Internet: A Networked Computing For Information Exchange in Oral Health Care.

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Abstract

Internet is often called a network of networks. It provides a vehicle for networks of all kinds and individual stand-alone computers to intertwine to form a global network, which connects people the world over. The internet use in dentistry is increasing. Internet connectivity has opened a new horizon of scientific cooperation and collaboration at global level. Anyone can have easy access to information on not only public health and hygiene matters, but also on more esoteric aspect of dental practice.

Key words: internet, search engines, databases, subject directories

Introduction

The fundamental technology of this new era of information exchange is computer networking, an evolutionary change as significant as the development of human language. Internet is often called a network of networks. It provides a vehicle for networks of all kinds and individual stand-alone computers to intertwine to form a global network, which connects people the world over. The Internet has a high degree of entropy[1]. The main reason why the Internet has so little structure and so hard to decipher for many people, including dental professionals, is related to its origin and underlying design concept.

History

Vannevar Bush, Director of the Office of Scientific Research and Development during the World War II, developed the conceptual idea for the modern World Wide Web in 1945[1]. Bush discussed in his seminal Atlantic Monthly article a system that he called "memex". Memex stores information for easy retrieval by humans. This system organizes information not by storing it by alphabetical order, location, or a hierarchy of topics, as most libraries, encyclopedias, or dictionaries do, but by "associative indexing" based on the content of the work[2].

The system that has grown into the Internet was originally designed by the United States military in 1969 under the name Advanced Research Projects Agency. The first Advanced Research Projects Agency configuration involved four computers and was designed to demonstrate the feasibility of building networks using computers dispersed over a wide area. Each computer communication point or node on the Internet is controlled using a set of data communications standards known as the Transmission Control Protocol/Internet Protocol (TCP/IP). The TCP/IP protocol is designed to ensure that every piece of information finds the most direct route to its destination[3].

Internet Tools/Internet services[5]

An understanding of digital technologies and concepts that promote the profession and their approaches to care is essential[6]. For data networking to be effective tool in collaborative research, patient care, and education, a minimum of four classes of services must be available to the users[5]: E-mail, Telnet, File transfer protocols, World Wide Web

E-mail is probably the most common use of the Internet. It allows Internet users to send and receive messages from around the world. Requests for database searchers and the result posted to an account can also be done by e-mail. E-mail can also be used to join electronic mailing lists (called list servers) on specific topics of interest. E-mail is used to transfer text, program files, spreadsheets, and even photographic images. Messages can be sent and received in hours at most and often within minutes.

Another Internet tool is the Telnet with which users can log on to other computers around the Internet[7]. Through Telnet a person can access other computer sites using his or her own computer as terminal. This is particularly useful for accessing medical libraries and other health care data base systems that are linked to the Internet.

File transfer protocol is the method by which specific computers transfer data or files around the Internet[8]. Files can be simple text, usually known as ASCII files, or more complex data such as graphics or computer programs, known as binary files. The ability to pull down a file, to get data, or to run a program (if file is executable) is vital for people doing research and development work. The Internet transfers files at a rate of millions of bytes per second. File transfer protocol can do more than just retrieve files. It can be used to transfer files to remote machines from a given computer. To make it a practical tool, file transfer protocol includes commands of listing directories, listing files in directories, changing directories, and getting information about what is being done and setting parameters for how the operations will be done. Many pieces of free software can be obtained from around the Internet via anonymous file transfer protocols, which will allow users to log in to file transfer protocol sites where they do not have accounts. These anonymous file transfer protocol sites together contain millions of files that add up to terabytes of information.

An understanding of both the basic and advanced concepts for information retrieval on the Internet is required[1]. The World Wide Web is the newest and perhaps the most powerful Internet service. It provides links to information via hypertext and, for those who have the proper type of Internet access; it can bring multimedia Internet to the desktop. Hypertext provides links to other information sources through selected or highlighted words within a text[9]. A person simply chooses the highlighted word to receive further facts on the topic of interest. The link could be of data located on the same machine or anywhere else on the internet. The World Wide Web is estimated to contain approximately 800 million pages of publicly accessible information. As if the Web's immense size was not enough, it continues to grow at an exponential rate, tripling in size every 2 years.

