, International Paper, 1992)

By writing data in electronic formats, one can store it on a computer, share it via modem with other computers or over a network within the same office or building. As many benefits as there are in electronic storage and retrieval, downsides do exist. For example, if someone handed you a marketing report on disk as you are leaving the office to catch the bus at 5:00 p.m., you can't access that data until you get to a computer. Clearly paper does have advantages. Not to mention that you can't read a floppy or optical disk without the aid of a computer and monitor. You can't read electronically stored data in bed unless of course you have a PC at your bedside.

Libraries Meet the Computer

Libraries are beginning to notice the importance of digital databases. They offer a faster rate of retrieval than traditional card catalog. Another benefit is that digital databases cannot be stolen or damaged by handling.

> "A pilot program at Cornell University provides an example of how Kodak's Photo CD can be used to make rare documents more accessible. The Cornell University library currently has three collections that are being transferred to Photo CD. The first is the Louis Aggasiz Fuertes Papers, a collection of artwork, journals, field notes, letters, and other documents of the noted ornithologist. The main images being scanned are watercolors, ink sketches, and pencil drawings of birds, groups of birds, or anatomical details.
>
> Cornell's second project is to transfer to Photo CD the photographs and architectural drawings from its John Nolen Papers. One of the founding fathers of the urban planning profession. Nolan kept records of some 450 planning projects throughout the United States. Finally, Cornell hopes to record on Photo CD a selection of photos drawn from the university's own archives, which document the 125 years of the school's existence. Besides research, these photos will be used for public relations purposes and in university publications.

> Most of Cornell's projects require the library to have 35mm slides shot of the items to that they can be written to Photo CD. Elaine Engst, curator of manuscripts for the rare and manuscript collection, notes that once the digital collections are produced, they will be used not only for research purposes but to produce classroom and other presentations as well."
>
> (The Photo CD Book, The Gosney Company, Inc., 1994, p.60.)

As you can see from the chart on the following page, paper is still the cheapest and most portable of the available media. Libraries need to evaluate if the cost of converting data to electronic formats is worth the expense. Aside from transforming data to optical disks or tape, the library needs to purchase the needed equipment to read the data. Staff will need to be trained in the operation of the equipment as well. ("Training Staff To Use Computers," p.84, from the book *Professional Competencies, Technology and the Librarian*, by Linda Baskin and Mima Spencer, 1993.) Maintenance of these machines is just another cost factor. If libraries determine that transferring data to electronic format is worth the cost, who ultimately will pay the bill?

Will libraries have to pass the expense of electronic data retrieval as well as on–line services to its patrons? If so, this will re-define the traditional free library. When libraries begin offering more on-line services for information searches, patrons will undoubtedly begin collecting references for books and articles that the library branch does not carry. These services will lead to more and more interlibrary loans. (The Librarian's CD–ROM Handbook, Norman Desmarais, p.78) One benefit is that by having data stored on disk, libraries will not have to worry about loosing books in transit. Another benefit to electronically stored information is that libraries can share information around the world without actually sending the physical document. This frees up the mail system and there is no damage to the actual document. Can you imagine what it would be like trying to catch someone half way around the world for not returning an overdue library book?

Paper vs. Electronic Storage

	Storage Capacity	Price/Mb.	Dia.	Read/Write/Worm
Floppy	1.4 Mb. formatted	.71/Mb.	3.5"	Read/Write/Erase
CD-ROM	550Mb. =240,000 sheets of ASCII text.	.04/Mb to produce	4.75" 116mm	Read/write One CD-ROM can hold as many as 15 44Mb SyQuest cartridges.
SyQuest	44 Mb. 88 Mb.	$1.50/Mb. $1.02/Mb.	5.25"	Read/write/erase

Continued on next page

Paper vs. Electronic Storage (continued)

	Storage Capacity	Price/Mb.	Dia.	Read/Write/Worm
Magneto-Optical 3.5"	135 Mb.	.26/Mb.	3.5"	Read/write/erase
Mag Tape	5 Gb.	.0176/Mb.	4"	Read/write
44mm DAT	1.3 Gb.	.0142/Mb.	2.5"	Read/write—standard medium for backups
90mm DAT	2.0 Gb.	.148/Mb.	2.5"	Read/write
Paper both sides 12 pt. text or picture 1 sheet paper cost=.0055/sh.	144 Mb.	.000381/Mb.	8.5x11"	2 sides-read/write/erase most portable-not dependent on computer to view data. holds color and b&w.

Consequently, libraries need to consider if the expense of having documents written to disk format is worth the high cost that comes with the benefits of rapid data retrieval. Libraries who do have the budgets to transform data to disk will also need to keep most of the data converted in paper format. This would be necessary as libraries could only afford so many computer workstations for its patrons. It appears as though transforming data to disk is becoming an unnecessary duplication of information.

It has been estimated that the life of magnetic tapes and disks is ten to twenty years. (The Librarian's CD ROM Handbook, Norman Desmarais, 1989, p. 62.) If data integrity is only guaranteed to be preserved on disks for twenty to fifty years, why bother with converting it? Is the price of updating the storage medium worth the cost?

Archives

Archives have been used for thousands of years to store, preserve and administer important documents. We can look back through archives to gain an understanding of past business or personal events. Archives have helped mankind understand society's progress over the years—politically, religiously, socially, culturally, economically and technically.

Many documents within an archive are in paper form and must withstand environmental elements or just the ravages of "air." Only the most valuable documents—such as the U.S. Constitution—are stored in climate controlled areas. These archives are areas where documents are protected from the aging effects of direct sunlight, humidity, heat, dust and human hands. Archivist's have the job of protecting, distributing and handling documents within the collection.

Library Archives

Jim Bodensteadt, archivist for Wallace Memorial Library, handles many rare books, documents and original pieces of work. His job includes assisting patrons with questions or retrieving materials. Mr. Bodensteadt performs clerical duties, keeps statistics of the archives, sorts, files and catalogs items, gathers documents of institute events and prepares historical displays for the library. He must monitor the temperature and humidity of the archive, and keep the room and its contents as close to the established standards of the "Archives and Special Collections Policies and Procedures for Wallace Memorial Library" manual as possible. This demanding job requires many skills in the care and distribution of both print and non-print items within the archive.

Items deteriorate with age and handling; like most archives, space is at a premium. Even after Rochester Institute of Technology put an addition on the library giving the archives more storage space, Mr. Bodensteadt found that the new storage area quickly filled up. Space for storage of documents is also limited, therefore, archivist's must be selective in deciding what to accept as a new piece in the collection. The RIT archives contains items of short and long term interest to RIT.

Frequently, archives need to re-evaluate their contents for historical value. Items that are of no interest or historical value are thrown away. (Jim Bodensteadt, RIT Archives) Because many rare documents are one-of-a kind and if damaged or stolen, can't be replaced. recording selective pieces of the archive on CD–ROM would be worthwhile. CD–ROMs can be accessed via modem, are user-friendly, can be reproduced at affordable costs, and allow 24-hour access to data. This is beneficial to patrons of the archive since, due to budgeting constraints, archive hours are limited.

The job of an archivist is no simple task. Since RIT installed its "Einstein" computer cataloging system, life has been easier for employees of the library as well as the users. Users can key into the system from virtually any computer on campus and can access Einstein anywhere in the world with a modem and PC.

This makes for a convenient and efficient system. Computers are hooked up throughout the library and within the archives. Users do not need to be in the archives to find out exactly what is inside. Even with restricted hours, this allows the user to continue research well after the archives or library has closed.

When asked if new technologies such as CD–ROM technology would change the way the archives at RIT operated, Mr. Bodensteadt replied that the "...new technologies would change the way cataloging and archiving worked outside of RIT, but because the cost of implementing new technology was so high, RIT probably will not see any changes in the near future. "(Interview with Jim Bodensteadt, RIT Archives)

If a copy or photograph of a document in the archive was requested, one could get a photostat of it; security is tight as many of the documents have a historical value and are one-of-a-kind. Older documents and photographs can't be duplicated too many times because the light within the copy machine or the flash in a camera will speed up the aging process of such certain papers and inks. If image quality isn't extremely important, copies of the document can be obtained by copying microfiche.

Catalog Systems and Traditional Filing Techniques

A major issue that archivists must contend with is cataloging. It is easy to catalog items such as books, because they have titles, authors, publishers and this is all written on the title page of the book. An archivist only needs to give the same name of the book/text item to the catalog system. When someone asks to see the book "101 Ways to Eat Jello" all you have to do is key the title of the book into the computer catalog system to find its location. If a person came into the archive and requested to see a picture, title unknown, by a photographer, the archivist could type the name of the photographer into the database; however, the computer may tell you that there are 500 pictures in the archive by that photographer, and the computer lists them all by name. How are you going to find that picture by looking at a list of titles? If you could remember what the picture

looked like, you could enter a key word into the computer with the artists name, thus narrowing down the lot of 500 to a manageable size.

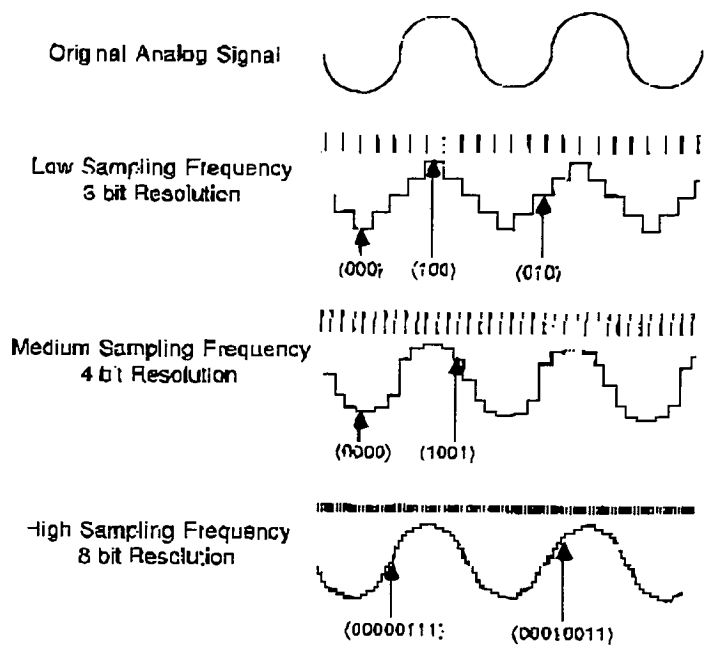

Figure 1

(Busk, P.J., "Integrating Mixed Mode CD–ROM,"p. 2, Disk Manufacturing, Inc. 1992)

Cataloging books and visual materials are very different. Books are reproduced in the thousands, whereas photographs and artwork usually are reproduced in small quantities. Images do not have titles on them like books do, so cataloging them can be quite a challenge. "It is hard to establish a balance between delivery of the images themselves and the text. Not just the display of the text . . . the facility within the user can ask text based questions and get visual answers." (Interview with Andrew Eskind, Manager of Information Systems, George Eastman International Museum of Photography.) The problem with many catalog systems is that they do a good job with text but not images, or do a good job with images but not text. A system that handles both well is needed.

Even image–based electronic catalogs must be text based to some extent because, without text, the images could not be stored in any logical order or even retrieved. Computers recognize series of characters or words that are linked to an image in a database. Computers cannot recognize images alone without the use of key words describing them, be it artist or subject matter, at this point in time. If you instructed a computer to find a picture of a sunrise over a lake in spring, that computer system, if it existed, would have to have the capability to

scan through thousands of images in its database and recognize clusters of colored pixels in specific locations within the image area. Currently, no computer has enough memory to perform such a task in a reasonable amount of time. Text based systems can perform the necessary tasks in short periods of time. Without text based image systems, electronic cataloging would not be feasible.

Information Seeking Behavior

How do we seek information? Before TV was introduced, people read newspapers, talked, wrote letters and used the telephone to communicate and exchange information. Today, in addition to using the methods listed above, we seek information in similar ways, but we now use technology and computers to make data search and retrieval more efficient for us.

Speedy Delivery

Letters or documents no longer need to be sent through the mail—we can have them sent anywhere overnight through Federal Express. If sending documents overnight isn't fast enough, we can FAX them so that information is received instantly. We no longer have to wait to read the paper in the morning to get up to date news. Turn on CNN and get your most up–to–date information on news events around the world every half-hour. Satellites allow for the rapid exchange of information around the world, and not just with television. Satellites give us the opportunity to use cellular phones to call anyone anywhere in the world at any time.

New technologies allow us to get the information faster and easier. In libraries, you no longer need to shuffle through card catalogs anymore. Using computer–based data retrieval systems gives you the call number and location almost instantly. Can't wait to read the latest issue of Newsweek? It is now available on–line. You can access many magazines and some newspapers through the Internet for a nominal monthly fee. The on–line magazines include the same information and pictures as the printed counterpart, but come in a different format. By using the on-line periodicals, the user also has access to older copies of

the journals as well. The general attitude of people today is "I want it, and I want it now." This demanding attitude has been met by the newest technologies and gadgets. In the future, getting accurate information quickly will be essential in maintaining our positions in the corporate and global environment.

During the Gulf War, communications technology aided the United States. The war may have been a war won based on which side had the most effective methods of communication between the battlefield and headquarters, not unlike wars that took place decades ago. Having the ability to communicate with aircraft and the base would allow you the information of knowing where your opponents stand before they know where you are. This could mean the difference between life and death.

Having information and transmission capabilities available at any time was an essential factor in the success of the U.S. troops during the war. Having the capabilities to communicate large quantities of data without the use of paper has multiple benefits—speed of delivery, lower costs, no need for paper, electronic storage which is retrievable at an instant and can be stored in a number of formats just to name a few. Sometimes the data transmitted is important enough to require storage for future reference. As new storage formats are introduced into the market, people will need to educate themselves on the many benefits of storage mediums such as CDs, in order to make educated decisions as to what the best storage medium will be for the data being handled.

Chapter 3

CD–ROM Technology

CD–ROMs currently offer the best of all storage mediums. Where floppy disks are adequate for text files and low resolution images, they can only hold up to 2 megabytes unformatted. They are the most popular storage medium though due to their small size, low cost and the fact that most every computer has built in floppy drives in them. Floppy disks are available in 8", 5¼", and 3 ½" formats. Other forms of storage include hard disks which come in 8", 5¼", and 3 ½" formats as well. They have a higher density than most storage formats but cost more. Data can be stored on tapes. The tapes come in the form of cassettes, cartridges and reels. They store a lot of data but take up lots of space and need to be in climate controlled environments. Tapes are effective as a storage device and have been used for quite some time. The problem with tape storage is that it is difficult to access the data because data stored on tape is in a linear format. If you need information that is at the end of the tape, you have to "fast forward" through the entire tape, just as you would with a movie on a VCR tape.

Magneto-optical disks store data in magnetic format. Their benefit is that they are more stable as a storage device, can store 135 megabytes and are the same size as floppies—3.5". Magneto–opticals are great for backups and are becoming more widely used due to their low cost per megabyte and ability to maintain data integrity more successfully than SyQuest removable hard disks. With CD–ROM, the information is stored on tracks which allows you to retrieve data anywhere on the disk at an instant. The laser that reads the disks' pits and valleys of binary data on the CD–ROM can skip to anyplace on the disk instantly. The laser never actually touches the disk and so there is no way the pits or valleys of the disk can damage the data. CD–ROM offers us storage capabilities in gigabytes of data. This amount of storage allows us to script text, graphics, video and sound to a disk. No other storage medium available today has the capacity to perform these functions while maintaining data integrity.

Sound on CD–ROM

Sound is defined as the noise created by waveforms that is transferred through our ears. Sound waves that create sound can not be seen, but can be represented visually in the form of waves and wavelengths (Figure 1). In order to record sound digitally, the wavelengths must be transformed into electrical signals through a microphone. Unlike analog recording devices used for tapes, disks, and LP's, the wavelength is turned into a digital recording by taking measurements of the waveform and recording these measurements as numerical values. A major advantage to recording digitally is that the measurements of the wavelengths are binary; that is, they are represented in either a one or a zero digit, this ensures a consistent quality is maintained throughout the recording process. (*Science and Invention Encyclopedia, V.5,* "Compact Disk," p. 580.)

