Towards an Accessible Web by Applying PUSH Technology

Tuula Käpylä, Isto Niemi, and Aarno Lehtola

VTT Information Technology
P.O.Box 1201, FIN-02044 VTT, Finland
Tuula.Kapyla@vtt.fi
http://www.vtt.fi/tte/

Abstract. Information overload makes it more and more difficult to get the right information at the right time. Nowadays, users get overwhelmed by the massive amount of information available on the Internet. The 'traditional' pull technology model is becoming a limit for more efficient use of the Web. Specifically requesting information from a particular source, e.g. downloading a Web page with a browser is an example of pull technology. As Web grows in size and complexity the importance of new information delivery models such as push technology increases. The push technology was created to alleviate problems facing users of the Internet, e.g. information overload and low bandwidth. The push technology is a data distribution technology in which selected data is automatically delivered into the user's computer at prescribed intervals or based on some event that occurs. The push technology can be used to make information more accessible for the user. By applying the push technology it is possible to design and implement user-friendly and effective information delivery systems. In this paper we first define what the push technology is. We will also describe what the advantages and disadvantages of the push technology are, and how we can utilise it best. This paper also contains a table where basic information about 50 different push tools has been collected.

1. INTRODUCTION

Internet and Web (World Wide Web) serve acquisition and distribution of information very widely at the moment. The 'traditional' pull technology model is becoming a limit for more efficient use of the Web. In the pull technology model the user specifically asks for something by performing a search or requesting an existing report, video or other data type. This has to be repeated for each Web site from which the user wants to get useful information. Often these searches result in hundreds of thousands of items returned. To get fast the updated information is not easy. With an increasing number of Web sites, combined with the quite slow transfer rate for dial-up users, the task results in a lot of wasted time and a higher telephone bill. As Web grows in size and complexity the importance of new information delivery models such as push technology increases. The push technology is a data distribution technology in which selected (customised/personalised) data is automatically delivered into the user's computer at prescribed intervals or based on some event that occurs. The difference between push and pull technologies centers upon the side which is initiating the transaction. The transaction is either initiated on the user/client side (pull) or on the provider/server side (push).

2. WHAT IS PUSH?

The push technology has rapidly gained considerable popularity since its emergence in April 1996, the time PointCast announced its PointCast Network, which soon became extremely popular. It pushes selected news and stock quotes into a user's machine at prescribed intervals. Since then, a number of similar solutions have been proposed and deployed on the Internet. Push is also know as "webcasting", "netcasting" or "PointCasting" (after the

company that invented it). When applied appropriately, it can be used to solve real business problems.

The push technology was created to alleviate problems facing users of the Internet, e.g. information overload and low bandwidth. Information overload is the main driver for the development of push services. It is a natural evolution required to cope with the amount of information now available over the Internet. The push technology can be augmented by filtering, indexing, and directory services to help manage information overload. Most end users are restricted to low bandwidth Internet connections making it difficult to receive e.g. multimedia content. Assuming users are willing to wait 15 seconds for a Web page to download. This leaves room for little more than text and small graphics. The push technology provides the means to pre-deliver much larger packages of content (with an unattended connection). This leaves plenty of room for multimedia content such as audio, large graphics, or short video clips.

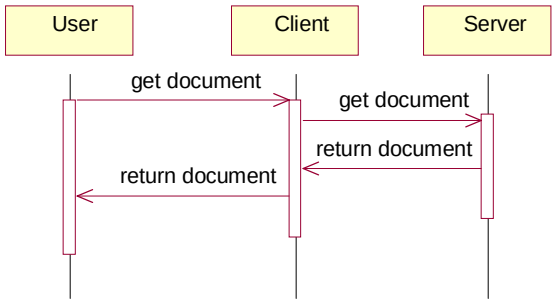

Figure 1. Pull technology. User seeks for new information.

The push technology is a technology by which a program running on the workstation can either request or receive information from Web automatically (on a pre-arranged schedule or when certain events occur) and then display that information on the screen. Content is delivered through a variety of ways, mainly through a browser either built-in to the push client or captured by an external browser like Netscape. One possible way is content that is delivered right to the user's e-mail client. The program running on the workstation can be called the push client. Push clients are only one side of a client/server process. On the other side of this process, push servers are responsible for sending channels of information to clients. A channel is a preselected Web site. The availability of various channels depends on the push client software.

