Multimedia and Networks Teach about Museums

Issues in Maintaining a WWW Site to Facilitate Distance Learning

Howard Besser

Visiting Associate Professor
University of Michigan School of Information & Library Studies
403B West Engineering Hall, Arbor, MI 48109-1092
tel: (313)764-3417, fax: (313)764-2475 email howardb@umich.edu

Introduction

A wide array of technological resources was employed in teaching a 1995 course on the impact of multimedia and networks. The course, taught simultaneously at the University of Michigan and the University of California at Berkeley, examined the impact of new technologies from a variety of perspectives (including cultural, political, and social), and focused on that impact upon daily life and upon social and cultural institutions (such as museums, libraries, and schools). Cutting-edge technologies were used to conduct the course in the two sites, and to provide text and multimedia resources to enrolled students and to the general public.

This paper reports on the experience of mounting multimedia information on the WorldWideWeb both for public consumption and to instruct students in the course. Paying particular attention to methods for making the information stand on its own without the presence of the instructor, the paper outlines a wide variety of issues, including: design concerns, technical limitations, and privacy issues. Concerns of ongoing maintenance of a WorldWideWeb site are dealt with in detail.

The Course

"Impact of New Information Resources: Multimedia and Networks" was an experimental, graduate-level course taught simultaneously in the Schools of Information and Library Studies at both

the University of California at Berkeley and at the University of Michigan. The experimental nature of the "Impact" course, as it was popularly known, lay in its distance education format. The class consisted of approximately twenty students in Berkeley and twenty students in Ann Arbor. The weekly lectures alternated between the two campuses. The instructor taught from the "live" site, students at the "remote" site contributing comments, questions, and, later in the semester, presentations. The primary distance medium for classroom instruction was videoconferencing from a specially equipped distance learning facility over ISDN telephone circuits. In addition to the classroom interaction, students used a variety of electronic media and resources to interact with the instructor and collaborate with other students.

The course content aimed to critically examine the new information landscape. It was essentially a communications course that examined new information likely to affect cultural institutions and everyday life from a variety of different social science perspectives, such as sociology, critical theory and public policy.

In addition to standard class attendance and readings, students were expected to join a focus group which paid special attention to issues related to the course, such as information retrieval, technology and creative arts, critical theory, or the possibility of virtual communities. Each of these groups met weekly and created and maintained an online news group, as well as a WWW page for their group. Students also created a Web page for themselves individually, reviewed a multimedia program and an online service provider, and did a major project or paper on some topic related to the class,

The instructor had taught the course in Berkeley three previous times without the distance aspect. Each time the course was taught, student work from previous terms was used as readings and other resource material, essentially building up a set of resources in this domain. And each time the course was taught, more automation and online resources were added to those of the previous term.

Papers reviewing various aspects of the course, as well as most of the WWW documents that students used in the course are available at http:Hwww.sils.umich.edu/impact/Winter95/html/class.html .

The WWW Site

Logistical problems in maintaining identical sets of class handouts and reserve reading materials at both sites created a strong argument for distributing these materials online instead of in print. The topical nature of the class also made it nearly impossible to distribute print versions of reading materials to both sites in a timely matter. (Frequently the class would discuss articles from that day's or the day before's newspaper which the instructor would post online.) Providing online course materials also immersed the students in the subject of the class — the impact of new information technologies.

Course materials were all posted as WWW documents and linked on a class HomePage (see Figures #1 -2). These materials included the instructor's and students' HomePages, the syllabus, a course description including major themes and questions of the course, assignments, information about guest speakers, readings (updated weekly), materials from earlier versions of the course, and, as the semester progressed, focus group HomePages (see Figure #3) and student essays and projects. The site served both as an online coursepack (facilitating both instructor and student access to readings and assignments), and as a repository of information about the course for outsiders.

A key student project for the course was The Impact Guide to Museums on the Web — an index to museum information throughout the world. This Web resource (see Figure #4) provides access to museum WWW sites by subject area,(currently Archaeology , Architecture , Art , History , Natural History , Science & Technology — see Figure #5) the geographic location of the museum (Figure #6), and the geographical region of the museum's content (Figure #7). It builds upon previously existing museum indexes, and extends the indexing to new areas, providing new forms of user interface (including a clickable map of the world — Figure #8). The system is flexible and new indexes can be added relatively easily. This resource was originally built by two Berkeley students in a previous (non-distant) version of this class, and new sites, features, and indexes were added by Michigan students during the Distant Education version of the class.

WWW Management Issues

The construction of a WWW site for this class exposed a wide variety of problems inherent in maintaining an ongoing WWW site with multiple contributors. This included issues of permission control, physical arrangement of files, ownership and maintenance of files, and presentation to end users.

Multiple contributors/collaborators

Because the content for the WWW site was generated by over 40 different users, it was difficult to maintain a constant "look and feel" between the different student contributions. Pages on the same subject often appeared to come from different WWW sites because their authors gave them such individual looks. This created a jarring impact on the end user. The instructor had intended to develop extensive guidelines for the students to follow, but the person in charge of this never followed through.

This experience made clear the necessity of guidelines for collaborators on a WWW site. Important features for such guidelines include layout, font and sizing, expression and placement of a variety of document parts (site title, links to other parts of the site, document title, document author, etc.), citation formation, etc.