Figure 1 shows how sound is converted from analog to digital format. At the top, the original signal. The three samples under it are shown in increasing resolution. At the bottom, the highest frequency represents the original sampling more than the others. Recording sound and maintaining the high quality sound after playing it hundreds of times is not a simple task with most storage mediums. By storing that recording on CD–ROM the same stereo sound is guaranteed by the multiple protective layers in the disk that were engineered to preserve the integrity of the recording with the same stereo quality.

Storage Required for 1 Minute of CD Audio

Sample Rate	8-Bit Mono	16- Bit Mono	8-Bit Stereo	16-Bit Stereo
11.025 KHz	0.635 MB	1.27 MB	1.27 MB	2.54 MB
22.050 KHz	1.27 MB	2.54 MB	2.54 MB	5.28 MB
44.1 KHz	2.64 MB	5.28 MB	5.28 MB	10.56 MB

(KAO Optical Products, "CD–ROM Mastering and Replication Services.")

By applying new CD–ROM technology, issues discussed above become obsolete. Lack of space and duplication issues are no longer a problem since the disk in its jewel box case only takes up one-quarter inch of space in width and is only three and one-half inches in length. Hundreds of volumes of information can fit on a single bookshelf. Today, one can obtain a full set of encyclopedias on a single CD which is equivalent to roughly 33,000 articles! (Compton's Interactive Encyclopedia) It is clear to see how this new technology will change the way libraries operate.

CD–ROMs have multiple uses in the way we learn and gather information. Now, instead of flipping through card catalogs, books, or microfiche, access to information can be as simple as clicking a button on a screen and typing in a key word like "radio bar." This technology opens up a whole new world to the disabled who in the past were restricted in the use of the library. For example, the audio feature of the CD–ROM allows those with visual disabilities to also enjoy magazines and books without the aid of another person reading it to them. Video, still images and text allow the hearing impaired to access data on the CD–ROM as well. CD–ROM technology has many advantages to it that can only serve to enhance the way we gather, store and retrieve data.

CD–ROMs can also be used to train employees in a variety of areas. Their ease of use is so simple that children will have no problem in using them; the hardest part may be getting the jewel box opened! Handling issues, and image degradation from day–to–day handling are no longer a problem. CD–ROMs can

store thousands of documents on a plastic disk that can fit in the palm of your hand. They hold millions of bits of information, images, sound and video to accompany the data within the document. This has a great potential to entice young children to become interested in difficult subjects such as history and science, for this technology involves all five senses.

Compression

Because many high–resolution images tend to take up lots of the computers memory, the best way to work with and store them is to compress them. Compression can be done with images as well as QuickTime movies. In the Interactive Archival Catalog of Art in Public Areas, QuickTime movies were added to several cards to help illustrate sculptures. These short films last no more than 30 seconds but take up lots of memory and when they are played on the monitor, tend to be jerky. By applying video compression in the HyperStudio application, frames per second are reduced and some color is removed from the movie. This way, the film runs smoothly and takes up less memory. With images, programs like StuffIt or Compactor Pro compress between 20 and 40 percent of the image. This is beneficial if you are modeming a document with images on it. The file will be sent faster. Compression is accomplished through complex algorithms that are called *lossless* or *lossy*. The difference between the two is that lossless compression enables you to compress and decompress a file as many times as you wish while retaining all of the critical information. It is generally recommended that images not be compressed with lossless compression because of its low compression ratios.

Lossy compression is not particularly good for image compression either. Losssy algorithms treat some pixels within the image as unnecessary ones and removes them. The more you compress and decompress a file, the more image degradation occurs. Lossy compression will only compress color information and not the resolution of the image.

JPEG (the Joint Photographic Experts Group) is another compression process. JPEG takes a file and reduces the size of it by an algorithm that selectively discards data at the expense of image quality. "JPEG algorithm achieves high compression rates by removing redundant information from the image. It deletes those portions of the image deemed not critical to human visual perception, and applies a highly effective compression technique to the remaining data."(Robert Virkus in "Quark Prepress," p.355)

> "Eventually, we may see JPEG–compatible compression functions built into scanners, computers, printers and other products used for color publishing. It's entirely feasible that data compression can be implemented anywhere in the system that provides the most benefits in throughput, capacity, and cost. Wherever it is located, the process must be fast enough that it does not negatively impact system performance.
>
> Data compression at the node level has excellent potential for increasing network bandwidth, especially in older, slower networks. Of all possible implementations, this would probably prove to be the most costly because every node on the network would need its own compression–decompression capability." (Robert Virkus, "Quark Prepress," p.357)

Compression issues are important to deal with in the compression of images. Selecting the right compression method can save image integrity over the lines or CD as opposed to rendering files of unrecognizable images due to hue distortion and loss of image data.

Software Piracy

CD–ROM duplication alleviates theft issues within an archive. All archives are required to have damage plans established in case of theft or damage occurs to the items within the archive. (Andrew Eskind, Director of Information Systems

of Information George Eastman House International Museum of Photography) However, unauthorized duplication is considered theft and is nearly impossible to control. Copying and distributing software and other copyrighted data happens more than we'd like to admit. Electronic data can be shared around the world via modem. Currently there is no way to monitor piracy of software at this time.

Creating digital documents to be put on line for public use brings up some concerns in terms of security. Document and images that are copywrited can be secured by encryption methods ensuring that the image can not be printed out and used illegally. This method of encryption can be applied for such things as stock photographs or any copywrited work. Electronic watermarks can be set into the image or document by scripting a symbol or word like "void" within the PostScript file. This way, the document can not be printed or reproduced accurately. This is one of the methods that can be used to protect data on–line.

Pros and Cons of CD–ROM

Pro

- Stores up to 600 Mb.
- Holds graphics, video, audio and animation as well as text files
- Small size
- Resists scratching; dust, fingerprints don't affect data
- Best storage medium for multimedia applications
- Virtually indestructible
- When read by laser beam, nothing touches the disk–no scratching to destroy data

Con

- Can not be revised in any way
- Slow data retrieval
- Cannot be written directly
- Can be expensive to produce in small quantities
- Need special drive to read the disk
- Many different CD formats available—no standard available yet

("Compact Disk," *Science and Invention Encyclopedia*, V.5, p.580)

Chapter 4

Statement of Problem

Currently, RIT has no complete visual or factual catalog of the many rare and valuable pieces of art presently displayed on the Henrietta campus. This catalog needs to be simple for anyone to use and add information to if necessary. The user should be able to quickly locate a piece of work by location, the medium, or artist. In addition, this thesis project will research how effective interactive archival storage is.

Chapter 5

Methodology

The Interactive Archival Catalog of Artwork in Public Areas on the RIT Henrietta Campus was designed to be an easy to use application that allows users to obtain information on artwork in public places on campus. The catalog allows the user to search for information in three ways: search by artist, search by medium and search by location. Each card in the interactive stack gives the user the freedom to end the search, select another search, exit the program or move ahead to the next card or back to view a previous card in the stack. Each card displays a control panel comprised of several buttons to navigate through the stack with. This control panel was designed mnemonically with letters representing the names of the functions they performed.

- "**X**" allows you to **Exit** the stack at any time.
- "**H**" allows you to go back to the **Home** card to select a different search.
- "**M**" returns you to the **Main Menu** in the section you are searching in to make another selection.
- "**Q**" allows you to view a **QuickTime movie**.
- The **left arrow** allows you to return to the **previous card** in the stack.
- The **right arrow** allows you to advance to the **next card**.

The subjects chosen in the data search were a search by artist, by medium and by location. This was the most logical way to catalog artwork. In addition, all artwork in the catalog is on campus and can be accessed in minutes from any building. A few pieces of art were difficult to catalog since they could be classified as either a painting or mural as was the case with the "Homage to the

Square" paintings in the lobby of the Eastman Building, by Josef Albers. The other instance was in classifying the piece "Reflections" by Fred Lipp. "Reflections" is formed of sheets of stainless steel and hangs off of the wall of the SAU Cafeteria. Is it a sculpture or a mural? In situations like this, the work was categorized under both categories.

Evaluation

The method used for testing the Interactive Catalog was simply watching several people use it and seeing if there were problems in understanding the buttons, how they worked as well as any problems reading or scrolling the text. The Interactive Archival Catalog was evaluated by several people. The program was operated by people individually. After they were done using the catalog, each person was asked if they enjoyed using the catalog, if they learned from it, if there was anything that should be changed to make it better, and if the program was easy to operate. All comments were noted and the necessary changes were made. If additions need to be made to the catalog, it can be done using the HyperStudio application.

Search by Artist

In the Search by Artist, a card appears listing names of all of the artists represented in the catalog. The user selects a name and the card displaying the work of the artist appears. Users can also browse by flipping through the stack card by card. This catalog offers users the option of going forward or back to previous cards unlike a slide show. At the end of the stack within the section, the card automatically sends you back to the main menu to make another selection to search by. Because the catalog is interactive, information can be retrieved at an instant by selecting the appropriate icons. (Appendix E)

Search by Medium

Search by Medium allows the user to search for data in the same way search by artist does. The main card gives the options of searching for tapestries, paintings, murals, sculpture and ceramics. At the end of each of these stacks, the menu card from this section appears allowing you to begin a new search.

Search by Location

Search by Location gives the user the option of looking for work within or near certain buildings on campus. At the end of each of these stacks, the menu card from this section appears allowing you to begin a new search. At any point within the stacks in any of the searches, the user has the ability to quit the program or begin a search in another area by selecting the appropriate icon.

Production Specifications

This thesis project required the use of the following:

- Macintosh Quadra 840AV Computer
- Apple QuickTake 100 digital camera
- Sharp Hi8 Viewcam video camera
- QuarkXPress 3.3
- HyperStudio 2.0
- SoundEdit Pro
- Adobe Photoshop 2.5
- FusionRecorder 1.0.2
- Backup of the Interactive Catalog was done on 44Mb. SyQuest removable hard disks.

Multimedia

"Multimedia is the computer integration of different forms of communication media for the presentation and dissemination of information and knowledge for education, entertainment, simulation, and promotion."(RIT Multimedia Committee) Multimedia involves many elements: images, photographs, video, animation, text, color, audio, interactive design, graphic design, computers, information, and effective communication to make the multimedia application a successful one. Multimedia has many applications that today, are replacing teaching methods of the past. In schools and at work, multimedia can take boring information and make it fun and exciting. Applying interactive multimedia allows the user to get involved with the information by making decisions that guide the application to giving the user more data. As tests have proven, people learn and retain information longer by doing and participating.

Companies can apply multimedia productions to make sales to customers, train employees, and advertise and promote business. Instead of reading training manuals, employees could learn how to operate machinery through a multimedia program. After viewing a tutorial, they could take a test within the application and have their score calculated by the computer. An example of applying this type of training is having the employee work through the application, take quizzes at the end of each section. When the program has been completed, the multimedia application could print out a copy of the pages in the document as well as the quizzes and test scores. The papers could be bound to create a customized training manual.

Multimedia presentations have proven to be more effective than overheads or slide shows with clients. Running presentations on a computer allows for a smoother transition from slide to slide. This alleviates the need for acetate overheads which wind up in the trash can later on. Companies are beginning to produce multimedia advertisements to duplicate and send on disks to their clients. Customers are more likely to pop a disk into the computer and view the program than open up another piece of junk mail.

Multimedia is entertaining and is currently applied in many areas. When did you last see a video game that didn't incorporate sound, animation, and graphics? Video games give the player the use of a joystick to control the direction of the game. By clicking on a button or moving a joystick, the user is sending a command to the computer telling it what move to make next. But, simply having the ability to click a button does not make something a multimedia application though. Is a voting booth multimedia? Is a pinball game multimedia? Is using the remote control for the TV a form of multimedia? In the near future it will be.

Multimedia Graphical User Interfaces

In order to determine what would be the best GUI for the Interactive Archival Catalog of Artwork, articles on multimedia programs were read, in addition, research was done on multimedia design. Reviewing an interactive thesis as well as two interactive CD titles on the market also helped in determining what would be the most effective layout for the catalog. The disks reviewed were *Compton's Interactive Encyclopedia* and *The Electronic Library of Art's Survey of Western Art.*

Compton's Interactive Encyclopedia

The first CD reviewed was *Compton's Interactive Encyclopedia.* This CD was probably developed in hopes that it would replace its paper counterpart. The interactive encyclopedia allows the user to search a subject based on a word, and then offers you a menu bar allowing you to make choices based on the options there. You can search for pictures and sound too. This disk has quicktime movies and scrolling text. The GUI is simple to use, however, the screen area does not fill up much space on the desktop. This can be useful if you need to view several pieces of information on the screen at the same time, but at first glance it appears as though the floating boxes can not be resized to fit the screen.

In searching for information on schools, there was one column of text with an option to search for further related topics listed in an adjacent menu. This interactive encyclopedia takes full advantage of multimedia tools by incorporating illustrations, photographs, sound and video along with text.

It's simple interface is entertaining and seems to be targeted towards a children's market. The small amount of text is good if the user is seeking a general explanation of a subject, however, any in-depth research is best done in with a paper version of the encyclopedia. If a the full amount of text in the paper version of the encyclopedia was displayed on the monitor, how many people would really read it? In general no one wants to read a lot of text on a monitor—it is like watching your TV to read a book—something doesn't feel quite right about it.

The Electronic Library of Art: *A Survey of Western Art* on CD-ROM

At first glance, the disk appears to be intriguing.The package design is really great—lots of images of famous works of art in color. The CD jewel box contains a basic black and white package insert and seems as though the CD was designed in a haphazard way. It is obvious that no one developing this disk lost much sleep worrying about the design or GUI. The packaging of the disk is simple black and white. Apparently, the producers felt they could save money by having one of their receptionists put the cover and insert together during a coffee break. *A Survey of Western Art* does not include sound, which would have been a nice touch to help keep the user awake while browsing. The background behind the cards was white. A tint of an image—pattern, tapestry, anything—would have made the cards in the stack look less like index cards with pictures pasted on them since there is not much on the cards to begin with.

The stark amount of copy on each piece of work makes me wonder how much research and thought went into the production of this disk. If someone were really trying to find out information on a piece of work, they could do better with a paper version of the encyclopedia.

Multimedia is a new communications tool that is becoming more widely used each day. Production of multimedia will require a skilled group of people who understand how people make decisions, what the principles of interactive design involve, how people react to color, placement of images and buttons, how to write effectively, as well as how we learn.

GUI of the Interactive Archival Catalog of Artwork

People who have never used a multimedia title before should have no problem operating the interactive catalog. Text was set in 14 point Palatino for the sake of legibility and because most computers have Palatino installed on them. This saves the type from being turned into some scary font like Courrier. Titles of each card were set in 20 point Palatino.

The application used to produce the catalog is HyperStudio and since it has a limited palette of 16 colors, the primary colors were used. Primary and dark colors are more legible on the monitor than tinted colors.

Images were all shot with the Apple QuickTake 100 digital camera. This alleviated the need to purchase film and developing and then scanning the images to transform them into digital format.

Chapter 6

Test Results

Testing of the Interactive Archival Catalog was done with thirty students; some had used interactive programs before and others were not familiar with them. Any problems with button position and or location were noted and the necessary changes were made. Most agreed that there was a sufficient amount of data on the screen. More text would have been too much to read on the screen. Most people enjoyed testing the stack and felt that they learned something about the art on campus. The only problem in operation was during testing with one person who was not aware that the text on most cards was scrollable. Overall, people found the interface easy to operate and more interesting to use for data searches than books.

Test Questions and Results:

Did you enjoy the interface of this catalog?

All 30 surveyed said yes.

What, if anything, would you change about the catalog?

Most said that they would not change anything about the catalog. Four said that they would have liked to have better quality QuickTime videos and six others said that they would have liked more sound incorporated into the program. Because the catalog was created in HyperStudio, the movie clips had to be compressed for them to run in the application. HyperStudio takes the movie clip and compresses the frames per second to allow the movie to run smoother by using less memory, however, in the process, compression damages the original color quality of the movie. Although sound would have been a nice feature to incorporate into the catalog, it took up too much memory and crashed the computer often enough to justify taking most all of the sound out. The only other complaint was that after the QuickTime movie was over, the rectangular area where the film was located turns white and the screen does not refresh

itself to the way it appeared before the movie was shown. Usually the white space overlaps a portion of the still shot of the artwork and the void is not pleasing visually.

