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HAS HYPERTEXT COME OF AGE ?

February 25, 1988

Seminar Notes

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This session of the communications forum examined the concept of hypertext which has become an active buzzword in the computer and information systems industries. These systems give the user the ability to create linkages between different sets of data. Although hypertext systems have been around in the R&D phase since the early 60's, it has not been till recently, especially with the advent of more powerful personal computers, that hypertext in the words of Norman Meyrowitz "has become reborn." Norman Meyrowitz presented background on the work of one such system at Brown University, while Ian Williams presented an overview of his companies commercial hypertext system. Both speakers are excited about the potential of hypertext in both academic and commercial applications.

Norman Meyrowitz from the Institute for Research and Information Scholarship (IRIS) at Brown University provided an overview of the evolution of hypertext. According to Meyrowitz the term "hypertext" is actually about twenty-three years old. The terms "hypertext" and "hypermedia" were apparently coined by Ted Nelson who believed that knowledge is an association of thoughts and not simply linear in nature. The concept of hypertext is based on the belief that these associations are not only textual, but also include connections to all sorts of ideas, e.g., text, graphics, audio, maps, voice, etc.

Meyrowitz believes that the Talmud could be considered a predecessor to hypercard since this literary work combines primary text with secondary commentary. He also alluded to a 15th century book--The Latin Tongue Not Unfurled--which might be considered an early example of hypermedia. According to Meyrowitz the book contained a set of pictures of humans, animals and birds with numbers attached to different components that were cross-referenced. The book enabled the reader to turn to the appropriate page for an explanation of each of the components. He noted that today with the help of computer technology we have access to visual dictionaries that are similar to this 15th century system. Today, vast amounts of information can be shared over a network.

Meyrowitz reiterated the fact that hypermedia and hypertext are not just ways of browsing for information. Instead, it should be thought of as an environment in which new information can be created, e.g., text, graphics, time lines, etc., and be linked together in to a "web" of information.

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Meyrowitz points out that although hypertext has come a long way there are many issues, espcially technical, that must be overcome before it can be considered a mass media. In this light, Meyrowitz showed a videotape of a system at Brown known as "Intermedia." This is a "shared, multi-user, hypertext, hypermedia system for education and research. This project has been underway at Brown for the past two and a half years with funding provided by IBM, the Annenberg CPB Foundation, and Apple Computer. According to Meyrowitz, the idea of the project was "to create a seemless environment where people could go to do their research, and find and create shared linkages between information."

IRIS chose to evaluate the "Intermedia" system by using it in the coursework for two undergraduate courses at Brown. After evaluating proposals from the faculty, IRIS chose to pilot the system in a survey English course and in a course in plant cell Biology. The Intermedia systems were introduced in to these two courses in the Spring term of 1987:

Brown University English Professor George Landow wanted to provide his students with extensive background information, e.g., social, political. religious, etc. to enhance their understanding of certain literary works. Landow emphasizes the importance of making linkages to factual information since his course is a seminar and therefore emphasizes discussion. Intermedia's extensive linking and graphics capabilities allowed the professor's students to tackle challenges like creating a graphic representation of how the work Great Expectations related to the other works studied in the context of the class. The professor seemed to be especially impressed with the system's ease of use (a mouse is used to go through the system) and extensive graphics capabilities, e.g. hard-copy pictures and drwaings reproduced very favorably on to the system.

The second Intermedia pilot project involved supplementary material for Professor Haywood's course in plant cell biology. The professor's object was to use the Intermedia system to make-up for the fact that the course did not provide students with hands-on lab experience.Graphics, e.g. pictures of biological pocesses and images from an electron microscope were created and

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linked to the biology class notes and readings. In addition, IRIS specifically developed a tool, in response to the professor's request, to provide 3-D images for the students to view. According to Professor Haywood the system allows for students to easily access information, whereas students might have to take out twenty books from the library without it.

Both professors and students were overwhelmingly positive about their experiences with the system. The IRIS project manager noted that the Intermedia system "did not seem to present the students with any conceptual problems." Professor Landow remarked on the improved quality of discussion in his class, while Professor Haywood acknowledged his students use of the links provided by the system. This positive reaction was important to the study of Intermedia because it was not a required part of either course. Several students remarked that they used the system as an academic resource to study for the final exam and in some cases students used the Intermedia system to the exclusion of reading the required texts for the course. In general, the use of Intermedia seemed to enhance the students' learning process.

There were also technical problems noted in the course of the Intermedia pilot studies, e.g., system crashes and system slowness. Meyrowitz pointed out that these problems have been addressed in refining and improving Intermedia. Some students did voice negative feelings that the Intermedia system might stifle students' creativity since most of the course information is put together for them. Other students aired mixed feelings, e.g., the system is good because it can be accessed a number of hours per day, yet students realize that the system is not human and therefore it is difficult to carry-on a debate with it.

The goal of the Intermedia project, according to Meyrowitz, was to get to the point where IRIS was no longer concerned so much with the medium, the technology. Instead, it wanted the discussion to focus on the use of the medium and the content. It appears that this goal was realized especially since the students dealt with the system as an integral part of the course work and assumed Intermedia would be an on-going system.

Anthropologists at Brown (in the Office of Program Analysis-OPA) were also asked to observe the project. In general they

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felt the system worked, e.g. it enabled professors and students
to connect new data to existing problems. This is referred to as
a multi-causal, integrated approach to thinking. The anthro-
pologists refered to this process as true education since it
allowed students to think like trained scholars. In contrast,
one problem they did cite was that the Intermedia system was
slower than professors and students had anticipated. However,
they emphasized that despite this shortcoming, everyone was able
to use the system.