Another key area that requires guidelines is that of filenames and links. Collaborators must agree on file name conventions. The problem of inconsistent naming becomes more acute as sites grow in size and management functions (such as updating, distinguishing file-types [including image file types, compression, etc.], grouping files by contributor, etc.) become more difficult.

Permission control

Due to restrictions on intellectual property rights, access to many of the files for the course had to be limited. Restricted material had to be identified and isolated into directories which could then be permission controlled.

Common WWW software permits two types of control: by user password or by the user's IP address. Password restrictions posed management difficulties: handing out individual passwords to 40 students and noting all these in each restricted WWW directory created too much overhead; having all students share a single password was deemed too insecure (including the fear of a student posting the password on a bulletin board or newsgroup). Restrictions by IP address faced the problem that many students used a variety of different workstations, many of them in public areas.

A decision was made to control access by IP address, but this approach provided access to a broader population. Approximately 3/4 of the students were served by granting permission to IP domains of commonly-used public terminal rooms, as well as to home accounts. But providing access to the other 1/4 of the students required a lengthy list of IP addresses (including individual workplaces, spouses' and friends' workplaces, other campus departments, off-campus dial-in services, etc.). In may of these cases a single IP address was not enough (such as for students who didn't have their own workstation at work, and had to rely on borrowing workstations from several different colleagues).

Granting permission to students who dialed in from home was quite different at each of the two campuses. The Berkeley campus gives each student their own personal Home IP address, making it easy to create a list of permissible addresses. On the Ann Arbor campus, on the other hand, IP addresses are assigned dynamically at login. This makes it impossible to create a list of IP addresses for students in the class; instead it was necessary to allow access to all IP addresses that can be assigned by each Ann Arbor dial-in number.

Physical arrangement of files

Directory structures — how the sets of WWW files are grouped and organized — is of critical importance. Once a WWW site is established, it is extremely difficult to reorganize the relationship of files to one another, as this will require resetting every link in every file that refers to a document that is moved. Any complex WWW site needs to develop guidelines to indicate how files should be grouped.

It is advisable to express hyperlinks as relative rather than absolute pathnames wherever possible. (A relative pathname shows its location in relation to the current document [filename defg within the directory abcd in the current directory]. An absolute pathname explicitly states an Internet address [via a URL].) Relative addressing of links allow one to change the site node- name or higher-level directory names without having to update hundreds of links. It also makes it possible to create a mirror site, or to move the entire site to a new location.

Ownership and maintenance of files

This course exposed several short- and long-term maintenance problems with dynamic collections of digital information. Because most WWW sites are constantly updating and changing, how do we provide a "snapshot" of 1995 information resources to future generations? A key problem the class experienced was that the systems manager was unable to archive the extensive netnews discussions, and the only remnant that now remains is the printed copies of a few discussion fragments.

Another key problem faced by any WWW site is the maintenance of hyperlinks to resources (particularly those at other sites). Any time someone changes file or directory names or rearranges their site, all hyperlink pointers to those files or directories become outdated. From the experience of this class, it is advisable that all links be checked on some kind of regular basis, and some effort must be made to update dead links.

Collaboratory work on a WWW site poses the question of where files should reside. Files located in personal directory space allow the individual who owns that space to continuously debug and make changes to those files. But files within personal spaces are inaccessible to others, and any collaboration on these are forced to go through the directory owner who must act as a gatekeeper.

Files stored in group or central locations (in theory) permit equal access for all group members, and should encourage greater collaboration. But because most current software does not allow the tracking of individual contributions, collaborations can lead to contentious arguments (particularly when one person edits portions of what someone else has done — and the previous work disappears). Furthermore, current Unix permission structure does not handle "group" permissions very well; each time one edits a file in a group area they must be very careful to avoid the permission for the entire directory reverting back to their own personal account (thus locking out all other group members from being able to write on any file within that directory.)

The experience of this class has shown that much work must still be done on operating system and word processing software before collaboratory work can become widespread. Most needed are developments in the areas of permissions, ownership, and tracking of individual contributions.

Presentation to end users

A key reason for the explosive growth of the WorldWideWeb is that this service is available from a wide variety of machines using software that can be obtained without charge. But even though access to the WWW is relatively ubiquitous (at least among computer users with modems or Internet connections), this does not mean that all users can access it with equivalent capabilities or ease. Individual user environments differ in capabilities of displaying graphics or images, compression, and bandwidth.

A good WWW site design must take into consideration the differing end user environments. Users without graphics capabilities should be able to access information in a pure ASCII format. This means providing alternate routes to ISMap navigation — navigation where one clicks on an image such as a map to indicate choices. (in Figure #4 "Query by Museum Location" can either use text-only query or use the ISMap shown in figure #8.) Design for users with low network bandwidth requires avoiding the delivery of large image files without first warning the user (see figure #9). If one doesn't include warnings such as these, users with low bandwidth connections may wait hours to download an image. Finally, it is also wise to include an indication as to storage format and compression scheme for an image; without this users who do not have the software needed to view these may wait a long time for an image to download before they find out that they cannot view it.