Did the catalog create an interest in interactive multimedia?

All 30 said yes.

Did you have a problem operating the program? What?

27 said there was no problem in operating the program. Three had never used any multimedia programs prior and were unsure of how to use the scroll bars to read the text on some cards.

Were the icons understandable?

All 30 said yes. Many commented that the buttons were not just attractive but were easier to use because of the clear explanation of the buttons shown at the beginning of the stack.

How would you rate the navigation on a scale of 1-4 (4 being the highest)?

35 rated the navigation with a 4

5 rated the navigation with a 3

Was the program educational?

All responded yes. Other comments made suggested that the catalog was easy and more fun to use than traditional paper catalogs. Because it was entertaining and interactive, people were more likely to pay attention to the information presented.

All of the students who tested the catalog were from the School of Fine and Applied Arts, School of Photographic Arts and Sciences and the School of Printing Management and Sciences. All had used computers before and were aware of interactive multimedia applications.

Chapter 7

Summary

Storing data on CD–ROM is currently one of the best ways to keep information stored. By putting data on CDs, the applications become endless. Not only can data be stored without fear of damage such as would happen with older paper documents, but the format allows us to share it around the world through computers. However, as there are many benefits to electronic storage and retrieval–speed being the main factor–there are downsides to it as well. What will happen in the future? In ten years, there may be a better format for data storage and retrieval and CDs may be considered a thing of the past just as 8–track tapes are today. How will we retrieve the data on CDs if CD players are not available?

In my opinion, paper that is well–made and treated properly will outlast any digital storage format. Paper is still the cheapest, most portable format available. Paper does not require any machines to decode the information on it–just a literate person. A main reason digital storage is becoming so popular is that there is a higher speed of data retrieval than paper. In addition, electronic storage gives us the ability to send the information over the wires. There are clearly more benefits than those listed, but ultimately it is up to the individual to decide the best storage format for the data they are dealing with.

Conclusion

The Interactive Archival Catalog of Artwork in Public Places on the RIT Campus was developed because currently, there is no complete catalog of artwork on the RIT Henrietta campus. The RIT archives possess a selection of slides of artwork as well as written documentation of the execution of some of the pieces. No one on campus seems to think that anyone could be able to locate all of the artwork since people frequently have pieces in their offices and move the art as they move from office to office.

By combining the available information about art on campus from the archives with current images of the works in their locations, anyone can discover the art in public places on campus through the text and visuals within the stack. If this type of catalog were put on–line, the information and images could be accessed around the world for anyone to use.

The results of the testing of the Interactive Archival Catalog were not suprising. As the catalog was being developed, people were asked their opinions on many items such as: button placement, size of the text, color in the text and how the images were cropped. As the catalog was nearing completion, people tested it and often found small problems with button programming that occured when buttons were being copied and pasted up throughout the stack. The catalog was tested multiple times as so to make sure it would be as easy to use as possible. Those who tested the catalog agreed that it was easy to use and made learning about art fascinating since many students were unaware of the history and facts behind the pieces of work on this campus. The conclusion of the testing verifyed the hypothesis of this thesis project.

It was difficult to get information on all of the pieces in public areas and so only the pieces that had some record of their artist, size and so forth were put into the catalog. It is possible to add on to the catalog through the HyperStudio program since the tools are basic ones found in most applications.

RIT owns many valuable, one-of–a–kind pieces of artwork that are not cataloged. Many pieces are still in storage in Physical Plant since the campus moved over twenty years ago. Bauhaus master artist Josef Albers murals "Homage to the Square, " located in the lobby of the George Eastman Building are not labeled. In fact, these murals are the only known "Homage to the Square" murals in existence. The murals have no identifying plaques next to them.

This thesis project asks the viewer to take notice of interactive multimedia applications and should help develop an interest in art. In addition, it is also a

plea to the Institute to protect the artwork it has, and not just because the artwork is valuable. It sends a clear message to students, especially art students, that RIT does not take care of what it possesses; it shows lack of respect for its investments also. Artwork never goes down in price; as an investment, these pieces will always be outstanding ones. Hopefully someone with some authority will take action in protecting the works before pieces like the Albers murals, become destroyed to the point where restoration costs will be too high to afford. RIT owes this to its community, the artists who created the work, and the world.

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All Images on the Multimedia Timeline on pages 35–39 were taken from the Kodak Picture Exchange.

All Images in the Interactive Archival Catalog of Artwork in Public Areas on the RIT Henrietta Campus were taken by Jill Clayman.

All QuickTime movie clips in the Interactive Archival Catalog of Artwork in Public Areas on the RIT Henrietta Campus were filmed by Jill Clayman.

Appendix A

Appendix A
Media Timeline From 1700-Present

1702

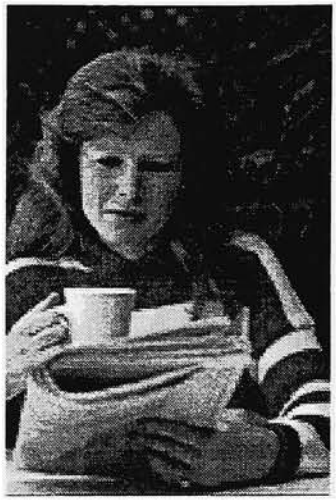
London produces the first daily newspaper, the Daily Courant

1768

Encyclopaedia Brittanica is published

1796

Senefelder: Lithography is invented



1798

Nicholas-Louis Robert invents the papermaking machine

1822

Photogravure Printing
Church invents the first type-composing machine

1833

Electronic Telegraphy

1835

Louis Daguerre invents the Daguerrotype

1837

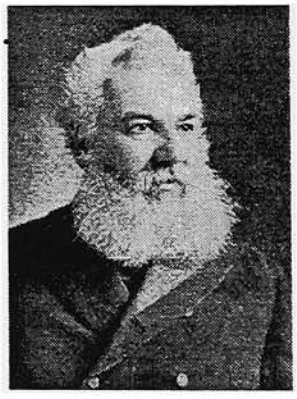
Morse Code

1866

Trans-Atlantic Telegraph Cable is set up

1868

Sholes invents Typewriter



1876

Bell gets patent on the Telephone

1878

Muybridge invents sequential photography

1880

Newspaper halftone created by Hogan

1884

Eastman introduces roll film

1885

Ottomar Mergenthaler invents the Linotype

Xerox photocopiers

1890

The Punch Card Counting Machine is invented by Hollerith

1892

Kurtz and Ives invent 3-color process halftone printing

1895

The Lumiere Brothers introduce the Cinematograph

Wireless telegraphy is introduced by Marconi

The Cathode Ray Tube is invented by Crookes

1900

X-ray photography

Radio Telephone

1903

Lumiere invents Autochrome colour photography

1904

Offset Lithography

1906

Photo Telegraphy

1917

Variable frequency receiver

1922

Portable Radio

Car radio

1923

Iconoscope/linescope television system

1927

Sound movies "Talkies"

Trans-Atlantic Telephone Service

1930

Four-color offset press is introduced

1931

Zuze invents the Z1 computer

1932

BBC Television Broadcasting begins

1933

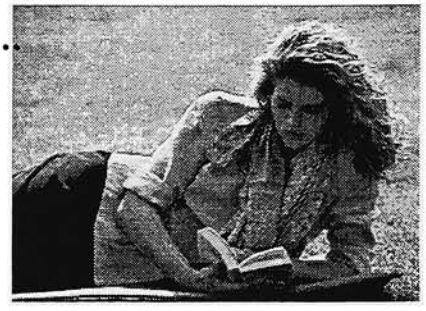
EMI Stereo Recording

1935

Technicolor Films

Kodachrome 35mm film

Modern paperback books



1940

Radar

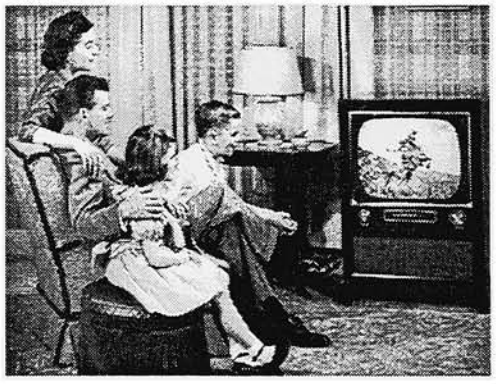
1941

Regular TV broadcasts in the USA

1943

ENIGMA computer

Colossus elecrtro-mechanical computer



1945

Photon photographic typesetting

1946

Stored program computer introduced by Von Neumann

Stibetz introduces the first electronic pro gram-controlled digital computer

1947

Transistor is invented by Bardeen, Brattain, and Shockley

LP records

1948

Polaroid invents Instant Photography

1949

First cable TV narrowcasts

1951

UNIVAC brings the first commercial mainframe computer to the market

1953

Color TV broadcasting

1957

Dot-matrix printer

1958

Fortran, the first high level programming language is introduced

45 rpm singles/consumer hi-fi stereo records

1959

Closed Circuit TV

1960

Computer Aided Design

Cable TV networks

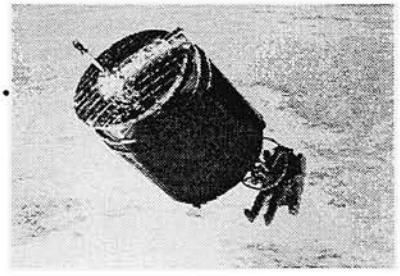
1961

Phillips invents the compact cassette

1962

Satellite TV broadcasting

Telstar telecommunications satellite



1963

Polaroid color film

1965

The mouse is invented by Englebart

1966

Kodak Carousel projector

1968

Intel Corporation invents RAM chips

1972

Phillips brings the VCR to market

1973

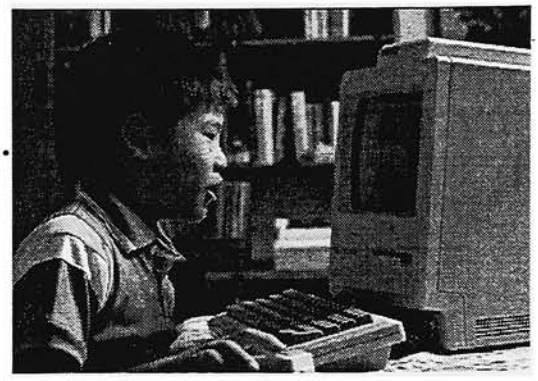
FAX machines

Canon color photocopier

1977

Apple II Computer

Laser typesetting



1978

Phillips Laserdisk

1979

Cellular Phones

1980

Laser printer

1981

IBM PC

1982

Sony Beta movie camcorder

1983

Compact disk audio introduced

1984

Apple Macintosh

Kodak DX coding

1985

Adobe PostScript Page Description Language

1986

Apple presents Desktop Publishing

1987

DAT recorders

Phillips Compact Disk Video

1988

Color laser printer

1991

Multimedia PC

Phillips Compact Disk Interactive

Sony mini disk

Canon digital scanner/printer/copier

1992

Kodak Photo CD

Apple personal digital assistant—Newton

(Timeline taken from "Understanding Hypermedia,"p.14–19, Phaidon Press, 1993.)

Appendix B

Appendix B
Text for Interactive Catalog

Harry Bertoia

Tree Urns

Harry Bertoia, sculptor and designer of jewelry was a pioneer in industrial metalwork. Bertoia's planters titled "Tree Urns" are cast in bronze and are located in the Student Alumni Union. The urns surround wooden tubs that hold small trees. Surrounding each planter is a bench which wraps around all four sides. The "Tree Urns" are 5' x 5' x 4' and weigh 1 ton apiece.

Bertoia was born in San Lorenze, Italy in 1915. At age 15, he moved to the United States with his father. After graduating from Cass Technical High School in Detroit, Bertoia attended the Cranbrook Academy of Art in Bloomfield Hills, Michigan with a scholarship he had won. Many of his works are owned by museums around the world including the Whitney, Guggenheim and the Museum of Modern Art. Harry Bertoia died in 1978 at age 63.

Golden Dandelions

Harry Bertoia's "Golden Dandelions" sculptures consist of seven pieces. The sculptures are gold plated and were designed in 1964 for the Kodak World's Fair Pavilion. "Golden Dandelions" are located in the courtyard of NTID. The sculptures were a gift to RIT from the Eastman Kodak Company.

José de Rivera

Infinity Loop

José de Rivera, sculptor of the "Infinity Loop" based his design on the Möbius strip, an abstract form discovered by 19th century German mathematician August Ferdinand Möbius. The loop rotates slowly, once each hour, atop a polished, black granite pedestal in front of the College of Engineering.

The pedestal is 12' tall and has a 1/4 HP motor set inside the pyramid base of the sculpture.

de Rivera created the loop by giving a strip of stainless steel a half twist before welding the ends together. A similar sculpture is located in front of the Smithsonian Institution's Museum of History and Technology.
During his career, de Rivera became partly deaf through hammering and welding his steel sculptures.

Belgian sculptor Geroge Vantongerloo stated that José de Riveras sculptures set the standard for "conceptual purity and craftsmanship." "He creates forms in polished metal, simple at a glance but infinitely various upon examination."(1)

(1) John Canady, art critic for the New York Times, 1960. The New York Times, "José de Rivera is dead at 80; Known for Metal Sculptures." Written by Douglass C. McGill, March 21, 1985, p.B8.

Frans Wildenhain

Allegory of a Landscape

"Allegory of a Landscape," a stoneware mural by artist Frans Wildenhain is the artists interpretation of aerial views of this region. This earthtone ceramic mural wraps around the curved wall of Ingle Auditorium in the Student Alumni Union. The mural measures 21' x 9.' Frans Wildenhain is a former professor at RIT's School of American Craftsmen.

Henry Moore

Three Piece Bronze Sculpture

Henry Moore's three piece bronze sculpture
"Reclining Figures" is located just outside the the College of Business. This particular sculpture is one of a series of seven. It measures 113" x 64" x 53 1/4" and weighs 3,200 lbs. The "Reclining Figures" were executed from 1961-1962. Moore always felt that his sculptures looked best outdoors interacting with nature. In fact, the bronze figures take on a stone-like appearance in the rain. "Reclining Figures" is considered one of RIT's finest pieces of artwork.

Carl Zollo

Split Cube

Carl Zollo's "Split Cube" is a large stainless steel sculpture that is located outside of the main entrance to the National Technical Institute for the Deaf. "Split Cube" is 11' high by 16' wide and weighs 8,000 lbs.
The cube is symbolic of the concept of education, a process which teaches students to pull apart information and re-assemble it in new, creative ways. The reflective surface was designed to inspire the viewer to reflect on the past and envision the future.

Zollo is a 1952 graduate of the College of Fine and Applied Arts at RIT.

Ron Callari and John Dodd

World Map in Wood

"World Map in Wood" is a creation of John Dodd and Ron Callari. It hangs in the lobby of the Student Alumni Union and serves to show the diversity of the RIT student body.

Josef Albers

Homage to the Square

Josef Albers' murals titled "Homage to the Square" can be viewed in the lobby of the George Eastman Memorial Building. The two murals are located on the north and south walls of the lobby and were executed in warm shades of yellows and oranges. Both "Homage to the Square" murals are 22' x 27' and are the only known wall murals in existance.

Originally, an interior decorator working for RIT requested the murals be in shades of gray. And they were painted in grey for a few short weeks. Gray made the lobby look cold and drab, and the Institute had Albers come back to campus to oversee the repainting of the murals to their present colors. The murals are painted on a layer of plaster applied directly to the lobby walls.

The "Homage to the Square" series was a color study Albers worked on for many years. The color of the murals appears to be constantly changing as the lighting in the lobby changes from sunrise to sunset.

Josef Albers, master Bauhaus artist, was the former chairman of Yale University's School of Art until 1958 when he retired. During his lifetime, Albers was honored with a retrospective, an exhibit of his life's work, at the Metropolitan Museum of Art in New York City.

Brick Mural

Josef Albers' untitled brick mural located on the College of Science is a unique piece of work that must be experienced firsthand. The bricks set in the wall are at different angles and, when viewing it head–on, it looks like a series of triangles. However, Albers designed the brick mural to be one that the viewer must interact with to fully experience it. As you walk by it, the bricks comprising the mural seem to flip from being downward pointing triangles to upward ones.