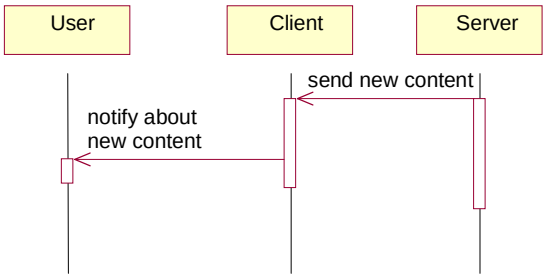

Figure 2. Push technology. A content provider (server) sends new information to user's desktop (client) and user is notified about it.

The content of a channel can be personalised so that the user gets only the information she/he needs. Many current push systems make use of user profiles in order to better determine what information a particular user actually wants to see. There are many different filtering technologies in use on the Web today.

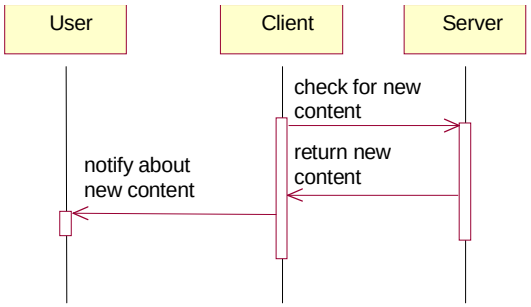

Figure 3. Smart-pull technology. User's computer (client) seeks for new information based on pre-defined schedule.

Many so-called push technology solutions are actually "smart-pull" services requiring clients to request information through search requests to servers. "Smart-pull" depends on the server recording user preferences. The true push technology is the unscheduled delivery of information to an end user. Even though push applications are not really push, there is a difference, however, in them. The difference is the automation of the process for both the publisher and the subscriber. There are a couple of true push technology applications, e.g. products like AirMedia Live and Wayfarer (INCISA).

3. PUSH AND USER INTERFACE ASPECTS

Push users can access their information in a variety of ways and they are not limited to how, why or when they get the information they need. Simplicity of use is the key factor for push services. Personalised services are a key to simplifying user interfaces. The push technology allows user profiles to be used to set up personalised information delivery systems.

The information coming to a user's workstation is usually a summary of a larger document that the user can access by requesting additional details. By clicking on a headline the full article appears on the screen. Some of that information, such as news headlines, could be presented in the form of a screen saver (the animations that scroll across a monitor when a computer is temporarily inactive). Personalised screen savers keep the user informed of the latest news with headlines that scroll across the screen. Other data, such as sports scores and stock prices, might be placed in a ticker. A ticker is a movable, resizable, bar-shaped window that appears on the screen, that scrolls time sensitive information from channels the user has subscribed to. The ticker can even display news while the user works in other applications. A ticker bar embeds and scrolls in the title bar of any active application. It can even automatically follow the user from one active application to the next. The most common type of display in BackWeb is the flash. Flashes are interactive multimedia displays that proactively alert users to the arrival of content without interfering with their active application. Clicking on an flash launches the Web browser with the complete article intact.

4. PUSH APPLICATIONS

The push technology is useful in many different types of applications. The push technology has been used for a number of years in the financial world, in live news feeds and cable television. One of the more common uses today is the automatic downloading of software upgrades and fixes and the delivery of news information to workstations. Push is useful to the end user because it prequalifies appropriate information, thus cutting down on research time. It is also vital to the companies or services that use push to sell their products and services.

The push technology is also capable of matching prequalified advertising banners to match the specific demographic. This means higher advertising rates and greater profit potential. Companies are at great advantage for making use of the push technology. Allowing them to make instant changes, based on the notice that they receive when their information is pushed to them, increases their productivity. They no longer have to rely on someone to search a site for out-dated material. However, information must be relevant to the business strategy, otherwise it wastes company resources. The push technology applies to entertainment and leisure, not just business news and stock updates. Push applications remain fairly specialized, however. The push technology will not replace 'traditional' pull communication and may not be useful in all businesses. It is just another way to access information. Traditional Web surfing is perhaps one of the few areas where the Internet brings something new compared to traditional media.

One area where the push technology is very useful is inside corporate intranets. Many push products are adaptable for intranet use, sending out only company-created content. And some newer push products are aimed solely at the exploding intranet market. Companies can use push technologies on intranets to deliver timely corporate information to employees. Push delivery is one way to make sure employees get the information they need.

