INTRODUCTION
When Windows 98 was officially released in 1998, one of its most discussed features was setting Internet Explorer 4.0 (IE 4.0) as its default Internet browser. IE 4.0 is one of the most advanced, modern browsers that can fully support the active desktop, push technology, multimedia, and much more. The other browser company, Netscape, in the release of Netscape Communicator 4.0, has included many important features, including auto-calendaring, auto-admin, the IBM Host-On-Demand interface, and other enhancements. These events set the framework for push technology. One is beginning to see the evolution of support products to ease corporate implementation of the technology into the workplace.

PUSH TECHNOLOGY BACKGROUND
From the Internet’s establishment in 1969 as a scientific–academic network of four computers financed by the U.S. defense establishment, it has become a powerful, public facility accessible to tens of millions of people worldwide in various fields. The technology was designed to provide a standard means of interconnecting networks so that any system could communicate with any other system without considering the operating system’s compatibility. Under this assumption, the Internet uses a subset of the total resources of all the currently existing public telecommunication networks, distinguishing the

PAYOFF IDEA
With the release of Windows 98, push technology has become reality. With this technology, as with others, new capabilities arise for the application designer and developer to ponder. There are both issues and impacts for CIS professionals and manager to assess with regard to push technology. Included in this process is the determination the level of risk they are accepting with this technology. This article provides an overview of “Push Technology” and the issues and impacts it brings with it.
Internet as a cooperative public network that uses a set of protocols called TCP/IP (Transmission Control Protocol/Internet Protocol).

The term “Internet” often includes the World Wide Web, electronic mail, FTP, gopher, and the growing suite of other network applications that are based on Internet communications. Standardization and wide acceptance of the Internet has stimulated many billions of dollars of broadly applicable software and network development. E-mail is the most widely used application on the Internet; and the World Wide Web is the most exciting, with its great range of content (according to Wired magazine in March, 1997, over 150 million individual places to go) and its powerful concept of linking the world’s information as hypertext. As of January 1997, approximately nine million people were reported to be using the Web every day.

An intranet is a network that is contained within an enterprise or organization. It may consist of many internal linked local area networks and a wide area network. It may or may not include connections to the outside Internet. Typically, larger enterprises allow connection outside of the intranet to the Internet through firewall servers that have the ability to screen messages in both directions so that company security is maintained. The main purpose of an intranet is usually to share company information and computing resources among employees. An intranet can also be used to facilitate working in groups and for teleconferencing.

An intranet uses TCP/IP, HTTP (HyperText Transfer Protocol), and other Internet protocols, and in general looks like a private version of the Internet. With a new tunneling protocol that is being developed, companies will be able to send private messages through the public network, thereby tunneling through the public network from one part of their intranet to another.

An extranet is a collaborative network that uses Internet technology to link businesses with their suppliers, customers, or other businesses that share common goals (Jim Barksdale and Mark Andersen of Netscape Communications used the term). It describes software that facilitates intercompany relationships. An extranet can be viewed either as part of a company’s intranet that is made accessible to other companies, or as a collaborative Internet connection with other companies. The shared information can be accessible only to the collaborating parties or it can be publicly accessible. Examples of extranet applications include (1) private newsgroups that cooperating companies use to share valuable experiences and ideas, and (2) groupware, in which several companies collaborate in developing a new application program they can all use.

WHAT IS PUSH TECHNOLOGY?

Push was created to alleviate two problems facing users of the Internet. The first problem involves information overload. The volume and dy-
namic nature of content on the Internet is an impediment to users and has become an ease-of-use issue. The second problem is that most end users are restricted to low-bandwidth Internet connections, such as a 28.8Kbps modem, making it difficult to receive multimedia content. Push technology addresses both of these problems.

Information Overload
Using the Internet today, without the aid of a push application, can be tedious, time consuming, and less than dependable. Users have to manually hunt down information, search out links (live and dead), and monitor sites and information sources. The advent of search engines such as Yahoo! and Alta Vista have met with tremendous success because they make it possible for the user to narrow the focus and expand the domain of information searches. Push applications and technology building blocks narrow that focus even further and add considerable ease of use.

Using push technology, an electronic publisher with content aggregated from multiple sources applies the subscriber's interest profile to select information to deliver to the subscriber on an automatic basis. For example, a news bureau can deliver articles of interest in electronic format to a PC each morning — or at any time requested.