Josef Albers, master Bauhaus artist, was the former chairman of Yale University's School of Art until 1958 when he retired. During his lifetime, Albers was honored with a retrospective, an exhibit of his life's work, at the Metropolitan Museum of Art in New York City. Albers died in 1976 at age 88.

Kay Dennning

Enamel Mural

Kay Denning's untitled enamel mural is located in the lobby of the College of Engineering. This piece of artwork is six separate angular shaped enameled panels. The bright colors and reflective surface brighten up the otherwise drab lobby of the College of Engineering. The mural was designed to reflect upon the technical emphasis of the school.

William Keyser, Jr.

Wood Screen

The "Wood Screen" designed by William Keyser, Jr. is located in front of a glass window within the Student Alumni Union Cafeteria. This piece of work serves to filter light coming in through the skylights on the other side of the window.

Alexsandra Kasuba

Brick Murals

Kasuba is the designer of two brick murals on RIT's Henrietta campus. One is located over the entrance to SolHeu- mann Residence Hall (close up bottom left). The other mural is located in the lobby of Grace Watson Dining Hall, shown at left top, also on the residential side of campus. Both murals were designed by Kasuba and were executed by local masons. The mural in Grace Watson Dining Hall is 85' in length. The bricks making up both murals are the same bricks RIT has used in surfacing all builings on campus.

Tojo Garden

The Tojo Garden is located in the courtyard outside of the Gannett Building. The focal point of the garden is a hand-carved stone pagoda, artist unknown.

Mr. and Mrs. Tojo donated the money and stone pagoda in memory of their son who died in an automobile accident while studying photography at RIT.

The garden has a small pond and waterfall and is a retreat for many of the students on sunny days.

Ragnhild Langlet

Tapestry

Ragnhild Langlet's blue and white tapestry adorns the length of the east wall of the Student Alumni Union Cafeteria.

Max Lenderman

Tapestry

Max M. Lenderman, School for American Craftsmen professor created this tapestry which hangs in the lobby of the Max Lowenthal Building. Lenderman was inspired by the autumn leaves from wooded areas on campus.

Kener Bond

Mobile

College of Fine and Applied Arts Professor Kener Bond fabricated this reflective mobile out of aluminum. The mobile hangs over the lobby of the Max Lowenthal Building. Bond is a graduate of the School for American Craftsmen at RIT, class of 1962.

Sheila Hicks Zanartu

Tapestry

Sheila Hicks Zanartu, one of the most well-known weavers in the world, created this large tapestry which currently is displayed in the Student Alumni Union across from Ingle Auditorium. The tapestry is made up of thousands of hand–made tassels of yarn.

Saul Borisov

The Journey

Two tapestries in the Fireside lounge were created by Saul Borisov entitled "The Journey," are a contemporary depiction of Noah's Ark.

Dennis Maust

A Key to Life

This sculpture by Dennis Maust, graduate of the College of Fine and Applied Arts in 1987, hangs in the Fireside Lounge of the Student Alumni Union. "A Key to Life," employs a variety of symbols and motifs from the major fatihs.

The Ankh, an ancient Egyptian symbol visible in the ceramic sculpture, symbolizes life. The concept for this dove is that the search for truth, inherent in all religions ulitmately promotes life and peace.

"A Key to Life," was commissioned in 1987 by the College–Alumni Union Advisory Board.

D.H.S. Wehle

Bengal Tiger

This cast bronze sculpture of a bengal tiger, RIT's mascot was created by D.H.S. Wehle. The tiger is located just outside of the Eastman Building. The sculpture was dedicated in November 1989.

Fred Lipp

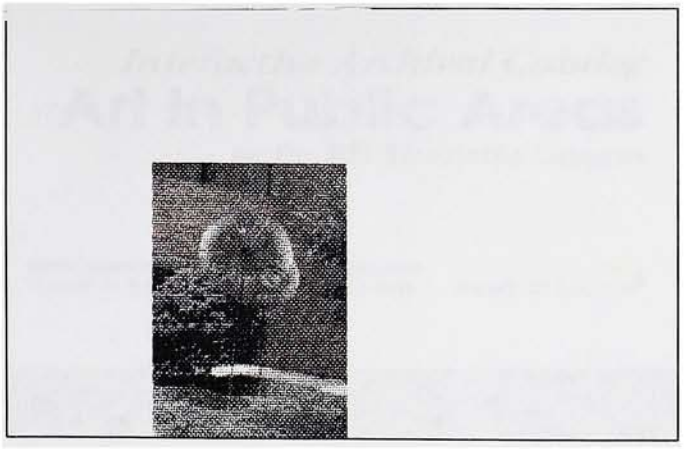
Reflections

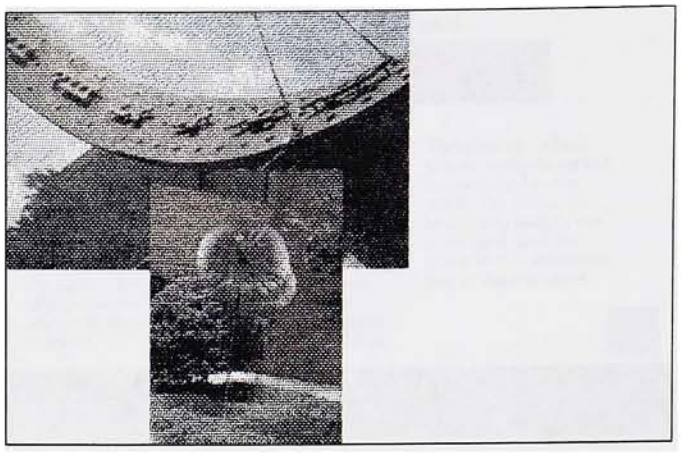
The title of this piece is "Reflections" and was created by Fred Lipp, a designer and craftsman who teaches in the College of Fine and Applied Arts at RIT.

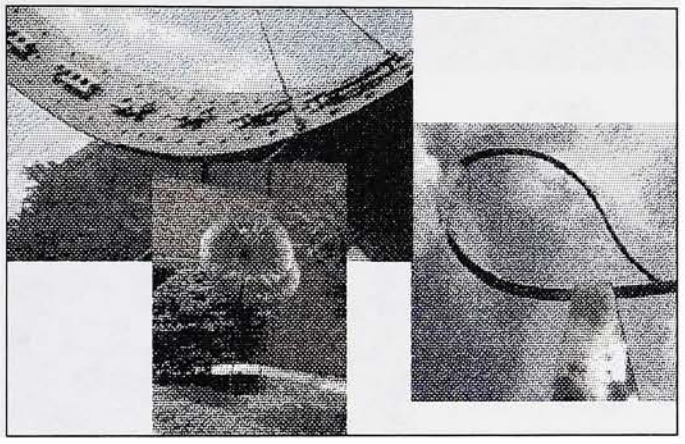
The sculpture is made of sheets of stainless steel and is suspended from the wall with bolts. "Reflections" is in the SAU Cafeteria and was proposed to the Beautification Commitee in the Spring of 1973 when the Cafeteria was being remodeled. The theme of the sculpture is space and movement.

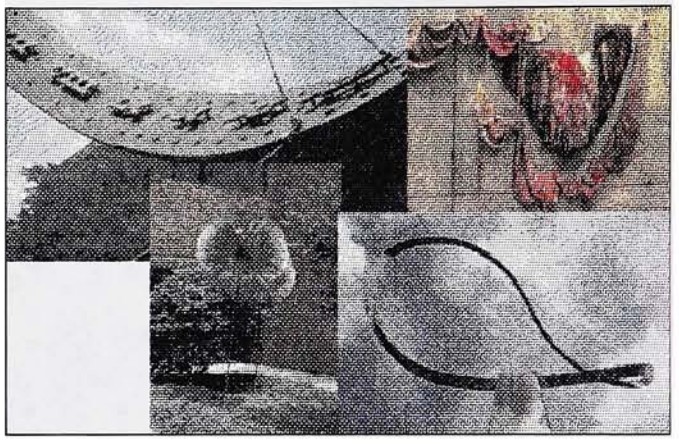
Each piece of metal creates the words "view it" which is meant as an invitation and command to move around the piece and experience the way the metal reflects the room around it.

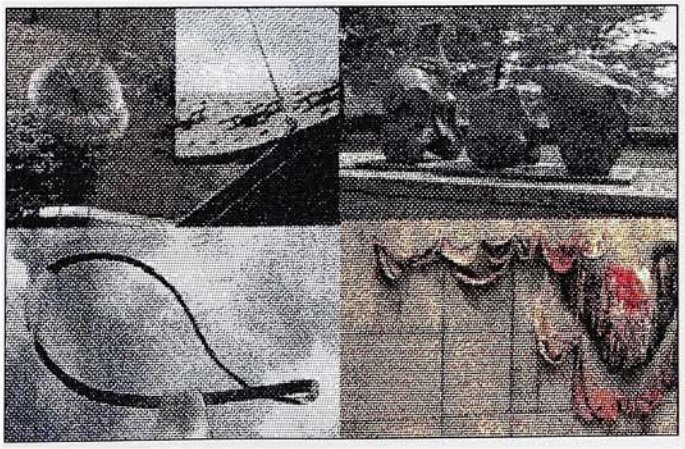
Appendix C











Interactive Archival Catalog

Art in Public Areas

on the RIT Henrietta Campus

Interactive Archival Catalog

Art in Public Areas

on the RIT Henrietta Campus

Search by Artist | Search by Medium | Search by Location

Begin a search by clicking on a selection with the cursor.

This is the Control Panel

The "X" allows you to exit the program.

The "H" brings you back to the home card of this program. From the home card, you can select a search in another manner.

The "M" will bring you back to the main menu of the stack you are currently in.

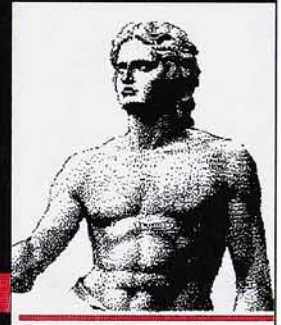
The "Q" allows you to view a QuickTime movie if one is available.

These buttons allow you to navigate forard or backward in the stack. The red arrow brings you back to the prior card, and the green arrow advances you to the next card.

What do the Buttons Do?

Josef Albers | Ragnhild Langlet
Alistair Bevington | Man Lenderman
Harry Bertoia | Fred Lipp
Keiner Bond | Dennis Maust
Saul Borison | Henry Moore
Ben Callart | Jose de Rivera
Kay Denning | D.H.S. Wehle
John Dodd | Frans Wildenhain
Alexsandra Kasuba | Sheila Hicks Zanartu
William Keyser, Jr. | Just Browsing

Select a name to begin.



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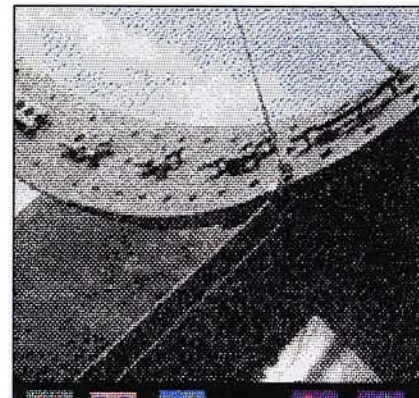
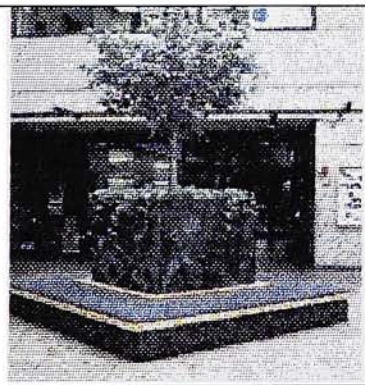


Architect Alistair Bevington's Sundial sits on the resident hall area of campus. The Sundial is 18' x 25' and is made with a special type of steel (Cor-ten steel) which has weatheed to a dark brown. The steel plates are 3/8" to 1/2" in thickness. The gnomen, a 1" solid stainless steel rod which casts a sha- dow on the face of the sundial, is suspended with yachting cable. The sundial was constructed

Alistair Bevington

Search by Artist



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Harry Bertoia

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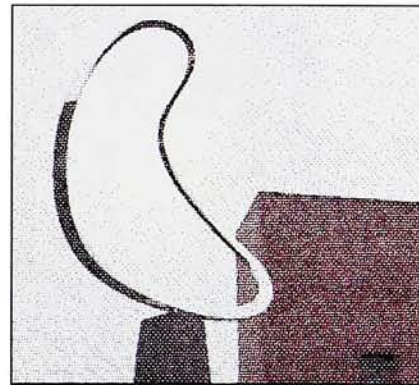

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José de Rivera

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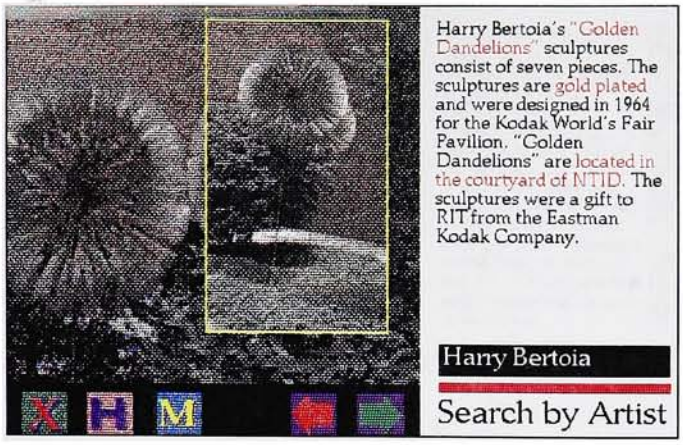

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Harry Bertoia

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Frans Wildenhain

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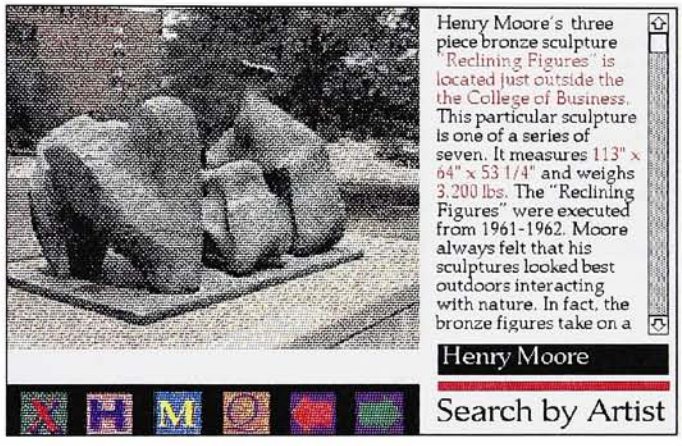

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Henry Moore

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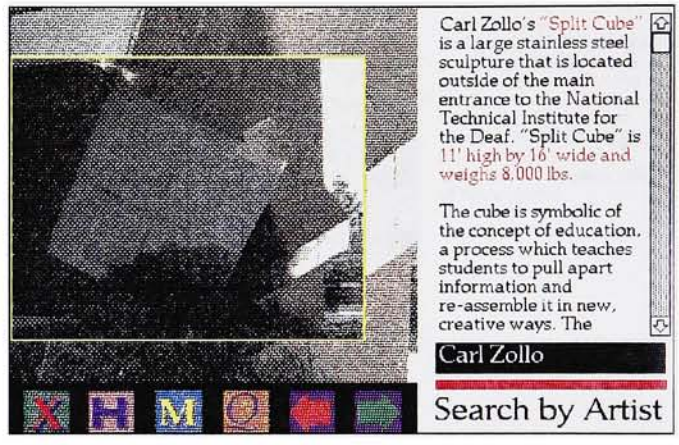

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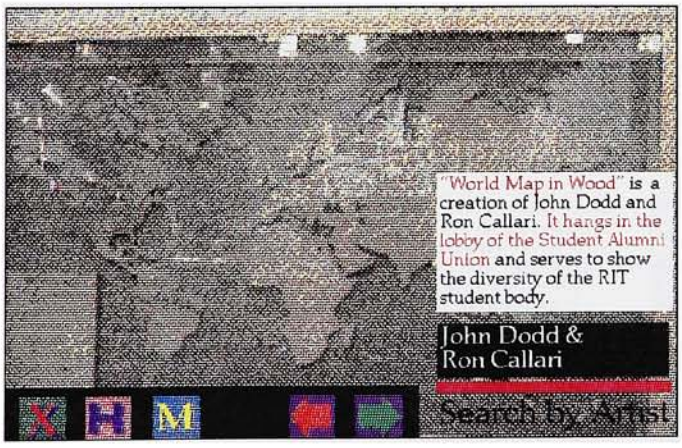

