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*Internet-based Document Management:  
Leveraging Digital Archive Retrieval  
Systems into the Next Century*

*INSCI Executive Brief  
Number 2*

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***“All digital archive and retrieval systems sold from the first quarter of 1999 on will utilize intranet browsers as their common dashboard.”***

***“Through 2001, IBM, Mobius, New Dimension, INSCI, RSD, Anacomp and Kodak will be among the leaders of the digital archive and retrieval systems market.”***

***-- The Gartner Group***

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# I. The Current Situation

The internet has changed everything. Technical strategies that seemed sound a few short years ago now fall short. Intranets -- company-specific versions of networks with Internet-like capabilities -- are quickly becoming the norm. Moreover, Extranets -- company to company intranet communication -- are also taking hold. Soon, browser-like thin clients will become the primary method for access to many applications, both internal and external to the company, and between organizations. Already Web browsers are a common part of any desktop, as common as word processing and spreadsheets, paving the way for an explosion in the use of thin clients.

The age of the Internet, intranets and extranets is here. The network is truly the computer.

Some of the key technical drivers behind the explosion of Internet/ intranet-based document archive and retrieval systems (DARS) are:

- A revolution in printing.
- The move towards “active” documents.
- Innovative use of e-mail.
- The rise of push and pull technologies.
- Convergence of key document management technologies driven by the rise of the truly digital document.
- The acceptance of client/server and thin clients as an enterprise-wide architecture and application framework, with the Internet, intranets and extranets as a logical extension of that architecture/framework.
- The need to integrate DARS into an intranet-based “common dashboard.”
- The evolution of intranet-based workflow and Internet-based statement processing.

As a response, we recommend the following:

- Web-enable your DARS infrastructure.
- Integrate document management and document output into a true end-to-end digital document infrastructure, based on a digital automated document factory (ADF) that extends into your user and customer base through intranets/extranets and the Internet.
- As a result, move away from microfiche and dependence on paper-based document strategies and towards a fully automated digital document environment.
- Rethink the concept of workflow, understanding that new technologies offer new opportunities to enhance your competitive edge by extending and redefining the nature of work.
- Rethink how statements are created, developed and delivered, as well as the purpose of statements beyond the purely informational.
- Integrate DARS and the Internet, intranets and extranets in new and innovative ways.

## II. Key Trends in the Intranet-based digital archive and retrieval systems

### Technical Drivers

Internet, intranet and extranet technology is evolving faster than most pundits conceived possible and as a result is defining new ways of accessing and distributing corporate data. Given the digital nature of archive data, internet technology can be used to both simplify and speed access to data stored within a digital archive and retrieval system (DARS) infrastructure through a company-specific intranet.

Several technical trends are driving the move toward intranet-based DARS technologies, including:

- A revolution in printing
- A move toward “active” documents
- Innovative use of e-mail
- The rise of push and pull technologies
- Convergence of key document management technologies
- Growing acceptance of thin clients
- DARS Integration into common dashboards
- Intranet-based workflow/Internet-based statement processing

Let's look at each in detail.

### A Revolution in Printing

There is currently a revolution (albeit a quiet one) that is happening in document printing. A primary reason for this is the quick acceptance and adoption of Adobe's PDF page description standard for Web-based applications.

Unlike HTML, PDF offers extremely high quality print capability. This means that Internet and intranet documents can be used acceptably as presentation-quality printed documents. More and more, Internet/intranet applications will be the vehicle through which printing takes place.

The next level of PDF will be for high-speed, high volume printers. Once this occurs, PDF will become the *lingua franca* for digitally-stored material. No translation from other formats will be necessary, and documents formerly limited

to the corporate archive and volume printing will be opened up for a variety of other uses.

**Strategic Bottom Line:**

*Think about the your future print strategy, and make sure to include PDF compatibility in that strategy. Not to do so will continually undermine your company's ability to leverage its digital archive across the enterprise.*

**Rise of “active documents”**

The nature and scope of customer documents is transforming because of the Internet. Customer documents, once passive purveyors of dry information, are becoming active and alive, specific to the customer, and leveraged in surprising new ways.