The basic approaches to searching the Web are search engines and subject directories. Search engines allow the user to enter key words that are run against a database (most often created automatically, by 'spiders' or 'robots')[10,11.] Based on a combination of criteria established by the user and/or the search engines, the search engine retrieves World Wide Web documents from its database that match the keywords entered by the searcher. While all search engines are intended to perform the same task, each goes about this task in a different way, which leads to sometimes amazingly different results. Factors that influence results include the size of the database, the frequency of updating, and the search capabilities. Search engines also differ in their search speed, the design of the search interface, the way in which they display results, and the amount of help they offer.

In most cases, search engines are best used to locate a specific piece of information, such as a known document, an image, or a computer program, rather than a general subject. Examples of search engines include: AltaVista (http://www.altavista.com), Excite(http://www.excite.com) Google (http://google.com)

The growth of the number of search engines has led to the creation of 'meta' search tools, often referred to as multithreaded search engines. These search engines allow the user to search multiple databases simultaneously, via a single interface. While they do not offer the same level of control over the search interface and search logic, as do individual search engines, most of the multithreaded engines are very fast. Recently, the capabilities of Meta tools have been improved to include such useful features as the ability to sort results by site, type of resource, or domain, the ability to select which search engines to include, and the ability to modify results. These modifications have greatly increased the effectiveness and utility of the Meta tools[12].

Subject-specific search engines do not attempt to index the entire Web. Instead, they focus on searching for websites or pages within a defined subject area, geographic area, or type of resource.

Subject directories are hierarchically organized indexes of subject categories that allow the web searcher to browse through lists of websites by subject in search of relevant information[13]. They are compiled and maintained by humans and many include a search engine for searching their own database. Subject directory databases tend to be smaller than those of search engines, which means that results tend to be smaller as well. Because subject directories are arranged by category and because they usually return links to the top level of a website rather than to individual pages,

they lend themselves best to searching for information about a general subject, rather than for a specific piece of information. Examples of such directories include: LookSmart (http://www.looksmart.com), Lycos (http://www.lycos.com), Yahoo (http;//www.yahoo.com)

An overview of trends in computing and its effect on dentistry has been reviewed[1]
Most Internet applications such as Internet-based scheduling and e-mail communication with patients still are an optional adjunct for dental practices. Some are of the view that the Internet appears to support clinical practice mostly indirectly, by helping users keep up in general, rather than by answering specific clinical questions.[14] Reduction of professional isolation was one of the most frequently cited advantages of using the Internet. The authors found that some dentists use the Internet to support clinical practice and that it helped dentists adopt new techniques for patient treatment and obtain information on new materials or products.

Nevertheless, dentistry cannot seek a long-term exemption from the Internet-based world of 21st century health care, and the speed and success of its transformation can be affected positively by the right professional leadership. This leadership should come soon with organized dentistry. The digital transformation of oral health care promises many exciting changes during the next few years[6]. However, like any revolution, it will not be easy or painless. Initially, there will be several skeptics for every true believer. The author states that dental associations are still in the best position to provide meaningful guidance and lead by example, but the advantage can be quickly lost.

New information technologies dramatically increase professional association's vulnerability to competition from other profit ventures. Therefore to maintain their relevance, voluntary dental organizations must expeditiously launch services that will help their members deal with this dynamic revolution. Meaningful programs would teach skills such as how to manage an effective dental practice Web site, how to conduct a financial analysis of alternative technologies and e-business arrangements, how to address legal and ethical issues of teledentistry and how to use the new tools for better practice management and continuing dental education. Dentists must take initiative by becoming compatible in the electronic world. 21st century health care, and the speed and success of its transformation can be affected positively by the right professional leadership.

An investigation was conducted at the School of Dentistry, University of Michigan, Ann Arbor, Michigan, to evaluate the knowledge, opinions, and behaviors of dental students about dental informatics and computer applications, to make baseline measurements at one school in order to assess the effects of informatics curricular components, and to compare findings with those from medical education[15]. Overall, the differences between first year and fourth year students were minimal. The data give some support to the expectation that entering students will be increasingly sophisticated in their knowledge and experience regarding generic computer applications. New students' competence with computers and generic applications will need to be assessed and remediated as necessary before more complex applications like imaging or management information systems are introduced. They say that including courses about dental informatics and computer applications requires identification of time in a perpetually crowded curriculum.

Conclusion

The Internet was originally developed so that science and research could share resources. Today, data traffic and the number of access points have multiplied by several magnitudes. The Internet already has reshaped our society, from economics and business to education and social reserves. For the foreseeable future, networking will advance through these trends: higher bandwidth, more access points, and increasingly versatile networks.

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