Another serious presentation issue involves what version of the HTML markup language one chooses to use. A number of WWW browsers (most notably Netscape) have implemented interesting features which can only be read by that browser. The temptation is great to employ these features, but doing so could be dangerous. These non-standard features will not be viewable by people using other browsers. And these features may change in future editions of the same browser. When considering the employment of such a feature, it is advisable to (1) determine the likelihood of its inclusion in future standards implementations (which today would mean looking through the emerging HTML 3.0 standards documents); and (2) carefully noting any use of non- standard HTML commands so that one can replace these with standard HTML commands when they become available.

Social and Policy Issues

The presentation of such a WWW site also raises a variety of social and policy issues. These include concerns over maintaining currency vs. archiving, over privacy, and over developing a dependence upon a set of technological tools.

Currency vs. Archiving

This WWW site served a myriad of functions. It was an archive of previous versions of the course (including student papers, course resources, and the tools and interfaces that students from previous terms had used to view course material). It was a teaching tool for currently-enrolled students (and had to evolve over the course of the semester according to changing student needs). And it served as a guide to the general public in the area of the "Impact of Multimedia and Networks".

The different functions often posed conflicts in deciding how to present the information. For example, the archival function (which seeks to preserve things the way they were) often conflicts with attempts to make information more up-to-date or easier to navigate for current students.

Future versions of this course will probably lean away from the archival function and try to excerpt the most relevant and up-to- date (approximately 50%) of material from previous terms. This would involve an editorial function, and probably follow a traditional "publication" model, where items are reviewed for relevancy and currency.

Privacy

In an attempt to provide an intimate picture of the class to interested parties (both currently and in the future), students were asked to post all coursework in public spots where others could read them. Most students appreciated the ability to review coursework from prior terms, and many said that this helped them gauge course requirements, find readings and citations relevant to the course, and inspire selection of project topics.

At three points during the term students were required to post their personal impressions of the distant learning experience, and these essays were immediately moved into central storage so that they could be publicly accessed but couldn't be altered (as the students' impressions changed). Again, this provided a valuable resource in reviewing the changing impressions of the distant learning experience. But it is likely that students were less frank in their criticism of the instructor, RAs, or fellow students than they would have been if the essays had been less public.

All these activities raise serious privacy questions. Is it an invasion of privacy to force a student to electronically publish their work? What about their personal impressions of a course? Future versions of this course will probably continue to require public postings, but experiment with masking identities.

Reliance on Technology

Surprisingly, the more common ("lower level") technological tools employed in this course posed far more problems than the "more advanced" tools. Classroom and student-to-student video connections

were extremely reliable (the classroom video connection only went down twice). Clear audio was a little more problematic. But what posed the greatest technological challenge for this class was the maintenance of the WWW site. Network sluggishness and server downtime caused occasional problems.

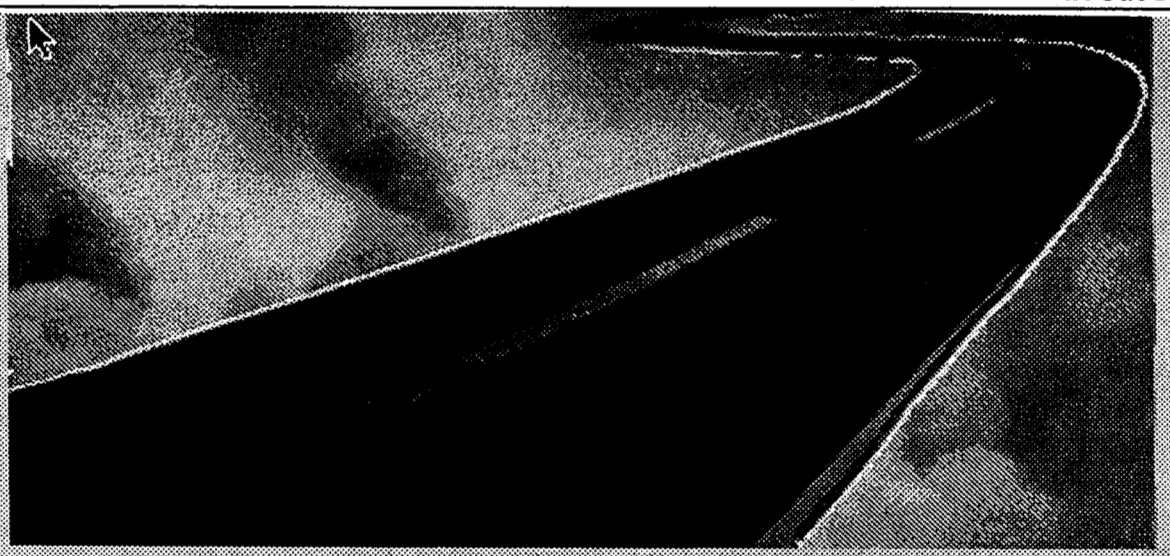
File permission control problems plagued this course. Systems administrators could find no way to conveniently allow the instructor and two research assistants to all have write-access to the same set of central course files. As mentioned earlier, each time a person would edit a file, all the files in that directory would revert from group ownership to personal ownership by that individual (preventing the others from writing to that file in the future). We can't expect group work to become widespread until operating system level tools for collaboratory access are developed.