4.1. Push Application Case

We have been designing and implementing a push application for the EIONET (European Environment Information and Observation Network) to intensify the acquisition and distribution of the environmental information of the European Environment Agency (EEA). EIONET is a co-operative organizational network of institutions that assists the European Environment Agency in providing the European Community and its member states with environmental information. It also allows electronic interchange of information between these organisations. EIONET is currently an intranet connecting multiple national hosts (intranet nodes). The purpose of the project was to provide a push application for delivering notifications on new documents and events published on a Web repository.

The project started at the beginning of the year 1998 and the first version of the push application was installed in September 1998. The developed system can be applied to many other information services, where efficient use of Web repository is needed (more information, see http://www.vtt.fi/tte/products.htm). We have also reviewed what push tools are available on the market at the moment, and how these tools differ from each other. The push tools about which information has been obtained have been listed in *Appendix*.

5. PUSH ADVANTAGES AND DISADVANTAGES

5.1. Push Advantages

Here are advantages of the push technology:

- The push technology can reduce the burden of acquiring data for tasks in which there is a large information flow. Push technologies improve efficiency by downloading information to a user's system in a scheduled fashion so it can be rapidly viewed, and thereby eliminating the risk of the user not ever viewing the updated information. The user always has the latest information. No longer do users have to search for the information. However, users must specify the information they need.

- The push technology can reduce the burden of acquiring data for tasks where occasional, time-critical data must receive immediate attention. Pushing alerts to the user (e.g. in the form of e-mail or the change itself), improves the efficiency of Web-based time-sensitive information distribution (such as stock quotes or trouble tickets in a technical support system).
- Businesses are able to target users with more precision, focusing on those who are more likely to benefit from their products or services. Push solutions help guarantee readership level and provide mechanisms to understand information usage better.
- Automatic downloading of software upgrades and fixes is a way to deliver software faster and, at the same time, reduce the costs associated with packaging and selling through the retail channel. E.g. Java applets and scripts can provide a means of providing timely updates to software. To be successful in this area, push products must add mechanisms to check client machines for software and configuration, and then modify these configurations. A key factor to allowing such distributed services is a security system that can apply on either side of a firewall.
- Only new and changed information has to be sent to the computer, so access to the Internet and download time is minimized.
- Software is being run on the client side, minimizing processor use of company Web servers. Servers can use more processor time for data production rather than to process numerous client requests and send much data over the network. Servers can better manage the amount of data transferred over the network.
- Response time is generally quicker because the information is on a local computer, not on a remote server.
- Because push applications run mostly at the client side, users can more easily protect there privacy. In many push applications the user profile and the log information about the user's behaviour are stored to the user's computer. An ordinary Web application stores this data to the content provider's database. From the content provider's view this could be a disadvantage too.
- The push technology enables intelligent information filtering based on personalised user profiles describing required information needs.
- When some data must be provided to employees for compliance with laws, company rules, health and safety and quality control, the push technology can help here if combined with some mechanism for reporting when users have spent sufficient time to absorb the received information.

5.2. Push Disadvantages

Here are disadvantages of the push technology:

- Development time for push technology applications is greater than creating static pages. Static pages can be viewed by any browser on any operating system, however dynamic information (using the push technology) can be browsing tool specific.
- More expensive additional software packages will be needed, and faster, more efficient, and more expensive computers might be needed to run push software.
- Downloading of sounds, images, applets, video etc. in the background can eat up hard disk.
- Content delivery causes innumerable bandwidth problems, which most vendors have not been able to resolve. Problems arise due to the enormous bandwidth that push technologies can require when feeding data to thousands of end users. Caching proxy servers, for

example, as well as multicast[1] solutions, will likely solve many of the bandwidth problems of push and allow it to scale. Some of the providers allow users to choose when the information is downloaded, so users can schedule it for times that they will be away from their computer. Most push clients will search for updates only when you tell them to, a feature that is particularly important for dial-up users. In the future network costs will determine more and more how often users can afford to update services.