The nature of the active document is that it includes in it “active links” to other applications or websites of interest to the customer. These links can be provided automatically, or selectively given based on a customer profile or customer selection. In addition, targeted marketing will become the norm through customized, customer-specific Internet documents.

**Strategic Bottom Line:**

*Documents should no longer be passive, but should become active. Include in your DARS technology the ability to create, distribute and respond quickly to active documents. If you don't, your competition will.*

**Innovative use of E-mail**

E-mail is growing geometrically. Everyone uses it, everyone is deluged by it, and yet everyone finds it indispensable. Why not leverage it?

E-mail must and should be archived in the future (more on this later). Further, e-mail should be a ( if not *the*) primary method of distributing documents in your enterprise. It makes sense that the primary method of communication would evolve into the primary method of report and document distribution.

Leery about the print quality of e-mail? How about e-mail in high quality PDF format? We believe the direction of e-mail is just that.

**Strategic Bottom Line:**

*E-mail will only grow in importance. You should get on the bandwagon and use it to its fullest. Leverage e-mail through an e-mail archive strategy, an e-mail report and document distribution strategy, and an e-mail print strategy. You'll find productivity up, paper costs down, and communications enhanced throughout your organization.*

## **Push and Pull Technologies**

There are two fundamental methods of accessing corporate data over the internet. One method provides access to corporate data through a Web browser (typically thought of as a "pull" technology) and the other has to do with distributing data to end users (often referred to as "push" technology).

### **Browsers**

Archives of value documents are often used for customer service applications. Often corporations have a legal obligation to maintain customer documents for a minimum of seven years. Archiving corporate data within a DARS infrastructure and providing secure and quick access to data from a Web browser will provide corporations with service differentiation as well as many competitive advantages.

This same technology may also be used to satisfy internal access to archived documents. Browsers not only reduce the complexities of installing and maintaining another application across the varied LAN / WAN configurations used within a corporation, but also provide a standard and common access method to all archive data.

### **Internet Document Distribution**

A typical DARS infrastructure is designed to handle large volumes of archive documents. Once these documents are archived, a small percentage of these documents are retrieved. A "push" strategy may also be used to distribute some of these documents over the Internet.

One of the most practical and effective uses of a document "push" strategy is to distribute reports and other documents to corporate users -- in short, to provide a new method for report distribution. This is discussed in more detail in the next section.

### **Strategic Bottom Line:**

*Organizations that understand the reality of browsers as the most pervasive “pull” technology as well as new forms of report distribution as one of the most compelling “push” technologies will find themselves able to save costs, increase productivity and create competitive advantage.*

## **Convergence of key document management technologies**

The rise of the truly digital document means that we can actually start realizing the technologists’ dream of the “paperless” office. But beyond that, the digital document means a new way to think about how we deliver documents to customers. Shortly, we can think in terms of the “paperless customer.”

What makes this possible is the rapid convergence of several key technologies:

- Web browsers
- New archive and retrieval systems
- Report distribution
- Workflow
- E-mail
- PDF
- Java and thin clients

As already described, *Web Browsers* are the key method for accessing intranet/extranet and Internet-based applications. They are standard, common, and inexpensive. They are the “common dashboard” and framework for applications access for the near future.

*New archive and retrieval systems*, based on computer output to laser disk (COLD) and CD technologies, allow for the archiving and real-time retrieval of any document from any time period instantly. These technologies are the “backend” of the ADF infrastructure.

*Report distribution technologies* allow for the timely and efficient distribution of reports on an enterprise basis. Report distribution is often the *raison de etre* of

document management. Here's where user needs explicitly drive the technology.

Mainframe-based RDS has been very successful. Numerous vendors have designed and developed very successful products to distribute mainframe reports to users electronically in a mainframe environment. Using some of the core strengths of an effective DARS infrastructure to process and archive legacy mainframe reports in conjunction with internet / intranet based report distribution provides a strong alternative to RDS's.

A typical DARS archive capability can be augmented with capabilities of extracting reports based on predefined user requirements, bundling these reports with a viewer or converting these reports to HTML, and distributing these reports to end users over the corporate intranet.