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John Dodd & Ron Callari

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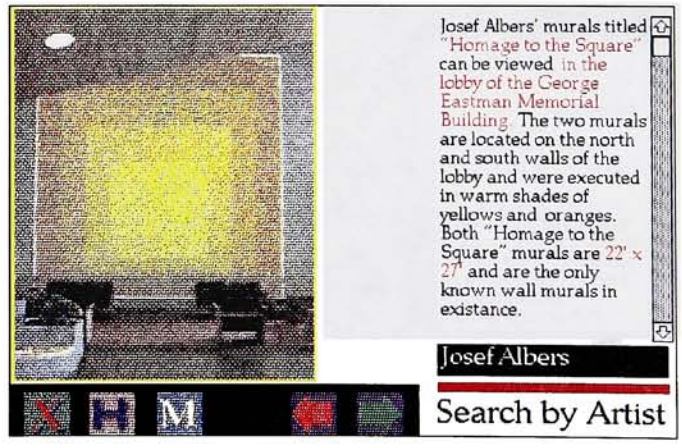

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Josef Albers

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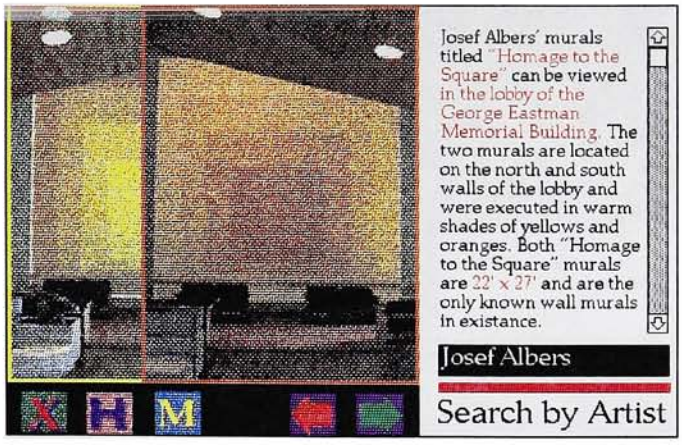

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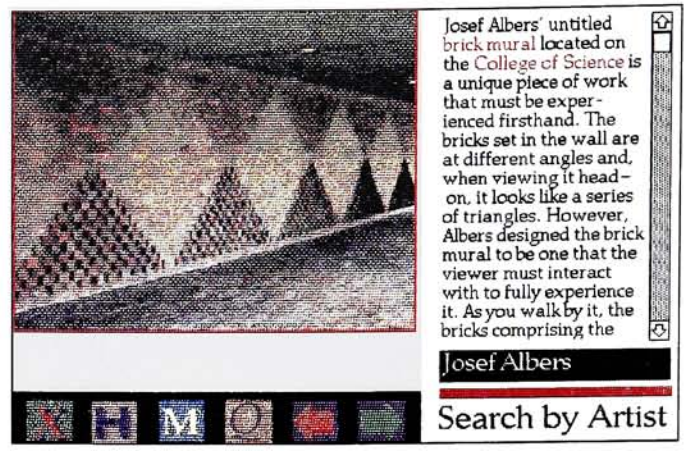

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Josef Albers

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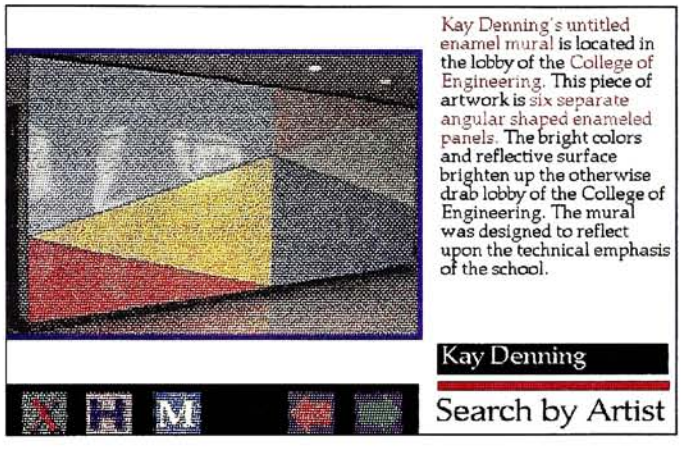

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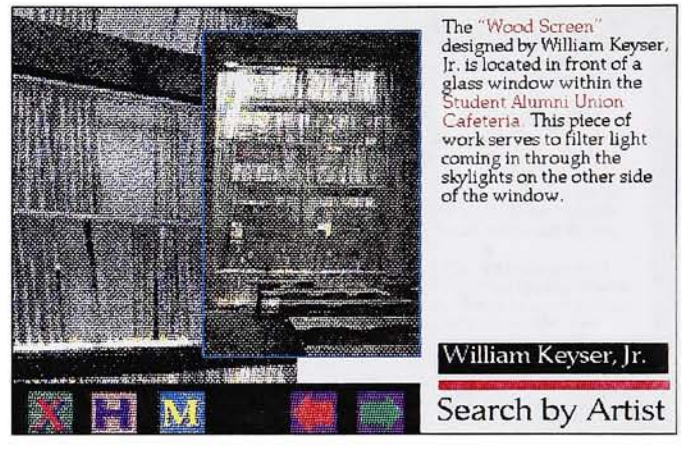
Kay Denning

Search by Artist



The "Wood Screen" designed by William Keyser, Jr. is located in front of a glass window within the Student Alumni Union Cafeteria. This piece of work serves to filter light coming in through the skylights on the other side of the window.

William Keyser, Jr.

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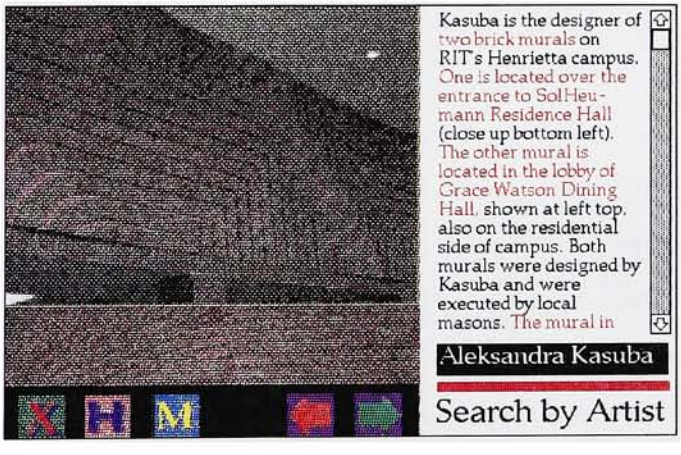

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Aleksandra Kasuba

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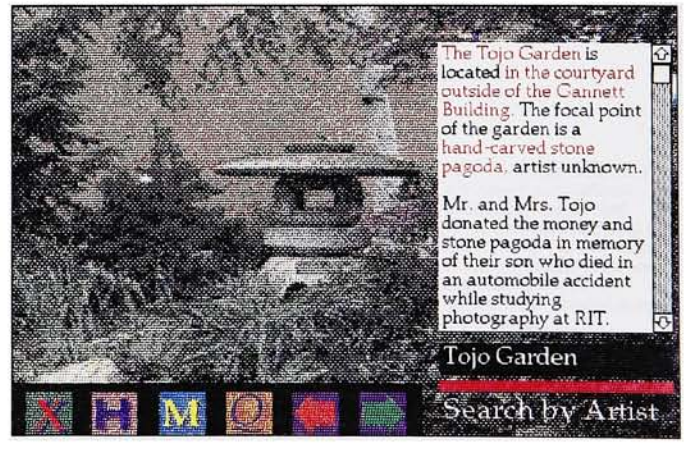

The Tojo Garden is located in the courtyard outside of the Gannett Building. The focal point of the garden is a hand-carved stone pagoda, artist unknown.

Mr. and Mrs. Tojo donated the money and stone pagoda in memory of their son who died in an automobile accident while studying photography at RIT.

Tojo Garden

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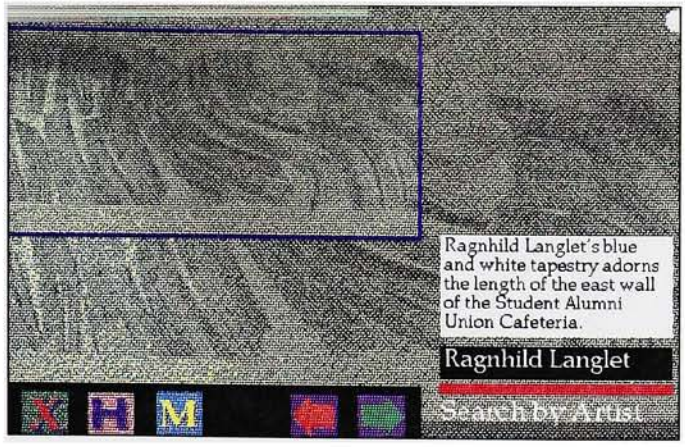
Ragnhild Langlet's blue and white tapestry adorns the length of the east wall of the Student Alumni Union Cafeteria.
Ragnhild Langlet
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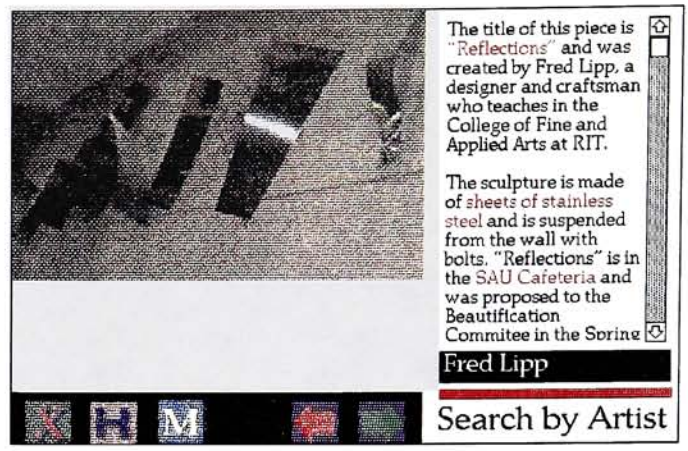
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Fred Lipp
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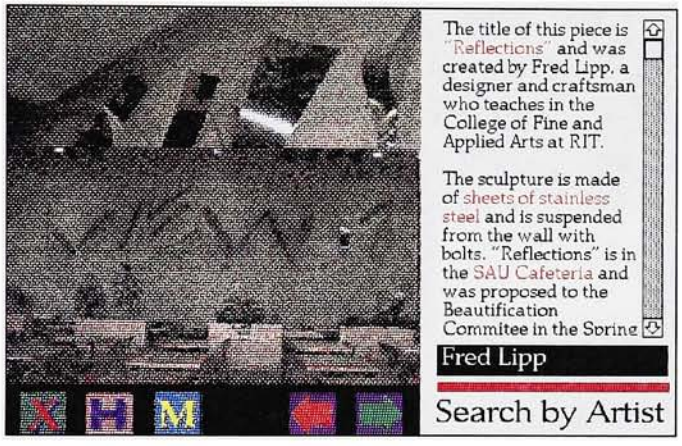
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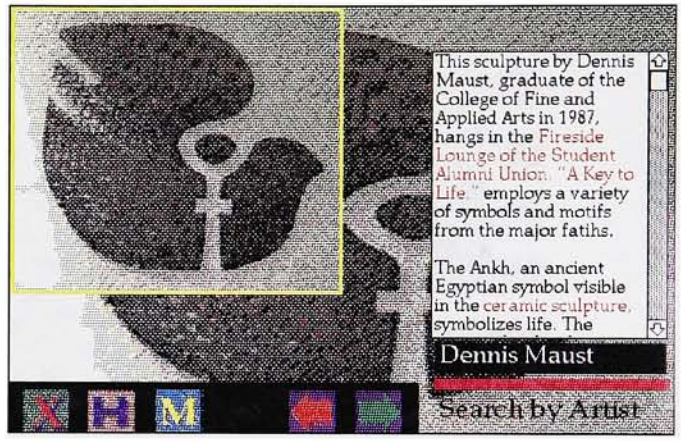
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The Ankh, an ancient Egyptian symbol visible in the ceramic sculpture, symbolizes life. The
Dennis Maust
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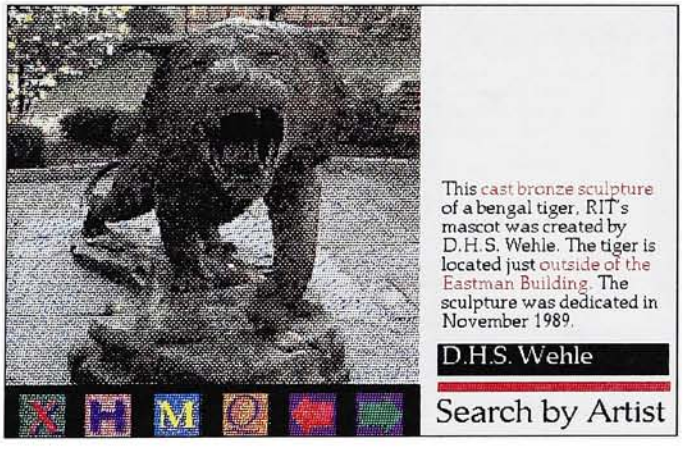
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D.H.S. Wehle
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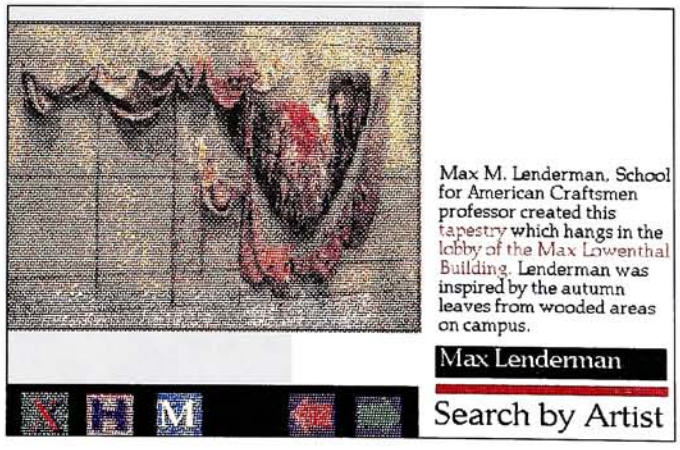
Max M. Lenderman, School for American Craftsmen professor created this tapestry which hangs in the lobby of the Max Lowenthal Building. Lenderman was inspired by the autumn leaves from wooded areas on campus.
Max Lenderman
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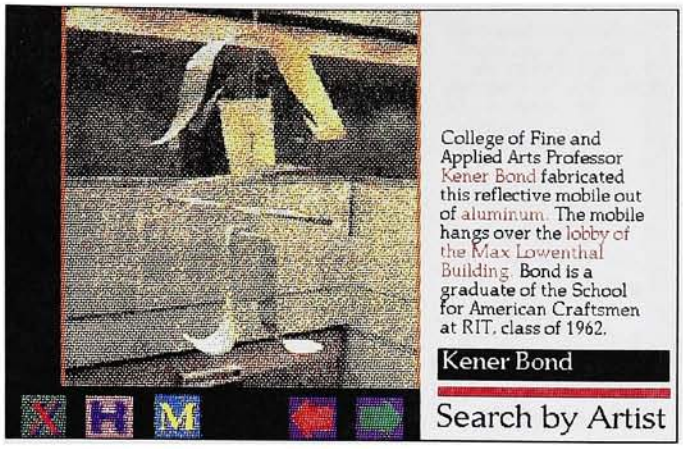
College of Fine and Applied Arts Professor Kener Bond fabricated this reflective mobile out of aluminum. The mobile hangs over the lobby of the Max Lowenthal Building. Bond is a graduate of the School for American Craftsmen at RIT, class of 1962.
Kener Bond
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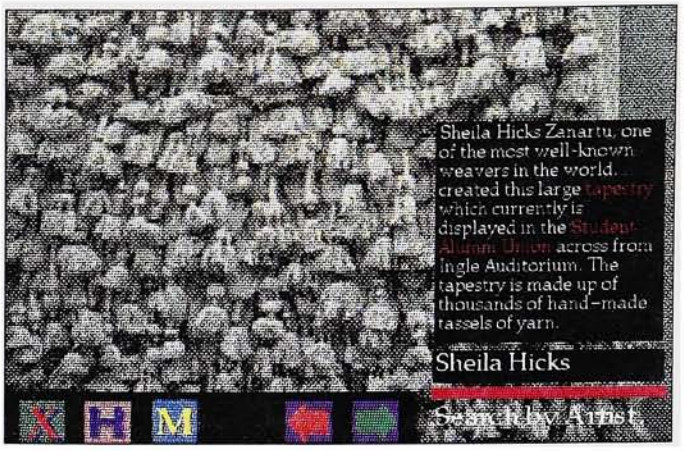
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Sheila Hicks
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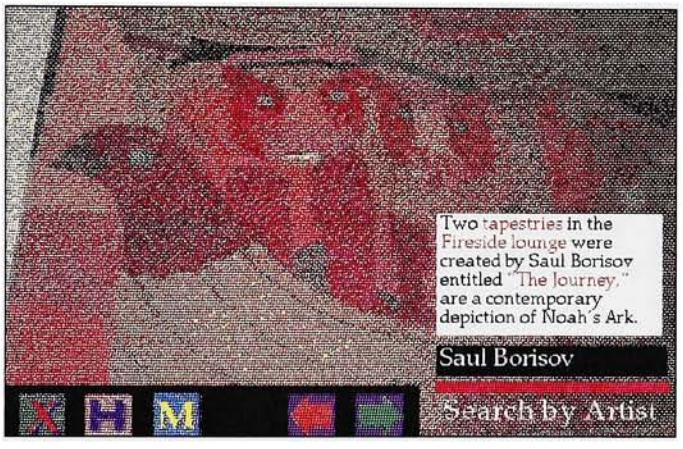
Two tapestries in the Fireside lounge were created by Saul Borisov entitled "The Journey," are a contemporary depiction of Noah's Ark.
Saul Borisov
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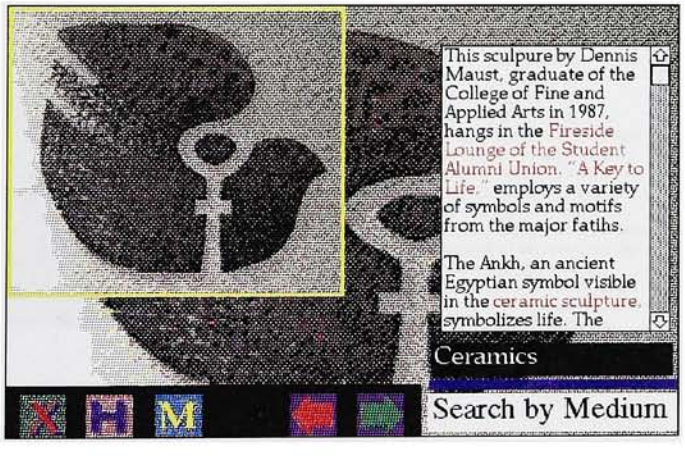
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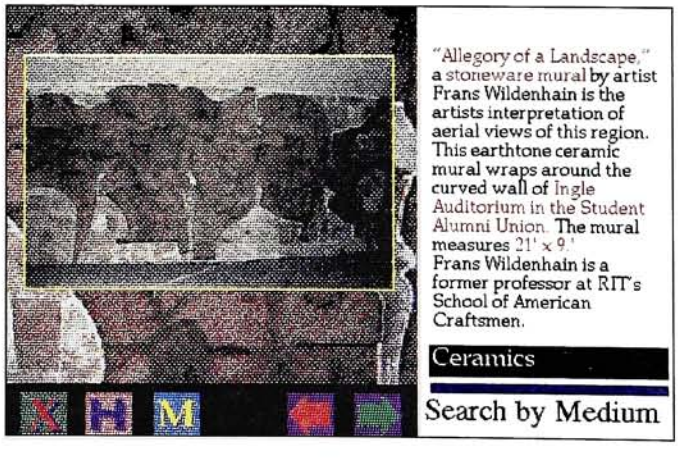
"Allegory of a Landscape," a stoneware mural by artist Frans Wildenhain is the artists interpretation of aerial views of this region. This earthtone ceramic mural wraps around the curved wall of Ingle Auditorium in the Student Alumni Union. The mural measures 21' x 9.'
Frans Wildenhain is a former professor at RIT's School of American Craftsmen.
Ceramics
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Murals

