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Internet Technologies Deployed

Behind the Firewall for Corporate Productivity

Prepared for the Internet Society

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Abstract

This paper and accompanying presentation will discuss the opportunities for deploying Intranets - Internet technologies used on the corporate network - for a variety of strategic and tactical communications purposes. This paper and accompanying presentation will explore the usage of Intranets and provide a series of recommendations on the business, social and organizational issues involved in rolling out an Intranet site.

Introduction

While 1995 was clearly the "Year of the Internet", 1996 is well on its way to becoming the "Year of the ***Intranet***". Thousands of organizations have already found that internal Intranets can help empower their employees through more timely and less costly information flow. This empowerment bolsters the company's competitive advantage, improves employee moral and assists in getting more timely information to customers and suppliers.

This paper will explore the business, organizational and technical issues behind the setting up of an organizational Intranet. In addition, it will provide some pointers in how to successfully deploy and manage an Intranet.

Before we explore the opportunities and issues in setting up an organizational Intranet, let's explore why Internet technologies are so effective behind the corporate firewall.

A Little Background

The technologies that support the Internet provide the following benefits:

- connected computers can share or transfer information among one another

- connected computers are heterogeneous - that is, they run a variety of operating systems and hardware from multiple vendors

- common user applications - email, web browser, etc., are available across most commonly used platforms

- hypertext links simplify navigation and information retrieval

It is this last principle that has driven the tremendous increase in Internet usage over the past year. Users can simply point and click to navigate across the World Wide Web. Today web traffic outdistances all other traffic on the Internet and the increasing use of graphics, audio, video, and other data types on web servers will continue to drive growth in web traffic.

Similarly, this increasingly rich information environment is drawing new users to the Internet daily. Users can get realtime stock quotes, register for training courses (and take them) online, listen to ***All Things Considered*** from NPR, read *The Wall Street Journal*, check the Manchester United/Leeds football match scores, or even watch the sun go down over the Santa Cruz pier.

Browser as Ubiquitous Window Onto Information

Similarly, the explosion in information resources has driven the development and deployment of browsers over a wide range of computing platforms, including Windows (all variants), Macintosh, IBM OS/2, Unix (most, if not all variants), and many other lesser known platforms.

Users are becoming increasingly used to retrieving information through their browser. As Microsoft Windows once was positioned as the universal interface to all applications residing on one's Wintel (Windows/Intel) computer, today, the ubiquitous browser is becoming the universal interface to all information types, whether these resources reside out on the Internet, on one's personal computer, or on the corporate LAN.

And the web server has become the ubiquitous host or coordinator for all of these information types. Using HTML and various add-on software and servers, whether they be SQL database servers, RealAudio servers, CU-SeeMe™ videoconferencing, or multithreaded discussion conferencing software, today several hundred thousand web servers provide simple point&click access to an incredible range of information resources.

Intranet Explosion

IS and functional department managers quickly identified the power of this new communications medium as a resource to be leveraged on the corporate network as well. Forrester Research interviewed 50 Fortune 500 companies and found that fully two-thirds already have or are considering some involvement with Intranet applications. These companies have identified the Intranet as a powerful mechanism to make information more readily available. (See Figure 1: Corporate Plans for Use of Intranet).

