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What Wicked Web Will We Weave?

Maggie Parhamovich Farrell, U.S. Government Printing Office
Washington, DC

The World Wide Web is an important development in the evolution of the Internet. With the Web, we finally get a glimpse of the possibilities of the National Information Infrastructure (NII). The Web incorporates easy-to-use graphics and limited commands to navigate through the wealth of online information. Based upon Windows technology, the Web facilitates multiple applications so that users can use a word processor and navigate the Web at the same time. The Web is more dynamic and incorporates URL linkages to pull together similar topics. In libraries, we do not need to provide intense instruction since users can easily learn the basics of navigating the Web.

Perhaps the most important aspect of the Web is that it has propelled the Internet into our business and everyday activities unlike any other aspect of Internet technology. It is impossible to ignore URL listings in advertisements and in popular culture as the Web has truly weaved its way into our everyday lives.

For all of the benefits and wonders of the Web, there still remains much developmental work. Despite the impression that the Web is an integral part of our lives, according to a recent Nielsen Survey, only 8% of the U.S. and Canadian population have access to the Web.1 Knowing that this percentage has probably increased since the survey was taken in 1995, it is still dangerous to think that we are developing technology and services for a small, elite portion of the U.S. population. To truly be effective, the Web and the developing NII must reach greater portions of our population.

The Web is limited in that it requires high end equipment to run. Users must have sophisticated online accounts in addition to possessing the technical skills to manage the software on their own personal computers. There are also limitations on the structure of the Internet. We can all attest to incidents of busy sites or slow responses during peak periods of use on the Internet. The technology is stressed due to the increase of users on the Internet. þThe same tools and applications that are expanding the enabling character of the Internet and attracting new users are pushing the network beyond the bounds of its current architecture.þ2 The success of the Web is limiting its own capabilities. Despite the advancements of the Web, essentially the Web is a graphical interface to ftp or file transfer protocol. The current Internet software and architecture need to be drastically revised in order to meet the demands of users.

I see five areas which need to be developed in order to fully realize the promises of the Web. These are infrastructure, conduits, software, content, and attitude.

1. INFRASTRUCTURE

Bandwidth

Currently, there is a lack of priority or sectioning of the Internet. For instance, your E-mail to a friend about Friday night plans competes for bandwidth space with a doctor who is sending graphical images of x-rays to another doctor. One solution would be to increase the bandwidth. Unfortunately, traffic on the Internet will increase accordingly. Our current highway system is an example of this scenario. As traffic increases on highways, we need to expand the number of lanes. However, expanded lanes draw more traffic and the traffic increases to the capacity of the highway. Increased bandwidth would solve slow response time. However, this would only be a temporary solution.

HOV Lanes

One solution to the increased traffic is the development of priority routing through the Internet. Similar to High Occupancy Vehicle (HOV) lanes on highways, regular traffic would flow along at a steady pace while high priority traffic would move along faster lanes with less traffic. This would permit those applications, such as video and interactive applications, which need faster and more bandwidth to travel according to their needs while ordinary traffic, such as E-mail and ASCII texts which require less bandwidth, would travel along normal lanes.

Another option would be to establish a system in which certain applications which need high capacity bandwidth can reserve the bandwidth for a certain period of time for that specific application. Packet assembling is currently being studied as well. Before information is transmitted along the Internet, the application is split into a series of packets which reassemble themselves when they arrive at their destination. With graphics and video, it is essential that the packets be reassembled in the correct order.

As we improve the quality of the bandwidth, we can be assured that the traffic on the Internet or the NII will be stable and reliable. Currently, the National Science Foundation in cooperation with MCI is developing priority and high capacity bandwidth which would run within the existing Internet infrastructure. Applications with Supercomputer centers are currently being tested.

.Rural Networks

In order for the NII to truly reach all Americans, the infrastructure needs to expand beyond universities, governments, and selected commercial companies. The NII holds the greatest potential for rural communities since it facilitates interaction between individuals and transmits timely and relevant information. Networks must reach every community and neighborhood before the NII can become a viable information resource. It is likely that the infrastructure will be built through cooperative ventures. The government cannot afford to build the infrastructure, yet the commercial sector must see the profit beyond the social

good before it heavily invests into building the NII. It is likely that the NII will be a cooperative venture between the public and private sectors working within local communities to build the NII.