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Murals

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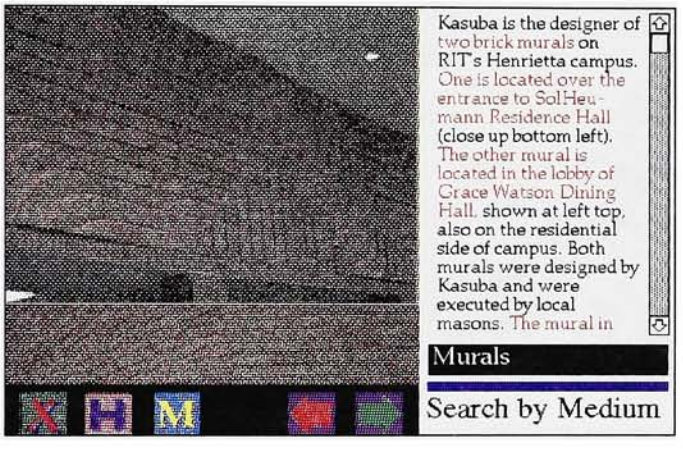

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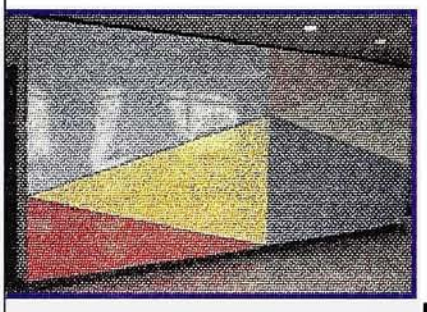

Kay Denning's untitled enamel mural is located in the lobby of the College of Engineering. This piece of artwork is six separate angular shaped enameled panels. The bright colors and reflective surface brighten up the otherwise drab lobby of the College of Engineering. The mural was designed to reflect upon the technical emphasis of the school.

Murals

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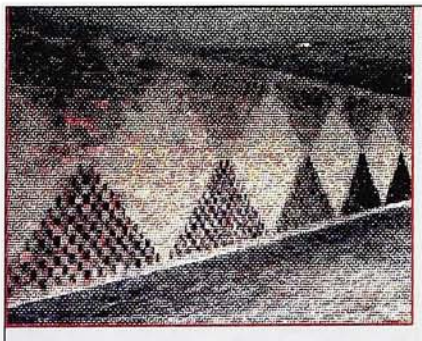

Josef Albers' untitled brick mural located on the College of Science is a unique piece of work that must be experienced firsthand. The bricks set in the wall are at different angles and, when viewing it head-on, it looks like a series of triangles. However, Albers designed the brick mural to be one that the viewer must interact with to fully experience it. As you walk by it, the bricks comprising the

Murals

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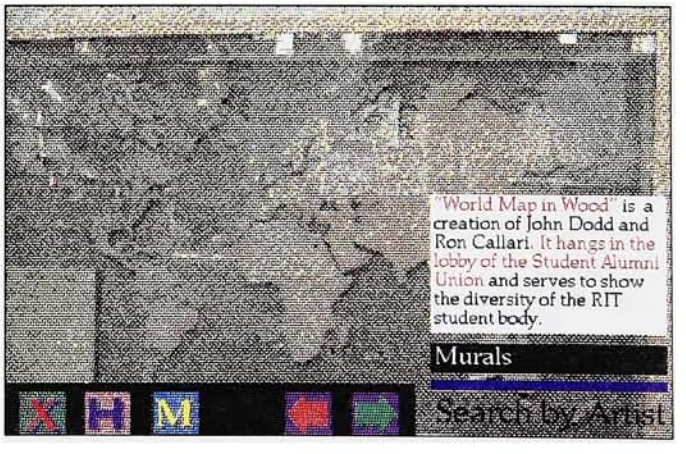

"World Map in Wood" is a creation of John Dodd and Ron Callari. It hangs in the lobby of the Student Alumni Union and serves to show the diversity of the RIT student body.

Murals

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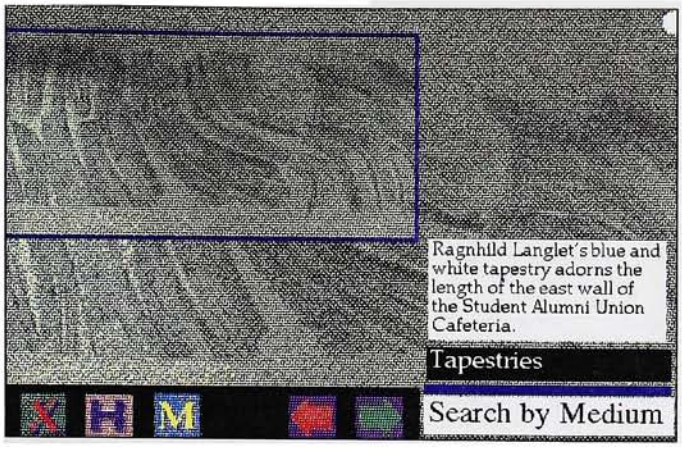
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Tapestries
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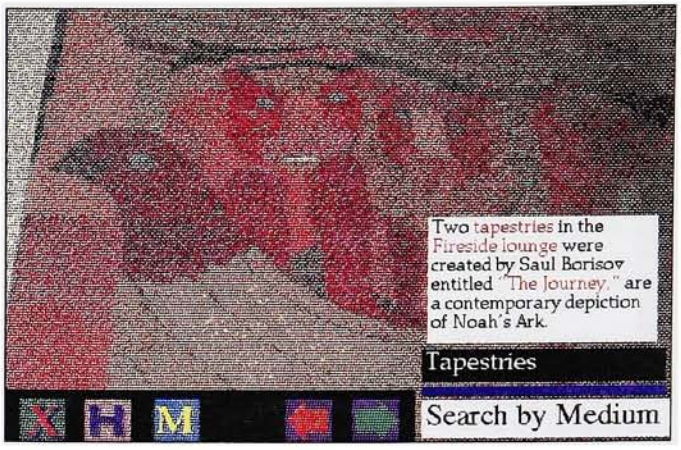
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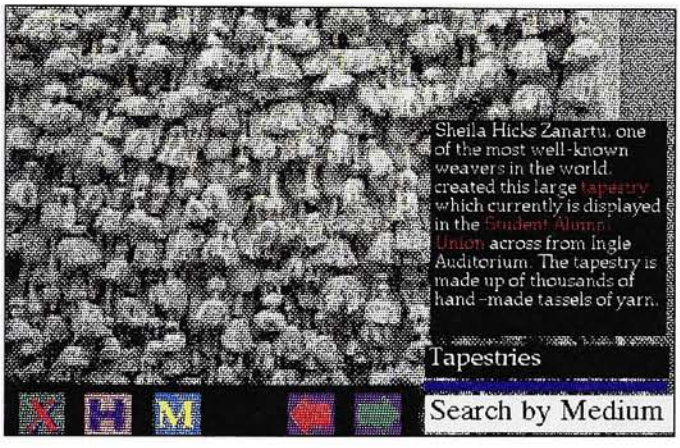
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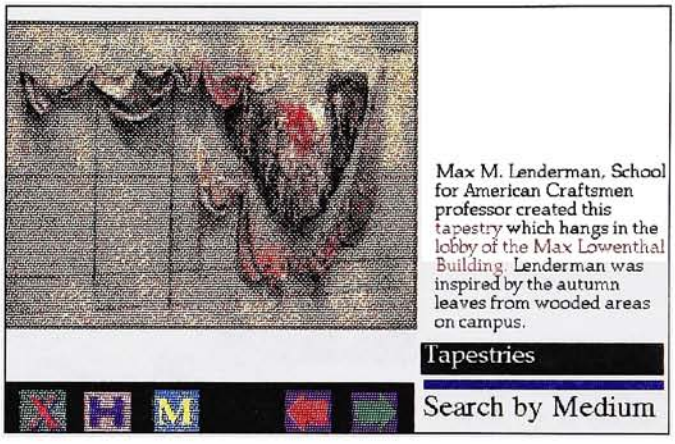
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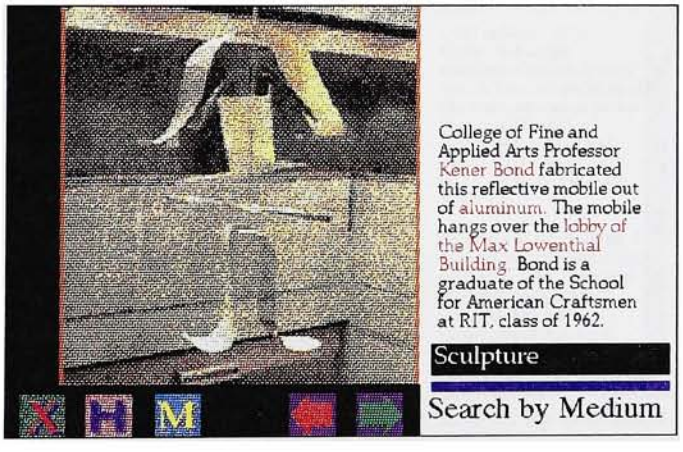
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Sculpture
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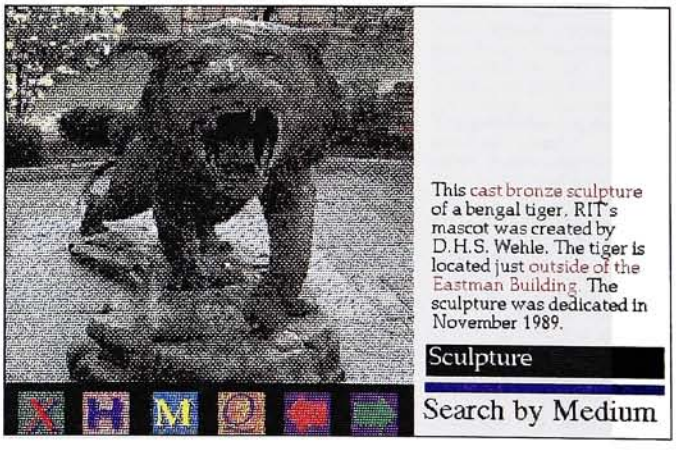
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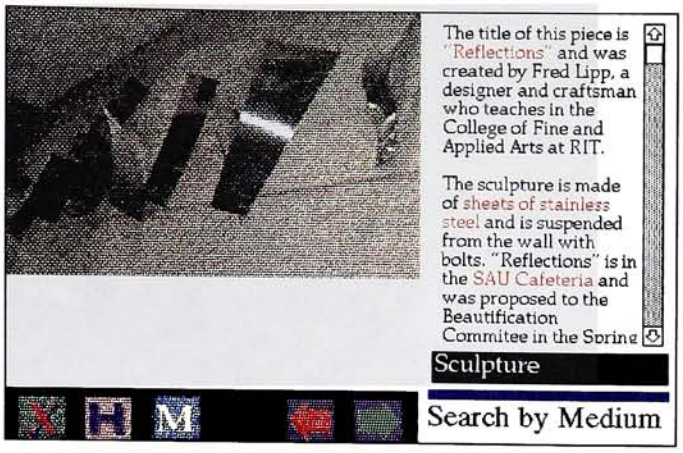

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Sculpture

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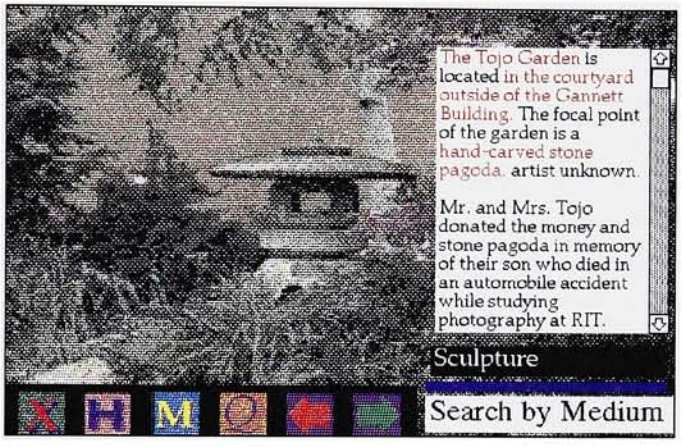

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Sculpture

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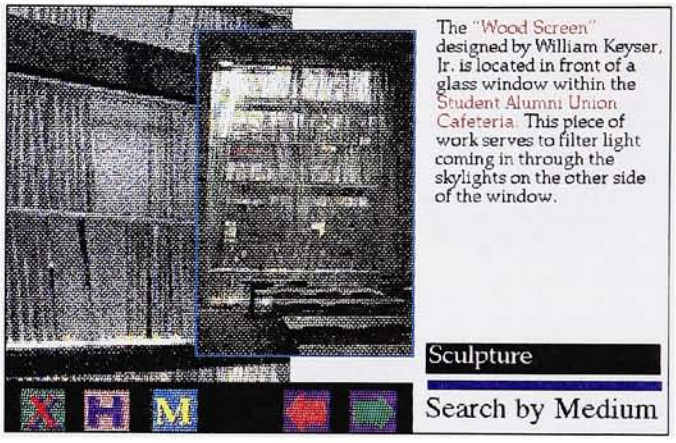

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Sculpture

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Carl Zollo's "Split Cube" is a large stainless steel sculpture that is located outside of the main entrance to the National Technical Institute for the Deaf. "Split Cube" is 11' high by 16' wide and weighs 8,000 lbs.