Because virtually all course materials were available online (and most of these only available online) the course was dependent upon guaranteed online access. Though online systems are quite reliable, they have not yet achieved this degree of reliability. Today's systems are reliable enough for searching for a book or sending email (activities that can be shifted around in time), but they cannot guarantee a decent level of performance every time a student wants to verify an assignment or interact with a student 2,500 miles away. Until our systems can achieve the reliability level of fault-tolerant systems (such as those used by the automated teller machines at banks), placing all access into an online environment will only encourage resentment among the people who must use it.

Conclusion

Maintaining a WWW site for a distance learning class revealed a number of serious concerns that need to be dealt with in any robust WWW site. The issues reviewed here should be useful for anyone planning to mount a WWW site.

Acknowledgments This course was funded by a grant from the Kellogg Foundation to the University of Michigan School of Information and Library Studies for the development and redefinition of Information Studies curriculum.. Research Assistants Maria Bonn and Sara Ryan (Michigan), and Alex Sutton and Natalie Zee (California) helped coordinate both the class and the Web site. The Museum Guide was originally built by Tracy Seneca and Robert Schroeder of UC Berkeley, and revised by Terese Austin and Catherine Rudelich of the University of Michigan.



Impact of New Information Resources:
Multimedia and Networks
Winter 1995 Homepage

The Winter 1995 version of the course "Impact of New Information Resources: Multimedia and Networks" was a distance learning course taught simultaneously in Ann Arbor and Berkeley by

Howard Besser.

Description

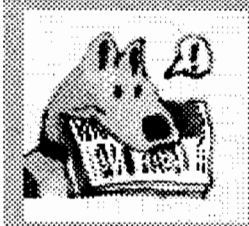
Major course themes and questions

Syllabus

Web documents created for earlier versions of the course.