*Workflow* is the other area where user needs are paramount. *Workflow* determines how documents are handed in day-to-day business transactions and processes. *Workflow* is discussed in more detail in later sections.

As already described, *E-mail* is quickly becoming as universal as the telephone. E-mail provides specific advantages to voice communication, including the fact that it can easily be archived and tracked.

We've mentioned that *PDF* -- the Web-based page description standard from Adobe -- is gaining ground, if not usurping, HTML as the key method (most often through Acrobat) of viewing documents. Why? Again, because of the high fidelity of PDF printing, and its wide compatibility with existing printer installations.

*Thin clients and JAVA* are quickly becoming the application model and development platform of choice for client/server. Everyone is moving to this new paradigm for building client/server applications (with haunting reminiscences of mainframe computing) because of the very real limitations of full-blown client/server applications based on "fat" clients that usually perform unacceptably and are too hard to maintain. More on this next.

### **Strategic Bottom Line:**

*Companies must understand how Web browsers, archive technologies, report distribution and workflow are converging and offer the opportunity to rethink how documents are handled in their organizations. They must also grasp the importance of e-mail, PDF, and thin clients. Not to do so will mean a loss of competitive advantage.*

## **Growing acceptance of client/server and thin clients**

Client/server is becoming more accepted as an enterprise-wide infrastructure. While some companies have moved to client/server wholesale, others are more reticent. But even here we see UNIX and Windows NT at least forming the highest tier of a tiered client/server architecture, with the mainframe staying on as the primary data repository and transaction system.

We believe that UNIX is and will remain the operating system of choice for high powered DARS environments, even while other operating systems are dominant on the client side of the equation; Windows NT, specifically, provides the standard platform required of ubiquitous and cheap intranet access.

As already mentioned, thin clients are a key driver behind the transformation of DARS. Based on the explosion of browsers and the Web, thin client applications are gaining acceptance. We see the workstation now as more of a commodity front end, with the real meat of applications residing on the server side. But far from being “dumb terminals”, thin clients have intelligence that is specific to the user: profile information, for example, that gives each user’s access to the Internet their own specific flavor. Soon, the user’s profile will be created and maintained by intelligent agents that reside on the client.

Ironically, thin clients also allow for greater corporate control. Thin client software is easier to distribute and maintain, and this to maintain corporate standards. It takes control away from the user in areas where it’s irrelevant, and gives them control where it is relevant. The bottom line is that we’re finally getting smart about the use of client/server.

### **Strategic Bottom Line:**

*Client/server and thin clients are here to stay. UNIX is the most powerful backend server operating system, while Windows NT provides the both a backend for lower-volume users and a standard client interface that is requisite for the internet revolution we are seeing. In order to maintain competitive advantage, you’ll want to consider a mixed client/server strategy that includes UNIX and Windows NT as the backends for your intranet-based DARS capability. More and more, your front-end applications will be based on standardized and cheap thin clients.*

## **DARS integration into common dashboards**

The Gartner Group has coined the term digital archive and retrieval systems (DARS) to characterize the converging technologies that form the digital document infrastructure in the future, and this acronym has been the inspiration for this study. At the core of this infrastructure is the automated document factory (ADF) that was described in detail in the first Executive Brief in this series.

The common dashboard for DARS will be an intranet-based browser that is common, standardized, cheap and can access a variety of applications (whether PDF or HTML based). This dashboard will be the standard method for accessing your DARS infrastructure.

**Strategic Bottom Line:**

*Common, browser-based “dashboards” are quickly becoming the norm for application access, particularly for those applications that have enterprisewide scope. If you seek competitive advantage, it is better to accept this trend and work toward common dashboards now rather than to insist on a more proprietary or fragmented scheme.*

**Intranet-based workflow/Internet-based statement processing**

Workflow is rapidly converging with DARS. This means that the very nature of workflow can be redefined and extended (we deal with this more in a subsequent section). Further, statement processing will soon be redefined by Internet capabilities.

Redefined workflow means that because of the capabilities of high speed archives, the “time” aspect of the archive ceases to influence the realities of work. All documents are available at any time from any place. This changes how work processes are handled dramatically.