- Because there is so much information on the Web, users are less inclined to pay for it. This means that content providers need to rely on advertising to cover their costs. Web advertising is one of the largest users of bandwidth as many advertisments are images, involving animation and moving images.
- Because the software is being run on the client side, and not the remote server, there is a greater emphasis on the resources of the personal computer.
- Notification is the best and worst aspect of the push technology. Users get the information they need as soon as it is available, but often that means constant interruption. Though interrupts can take a user's focus away from the task at hand, the real problem is that they are too frequent and generally unscheduled.
- Push technology tools are increasing rapidly. They are, however, often offered by new ventures that have been in business for a short time. Many of these products are in early development stages and do not meet all the desired requirements.
- The philosophical implications of the push technology are large. The push technology pushes the user back into a passive, receipt-only role. It may be that it could turn the Web into a more passive medium. On the other hand, one can also say that the user have more time to other more interesting tasks.
- The users of the Web are not necessarily in an equal position. It will cost a bundle to have advertisements pushed through, too much for the smaller companies. Once the average user becomes accustomed to having information on the Web pushed at her/him, she/he will no longer (or rarely) go out and seek something more. The push technology is clearly not just for big companies anymore. Open, cheap push platforms make it possible for any online business to push marketing materials, price lists/changes etc.
- The push technology is not good for the typical knowledge worker who mines information from a variety of sources and then draws conclusions by digesting that information.
- Creating and maintaining user profiles can exert a huge burden on users, assuming their information needs can be expressed in those profiles. Our information needs are constant to some degree only.
- Security safeguards are needed.
- Standards are currently lacking in this area (competing de facto industry standards are pushed by companies).

6. PUSH MARKET

The push market can be divided into four basic categories [3]:

- Application distributor. These products enable you to automatically deliver simple applications to your end users. E.g. products like Marimba's Castanet.
- Content aggregator. These products gather content, format it in a consistent wrapper, and push it to your workstation before you even ask for it. E.g. products like PointCast Business Network.

[1] Multicast is a technology to deliver all kind of contents so that only one copy of a multicast message will pass over any link in the network, and copies of the message will be made only where paths diverge at a router. Multicast is a receiver-based concept; the sender does not need to maintain a list of receivers.

- Platform provider. Platform providers are similar to content aggregators, except what you are buying is the infrastructure to deploy content delivery systems as you see fit. E.g. products like BackWeb.
- Real-time data transfer. Real-time data transfer is one of the more compelling applied uses of the push technology. It is expensive to implement, but it makes timely, guaranteed delivery of information possible. This class of software offers the advantage of multicasting -- the capability to efficiently and simultaneously send information to a multitude of sources. E.g. products like TIBCO and Wayfarer (INCISA).

Microsoft Corp. and Netscape Communications Corp. are the two leading competitors in the world of the push technology. Microsoft is pushing the Channel Definition Format (CDF) for defining push updates and content. The actual markup within a CDF file is based on Extensible Markup Language (XML), which is relative to HTML (Hypertext Markup Language) and SGML (Standardized General Markup Language). The CDF format already has some major supporters, including BackWeb Technologies Inc. and PointCast Inc. Netscape is using the Meta-Content Format (MCF). MCF was invented by Apple Computer, and its main architect has since moved to Netscape to work its development. For example Marimba Inc. has begun co-operation with Netscape. Microsoft and Netscape each have created their own push clients for use in conjunction with their latest browsers. Instead of having to go through several different proprietary clients, users can access channels from different push services in Internet Explorer 4.0 (IE 4.0) or Netscape Netcaster. Netscape's Netcaster differs from Microsoft's CDF technique in that netcasting is implemented with the existing open standards of HTML, Java, and JavaScript.

There are several push technologies in competition on the market. Each push technology has its own strength and is better suited for a particular category of users. E-mail is perhaps still the best push technology for delivering time-critical information to a specific audience. Today's e-mail systems are not as rich as most push solutions, but e-mail will continue to evolve. Push systems give users more authority over the content they receive. Most push technologies try to be a more serious information tool that changes the look and function of the workstation.

Knowing which tool to choose starts with a clear understanding of the problem you need to solve, e.g. [3]:

Task	**Most appropriate tool**
Receive daily news	BackWeb, PointCast
Broadcast company news	BackWeb, PointCast
Allow users to publish to internal channels	BackWeb, PointCast
Hijack content from competitor Web sites	BackWeb, PointCast
Conserve bandwidth	BackWeb, PointCast
Receive stock quotes	BackWeb, PointCast
Receive industry-specific information	PointCast
Deliver information in real-time	TIBCO
Guarantee message delivery	TIBCO
Address messages by subject	TIBCO
Manage bandwidth	BackWeb
Control information access	BackWeb
Customize the front end	BackWeb

Distribute software	Marimba Castanet

The ability to recognize, separate, and deliver the correct information to the correct audience at the correct time is the principal requirement of push tools. Filtering, security, bandwith, and automated operation are among the primary concerns of a company developing push tools. The most productive information filtering takes place during the distribution process without user involvement. If the users become involved in filtering content, the system does not provide adequate content control. The best push technologies provide a means for access control to sensitive and confidential materials by authenticating users and limiting their access privileges. Push tools that have built-in capabilities for measuring their own impact on network performance and can adjust their operations accordingly are the preferred solutions. Automatic location and acquisition of information from various sources with minimal involvement of programming talent enhances productivity.