Low Bandwidth
The bandwidth of the 28.8, or even 33.6Kbps modem provides very limited capacity to deliver multimedia content. Assuming users are willing to wait 4.16 seconds for a Web page to download means that the combined size of all elements on the page must be less than 15KB. This size limit leaves room for little more than text and small graphics. However, push technology provides the means to predeliver much larger packages of content. With an unattended connection for a half hour the previous night, an end user can receive up to 5.4MB of content to view the next day. This leaves plenty of room for multimedia content such as audio, large graphics, or short video clips. Push technology enables multimedia upon receipt.

HOW DOES PUSH WORK?
The traditional Web concept currently requires the user to poll sites for new, updated information. This manual polling and downloading process is referred to as pull technology. From a business point of view, this process provides little information about a user, and offers little control over what information is acquired. It is the user who has to keep track of the location of the information sites, and remember to continuously search for informational changes. This is a very time-consuming process and waste of valuable time.
The push model alleviates much of this medium. Interestingly enough, from a technical point of view, most push applications are still “pull” and just appear to be “push” to the user. A more accurate description of this process is called automated pull. Most push applications require a subscription and an information request profile from the user before they can begin filtering information. The software initiates the pull according to a user-defined schedule (once a day, every three hours, etc.), and the server responds with the information to match the request profile.

How Do Extranet and Intranet Relate to Push Technology?
An extranet provides non-public information to a select group of individuals, and this allows specific information to be pushed to the user's desktop in a fairly protected way. An extranet is an extension of an intranet that permits people outside the intranet to receive information within the organization’s intranet.

An intranet is an internal network based on Internet protocols and technologies. An intranet enables an organization to share its resources with users without confidential information being made available to everyone with Internet access.

PUSH TECHNOLOGY PRODUCT RESEARCH
Exhibit 1 summarizes key features of push technology product providers. The Price column reflects the cost to the host organization (the purchaser and channel provider), from server software licenses to metered channel rates depending on the package’s complexity. The Requirements column contains any information made available on the physical or system requirements of each particular software package. Finally, the Features column shows some major features, or gizmos, that make that particular product unique.

The following provides suggestions on how push technology can be used in a business environment.

Information delivery is an important requirement for business, especially within the organization. PointCast can be used for information delivery in the workplace, giving on organization the ability to broadcast company news and dramatically reduce network traffic. PointCast also provides enhanced administrative control over the broadcast, including channels and ad filtering. It also is open-channel architecture, enabling one to integrate extranet broadcasts from customers and users with optimized administration capabilities, including configuration of the PointCast Network on user desktops. The internal company channel is broadcast to users via an intranet, along with PointCast Network channels carrying public news and information.

One can capture employees’ attention using SmartScreens, screen savers with up-to-the-minute company news and information. With Smart-
## EXHIBIT 1 — Key Features of Push Technology