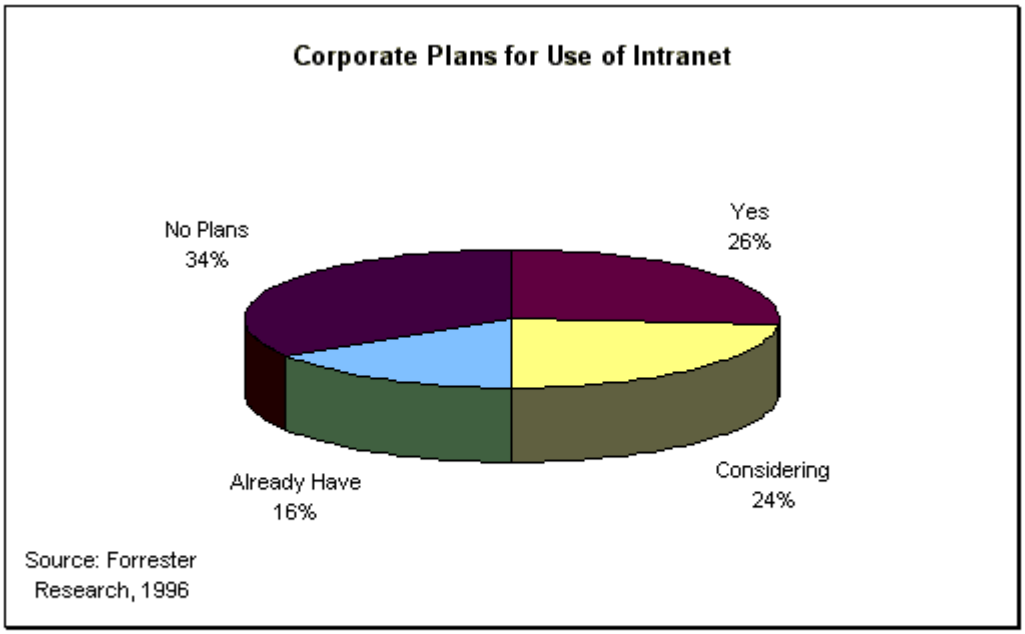

Figure 1: Corporate Plans for Use of Intranet

With corporations under tremendous pressure to empower employees and to better leverage internal information resources, Intranets provide a highly effective communications platform, one that is both timely and extensible. A basic Intranet can be set up in hours or days and can ultimately serve as an "information hub" for the entire company, its remote offices, partners, suppliers and customers.

Intranets offer the following application feature set:

- rapid prototyping (can be measured in hours or days)
- scalable (start small, build as needs, requirements allow)
- easy navigation (internal home page provides links to information)
- accessible via most computing platforms
- can integrate distributed computing strategy (localized web servers residing closer to the content author)
- can be tied in to "legacy" information sources (databases, existing word processing documents, groupware databases)
- extensible to a variety of media types (audio, video, interactive applications)

The benefits to these features are many, including:

- inexpensive to start, requires little investment either in dollars or infrastructure
- significantly more timely and less expensive than traditional information (paper) delivery
- distributed computing strategy uses computing resources more effectively

- users familiar with link metaphor from surfing experiences
- open platform architecture means large (and increasing) number of add-on applications available

New Information Paradigm

Intranets leverage the concept that the web browser is quickly becoming the universal information interface. An increasing number of workers gain Internet access from their work desk every day and are becoming accustomed to retrieving information through the now ubiquitous browser. While most of this information today comes from beyond the firewall, International Data Corporation reports that even in 1995 sales of web servers for *Intranet* use outdistanced those sold for Internet use. (See Figure 2: Internet versus Intranet Usage)