2. CONDUIT TO HOMES AND OFFICES

This is closely tied to infrastructure but is more specific to the connections from the network to your home and the hardware necessary to access the Internet or its successor. Once the infrastructure is built, we need stable and simple connections to our homes. SLIP/PPP technology needs to be easier to install and more reliable. However, PPP connections will probably be surpassed by the development of direct connections to the NII.

There are several types of direct connectivity including ATM (Asynchronous Transfer Mode), ADSL (Asynchronous Digital Subscriber Lines) and cable modems which operate on cable television wiring. Perhaps the most popular is the development of ISDN (Integrated Services Digital Network) which is available in some major metropolitan markets. Yet at this time, direct connections are costly, unstable, and do not reach every community. .MCI and AT&T are working on the development of direct connections to offices and homes through telephone cables. Cable television is also pursuing direct connectivity through existing cable television wiring. I do not think it will be long before we are able to directly connect to an Internet Service Provider (ISP) without going through a modem connection. The driving force behind direct connectivity will be the business profits seen in providing entertainment options to the consumer.

3. SOFTWARE AND TOOLS

The Web is a great tool and advances the development of the Internet. However, we need an even more seamless interface with graphics across protocols, and advanced applications such as videos and interactive technologies. Currently, the browser, in cooperation with the Windows interface, looks for the application on your computer to handle unique file formats. For instance, with JPEG files, the browser will call up Adobe Acrobat or whichever viewer you have in order to view the image. However, if you do not have the appropriate application, then you must save the file but can not view it at that moment. The other problem is that each individual must maintain the most current version of various application software on their PCþs. The Web is high maintenance at this stage and we need to develop software which requires automatic maintenance.

Java is important in this development. Java will find the most recent version of the application software and run the software on your PC and then return the software to the host computer. This provides for a more seamless interface and reduces the burden of the user to have all of the latest versions of application software. þSome well-known computer scientists even argue that Java, or a language very much like it, will eventually transform the computer industry by turning networks into a new technology platform - supplanting both the personal computer and PC operating system software as the foundation for a new market and new businesses that will grow as quickly as the PC software industry once did.3 Java or javalike applications have the potential to radically change how we use software applications.

The development of indexers has facilitated searching on the Internet. GovBot, the forthcoming Pathway Indexer, Yahoo!, and Open Text are excellent tools but limited in their capability. Relevancy ranking is problematic since it is the interpretation of a computer, not human expertise.

One of the contributing factors to the success of the Web has been the relatively easy coding language HTML (HyperText Markup Language). HTML is easy to learn and facilitates the development of Web applications for small companies and institutions since it does not require expensive programming to implement. Javascript is more difficult to learn and requires advanced skills to implement. We need to continue to develop software and computer coding or languages which empower the individual and smaller companies in developing their own applications on the Internet.

Another development is forms software which integrates Web technology to existing computer systems. This goes beyond a form on the Internet to taking the information submitted via a form and converting that information into another application. For example, depository libraries could submit their item selection on a form and computer programming would convert the form information to a computer which controls the selection. The lighted bin system would be automatically updated and the new selection would begin immediately. Human intervention would not be necessary since this function is completely automated. Form software technology goes beyond a simple submission of data to integration of data with existing systems.

Collaborative software, especially available on Internet and Intranets, is currently being developed. This includes sharing of documents simultaneously and the ability to provide instant feedback within a group process. Collaborative software facilitates virtual workplace environments which promote telecommuting and the utilization of experts located throughout the world. Work is not limited by geography or physical space. Collaborative software goes beyond E-mail and fax technology to fully integrated work processes and collaborative working environments available through Internet technology. The Federal Webmasters Consortium is developing work in this area in cooperation with NCSA.4

One of the major problems of the Internet is the instability of file locations. Files are moved or Web sites are reorganized which makes it difficult for users to locate a file after it has been moved. Although Webmasters are sensitive to this problem, the difficulties continue to persist. Under development is the idea of Uniform Resource Identifiers (URI) or handles. Another terminology is persistent URLs or PURLs. Regardless of the name, the idea is that a file would have a single URI which would point to the correct location of the file regardless of where the file is located. This idea also works for E-mail, so that regardless of your institution or geographical location, your E-mail would be a unique identifier and you would never worry about new E-mail addresses when you change institutions or Internet service providers.

As depository librarians, we have all experienced patrons who need authentication that the government publication which they are photocopying is a legitimate and authoritative copy of the original. This issue is further complicated in the electronic environment. How can we ensure that the electronic copy is as authoritative as the print copy? How can we authenticate a signature on a document? The development of authentication tools is critical.