The cube is symbolic of the concept of education, a process which teaches students to pull apart information and re-assemble it in new,

Sculpture

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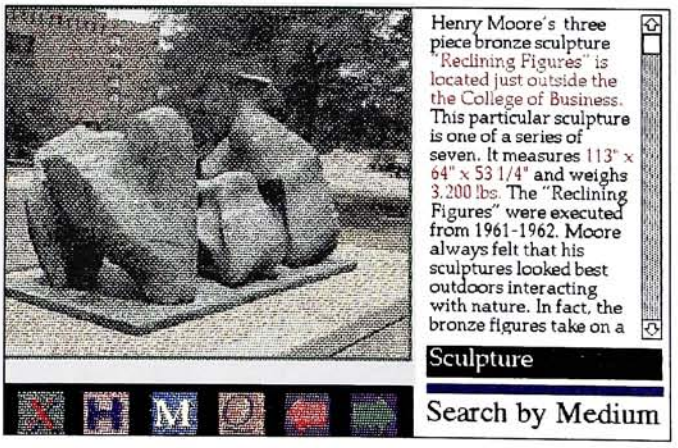

Henry Moore's three piece bronze sculpture "Reclining Figures" is located just outside the the College of Business. This particular sculpture is one of a series of seven. It measures 113" x 64" x 53 1/4" and weighs 3,200 lbs. The "Reclining Figures" were executed from 1961-1962. Moore always felt that his sculptures looked best outdoors interacting with nature. In fact, the bronze figures take on a

Sculpture

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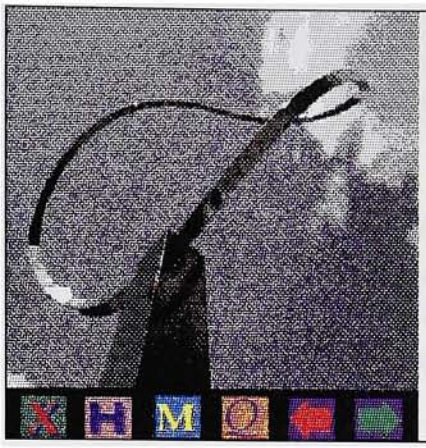

José de Rivera, sculptor of the "Infinity Loop" based his design on the Möbius strip, an abstract form discovered by 19th century German mathematician August Ferdinand Möbius. The loop rotates slowly, once each hour, atop a polished, black granite pedestal in front of the College of Engineering.

The pedestal is 12' tall and has a 1/4 HP motor set inside the pyramid

Sculpture

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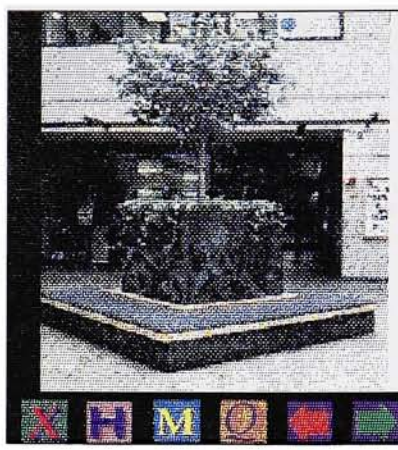

Harry Bertoia, sculptor and designer of jewelry was a pioneer in industrial metalwork. Bertoia's planters titled "Tree Urns" are cast in bronze and are located in the Student Alumni Union. The urns surround wooden tubs that hold small trees. Surrounding each planter is a bench which wraps around all four sides. The "Tree Urns" are 5' x 5' x 4' and weigh 1 ton apiece.

Sculpture

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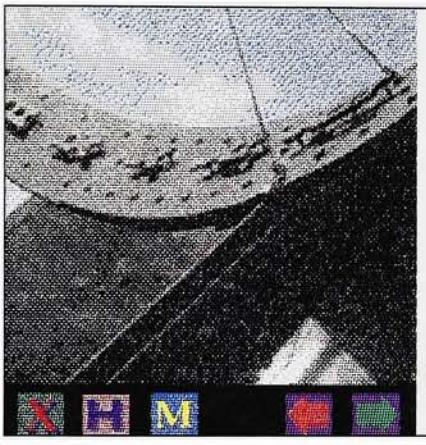

Architect Alistair Bevington's Sundial sits on the resident hall area of campus. The Sundial is 18' x 25' and is made with a special type of steel (Cor-ten steel) which has weatheed to a dark brown. The steel plates are 3/8" to 1/2" in thickness. The gnomen, a 1" solid stainless steel rod which casts a shadow on the face of the sundial, is suspended with yachting cable. The sundial was

Sculpture

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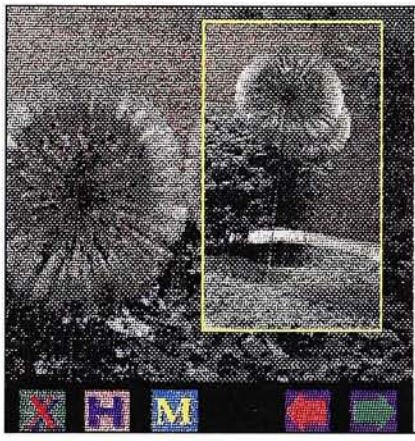

Harry Bertoia's "Golden Dandelions" sculptures consist of seven pieces. The sculptures are gold plated and were designed in 1964 for the Kodak World's Fair Pavilion. "Golden Dandelions" are located in the courtyard of NTID. The sculptures were a gift to RIT from the Eastman Kodak Company.

Sculpture

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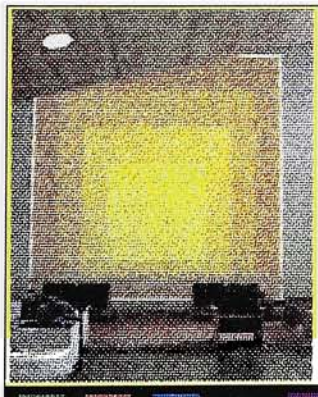

Josef Albers' murals titled "Homage to the Square" can be viewed in the lobby of the George Eastman Memorial Building. The two murals are located on the north and south walls of the lobby and were executed in warm shades of yellows and oranges. Both "Homage to the Square" murals are 22' x 27' and are the only known wall murals in existance.

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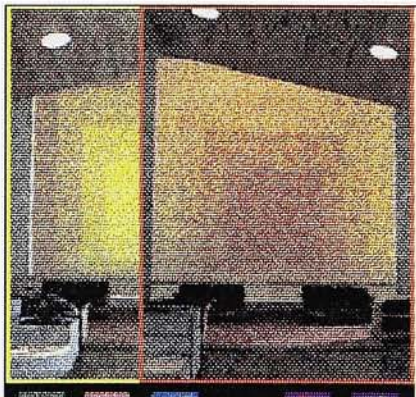

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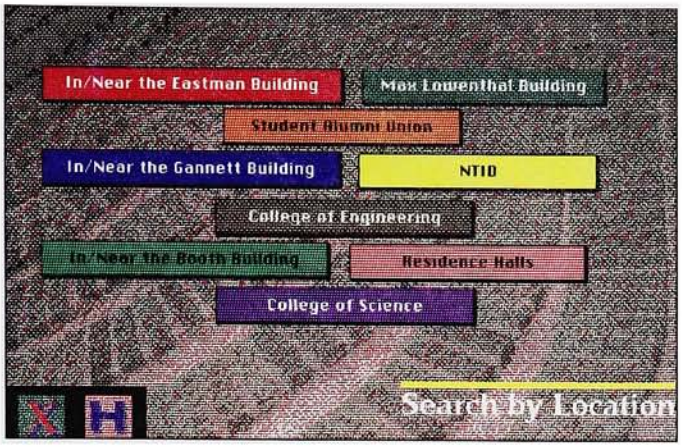
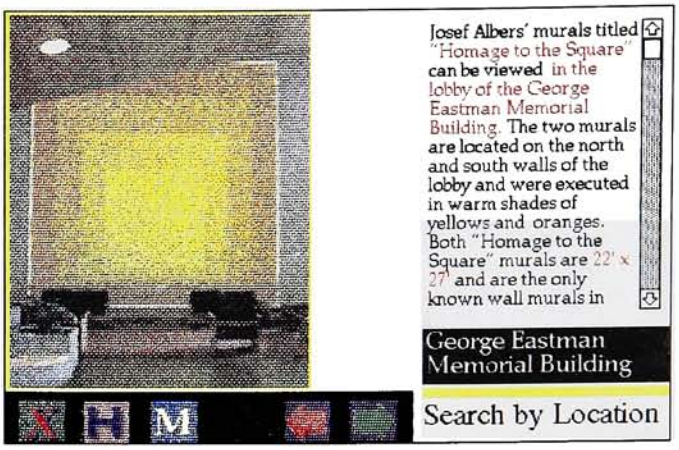

In/Near the Eastman Building
Max Lowenthal Building
Student Alumni Union
In/Near the Gannett Building
NTID
College of Engineering
In/Near the Booth Building
Residence Halls
College of Science
Search by Location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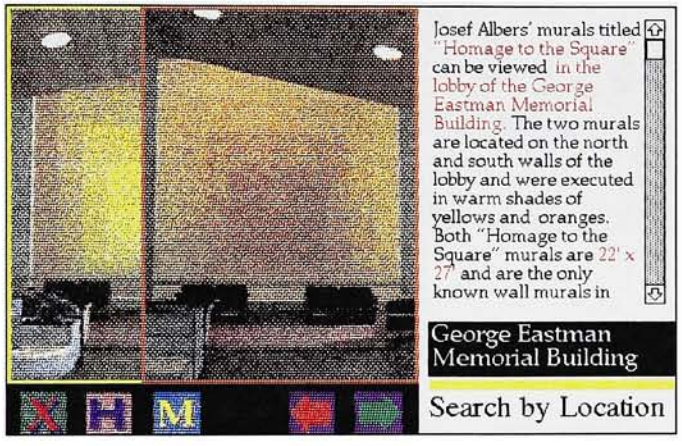
Josef Albers' murals titled "Homage to the Square" can be viewed in the lobby of the George Eastman Memorial Building. The two murals are located on the north and south walls of the lobby and were executed in warm shades of yellows and oranges. Both "Homage to the Square" murals are 22' x 27' and are the only known wall murals in
George Eastman Memorial Building
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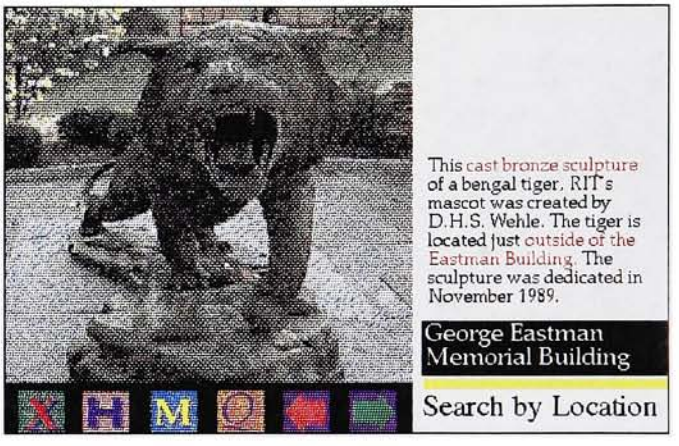
This cast bronze sculpture of a bengal tiger, RIT's mascot was created by D.H.S. Wehle. The tiger is located just outside of the Eastman Building. The sculpture was dedicated in November 1989.
George Eastman Memorial Building
Search by Location


The title of this piece is "Reflections" and was created by Fred Lipp, a designer and craftsman who teaches in the College of Fine and Applied Arts at RIT.
The sculpture is made of sheets of stainless steel and is suspended from the wall with bolts. "Reflections" is in the SAU Cafeteria and was proposed to the Beautification Commitee in the Spring
Student Alumni Union
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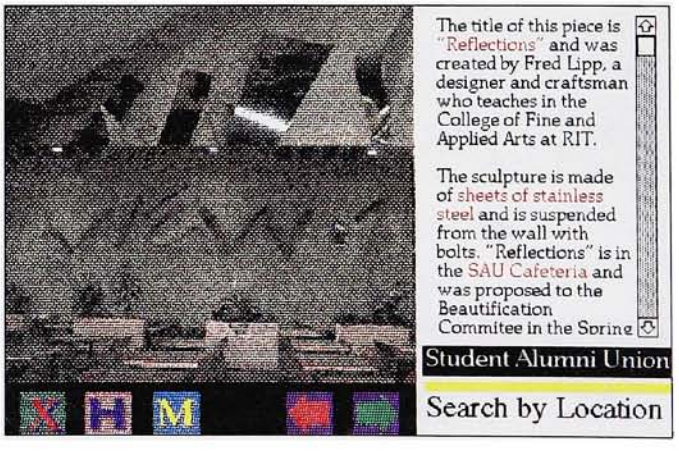
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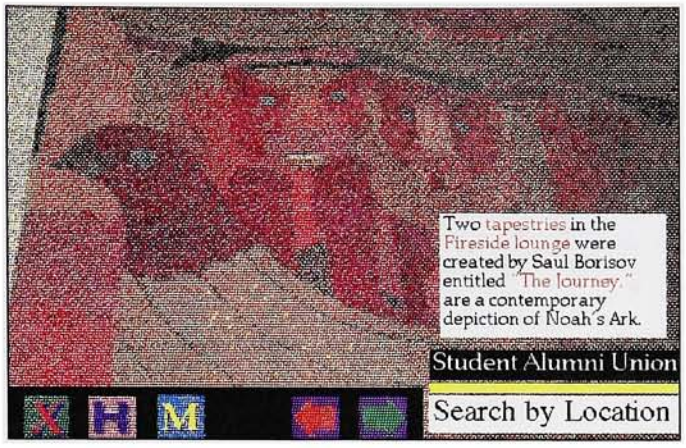
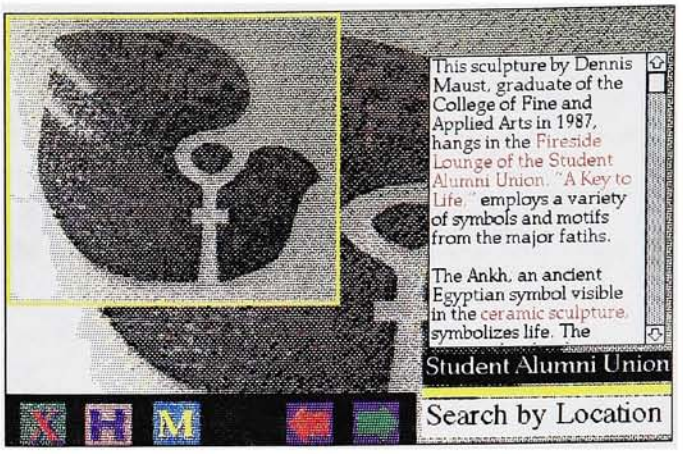
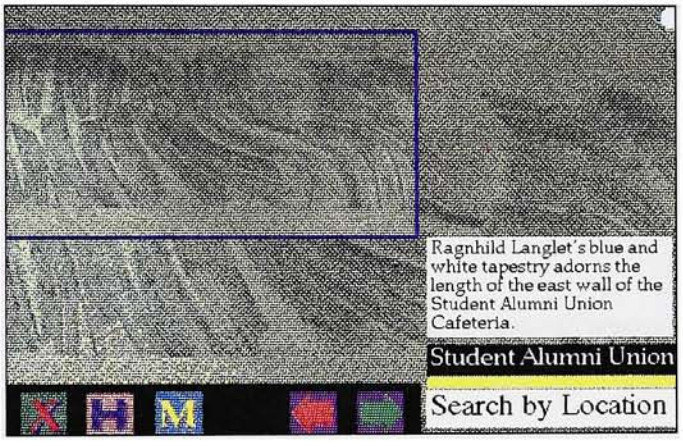