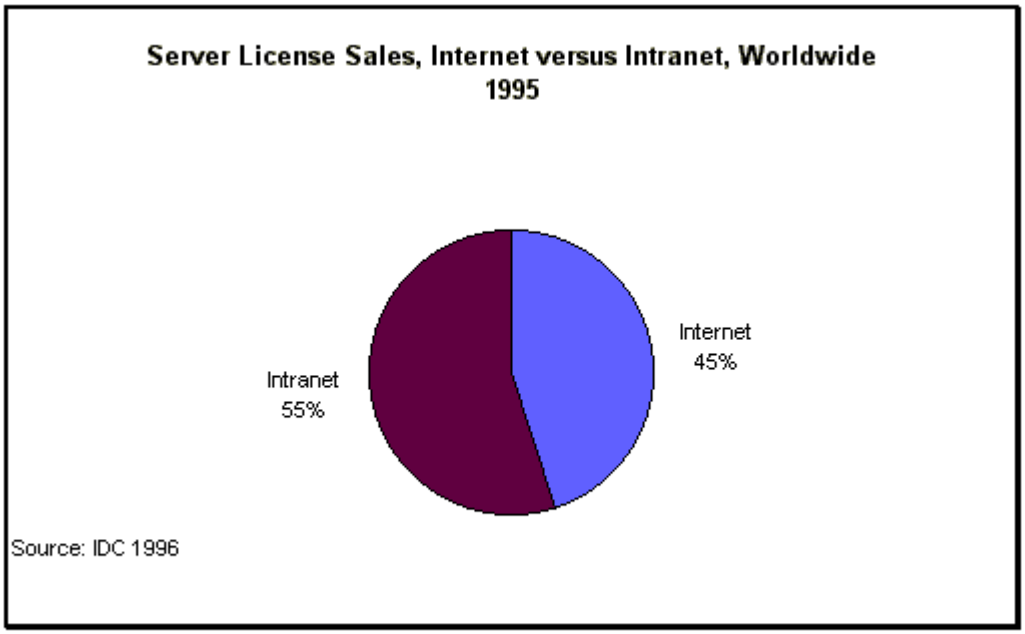

Figure 2: Internet versus Intranet Usage

Furthermore, IDC forecasts that by the year 2000, server licenses sold for Intranet usage will outdistance those for Internet usage by a factor of ***ten*** to one. Clearly, many organizations are quickly adopting this new information delivery paradigm.

Calendar-driven versus Event-driven Publishing

One of the key drivers in this adoption curve is that Intranets allow organizations to evolve from a "calendar" or "schedule" based publishing strategy, to one of an "event-driven" or "needs-based" publishing strategy. In the past, companies published an employee handbook once a year, whether or not policies changed to coincide with that publication date. Traditionally, even though these handbooks may have been outdated as soon as they arrived on users' desks (and were promptly misplaced), they would not be updated until the following year.

With an Intranet publishing strategy, information can be updated instantly. If the company adds a new mutual fund to the 401K program, content on the **Benefits** page can be immediately updated to reflect that change, and the company internal home page can have a brief announcement about the change. Then, as soon as employees look up the 401K program, they have the new information at their fingertips. Content can be changed or updated to reflect new information at any time.

Intranets Reduce Cost, Time to Market

Just as importantly, Intranets dramatically reduce the costs (and time) of content development, duplication, distribution and usage. The traditional publication model includes a multi-step process including:

- creation of content
- migration of content to desktop publishing environment
- production of draft
- revision
- final draft production
- duplication
- distribution

The Intranet publishing model includes a much shorter process, skipping many of the steps involved in the traditional publication model:

- creation of content
- migration of content to Intranet environment

In this latter model, revision becomes part of the updating process while the original content is available to the end users, thus dramatically reducing the time it takes for the information to become available to the user of that information. As the information is centrally stored and always presumed to be current, the company will not have to retrieve "old" information from employees to be replaced with new information, thus saving any expenses incurred in updating.

This new publishing model can dramatically reduce both costs and the time frame involved. Assuming that the corporate LAN environment can support Intranet activities (and most can), the IT infrastructure is already in place. In addition, most popular Intranet web servers can run on platforms widely found in most organizations (Intel 80486 or Pentiums class computers, Apple Macintosh, Novell NetWare, etc.), so that little if any additional infrastructure is needed.

Organizations estimate that the traditional model may entail physical duplication and distribution costs of as high as $15 ***per employee***, costs separate from the content development or testing phases. An organization with 100,000 employees may find potential cost savings of moving to an Intranet strategy for a single application - the employee policies and benefits manual - of $1.5 million alone. And this cost savings does not reflect the additional value in an Intranet solution which makes information more readily available to employees, thus raising both their productivity and job satisfaction.

Intranets Support Distributed Computing Strategy

An additional driver in the growth and speed of this adoption curve is the fact that Intranet applications can fully support a distributed computing strategy - one that places the server and content closer to the owner of that content. Ultimately, basic web servers may be included as utilities shipped with every operating system, in effect allowing everyone to be a publisher.