What We Did In This Course

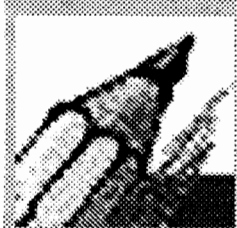
Assignments



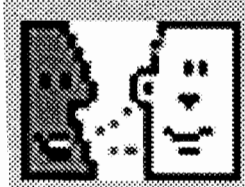
Newspaper Articles

Projects

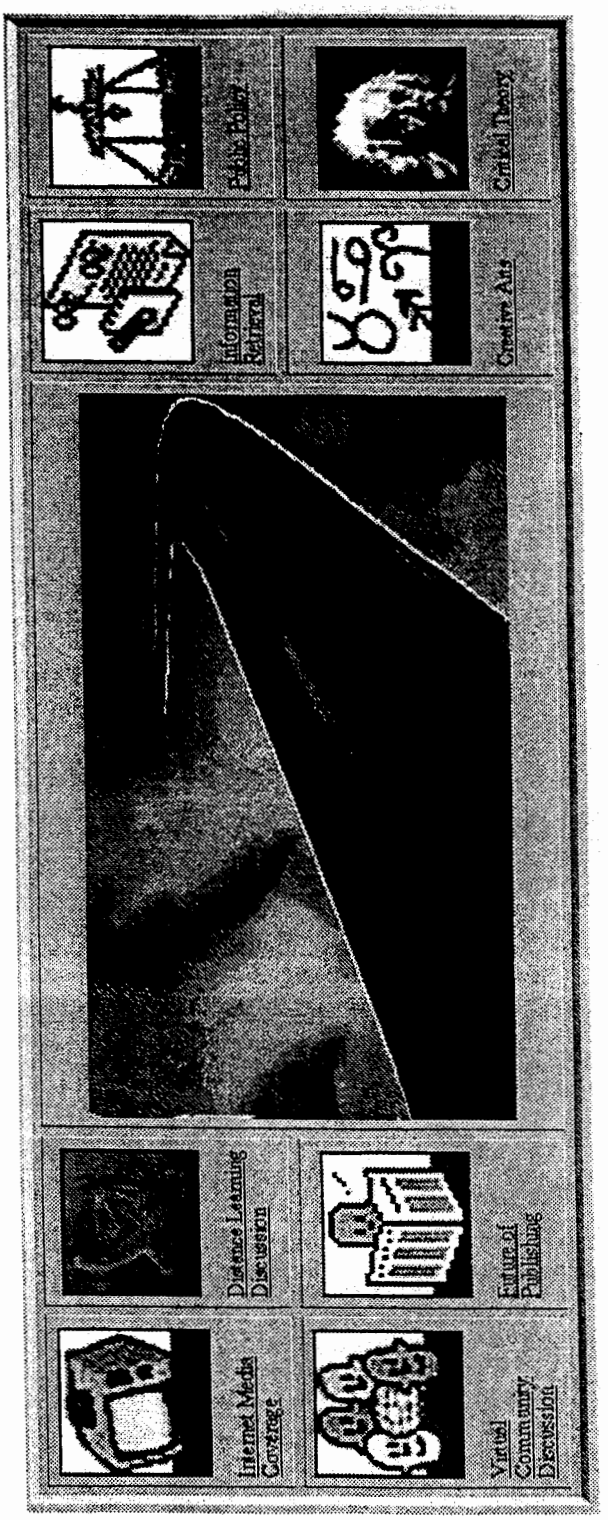
Homepages

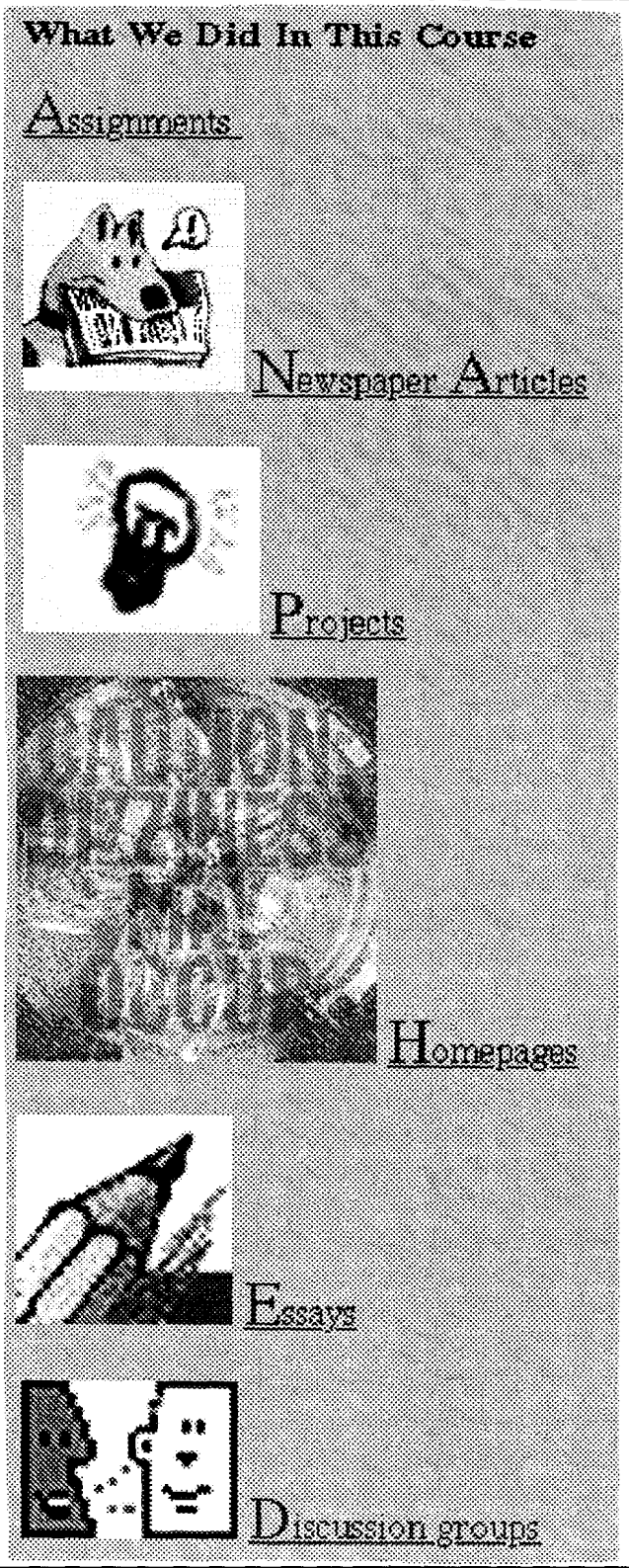