Two tapestries in the Fireside lounge were created by Saul Borisov entitled "The Journey." are a contemporary depiction of Noah's Ark.
Student Alumni Union
Search by Location


This sculpture by Dennis Maust, graduate of the College of Fine and Applied Arts in 1987, hangs in the Fireside Lounge of the Student Alumni Union. "A Key to Life," employs a variety of symbols and motifs from the major fatihs.
The Ankh, an ancient Egyptian symbol visible in the ceramic sculpture, symbolizes life. The
Student Alumni Union
Search by Location


Ragnhild Langlet's blue and white tapestry adorns the length of the east wall of the Student Alumni Union Cafeteria.
Student Alumni Union
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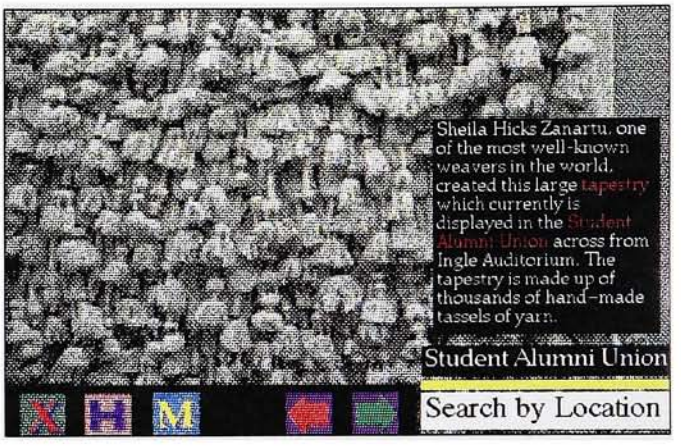
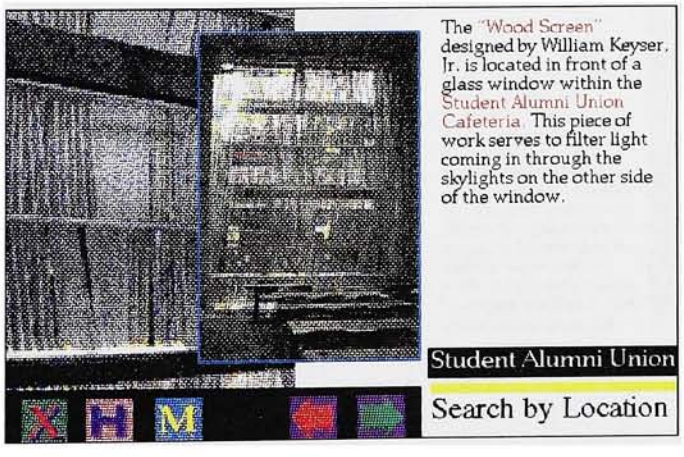
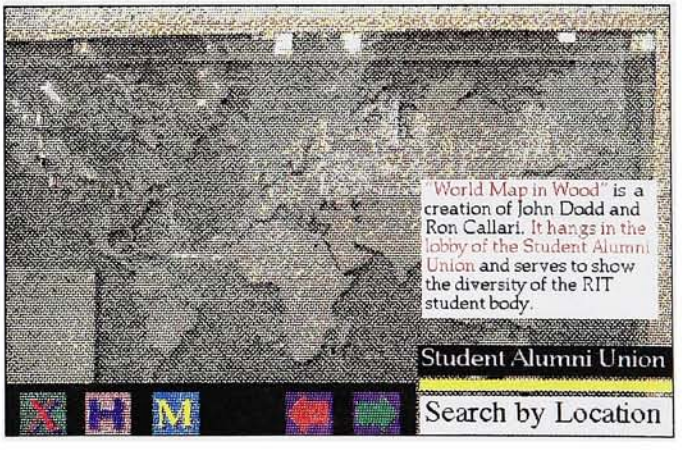
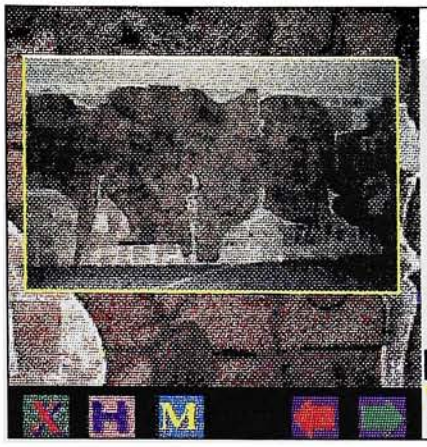

Sheila Hicks Zanartu, one of the most well-known weavers in the world, created this large tapestry which currently is displayed in the Student Alumni Union across from Ingle Auditorium. The tapestry is made up of thousands of hand-made tassels of yarn.
Student Alumni Union
Search by Location


The "Wood Screen" designed by William Keyser, Jr. is located in front of a glass window within the Student Alumni Union Cafeteria. This piece of work serves to filter light coming in through the skylights on the other side of the window.
Student Alumni Union
Search by Location


"World Map in Wood" is a creation of John Dodd and Ron Callari. It hangs in the lobby of the Student Alumni Union and serves to show the diversity of the RIT student body.
Student Alumni Union
Search by Location



"Allegory of a Landscape," a stoneware mural by artist Frans Wildenhain is the artists interpretation of aerial views of this region. This earthtone ceramic mural wraps around the curved wall of Ingle Auditorium in the Student Alumni Union. The mural measures 21' x 9'
Frans Wildenhain is a former professor at RIT's School of American Craftsmen.

Student Alumni Union

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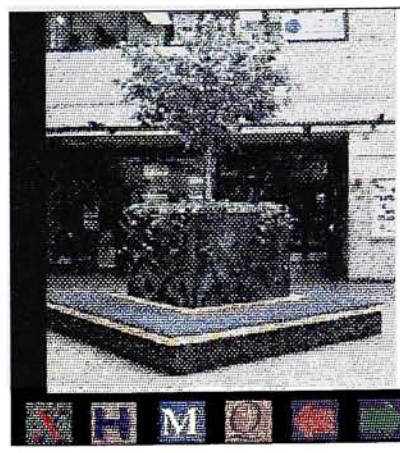

Harry Bertoia, sculptor and designer of jewelry was a pioneer in industrial metalwork. Bertoia's planters titled "Tree Urns" are cast in bronze and are located in the Student Alumni Union. The urns surround wooden tubs that hold small trees. Surrounding each planter is a bench which wraps around all four sides. The "Tree Urns" are 5' x 5' x 4' and weigh 1 ton apiece.

Student Alumni Union

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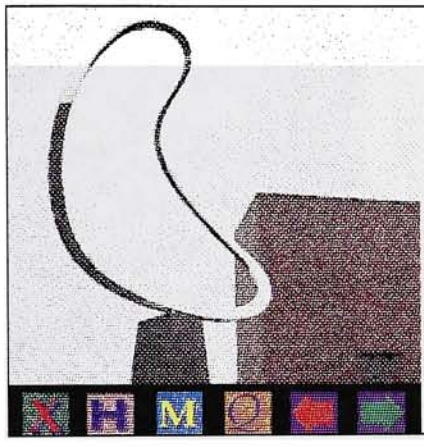
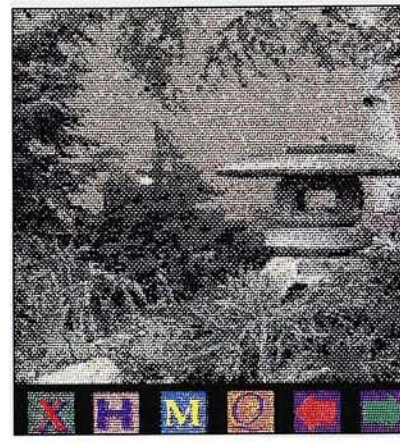


José de Rivera, sculptor of the "Infinity Loop" based his design on the Möbius strip, an abstract form discovered by 19th century German mathematician August Ferdinand Möbius. The loop rotates slowly, once each hour, atop a polished, black granite pedestal in front of the College of Engineering.

The pedestal is 12' tall and has a 1/4 HP motor

James E. Booth Building

Search by Location

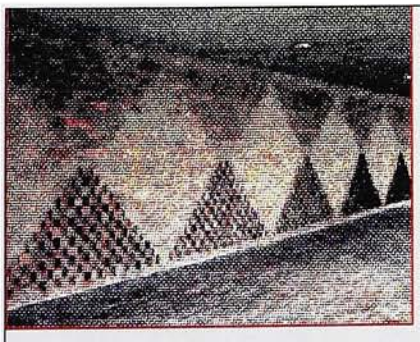


The Tojo Garden is located in the courtyard outside of the Gannett Building. The focal point of the garden is a hand-carved stone pagoda, artist unknown.

Mr. and Mrs. Tojo donated the money and stone pagoda in memory of their son who died in an automobile accident while studying photography at RIT.

Frank E. Gannett Building

Search by Location



Josef Albers' untitled brick mural located on the College of Science is a unique piece of work that must be experienced firsthand. The bricks set in the wall are at different angles and, when viewing it head-on, it looks like a series of triangles. However, Albers designed the brick mural to be one that the viewer must interact with to fully experience it. As you walk by it, the bricks comprising the

College of Science

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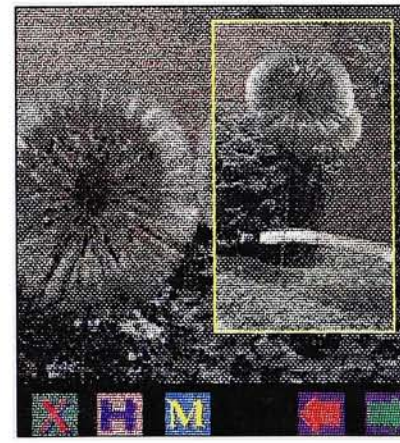

Harry Bertoia's "Golden Dandelions" sculptures consist of seven pieces. The sculptures are gold plated and were designed in 1964 for the Kodak World's Fair Pavilion. "Golden Dandelions" are located in the courtyard of NTID. The sculptures were a gift to RIT from the Eastman Kodak Company.

National Technical Institute for the Deaf

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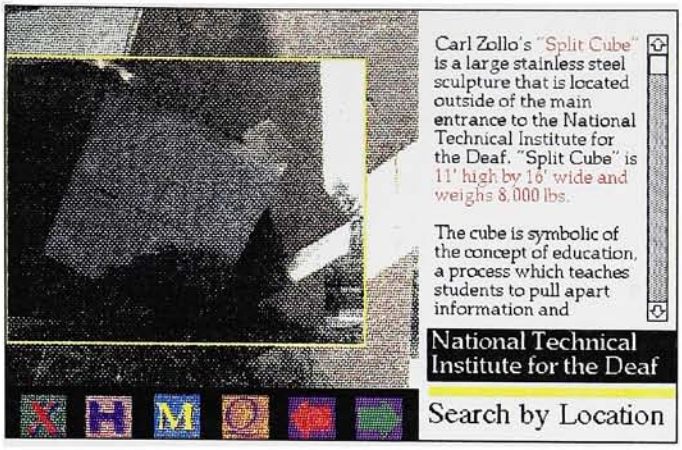

Carl Zollo's "Split Cube" is a large stainless steel sculpture that is located outside of the main entrance to the National Technical Institute for the Deaf. "Split Cube" is 11' high by 16' wide and weighs 8,000 lbs.

The cube is symbolic of the concept of education, a process which teaches students to pull apart information and

National Technical Institute for the Deaf

Search by Location

Architect Alistair Bevington's Sundial sits on the resident hall area of campus. The Sundial is 18' x 25' and is made with a special type of steel (Cor-ten steel) which has weatheed to a dark brown. The steel plates are 3/8" to 1/2" in thickness. The gnomen, a 1" solid stainless steel rod which casts a sha- dow on the face of the sundial, is suspended with yachting cable. The sundial was constructed

Residence Halls

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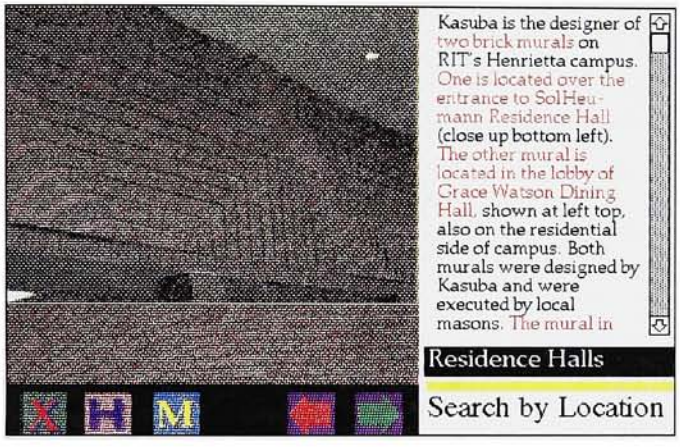

Kasuba is the designer of two brick murals on RIT's Henrietta campus. One is located over the entrance to SolHeumann Residence Hall (close up bottom left). The other mural is located in the lobby of Grace Watson Dining Hall, shown at left top, also on the residential side of campus. Both murals were designed by Kasuba and were executed by local masons. The mural in

Residence Halls

Search by Location

Max M. Lenderman, School for American Craftsmen professor created this tapestry which hangs in the lobby of the Max Lowenthal Building. Lenderman was inspired by the autumn leaves from wooded areas on campus.

Max Lowenthal Building

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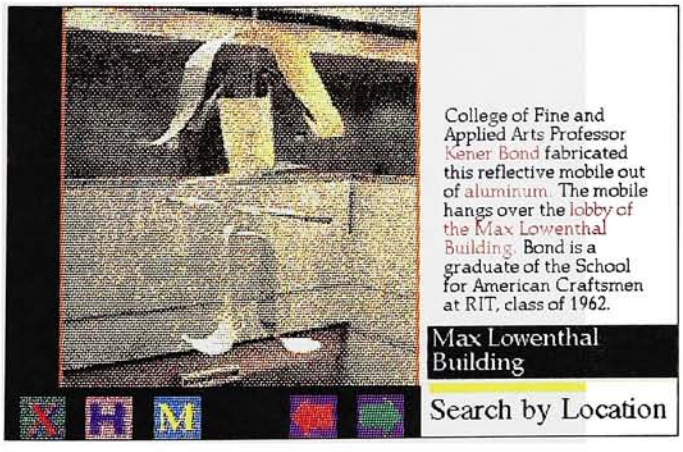

College of Fine and Applied Arts Professor Kener Bond fabricated this reflective mobile out of aluminum. The mobile hangs over the lobby of the Max Lowenthal Building. Bond is a graduate of the School for American Craftsmen at RIT, class of 1962.

Max Lowenthal Building

Search by Location

Henry Moore's three piece bronze sculpture "Reclining Figures" is located just outside the the College of Business. This particular sculpture is one of a series of seven. It measures 113" x 64" x 53 1/4" and weighs 3,200 lbs. The "Reclining Figures" were executed from 1961-1962. Moore always felt that his sculptures looked best outdoors interacting

Max Lowenthal Building

Search by Location