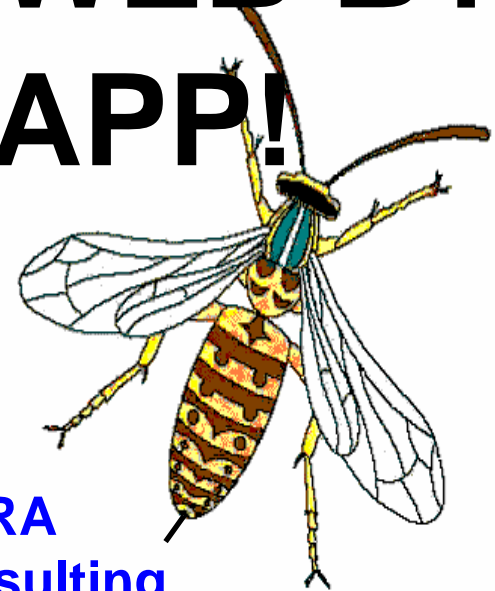


HIMSS '97

CAUGHT IN THE WEB BY THE KILLER APP!



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The
World Wide Web
IS
the Killer App!

**What Windows
did for DOS,
the **WWW** has
done for the
Internet.**

Netscape Communication's Navigator and Microsoft's Internet Explorer

Web Browsers

**have become ubiquitous –
and are having a bigger impact on
computing than
Microsoft's Windows '95 or NT.**

IN HEALTH CARE

- **The WWW is allowing the Internet to become the Health Information Network (HIN) everyone is waiting for.**
- **The WWW is being used to achieve (at least pieces of) the Computer-based Patient Record (CPR) system everyone is waiting for.**

BRIEF BACKGROUND

- **What is the WWW?**
- **What are Web Browsers?**
- **What are Intranets?**
- **What are Extranets?**

What is the WWW?

- **The Internet's most popular place for users to browse through, search for, and disseminate information**
- **A collection of server computers providing information to requesting client computers through the Internet**

What makes this Internet application different from all the other Internet applications?

- **The Internet received a GUI**
- **The WWW allows users to transfer multimedia-based information between computers within one protocol**
- **The WWW supports interactive services**

What are Web Browsers?

- **Software programs:**
 - **Able to read multiple Internet protocols**
 - **Available for almost every computer platform and operating system**
 - **Provide users the means to retrieve and display multimedia-based information on the Web**

Why is there a fierce outpouring of new Web Browser apps, connection tools, upgrades, and beta product versions?

- **Web servers with Web Browser software provide an unprecedented uniform client model for any number of different kinds of server processes**

What are Intranets?

- **Private Internet networks with servers inside a firewall**
 - so that the network cannot be accessed by the general public
 - so that the users inside the network can access the Internet for email and other Internet applications

Why is this type of network better than all the other types of networks?

- Offers better security than the Internet
- Less expensive to implement and maintain than other networks
- Easier to use than most networks of proprietary mail and messaging software products

What are Extranets?

- **A connection of Internet networks outside the firewall**
 - so that a community of organizations with shared interests can benefit from the use of Internet standards (HTTP servers, HTML, etc.)
 - so that one's external customers, suppliers, trading partners, etc., can exchange information

Why is this type of external network connection different from any other type of external network connection (like EDI)?

- **Offers better security than the Internet**
- **Less expensive to implement and maintain**
- **Easier to use**

**SO, WHAT DOES ALL THIS
HAVE TO DO WITH
HEALTH CARE PROVIDER
ORGANIZATIONS?**

HEALTH CARE PROVIDER ORGANIZATIONS

- Can use the WWW to allow the Internet to become the Health Information Network (HIN) everyone is waiting for.
- Can use the WWW to achieve (at least pieces of) the Computer-based Patient Record (CPR) system everyone is waiting for.

PROBLEMS IN PROVIDER ORGANIZATIONS

- **The diverse health care facilities making up complex Integrated Delivery Systems cannot distribute information throughout their enterprises.**
 - **The facilities are made up of a variety of workstations with different platforms and software that get in the way.**
 - **The plethora of incompatible databases requires modifying the formats in which all the various types of documents are stored.**

SOLUTIONS

FOR EXAMPLE

- **If these diverse IDS databases are connected to a Web server (i.e., an intranet), health care users can access the server through the a Web browser, extracting all the document data in the popular HyperText Markup Language (HTML) format.**

SOLUTIONS

FOR EXAMPLE

- **Since the WWW provides access to the widest range of information by linking documents not only marked up in its special format, health care users can even access additional sources of information via File Transfer Protocol (FTP) or Gopher.**