Until that time, Intranet servers may be located strategically at the group or department level to minimize administrative delays in posting content. (See Error! Reference source not found.). In addition, for strategic or technical reasons, Intranet servers will continue to be located centrally in departments or organizations to provide coordinated access to legacy databases and other external resources, with individual users conducting "secondary" publishing roles. Remote Server Management (RSM) allows web servers to be managed from the

desktop of the administrator. Purveyor IntraServer's RSM is managed from any browser which offers flexibility and ease of use. RSM is enabled from Purveyor's main settings page and installed with access control protection set. Next step is to allow the remote administrator permission to the RSM directory. The remote administrator simply loads a browser, points to the http://server/rsm directory, enters the valid username/password and is then allowed to manage the server.

This distributed computing strategy allows the content developer or functional department manager to both develop and maintain the content, and thereby avoiding having to deal with different departments that may have different agendas or timing requirements. In this instance, the functional department, having decided that a particular set of information would be valuable to employees, has the full control to empower the distribution of that information.

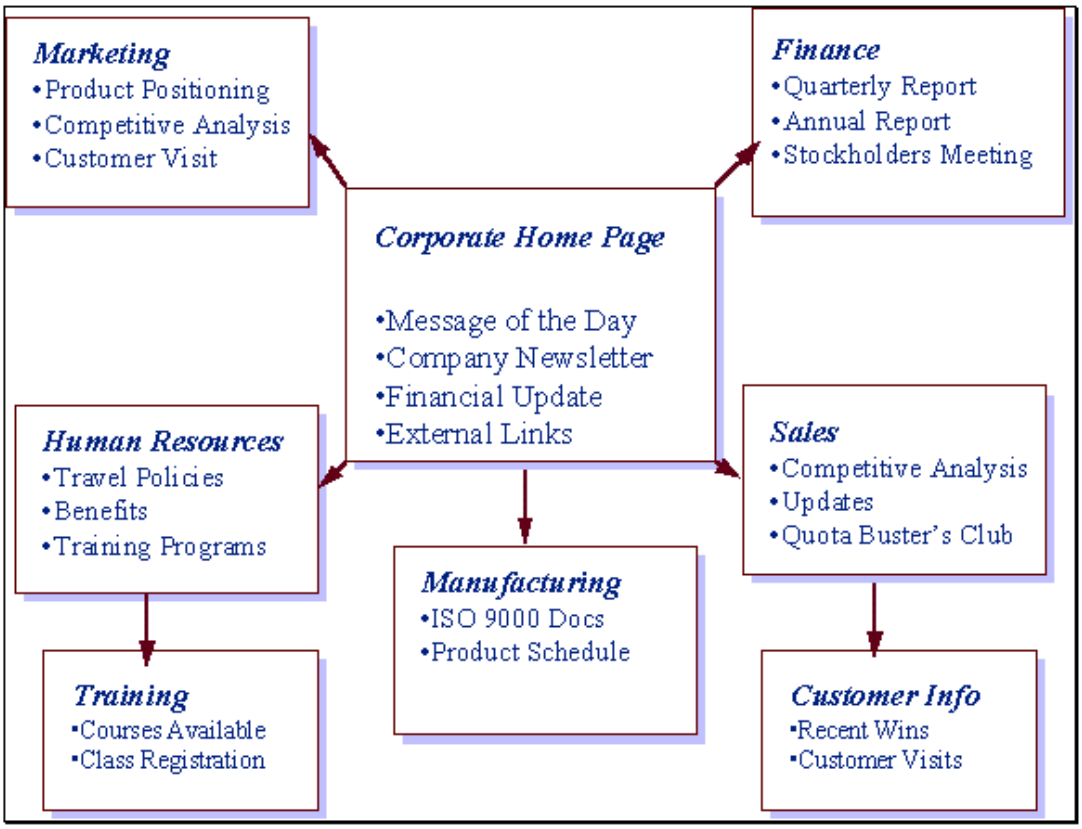

Figure 3: Distributed Computing Environment

So just what are companies doing on the Intranet?