Ian Williams, the Director of Office Workstations, Ltd (OWL)
went on to discuss the development of large hypertext systems
especially for commercial applications. He provided a general
overview of the advantages of hypertext versus linear medium.
According to Williams, hypertext allows for much more rapid
linking of information than human discourse can provide.
Furthermore, Williams noted that hypertext documents allow one to
consolidate information and are therefore not as redundant as
paper-based media. He believes that hypertext thus allows the
individual to become a better communicator since allows the user
to focus in on ideas. Williams noted that hypertext can even be
used advantageously to communicate information in linear
channels, e.g., he used a hypertext system, instead of a word
processor to outline his speech for this forum.

OWL's first hypertext product, known as "GUIDE," has been on
the market for a couple of years. It runs on the Apple MacIntosh
and Microsoft Windows which were already available resources in
the marketplace. Williams noted that in developing its GUIDE
system, OWL faced challanges similar to those faced by
Intermedia.

Some of the features of the Intermedia system, e.g. one window
per document, the "point and click" linking action, the graphics
quality, are typical of what can be found in GUIDE hypertext.
Like the Intermedia system, GUIDE can support text and graphics,
gives the user full editing capabilities, as well as the ability
to import graphics and print hard copy. The GUIDE system, like
Intermedia, provides the user with windowing capability, i.e.,
the user can shrink some information in to the background of the
screen, while other information is brought in to the forefront.
The GUIDE system provides users with a lot of functionality at

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the press of a button, e.g., there is a reference button,
expansion button, note button, command button, etc. As with the
Intermedia system, GUIDE presents the user with a visual table of
contents or index to navigate his way through the system.

In contrast to IRIS's work on Intermedia, OWL's development
of GUIDE is driven by market needs. Recently, OWL has used
enhancements of GUIDE to address the needs of those in the
business of vehicle maintenance, parts catalogs, production
assembly systems, etc. In general, OWL's enhanced systems are
applicable to any operation where there is a large collection of
documents that take up a lot of physical space and must be
accessed by a large number of users, e.g., 100-200 users.
According to Williams, the real challenge is converting existing
information from word-processing type systems and paper, as well
as meeting a variety of industry standards.

One client of OWL's is in the nuclear power plant business.
Williams noted the extensive documentation needed for the
maintenance scheduling of such facilities. In the past, over 800
manuals were distributed, requiring over 100 meters of shelving
per set, as well as a large annual cost (a half million or more)
to maintain the paper-based system. OWL had to be sensitive to
the requirements of the nuclear power regulatory environment in
implementing its hypertext system. In the case of the nuclear
power plant client, OWL installed a hypertext system using a
mainframe computer and an ethernet network. According to
Williams, the system has been designed to stand-up to a highly
demanding environment and work effectively in a high-tech
environment.

Williams went on to discuss the role of the Systems Manager
in maintaining the hypertext system. This person can index
information on the hypertext system similar to the way a
librarian organizes a library card catalog. Readers can retrieve
documents by searching the indexes. The "catalog card" provides
users with information on the origin and status of documents. In
the end, a user can use the hypertext links or computer commands
to call-up related information.

Williams made some general observations about the future of
hypertext technology and the marketplace. He has observed the

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integration of hypertext in to microcomputer software products, e.g., a hypertext "help" file appears in Microsoft's EXCEL (a spreadsheet application). It is becoming more common for applications to be able to "talk" to other applications, as more well-defined interfaces are developed. According to Williams, this makes it easier for thrid-party companies to work on systems that can be integrated. Another trend he has observed in software design is the increasing transparency of systems. In other words, the user is not easily aware of sophisticated functions the software is performing since the user only sees the simplest aspects on the computer screen.

In addition Williams sees the industry working on improving the way in which hypertext systems index information, as well as integrate information, e.g., integrating full text systems with other kinds of databases. He also believes there is a lot of standardization going on in the industry which will result in the acceptance of certain kinds of formats that all applications can rely on. According to Williams this will lead to the integration of several of the tools he has mentioned. Lastly, Williams believes that as systems like Intermedia and OWL arise with emphasis on ease of navigation, use of hypertext will become much more widespread.

In addressing the hypertext system of the future, Meyrowitz believes it will not look like the Intermedia system or like GUIDE, but will exist as a link to a number of resources. In other words, the linking functionality will become something that ever application can utilize. For example, a system will exist whereby the user can link all the features of existing software products like LOTUS (for spreadhseet) and WordPerfect (for wordprocessing). To make his vision of hypertext in to a reality, Meyrowitz noted that standard linking protocols must exist so third parties can participate.

On the subject of standardizing links, Meyrowitz elaborated on the variety of linkages that are possible and therefore the difficulty of addressing the issue of standards. Examples of these linkages include navigational linking, expansion/ contraction linking (which OWL does), the kind of "hot" linking that is done by a product like Lotus' JAZZ, and versioning which

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is used to keep track of historical information. Meyrowitz noted that standardization is happening in the area of hot linking, while he cites this is not the case in the area of versioning which is much more complex.

Finally, in addressing the question--"Has hypertext come of age?"--Meyrowitz notes "it has been reborn, but still has a long way to go from infancy, to adolescence, to adulthood." He is optimistic in the fact that hypertext is finally being used after having been around for such a long while. Williams is also optimistic about the future of hypertext. Both Meyrowitz and Williams raise a plethora of questions that must be addressed in developing future systems, including the role of "authors" and "readers" and how to maintain the integrity of electronic information.