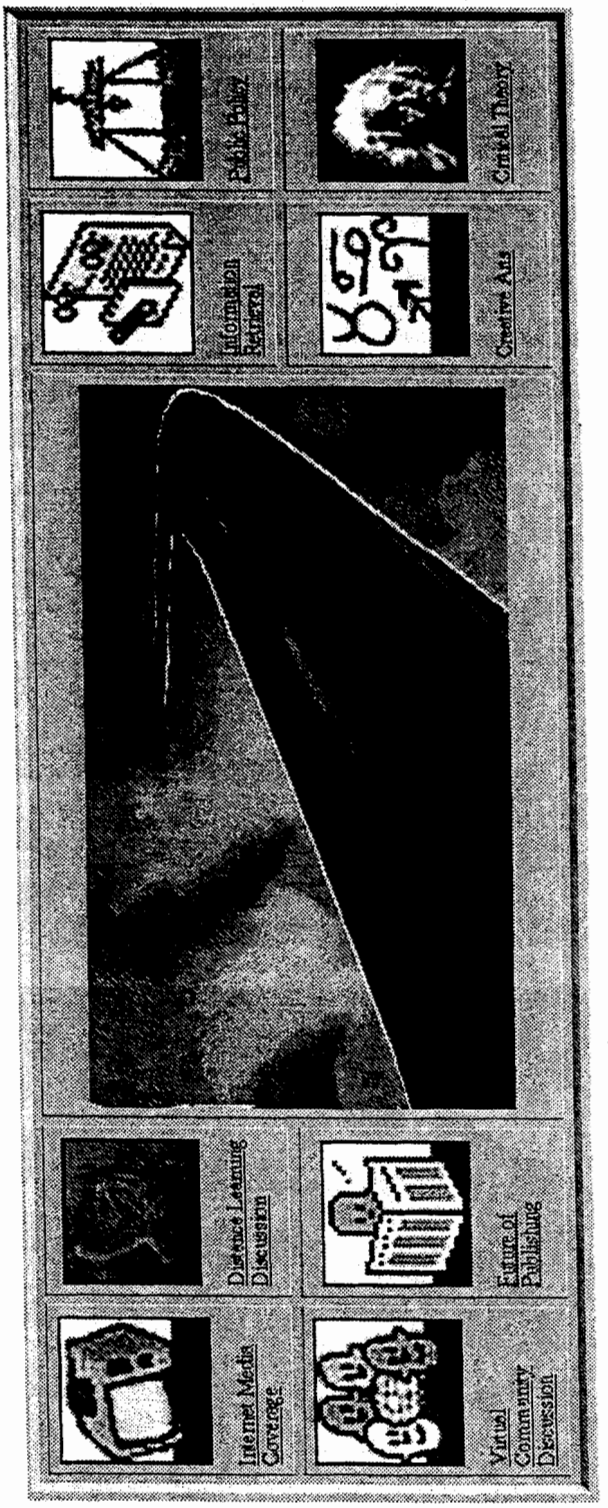
Essays

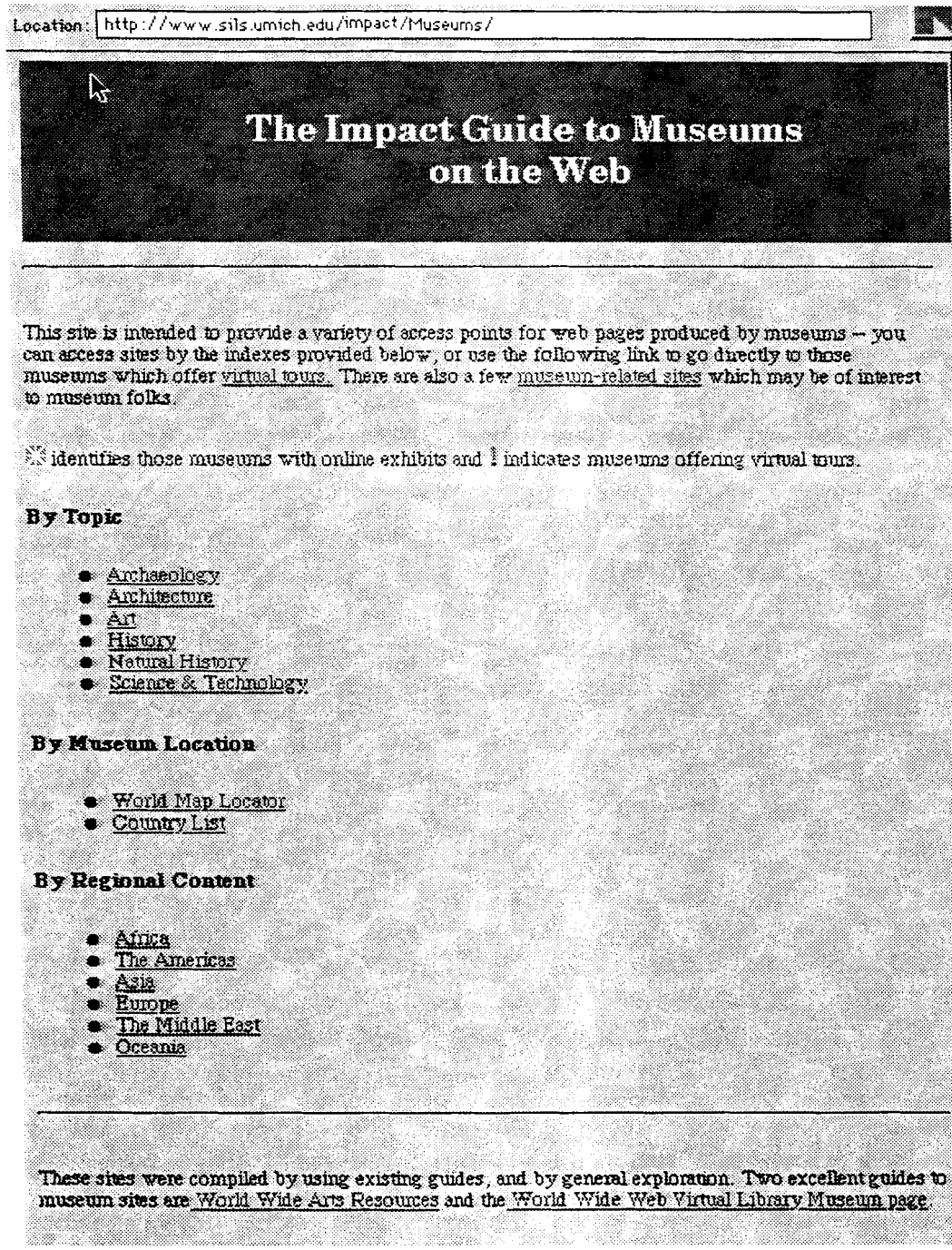


Discussion groups









Architecture

Australia

- National Gallery of Australia Includes many images of prints and architecture images.