The first organizations to use Internet technologies on the corporate network generally moved traditional paper-based information distribution online. These organizations have focused on a core group of supporting or mission critical information sets, including:

- competitive sales information
- human resources/employee benefits statements
- technical support/help desk applications

- financial
- company newsletters
- project management
- ISO 9000 documentation

These companies typically provide a "corporate home page" as a launch pad for employees to find their way around the corporate intranet site. This page may have links to internal financial information, marketing, manufacturing, human resources, and even non-business announcements (company outings, personal events such as weddings, births, etc.). (See Figure 4: Corporate Home Page) Setting this page as the default home page in users' browsers. Companies can further ensure that this page will act as a key launch pad

Figure 4: Corporate Home Page

Sales Applications

Sales organizations publish both the highlights of recent "wins" and the competitive matrices allowing their sales people to have instant access to the information that allows them to win new sales. Companies report that timely access to information of this type empowers their telesales representatives, and makes them more confident while speaking with potential customers. (See Figure 5: Sales Department Home Page)Figure 5: Sales Department Home Page

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Human Resources Applications

Many human resources organizations have migrated existing employee policy or benefits manuals to the Intranet and have added incremental functionality. First, employees gain point and click access to all of the company HR policies. Second, as many companies have begun to tie Intranets into existing legacy databases, employees may conduct database lookups on their own, right from their web browser. In the same way that banks have moved to ATMs or telephone transactions to allow customers to look up balances (and thereby taking expensive bank personnel out of the transaction), organizations are now allowing the user to do their own database lookup without HR intervention. (See Figure 6: Human Resources Home Page)

Using a browser, an employee can enter their name and company ID into a web-based form. The Intranet server then conducts a database lookup and report back, via HTML, any number of individual data points, including:

- number of vacation days outstanding
- current job grade
- balance in 401K program
- number of training days required by the end of the year

and so on. Virtually all of this information resides in legacy databases within the organization, and using Purveyor IntraServer's WebDBC, information can be added, updated, removed, queried and calculated. The Intranet server simply takes the HR personnel out of the retrieval loop, reducing costs *and* the response time for the employee. At the same time, the use of user IDs and passwords ensures that only appropriate personnel have access to individual resources - the employee and his or her management. (Figure 6: Human Resources Home Page)

Figure 6: Human Resources Home Page

Intranet servers can also save incoming information to relevant databases. Purveyor's Data Wizard easily creates forms for collecting registration information for upcoming training classes or seminars, and Purveyor's WebDBC provides tools for more sophisticated database applications such as notifying instructors of the number and demographics of the attendees. Again, the Intranet server takes the human intervention out of the registration process, allowing the information to move more quickly from originator to end-user of that information. (See Figure 7: Training Registration Form)

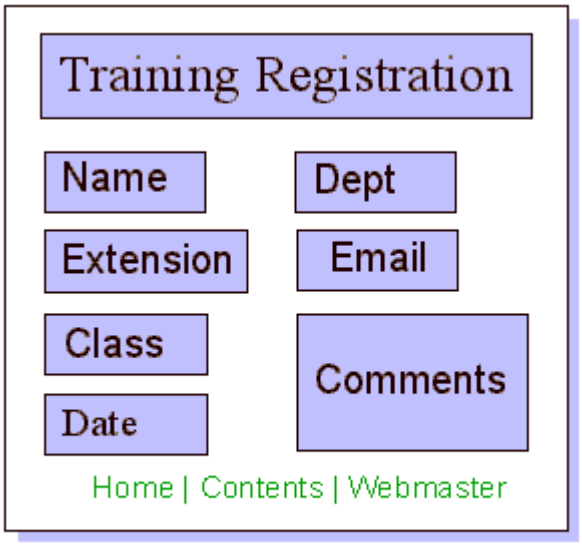

Figure 7: Training Registration Form

Technical Support/Help Desk

Many companies are employing Intranets to provide faster technical assistance to internal users. These sites may include forms for people to use in requisitioning new hardware and software, to report problems with existing equipment, or to easily download updated software applications, drivers or bug fixes. Workflow software can then direct the form to the appropriate recipients for handling, and provide a tracking mechanism to ensure that

requests are not "lost" along the way.