SOLUTIONS

FOR EXAMPLE

- **Using “intelligent agents” to see when certain events take place, health care facilities can define rules on other servers that automatically kick in when they’re notified, speeding up time-sensitive patient care delivery projects.**

SOLUTIONS

FOR EXAMPLE

- **These technologies have the potential to reduce the amount of redundant or outdated information stored on existing health care networks.**

SOLUTIONS

FOR EXAMPLE

- **Health care facilities can add other data types or objects to their databases.**
 - **Document images**
 - **Diagnostic images**
 - **Video clips**
 - **Audio clips**
 - **Graphics**

POTENTIAL PROBLEMS

- **There are still (perceived) security concerns!**
- **Having access to a wealth of information does not mean that clinicians can manipulate the information or use it to make better decisions about patient care.**

**SO, ARE WE
ACHIEVING THE
CPR YET?**

CASE STUDIES

Sample Uses of Web/Intranet Applications for CPR Systems in Health Care Provider Organizations

- **Doheny Eye Institute and Hospital (Los Angeles) accesses the Virtual Academic Medical Center “web server” at the University of Southern California Medical School.**
 - **Following completion of a retinal scan, an ophthalmologist at an eyecare IPA dials into the Internet via ISDN lines and connects to Doheny to upload a digital diagnostic image. The clinician then makes an electronic referral to a specialist at Doheny. The Doheny specialist consults on the case and sends an E-mail back to the IPA clinician.**

Sample Uses of Web/Intranet Applications for CPR Systems in Health Care Provider Organizations

- **Long Beach Community Hospital and Medical Center (CA) establishes a Web site.**
 - **Patients access the facility's Web page and pre-register on line. The Web page links with contracted HMOs, to a physician referral service, and to the local newspaper.**

Sample Uses of Web/Intranet Applications for CPR Systems in Health Care Provider Organizations

- **Children's Hospital and Medical Center (Seattle) establishes an Intranet.**
 - **The facility's referring clinicians view treatment protocols using familiar keyword searches to pinpoint to useful text. This allows the clinicians to treat lower-level cases and provide better care for referral patients.**

Sample Uses of Web/Intranet Applications for CPR Systems in Health Care Provider Organizations

- **Columbia-Presbyterian Medical Center (NY) develops a clinical information system based on the WWW.**
 - **The architecture includes both a patient database server and a controlled vocabulary server. With these components and off-the-shelf viewers, interfaces, and network protocols, the tertiary care teaching facility allows its clinicians to access most of the patient care information they need to determine the next step of patient care, such as all the computer-generated data stored in the CIS.**

Sample Uses of Web/Intranet Applications for CPR Systems in Health Care Provider Organizations

- **The University of Iowa Medical Center develops its “Virtual Hospital” as an early Web site, using the Mosaic Web Browser.**
 - **Incorporating images and sounds, consumers and caregivers access medical information on the Internet, such as literature searches, expert systems, and medical textbooks.**

Sample Uses of Web/Intranet Applications for CPR Systems in Health Care Provider Organizations

- **The rural, Wayne WV clinic accesses its patients' Valley Health System records (and vice versa) via the WWW.**
 - **The Wayne clinicians electronically record and post all patient clinic notes and receive all patient acute care history, medication, laboratory and (analog) X-ray information.**

Sample Uses of Web/Intranet Applications for CPR Systems in Health Care Provider Organizations

- **The University of Kansas, the University of Pennsylvania, and the University of California Los Angeles Medical Centers store transcribed radiology reports and digital diagnostic images in radiology databases, allowing their clinicians to access the databases via web servers using the Netscape Web Browser.**

Sample Uses of Web/Intranet Applications for CPR Systems in Health Care Provider Organizations

- **The Virginia Neurological Institute at the University of Virginia Health Sciences Center (Charlottesville) creates a “medical record generator” that uses Web and Intranet technologies.**
 - **The Virtual Electronic Medical Record (VEMR) is a collection of applications and integrated information systems that generate a customizable representation of the patient records by creating HTML pages on the fly.**

Sample Uses of Web/Intranet Applications for CPR Systems in Health Care Provider Organizations

- **Three Boston area hospitals place their patient records on the Web through a collaborative, home-grown program called MedWeb.**
 - **Clinical information stored in three separate and dissimilar hospital databases are accessed remotely by the three hospital EDs and authorized staff members using standard Web browsers.**

Sample Uses of Web/Intranet Applications for CPR Systems in Health Care Provider Organizations

- **The University of Pittsburgh Medical Center's Department of Pathology develops a Web-based static image transmission system for pathologists in rural and community-based facilities in the Pittsburgh tristate area.**
 - **The consulting physicians render an opinion and upload the pathology results to referring physicians using HTML-coded reports and digital images via the Web.**