Finland

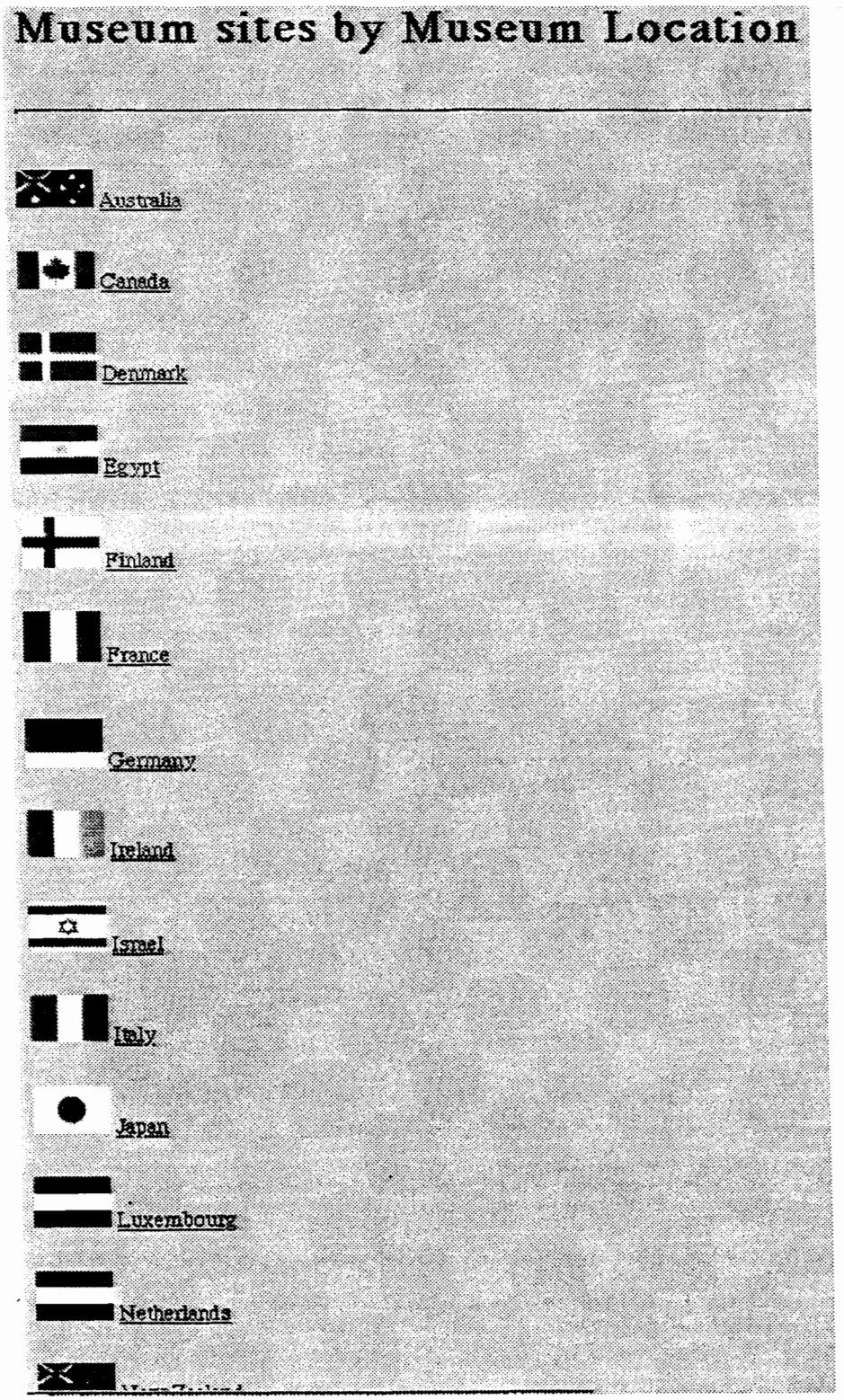
- Alvar Aalto Museum Jyvaskyla. Exhibit on Alvar Aalto, Finnish architect.

Norway

- Troms Museum Troms. (In Norwegian)

Russia

- Paleontological Institute of the Russian Academy of Science Moscow. Exhibits include Mongolian dinosaurs and architectural motifs of the Institute. (In cooperation with U.C.



Regional Content: Europe

Denmark

- Karen Blixen Museum. Rungsted. Exhibits on the life of the Danish author (In Danish)

Finland

- Alvar Aalto Museum Jyvaskyla. Exhibit on Alvar Aalto, Finnish architect
- Oulu Art Museum Oulu. Mostly 20th century Finnish art.

France

- Centre National d'Art et de Culture Georges Pompidou Paris. (In English and
- Galleries Nationales du Grand Palais Paris. By The Paris Pages.
- Maison de Victor Hugo Paris. By The Paris Pages.
- Musee Auguste Rodin Paris. Several images from the sculpture garden by'
- Musee National du Moyen-Age Thermes de Cluny Paris. Several images o Paris Pages.
- Musee d'Orsay Paris. Some of the museum's most famous paintings online Pages.
- Musee de l'Histoire de France-Archive Nationales Paris. By The Paris Pages.
- Musee de l'Orangerie Paris. By The Paris Pages.
- Musee de la Monnaie Paris. By The Paris Pages.
- Musee du Petit Palais Paris. By The Paris Pages.