In addition, FAQs provide a summary of the most often asked questions and their answers, providing expertise and technical support to the user in a first-pass attempt to solve problems prior to (expensive) human intervention.

Setting up an Intranet

Intranet applications are scalable - they can start small and grow. This feature allows many companies to "try out" an Intranet pilot - to publish a limited amount of content on a single platform, and gauge the results. If the pilot proves promising, additional content can be migrated to the Intranet server.

Getting Started

The first step in building an Intranet is to identify a likely area for deployment. A quick sampling of the paper flow within the organization may point to a likely candidate, whether it be the company newsletter, human resources or employee benefits handbook, competitive sales information, etc. The more ambitious may want to look at information ***needs*** and build an information flow strategy from scratch (not trying simply to deliver previously paper-based information electronically).

The second step is to identify the content source or author - the person actually responsible for the intelligence behind the information and for getting it down on paper. Where does the information currently reside? Is it in a series of Microsoft Word or WordPerfect documents? Excel spreadsheets? Lotus Notes, Oracle or other database? Should this particular person be responsible for "HTMLizing" the information, for serving it on their personal computer?

Further study will uncover other authors of similar information, most likely leading to a distributed content development and serving strategy. Individual content owners, most likely line managers and individual contributors, save their documents to HTML or leave them in their original format and forward them to a group administrative assistant. This assistant, who may already have desktop publishing responsibilities for the group, can convert non-HTML documents quickly using a pre-defined template for consistent corporate style with Purveyor's HTML Transit. Hypertext links, table of contents and indexes are automatically created with HTML transit, so the assistant need only to apply the content to a web server running on their local personal computer.

Alternatively, the content can be forwarded to an IS manager who can apply it on a system running other company applications, aggregating both the management and security activities for the content. Thus the content is available to anyone with appropriate access rights to the site.

Likely Content

Organizations must determine whether information should be made available via a web server, via email, or through some other means. If the information is of general relevance, such as company travel guidelines or mileage reimbursement, it can be posted on a web server so that when people require this information, they click on **Travel Guidelines** from the human resources page, and receive the most current information.

Many companies find building web interfaces to "legacy information" as a key application. With tools such as Purveyor's Data Wizard, HTML Transit and WebDBC, end users can build simple point and click access to this legacy information without any programming, making it available to non-technical users through their web browser. Key database applications include: customer records, product information, inventory, technical problem tracking, call reports, etc. In addition, individuals can quickly set up seminar or training registration forms for short term usage, loading the registrants' information into an easily manipulated database.

Conversely, interoffice email may be more appropriate for "interrupt-driven" time sensitive information, particularly for a focused group of recipients. "Our largest customer is coming in tomorrow, so please be sure to attend the briefing at 4 PM." In this situation, the web server can be used as an extended information resource: "Before attending the meeting, please be sure to check the internal web server link for **Current Customers** for more information on the history behind this account."

Selecting a Likely Pilot Candidate

Typically, organizations will begin a pilot with existing content that is delivered via paper, whether it is an employee benefits manual, competitive sales guide, or technical support information. It is important, for the sake of the pilot, to choose a candidate in which both the costs and results can be tracked and measured. Companies also find it useful to be able to measure the reduced costs of the switch in information distribution strategy.

For instance, usually a company can directly measure the cost of duplicating and distributing copies of its employee benefits manual. When this traditional process is moved over to an Intranet solution, the savings in direct costs can be taken directly to the bottom line, and the incremental costs of managing the content on the Intranet server can be tallied and easily justified.

On the other hand, the costs of informal information publishing, such as a memo or matrix that provides a competitive product analysis, may not be directly measurable. In many organizations, these competitive matrices are developed and distributed by staff people rather than production departments, and the direct costs are buried in other office expenses. Therefore, the move from traditional paper-based information flow to the Intranet may not result in direct *measurable* costs savings.