þDigital signatures are needed for electronic commerce and official communication so that electronic transactions can be done with as much confidence as a signed paper contract or document.5 Authentication software is based upon the safety deposit key analogy. In order to authenticate a document, you need two keys, one from the originator and one from the receiver. When the keys match, then the user can be assured that the document is official from its government entity. The U.S. Postal Service is working toward developing standards for authentication of documents and signatures.

Closely related to authentication is encryption. Now you might recall the dreaded v-chip or call up images of spies, but encryption has valid uses for all of us. Encryption ensures secure transactions by using mathematical formulas to change the original message into garbage and then translates the message once it is received by the correct recipient. There is the false perception that encryption creates closed communication but the opposite is true. If we have confidence that our activities on the Internet are secure, we will have more open communication and transfers of information. Encryption is critical if we use the Internet for business applications, especially in sales. Individuals will be more comfortable in placing online orders if they are ensured that their transaction is secure. Encryption will have a positive impact upon electronic applications by facilitating more interactive services.

As we move into the electronic era, we have discussed changing from a just in case to a just in time scenario. With the advancement of technology, we no longer need to collect all of the information in the world but we need to be able to connect to specific information in the world when we need it. Now we are moving to a just for you environment. Technology not only needs to connect us to information, but to that specific information which we need for a specific application. Also, software needs to locate relevant information regardless of the format. For instance, if you were doing research on document collections in public libraries, search software would locate not just the articles you need but would locate the paragraphs within articles and chapters within books along with any graphics you need for your research. Another example: NBC is testing an application called HyperMedia which permits affiliates to pick and choose which videos they need for a local broadcast. Affiliates no longer need to download the entire video archive for the small percentage of video they will actually use. Affiliates only download specific files relevant to their needs.6 You already apply this principle when you channel surf through programs on television. For instance, you watch the first 15 minutes of a news program and then move on to a sitcom. If you do not care for a particular story, then you switch channels to another newscast. This same principle is being applied to software so that you not only locate information, but you locate specific information tailored to your particular needs.

4. CONTENT

This is dependent upon the first three needs of the Internet. The Web is limited in significant content primarily due to the instability of the structure and lack of authentication. Once the structure is constructed, we need to build the content of the World Wide Web. It needs to be more than advertising and promotional materials to information which is being requested by individuals.

The strength of the Internet has been the idea of the information commons. Anyone and any group can interact through the Internet. The Internet has supported minority opinions and

has promoted the free exchange of ideas. While entrepreneurs rush to build Web sites and Web products, content remains thin. Some of the richest aspects of American culture have come from its minorities and outcasts.7 We need to protect the information commons concept and fulfill the empty promises of television and cable TV.

5. ATTITUDE

I personally believe that as individuals we need to put an end to technology controlling us and turn it around to us using technology to do our jobs better. I will give you a simple example which I think illustrates what I mean. When you are using E-mail, do you respond to each new incoming message when it is sent? Do you feel pressured that you must respond to that E-mail immediately or to the latest posting on GOVDOC-L? Or do you use your E-mail to control your communications and set aside time in your daily routine to check and respond to E-mail? We need to stop viewing technology as a threat and develop procedures and services which utilize the best of technology. The Internet Goddess at UNLV, Kay Tuma, often asks this question in her training Are you doing your job differently today because of technology or are you doing the same job just with a computer? If your personal computer is a glorified typewriter and messaging center, then you are not tapping the potential of technology to do your job better and provide effective services. We need to use technology as a tool. A positive, objective viewpoint will assist in the development of tools which we need in order to bring about the full vision of the World Wide Web.

And finally a note of encouragement. Throughout the last two days of the conference, we have been discussing many problems in making the transition to an electronic environment. These problems are not limited to GPO and the Federal Depository Library Program. Bibliographic control, persistent URLs, locators, and search engines are issues which are being considered throughout the Internet community. The World Wide Web is just one more step in the evolution of the Internet. What are we going to do with it? How will it improve our lives? Can it improve our lives? What is its value? New technologies do not mature and take hold overnight, let alone change our culture . . . If we want a fundamental change for the better in human relations, it will take more than the presence of a new technology to do it.8 I am confident in the future developments of the Web and that we can build an infrastructure which supports our current information needs. It is up to us to determine how to use this new tool within our society and I hope we make the correct decisions.

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