Germany

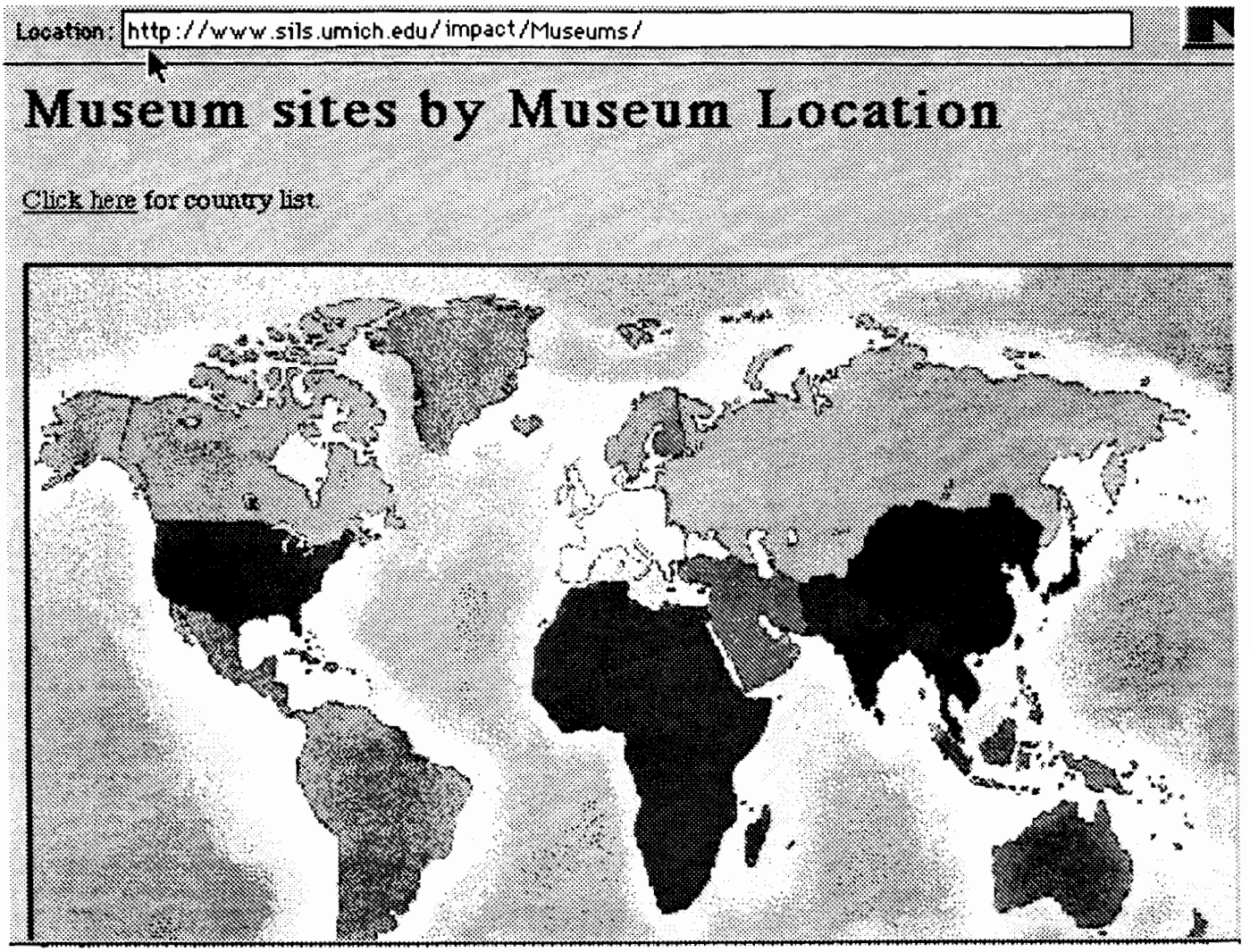
- Atomkeller-Museum Haigerloch. Online exhibit of German experiments on during World War II. (In English and German)
- Reiff II Museum Aachen. Online art exhibits. (In German) Tour

Ireland

- Telecom Eireann Museum of Communications Exhibit on Irish CallCards.

Italy

- Astronomical Museum of the Observatory of Rome Rome. Descriptions an of historical astronomical instruments and artifacts.
- Astronomical Museum and the Observatory Tower Bologna. Early astronom instruments.
- Istituto e Museo di Storia della Scienza (Institute and Museum of History o Florence. Several online exhibits of historical scientific instruments. (In Englis
- HREF="http://www.christusrex.org/www1/vaticano/0-Musei.html"> V Rome. Many images of Vatican treasures.
- Museum of the Physics Department Naples. Early instruments of the Instit



Friday Noon Lecture Series

Impact of New Information Resources: Multimedia and Networks

An occasional series of presentations by practicioners in the forefront of their fields. This continuing series examines cutting-edge technology and its impact upon society and daily life.

Nov 4, Ben Davis

4.1Mb Video Clip

Dubl-Click on photo to download Video

Nov 18, Steve Dietz

4.1Mb Video Clip

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