Push information delivery models differ in the costs incurred for purchase and uptime, the ease of use, the ease of integration into a user's existing information delivery structure, the customisation capabilities etc. Push information delivery models can be categorized at least into three main categories [6, 14]:

- Push Server Model. The most common delivery model is the Push Server Model. This is a turnkey solution that provides a client, server, and development tools. Costs associated with the server may include the number of connections and/or the number of packets sent. A proprietary client is supplied. These applications may use a proprietary protocol. Both users and content providers have control over the content. E.g. products like BackWeb and Marimba's Castanet.
- Web Server Extension Model. In this model, the push vendor does not buy a server, so the costs are associated with the number of extensions sold. Feedback and demographic information can be directed to an external server, so that information can be retained by the push vendor (transfer costs may need to be negotiated separately). Installation should be less extensive since no true server is involved. The drawback is that content providers do not have any control over fetching because they do not know the settings of the client program. No proprietary client is required. These run within the user's installed browser, e.g. products like PointCast. Or the server delivers content using email, e.g. products like ChannelManager and InfoBeat.
- Client Agent Model. This model does not need to have a server at all, except to update client software and retain user demographics. This model uses a "client agent" to retrieve the information from Web. Each agent is designed to provide different search results. This model can allow for an anonymous relationship between the vendor and the subscriber. Costs are associated with the agent customisation. The user is responsible for deployment, and controls the search type extensibility.

7. CONCLUSIONS

We have been designing and implementing a push application and also have obtained basic information about 50 push products. We have tested several products. By applying push technology we can design and implement user-friendly and effective information delivery systems. These systems can be general enough so that they can be applied to other environments with reasonable amount of work. As Web grows in size and complexity the importance of new information delivery models such as the push technology increases. Dramatic increase of data traffic on the Internet has made information access periodically difficult to achieve. The push technology can be used to make information more accessible for the user. Push technologies will develop when multicasting on the Internet becomes

common. Currently they rely on multiple transmission of the same data. However, multicasting is unlikely to be soon fully standardized.

8. ACKNOWLEDGEMENTS

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9. SOME PUSH REFERENCES AND SOURCES

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19. http://www.awaken.org/push.html
20. http://webreview.com/97/04/18/addict/index.html
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24. http://www2.echo.lu/oii/en/push.html

Appendix. Push tools.

Note that the information given above reflects our understanding at the time of writing, and that due to fast changing market conditions, we cannot guarantee its accuracy over time. Please follow the respective links for more information on referred technologies. We are not responsible for the errors in the used sources.

Product name	**Price/Licence**	**Company/author**	**Client platforms**	**Server platforms**	**Notification and/or delivery**	**Description/Usability**
7am news ticker	Free (ad supported)	7am News http://7am.com/	Java-enabled browser	None	Delivery only	Java applet for news feeds (headlines and links).
AirMedia Live Internet Broadcast Network	Software comes free with Internet Antenna. Service $5.95/month.	AirMedia (formerly Ex Machina) http://airmedia.com/	To connect to the AirMedia Live Internet Broadcast Network, you need an Internet Antenna (a wireless receiver, serial port) and AirMedia Live software and service. CD-ROM drive for AirMedia Live software installation. Available for Win 95 and Win NT.	None	Delivery only	Internet's wireless news delivery. For users who lack a full-time Internet connection. You must initially purchase a NewsCatcher wireless receiver ($150 street price) and an AirMedia service plan.
BackWeb	Client software free. Server starts at $10,500 (one channel-server licence) depending on channel volume. To broadcast using Multicast will have to pay an additional $50 per seat.	BackWeb Technologies http://www.backweb.com/ BackWeb has acquired Lanacom, see HeadLiner.	Win 3.11, Win 95, Win NT, Macintosh. A Win95/NT authoring tool to develop the content.	The BackWeb Channel Server runs on Windows NT, Solaris and Irix; the Proxy server runs on Win NT. Server is managed by a remote console running on Win 95/Win NT.	Both	BackWeb is a open platform for the development of simple to complex push systems. It uses Polite Agent Technology that uses only excess bandwidth. The client allows for software updates to be sent out. BackWeb has integrated with TIBCO Inc.'s TIB IP Multicast technology.
BroadVision One-to-One	Varies by installation (starting about $125,000)	Broadvision http://www.broadvision.com/	One-To-One applications can be accessed from any HTTP server that is compliant with either NSAPI, ISAPI, or CGI standards. RDBMS: Oracle RDBMS Version 7.x , Microsoft SQL Server 6.x, Sybase SQL Server (10.x, 11.x), Informix 7.x	Server Hardware and Operating Systems: Solaris 2.x on Sun Sparc, Win NT 4.0 on Intel x86, HP UX 10.x , SGI IRIX 6.x.	Both	Development environment for delivering customized information.
Communicator	Free	InterMind http://www.intermind.com/ It no longer offers webcasting products.	Win 95 or Win NT	Any web server	Notification only	Creates a personal, interactive connection between Web site publishers and their channel subscribers.
Channel Manager	$19.500 (100-user minimum); additional users $195 per seat, volume discounts apply for additional user licences.	DataChannel http://www.datachannel.com/	ChannelManager supports most 32 bit Java and Java-enabled Web browsers.	Channel Server platforms: Sun Solaris, Win NT 3.5/4.0, HP MP UX, IBM AIX, DEC Ultrix. Web server: Netscape 3.0 and Constellation, or Microsoft Information Server 3.0, or Microsoft Active Server. Databases: Oracle, Sybase, Informix, SQL Anywhere, or MS SQL	Both	To create and manage unlimited number of channels with real-time (TIBCO) push. A navigation management tool for files, applications, and Web sites, links users and information on a one-to-one basis. DataChannel focuses on development of XML-enabled Active Content Technologies. DataChannel is using Microsoft's Channel Definition Format (CDF).