Sample Uses of Web/Intranet Applications for CPR Systems for Health Information Networks

- **Several state HINs establish intranets for accessing CPRs or patient demographic data.**
 - **A Vermont rural physician uses the Web-based VtMedNetPlus to transmit blood sugar test results to an endocrinologist at a major Vermont medical center.**
 - **The Minnesota Health Data Initiative establishes the MEDNET intranet for accessing MPI data from the state HIN-affiliated health care institutions.**

**IF YOU'VE BEEN
CAUGHT...**

**HERE'S SOME
GENERAL TIPS FOR
IMPLEMENTING
OR EXPANDING THE
CAPABILITIES OF YOUR
WEB AND INTRANET
APPLICATIONS**

THE EASY STUFF

■ The Basic Building Blocks

- Web server hardware
 - NT or Unix-based
- Web server software
 - Server maintenance, authoring, viewing, gateway, and client browser software, such as HTML, Common Gateway Interface (CGI) scripting language, and Internet Explorer/Netscape.
- Networking hardware
 - A router
- Networking software
 - The standard Internet communications protocol software, TCP/IP

THE CFO STUFF

- **The Estimated Costs**
 - Experienced staff to configure and install the hardware/software and register the Internet domain name
 - The hardware and software
 - The Internet connection, depending on the type of communication lines used
 - The monthly maintenance costs, including the connection cost and the labor to maintain and update the server
- **\$50,000???, excluding maintenance - depending on the size of the organization**

THE NOT-SO-EASY STUFF

- **Identify the Health Care Organization's Primary Web Applications**
- **Ask Hard Questions**
- **Determine The Rules and Regulations of Content Development**

IDENTIFY THE PRIMARY WEB APPLICATIONS

■ Establish the Project Domain

- Identify all the business activities that directly supply or receive information from the application being Web-enabled.
- All the information (documents, images, messages, drawings, emails, works-in-progress, etc.) must be categorized by source, recipient, format, or department.

FOR EXAMPLE, A CPR SYSTEM
PROJECT DOMAIN

IDENTIFY THE PRIMARY WEB APPLICATIONS

- **Identify the Users' Needs**
 - **List all the problems encountered by the organization's members in accessing patient record information, in receiving incomplete patient record information, in receiving inaccurate patient record information**

IDENTIFY THE PRIMARY WEB APPLICATIONS

- **Prioritize the Business' Requirements**
 - **Develop a list of the features and functions needed to meet the users' needs**

IDENTIFY THE PRIMARY WEB APPLICATIONS

- **Obtain Vendor Input**
 - **Evaluate software applications that are available for free in final or beta test form**

<http://www.infotivity.com/instralst.htm>

- **<http://www.simware.com/-salvo/download.htm>**
- **<http://www.allaire.com/>**
- **<http://www.infotivity.com/secure.htm>**
- **<http://www.gradient.-com/products/products.htm>**
- **<http://www.mustang.com/>**
- **<http://www.netmanage.-com/>**
- **Vendors' Web Sites**

IDENTIFY THE PRIMARY WEB APPLICATIONS

- **Put It All Together**
 - **The Web/Intranet development and implementation team check that the following are tightly in place:**
 - **HTML links**
 - **Web document revisions**
 - **Web security**

ASK HARD QUESTIONS

- **Who “owns” the Web servers, the applications, the Web infrastructure?**
 - **Must pay for the upkeep**
 - **Must rewrite Web apps significantly every few months to accommodate changes in APIs or extensions**

ASK HARD QUESTIONS

- **Who has access to the internal Web sites, FTP sites or collaboration groups?**
 - **ISD responsible for monitoring usage logs**
 - **Management responsible for enforcing policies**

ASK HARD QUESTIONS

- **Who will access the Intranet remotely?**
 - **An IDS may want to gather patient information from an acute care facility and several remote clinics**
 - **Individual suppliers may want to review and stock an IDS' pharmacy inventory levels**

ASK HARD QUESTIONS

- **Who pays for the additional bandwidth once the Intranet is successful and utilization of it will skyrocket?**

DETERMINE THE RULES AND REGULATIONS OF CONTENT DEVELOPMENT

- **Which area of the health care organization defines and enforces a consistent organization content style?**

DETERMINE THE RULES AND REGULATIONS OF CONTENT DEVELOPMENT

- What types of content are likely to add value early on?

DETERMINE THE RULES AND REGULATIONS OF CONTENT DEVELOPMENT

- **How should content development strategy be coordinated?**
- **How do community content needs compare and contrast with enterprise needs?**

QUESTIONS