<table>
<thead>
<tr>
<th>Company</th>
<th>Product</th>
<th>Price</th>
<th>Requirements</th>
<th>Features</th>
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<tbody>
<tr>
<td>PointCast</td>
<td>Intranet</td>
<td>Free</td>
<td>Intel-based computer; Pentium 75 MHz, 32 MB RAM, 10 MB free space, NT V3.51 or NT V4.0 (Server or workstation) Web browser that supports Java</td>
<td>Public news headlines, easy-to-create intercompany channels, administrative control, including Configuration of PointCast on users' desktops includes contents. Smart-screens deliver information in screen-saver format and scrolling newsflash ticker.</td>
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<tr>
<td>Intermind</td>
<td>Communicator</td>
<td>Range from free server licenses for noncommercial publishers to top-end licenses that cost $1500 and up, depending on number of subscribers; clients, free.</td>
<td>Intermind Communicator contains both publishing and client software components. Merely upload a control file that contains pointers to particular pages of content. This file — only a few kilobytes — downloads to each client.</td>
<td>Works well at notification but does not deliver anything other than a desktop link. Has the most channels available (over 200 and growing rapidly); has the best reporting system. Its usage and hit reports are available in HTML format directly from the client software. Can examine how many individuals downloaded your channel, what topics they viewed, and the popularity of the channel overtime. The simplest tool of its kind. A notification system that points users to places around the Web. One does not get as much control over the presentation of the channel.</td>
</tr>
<tr>
<td>BackWeb</td>
<td>Polite Agent</td>
<td>Starts at $10,000 and has additional monthly per-message charges; can cost upward of $50,000. They charge a fee for every channel they deliver, which can range from $0.12 to $1.16 per subscriber.</td>
<td>Need at least two different computers to publish your own BackWeb channel: one for content managed by a remote console and one for a 95-only authoring tool. It requires both a UNIX and a Windows NT server on the network to deliver its “InfoPaks” or subscription channels to each user. The NT server manages the content on the UNIX server.</td>
<td>Channel provider and software distribution.</td>
</tr>
<tr>
<td>Company</td>
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<tr>
<td>Intel</td>
<td>Intercast</td>
<td>About $140 for the receiver</td>
<td>Client — (minimum) 90 MHz Pentium processor with PCI bus; 133 MHz recommended 16 MB RAM, 15 MB available hard disk (default configuration, 25 MB) 1 MB VRAM (2 MB recommended) PCI 2.0-compliance Standard CD-ROM audio port Windows 95 operating system.</td>
<td>Combination of Web pages and live broadcast.</td>
</tr>
<tr>
<td>Megasoft</td>
<td>Web Transporter</td>
<td>Web Transporter software distribution application starts at $20,000, with volume licensing available.</td>
<td>Client: Windows3.x Windows 95, Windows95/NT Solaris 2.5.1 AIX 4.x HP UX supports with an existing TCP/IP connection to the Internet or a private network. This can be a dial-up or direct connection and Netscape Navigator 2.0 or above or Microsoft Explorer 3.0 or above. Server: UNIX or Windows NT Server operating system. An HTTP server. An SQL database system. Agent-Windows 95/NT AIX 4.x. HP UX.</td>
<td>Combines agents push and pull capabilities with advanced tracking, management, and version control.</td>
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### First Floor Smart Delivery

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<th>Company</th>
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| FirstFloor| Smart Delivery   | $3375 for a server module and 25 user licenses. | Client: Macintosh
PowerPC Computer System 7.5
486 or Pentium PC Computer
Windows version 3.1
Windows 95/NT
8 MB of RAM
5 MB of hard disk space
LAN or dial-up Internet
Server-Solaris 2.5
Windows NT 3.51 or later
Netscape Server 1.1
Microsoft Information Server 1.0 | The FirstFloor Smart Delivery system is a Web-based notification and delivery solution that streamlines the flow of corporate information. SmartDelivery allows organizations to customize information delivery, ensuring that users get the information they need, when they need it. Unlike other information management systems, SmartDelivery provides users with tools to personalize their information environment, controlling how, when, and what information they receive while automatically notifying users of what information is new or changed. |

### Caravelle Ipnet WATCHER

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| Caravelle| Ipnet WATCHER    | Starting at $595    | Operating System Requirements: Windows NT 3.5.1 or 4.0
120 MHz Pentium
32MB RAM
10MB hard disk space
VGA or better video.
Recommended Browser: Netscape Communicator 4.0.3 (4.0 minimum) or Microsoft Explorer 3.0 | Ipnet WATCHER finds and concurrently tests IP and SNMP network elements, including HTTP, FTP, DNS, NNTP, gopher, POP3, and SMTP services, server hardware, routers, printers, switches, and proxy servers. IpnetWATCHER can also monitor applications, such as Web site links, individual Web pages, and the databases behind them. When impending problems or realtime failures are identified, IpnetWATCHER Java Edition immediately notifies user-designated people through on-screen alerts, e-mail, alphanumeric pager, individual desktop icons, or the network management system. |

Note: All information contained within this table was taken from the Internet, or demo CDs.
Screens, company news headlines dynamically appear on the screen whenever a computer is in “sleep” mode. Users simply click on any headline to obtain instant access to a full news story. One can also broadcast late-breaking company news via an independent, scrolling news-flash ticker. PointCast is available with a 60-day free evaluation of the Intranet Tools beta version (all three managers included).

Extranet Use
PointCast also provides the ability to manage an extranet with broadcasts from suppliers, customers, and service providers without writing any code or buying proprietary servers. The PointCast Network’s new open architecture enables anyone with a Web site to broadcast content to PointCast’s viewership by becoming a PointCast Connections™ webcaster. The Connections super-channel, which can be preconfigured to include one’s extranet partners, runs seamlessly alongside other PointCast channels like CNN and Companies.