Product name	Price/Licence	Company/author	Client platforms	Server platforms	Notification and/or delivery	Description/Usability
Crayon		NetPressence http://crayon.net/				a personalized newspaper
Desktop News	Free (ad supported)	DesktopNews http://www.desktopnews.com/	Operating System Win 3.11, Win 95 or Win NT 3.51, 4.0. Browser Netscape Navigator 3.0, Microsoft Explorer 3.0 or any popular browser that is 100 % compatible with either of these. Disk Space 4 MB for the Desktop News client software plus content updates Network Winsock 1.1. Desktop News accommodates Java, C++, ActiveX, and soon, Microsoft CDF.		Both	Customized news deliveries to the desktop. Desktop News open publishing model allows any content provider to publish to the Desktop News specification and become a Channel selection for users.
Diffusion Server (formerly IntraExpress)	Diffusion Server 2.0 is available with prices starting at $75,000 per CPU.	Diffusion http://www.diffusion.com/	Supported recipient platforms: E-mail, Fax, Pager, Postal Service, Network Printer, Web Browser Information Sender: Win 95, NT 4.0. Information Recipient Profile Manager: Java-enabled Web browsers such as Netscape Navigator and Internet Explorer, Native Windows support including Win 3.1, Win 95, Win NT 4.0	Win NT 4.0	Both	If you need to send documents to many people who require different delivery methods.
Downtown	$10,000	inCommon, http://www.incommon.com/ TIBCO Software has acquired inCommon.	Win 95/NT. Win 3.1 coming soon. Minimum 16 Megabytes of memory. 20 Megabytes of disk space (varies with cache size). 486/66 MHz or higher processor.			Customizable Webcasting: choose from a selection of news and weather channels, or create your own.
Eye on the Web		internet eye on the web http://www.eyeontheweb.com				a personalized newspaper
fishWrap	Free	The Gate http://www.sfgate.com				a personalized newspaper
GroupMaster	GroupMaster Server software is priced according to its capacity for subscriptions (5000 ->): $495 - $11995. GroupMaster Enterprise, unlimited capacity for subscriptions, 16 remote managers, retail $9,995, 1-yr. maint. $2,000, package $11,995	Revnet http://www.revnet.com/	Win 95, Win NT, Win 3.1 To administer the program, you need a frames-capable Web browser such as Internet Explorer or Netscape Navigator.	Win NT4.0/3.51	Both	GroupMaster can deliver information to email as well as Web clients, also stage content delivery depending on when a user subscribes.