In these instances, it is important to focus on the value of enhanced access to information, and anecdotal accounts of the value may be helpful in measuring the results of the pilot. Statements such as "I was able to win 3 new accounts over the telephone because I had the information at my fingertips, and I knew it was current. With the old system, I was always putting the customer on hold and asking the other reps for information..."

Once the value of an Intranet solution has been established through such a pilot, it can be expanded into other departments and functions. In addition, access to other legacy information can be provided, so that employees can search and update customer databases, check 401K balances, vacation days, or register for training classes.

Organizational Issues

Typically, Intranets are based around functional department support - sales/marketing, human resources, engineering, finance, etc. It is entirely appropriate, and usually beneficial, for those departments to take responsibility for both developing the content for the Intranet server and for keeping it updated. In this manner, the content owner can publish the information more quickly and the users or consumers of the information can apply it to their competitive advantage more quickly.

Challenges

The technical capabilities of web servers bring up certain organizational challenges, including:

- security
- privacy
- currency

Each of these issues, and many others, can be resolved through careful planning and implementation of an Intranet strategy.

Security

Security is a multi-headed issue. First, security can be defined as providing access by the appropriate personnel to the correct information, while at the same time barring access to all others. Most popular web servers today allow such access configuration on a user/group/realm basis, while some in fact, allow the systems administrator to go far beyond this, allowing them to limit access rights by specific IP address for individual pages. This capability would potentially allow the systems administrator to set access to financial records or personnel files only for the personal computer in the CEO's office.

Similarly, access can be barred to all other users or groups, keeping unauthorized personnel from gaining access to sensitive financial, company or personnel records. Purveyor's IntraServer allows easy configuration of access control using the File Manager and clicking on files, directories or virtual paths. Users and groups can be managed within Purveyor's database, the Windows NT user registry database or even an external ODBC database such as Microsoft Access.

Second, security may include encryption, also at several levels. Again, popular web servers offer SSL encryption for communications between the server and browser, effectively scrambling the message and keeping it from interception. Encryption may also play a role if the Intranet application spans multiple organizations or locations - effectively a virtual private network running over the public Internet. An increasing number of organizations use their public web servers in this manner - setting certain pages for use only by partners or customers through access control. Intelligent firewall solutions can create "tunnelling" applications that establish and keep open trusted communications lines between sites for further security.

The 'keys' to successful encrypted applications are uniqueness in creation of the keys and confidentiality of the private keys once generated. Purveyor IntraServer uses a highly secure and unbreakable method of generating key pairs by using a combination of mouse movements and other parameters. Purveyor also includes the Key Management utility which is a graphical management feature used to manage and secure the key pairs used for encryption.

Finally, security of the local area network within the corporate infrastructure and from the internet is an important issue. Intranet servers may offer proxy servers as part of the web server. Proxy servers handle HTTP, gopher and FTP requests and can be configured to restrict/allow these functions for each host. The Proxy to Proxy feature within Purveyor offering a chain of proxy servers to be set up, restricting intranet clients from visiting other web servers, performing FTP functions, or making gopher requests. Proxy servers sometimes offer caching which means the web server will cache web pages, FTP and gopher data allowing client requests to be served by the local proxy. This reduces internet requests and requests between intranet web servers.

Privacy

Privacy is largely an organizational issue, clarified and intensified by the potential capabilities of technology to invade one's privacy. In this area, Intranet applications can either assist in maintaining users' privacy, or potentially invade it if the developer or systems administrator is not careful.

Privacy can be enhanced by the use of Intranet applications through the delivery of sensitive information in a largely anonymous manner. While the interoffice mail staff may snicker (or worse, peek) when they deliver a memo marked confidential, the Intranet server will serve all pages with no similar bias or prejudice. Employees can feel free to review the **Employee Assistance Program** information at their desktops. Similarly, they may browse information on **Maternity Leave** or **Sabbatical** programs without fear of raising eyebrows (or gossip) from their managers or from personnel representatives.