Another important requirement within business is the ability to publish, subscribe, and provide feedback. InterMind’s Communicator is a Web publishing, subscribing, and feedback system. It delivers news and information via hyper-connectors. Content providers pay for licenses per unique visitor. Content providers do not need a Web site to deliver content via the Intermind Communicator.

Intermind’s extranet version is not a ready-to-use product, as this product requires a large degree of customization by the user. The user and his organization must do a very good job of defining their requirements and then using Intermind’s value-added customer support on all of the customizable content of the product. Furthermore, Dynamic Publisher for Domino must be installed along with Lotus Notes Domino in order to set up an intranet network.

How Is This Different from PointCast?
PointCast 1.0, introduced in February 1996, did not use channel objects. Rather, it was a client/server application that acted as a dedicated access program for the newsfeed, of which PointCast Corporation was the exclusive publisher. PointCast has patents pending on the use of this kind of application to display advertising information in a screen-saver format.

Intermind introduced channel-object technology with the launch of Intermind Communicator™ in October 1996. Like Web technology, channel objects do not limit subscribers to proprietary channels. Anyone with Web site access can become a channel publisher.

In March 1997, PointCast announced that PointCast 2.0 would support open channels based on the Channel Definition Format (CDF) specification for channel objects jointly developed with Microsoft. PointCast also said it would offer a channel-object-authoring tool, PointCast Connec-
tions, that would create CDF channel objects compatible with the new PointCast client. Today, one can even try the newest version of PointCast 2.5 (download free), with more features.

Another key requirement within business is the ability to share information. Using Megasoft’s WebTransporter, one can simply load files into a Web server library, set up authentication, give users a simple, lightweight client to access the system, and let them download and install files at their convenience. It is also possible to execute download jobs on a schedule.

WebTransporter’s principal functions include the following:

- enable users to scan lists of data files or software applications located on a public or private Web site, and then make requests to download any number of files
- maintain software libraries, authenticate users, and track distribution activity, including information on the number of downloads, versions and types of software, and data files requested
- prepare software and data files for online delivery; can perform automatic download and installation routines
- allow system administrators and webmasters to integrate software download capabilities into existing Web pages; can be customized with company logos, graphics, and text, providing a way to transparently link Web pages and HTML interfaces with software distribution services

The ability to combine push and pull is a key characteristic of Megasoft's product. It is not merely a tool to push files out over the network, but also to provide the technology to manage, update, and track every aspect of the process.

As mentioned earlier, getting information out to the intranet or the extranet on a timely and reliable basis can be a problem. Support systems like the FirstFloor Smart Delivery system provide a Web-based notification and delivery solution that streamlines the flow of corporate information. Smart Delivery allows organizations to customize information delivery, ensuring that users get the information they need, when they need it. Smart Delivery provides users with tools to personalize their information environment, controlling how, when, and what information they receive while automatically notifying users of what information is new or changed. The Smart Delivery line of products includes the FirstFloor Smart Publisher™, Smart Server™, Smart Subscriber™, Smart Delivery ADK, and Smart Bookmarks™.

The market leader in push technology is currently PointCast.

CONCLUSION

Businesses are looking for ways to improve their business process. For most, this means expending the least amounts of time and effort to gain
the most output. The traditional pull technology has become outdated because it has more complex dynamics of information flow compared to push technology.

Push technology provides benefits such as reducing and managing the information overload and dealing with communication bandwidth bottlenecks. In addition, push technology can also easily develop an extranet solution by integrating webcasts into one’s broadcasts. Some of this is seen today by subscribers to cable channels using such technology through network channels such as CNN and MSNBC. Push technology allows one to broadcast unique information by integrating one’s network directory service.

Push technology makes the online experience more convincing and responsive to the needs of one’s clients. Push technology is an important chemistry to push and integrate future computer communication. This chemistry cannot be complete without management’s support, commitment, and future vision of a global electronic commerce environment.

For the IT professional and manager, this is a new step and horizon for which communication and teamwork with the users are key components. It can provide business with the competitive edge needed to survive. Global competition pressures have set the tone for the evolution of push technology. Those who accept the risk, plan, and communicate and work together can make it successful for the business.

Suggested Readings

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