Product name	Price/Licence	Company/author	Client platforms	Server platforms	Notification and/or delivery	Description/Usability
HeadLiner	Free	Lanacom http://www.lanacom.com/ BackWeb has acquired Lanacom. Headliner information delivery product still available for free.	Win 95 and Win NT 4.x platforms. For Netscape Navigator (3.x, 4.x) and Internet Explorer (3.x, 4.x).		Both	HeadLiner offers you up-to-the-minute customized news and information from more than 700 web-based news sources (you can subscribe to 40 channels).
Highlights2	$49.95	Tierra http://www.tierra.com/	Win 95 and Win NT 4.0 For Netscape Navigator and Internet Explorer.	None	Both	Users select Web sites and subscribe to particular pages.
HotWired		Wired Digital http://www.hotwired.com/				a personalized newspaper
InfoPager		ZEBRA Pushware Solutions http://www.infopager.com/				a personalized newspaper
Infoseek Personal		Infoseek http://personal.infoseek.com				a personalized newspaper
InfoBeat (formerly Mercury Mail)	Free (ad supported)	InfoBeat http://www.infobeat.com/	Email		Delivery only	InfoBeat delivers news on topics you select at the times you have requested right to your existing e-mail box.
Inquisit	$12.95/month, 24 months $249.95. For Enterprise Inquisit pricing is agreed differently.	Inquisit (before Farcast) http://www.farcast.com/	Any POP email client.		Both	Customized newspaper using agents to retrieve articles via email.
Intercast		Intel http://www.Intercast.com/		None		Viewing of TV and Web content together.
Marimba Castanet		Marimba http://www.marimba.com/datasheets/castanet-ds.html		Castanet servers (called Transmitters). Castanet requires a large investment in proprietary server technology.	Both	Designed to distribute and manage applications automatically. Castanet transmits updated content only. Castanet development requires Bongo, Java, or other scripting or programming expertise.
Microsoft CDF (Internet Explorer)		Microsoft www.microsoft.com/standards/cdf.htm				Channel Definition Format (CDF) is a text-based format for letting publishers define channels that point to Web pages (personalised push delivery). In Internet Explorer (IE): Scrolling ticker. Users have control over content. Development requires you to learn a new CDF language.
My Excite		Excite http://www.excite.com/				a personalized newspaper

Product name	Price/Licence	Company/author	Client platforms	Server platforms	Notification and/or delivery	Description/Usability
My Yahoo! News Ticker (formerly known as Instant Online News)	Freeware	Net Controls Corporation, http://www.netcontrols.com/	Win 95, Win NT, Win 3.1 For Netscape Navigator and Internet Explorer.			Yahoo! and Net Controls partnered to bring the My Yahoo! News Ticker, a direct feed of the latest news headlines, stock quotes etc. With News Ticker you lose the advertisements associated with the My Yahoo! service.
NETdelivery	Free client + subscriptions	NETdelivery http://www.netdelivery.com/	Win	None	Both	In the business-to-consumer environment, NETdelivery's Electronic Delivery Management (EDM) capability supports personalized information delivery to and from consumers.
NETpresenter	$799 (1 Editor, 20 Player)	NETpresenter, http://www.netpresenter.com/netpresenter/	Win 95, Win NT; 16-bit (Q1 '98)			NETpresenter is a push/pull application consisting of an Editor for designing information channels, and a variety of desktop viewing media, including screen saver, browser plug-in, video and compact (150kB) Player.
Netscape Netcaster	Free	Netscape, http://www.netscape.com/netcenter/	Netcaster is now shipping as part of Communicator 4.04 for Win 95 and Windows NT users and is available in beta for Macintosh PowerPC and UNIX AIX.	It does not need server, but can use Marimba Castanet server.	Both	Menu on the desktop. It can be used to load HTML-pages beforehand and store them to a local hard drive. It offers a information stream to a user's desktop (they called it webtop).
NewsEdge		NewsEdge http://www.newsedge.com/				a personalized newspaper
NewsHound		Knight Ridder http://www.newshound.com/				a personalized newspaper
NewsPage		NewsEdge http://www.newspage.com/				a personalized newspaper
Pathfinder Personal Edition		Pathfinder http://www.pathfinder.com/welcome/				a personalized newspaper
Paracel Today		http://www.unc.edu/~fookie/home.htm				a personalized newspaper
Personify (formerly Affinicast)		Personify http://www.personify.net/			Delivery only	Personify Snapshot Server is an online, server-based application that makes Personify Snapshot analyses available continuously, on demand.