On the other hand, some of the tools taken for granted in the web server marketplace, such as the site log, do have the potential for invading privacy. Intranet administrators must balance the desire to track visitors (and therefore, value attained from the site) with the need for privacy with regard to certain content. It may simply be inappropriate for the company to track ***who*** has visited the **Employee Assistance Program** page, particularly since those with access to the log files may be IS rather than human resources personnel.

Purveyor IntraServer provides logging management at the individual file level, allowing administrators to disable logging for particularly sensitive pages, and thereby avoiding the invasion of users' privacy specifically for those pages that may contain sensitive information. Within Purveyor's extended logging capabilities, this is as simple as specifying the file name as a parameter not to be logged.

Currency

While Intranets allow information to be updated instantly, by no means do they *guarantee* currency. To this end, publishers must be committed to keeping the Intranet site up to date, and certain steps may be taken to ensure that consumers of the information use it appropriately. Simply putting the "date of last change" on each page will

help tremendously in this respect, allowing a browser to check that the information is indeed current.

In addition, certain pages, such as competitive matrices, should have regular updates or "refreshes" scheduled, along with someone identified to provide instant updating as soon as new competitive information is received. In this way, browsers can trust that the information represents the competitive wisdom of the company.

Other steps, such as providing an email address or telephone number of the author, can further assist in the use of the information, as users will be able to contact the author to request further information or clarification on specific points.

Tools Used

A number of basic Intranet publishing tools make this new paradigm possible. First, in addition to the web browser, web servers are available for a variety of platforms found in the typical organization, including all flavors of Windows, Macintosh, NetWare, OpenVMS, Unix, OS/2 and many others. This general availability allows publishing from virtually any computing environment.

Second, an increasing number of tools empower the user to create HTML for the Intranet application. Many, if not most of the popular word processing packages, allow documents to be saved as HTML, and tools are beginning to enter the market that allow for large scale migration of content from traditional word processing format to HTML (HTML Transit from InfoAccess is one such package.) These tools allow the non-sophisticated user to continue to create content in their familiar application and to move this content to the server without having to manipulate each file or document.

Enhancements

Intranets can also provide efficient access to other external information resources, including:

- Group access to mailing lists
- threaded discussion groups
- stock quotes

In this way, the oft-accessed information can be aggregated at the company firewall and efficiently disperse the information within the company, thus reducing external bandwidth and connectivity requirements.

Multithreaded discussion group software, or conferencing applications, can run on the same platform as the Intranet application, providing further opportunities to discuss company issues and the content that resides on the server.

Intranets versus Groupware

While a full discussion of the issues in choosing between an Intranet application and groupware is beyond the scope of this paper, a few comments are in order. First, Intranets and groupware are not mutually exclusive. Many organizations find that groupware (workflow, collaborative computing, etc.) is appropriate for certain focused applications, while Intranets are appropriate for migrating existing content to online delivery. Others find that a powerful combination in groupware and a web server (Lotus InterNotes engine for publishing Notes databases on the web, for instance).

Ultimately, each application strategy has its merits. Beyond this, Intranet applications and web servers make an excellent foundation for web-based groupware, allowing organizations to employ a web-centric IS strategy and leverage the nearly ubiquitous web browser and the powerful navigational aids provided by HTML.

Summary

In summary, the application of Internet technologies in an Intranet setting can dramatically increase the flow and

value of information within an organization. Users can gain quick and timely access to a much wider variety of existing information residing in a variety of original forms and sources, ranging from word processing files, to databases, Lotus Notes, and other resources. In addition, traditional paper-based information distribution can be displaced by Intranet applications, lowering costs and increasing the timeliness of information flow.

Finally, Intranet applications can start as small "pilots" and scale upwards over time, gradually providing or facilitating access to an increasing breadth of information, thus improving both employee productivity and satisfaction, and ultimately bolstering the company's competitive advantage.