Product name	Price/Licence	Company/author	Client platforms	Server platforms	Notification and/or delivery	Description/Usability
PointCast Intranet broadcast tools (formerly PointCast I-Server)	Clients free (ad supported)	PointCast http://www.pointcast.com/	The PointCast Network version 2.5 (current version) client requires the following: 16bit: Windows 3.1, Windows for Workgroups 3.11, 486 Pentium or higher, 8 MB of RAM or higher, 256 colors or higher, 10 MB free hard disk space, a direct or dial-up connection to the Internet.	Push-data can be on any Web server. PointCast Caching Manager needs: Win NT V4.0 or V3.51, Pentium 75 MHz, 32 Mb RAM, 18 Mb free disk space. PointCast Intranet Manger, PointCast Administrator and PointCast Studio needs: win95 or NT4.0, Pentium, 16Mb Ram, 10	Both	PointCast is the pioneer of Push. PointCast Intranet Broadcast Solution enables you to define customized, corporate channels. PointCast uses CDF.
Posta	$3,999 for 20 Posta Desktop accounts and the server, plus $189 for each additional account.	Tumbleweed http://www.tumbleweed.com/			Notification only	The sent document resides on the sender's server, and the recipient gets e-mail notification with a URL for the document.
SEARCH'97 Agent Server	Varies by installation	Verity, http://www.verity.com/	Users initiate searches and view results using all major Web browsers and client operating systems. Verity also has client-side tools for indexing and searching desktop computer environments.	SEARCH'97 is server-based and runs on Win NT and popular UNIX platforms (including those from IBM, Sun, SGI, DEC, SCO, and Hewlett Packard).	Both	Knowledge management solutions using agent and search technologies for information access.
Smart Delivery	Varies by installation	First Floor http://www.firstfloor.com/	Win 95, Win NT, Win 3.1, Macintosh	Win NT, Solaris	Both	To software developers. FirstFloor's Smart Delivery product line enables client/ server developers to build virtual corporate that deliver mission critical business documents, in their native format, to both corporate office and field organizations.
TIBCO		TIBCO Software http://www.tibco.com/			Both	Multicast IP publishing development environment.
URL-Minder Enterprise Minder (or Minder)	Free Commercial	NetMind, http://www.netmind.com/	An email account and Internet access via a web-browser or online service are all that is required to use URL-minder. Wind NT 4.0 or Solaris 2.5 or above. 32M of RAM is the minimum. A JavaScript enabled browser, such as Internet Explorer 3.0 or higher, Netscape 3.0 or higher is required by the end user.The Wind NT version can be installed and run on Win 95 on an evaluation basis only.			You can enter the Web sites you want to keep track of. When the site is updated you will be alerted or you can have that page sent as an attachment. Enterprise Minder is online tool that monitors the information that you select, and sends you an email whenever your selection is updated. This information can reside anywhere on your company intranet or the public Internet.

Product name	Price/Licence	Company/author	Client platforms	Server platforms	Notification and/or delivery	Description/Usability
WavePhore NewsCast, WaveTop	Free (ad supported)	WavePhore http://www.wavephore.com/	A standard PC with a built-in TV tuner or equipped with an add-on TV tuner card.		Both	Hardware-based products to deliver news. PC must be equipped with a television tuner.
Wayfarer 4.0 (formerly called INCISA)	Pricing starts at $10,000 for 100 seats with discounts for higher volume purchases.	Wayfarer http://www.wayfarer.com/	Win 95 and Win NT For Microsoft Internet Explorer 4.x and Netscape Communicator 4.x.	Win NT	Both	A tool to create deliveries of business-related information from in-house sources and the Web. Designed for intranets. Real-time delivery (a multicast approach).
WebCast	Webcast Professional $1,995 WebCast Studio, the authoring environment, as a standalone product without WebCast Server for $495.	Astound http://www.astound.com/	Any desktop system will do, or any system that has write access to your server (such as a network server).	Win NT	Both	For developers using middleware tools, such as Cold Fusion. For developers using HTML authoring tools, such as Adobe Pagemill. For anyone interested in creating high-impact Netcaster and Internet Explorer 4.0 broadcast channels, with no scripting required.
Web Transporter		Megasoft http://www.megasoft.com/ wtsoc.html	Macintosh, Win, UNIX, Java	Win 95, Win NT, UNIX	Both	Web Transporter combines a Java-based push agent and user-activated pull capabilities, security, scheduling and an open, standards-based architecture that can be linked to legacy systems including corporate directories and purchasing systems. It is designed to maintain versions, track licenses and generate reports. It streamlines enterprise software delivery and provides the tracking, reporting and control functions.
WorldFlash	Free	http://www.worldflash.com/	Win95, NT	None	Delivery only	news ticker
ZD Net Personal		ZDNet, http://www.zdnet.com/				a personalized newspaper