Further, advanced features embedded in workflow will also extend its nature and scope. Data mining, report mining, and intelligent agents that perform many of the rote tasks of today will greatly enhance the productivity and effectiveness of workers.

Delivery of statements over the Internet redefines not only how customers access statements, but what the statement itself is. Once a statement can provide “hot links” to other areas, the statement becomes a “window” or “customer profile” that can be used to market to your customer in numerous new ways.

**Strategic Bottom Line:**

*Intranet-based workflow and Internet-based statement delivery will redefine how work is done and how customers think of statements. Companies that understand this fully will be able to dramatically streamline their operations and customer service, as well as offer new services to customers and market to customers in new and innovative ways.*



## **III. The Response**

### **Web enable your DARS system**

The first step toward realizing the power of Internet/intranet-based DARS is to Web-enable your current DARS infrastructure. This means giving access, through browsers or thin client applications, to corporate documents that had previously been out of reach to both your users and your clients.

Once you do this, innovation will in some ways come from the “bottom up.” Meaning that your user community will begin to see new and innovative ways to use the Web-enabled infrastructure. A few possibilities are outlined a little later, but we’re sure your own personnel will dream up uses as yet unthought of.

### **Integrate DARS into a truly digital document environment**

When we say a “truly digital document environment” we mean one that supports the input, creation, maintenance, and distribution of documents in purely digital form, and hypothetically requires no paper-based printed artifact. In other words, the creation of documents that support business transactions would become totally digital in nature.

We recommend this for many reasons, as follows:

- Digital documents can be leveraged more easily across the DARS infrastructure once they are captured, archived and indexed.
- They can be easily distributed via a Web-based document distribution mechanism, whether in house or external to your customers.
- They are better candidates (if they are captured textually) for full text retrieval and intelligent searches.
- They cut down on paper costs.
- They are better suited for report and data mining.

### **Move away from microfiche and dependence on paper-based document strategies**

Many industry pundits have stated that “Microfiche is Dead.” We realize that many companies have substantial investment in microfiche and for this reason the technology will be with us for awhile. But the trend is nonetheless away from

microfiche; in fact, those companies that linger too long will find themselves at a competitive disadvantage. According to the Gartner Group:

*“Enterprises today that continue to rely heavily on paper and microfiche for storage and retrieval of mission-critical files will experience substantially higher administrative support costs and inferior customer services, situating themselves for both reduced profitability and market share loss until they implement a strategic DARS environment.”*

The proverbial writing, you might say, is on the wall.

## **Rethink workflow**

Rethinking the concept of workflow means reevaluating what work means when taking new capabilities into consideration. We recommend that companies actively and aggressively evaluate how they can rethink their work processes provided the increased functionality offered by the new DARS environments.

Primary among these capabilities is innovative and proactive report distribution. Second is data and report mining. Third is the use of intelligent agent technology. All of these are discussed in more detail in Section IV.

## **Rethink statement processing and delivery**

Rethinking statements is going to have a profound impact on the way you do business. We recommend a total revamping of how statements are handled to take into consideration new developments in DARS technology.

Specifically, this means:

- Evaluate and implement an Internet-based statement delivery system.
- Seek to use Internet-based statements in useful ways to link those statements back to archived information, or to provide links into marketing-related information.
- Rethink how statements are created, developed and delivered, as well as the purpose of statements beyond the purely informational.
- Integrate electronic billing with electronic payment (such as through Quicken).
- Seek to deliver documents including invoices and payment records directly to PCs on a scheduled basis.
- Provide direct, ad hoc customer access to documents including invoices and statements for viewing.

To date, most documents that record commercial transactions have been on paper or microfiche. These payment and billing records are certain to be sent over the Internet and put on Web sites for customer viewing and downloads. These electronic transaction documents will become part of digital repositories on the Internet. They will become the source documents for Internet commerce, and linked to more traditional vital elements in Internet payment mechanisms -- such as accounts receivable and accounts payable databases. These databases in turn will also become vital elements in Internet payment mechanisms.

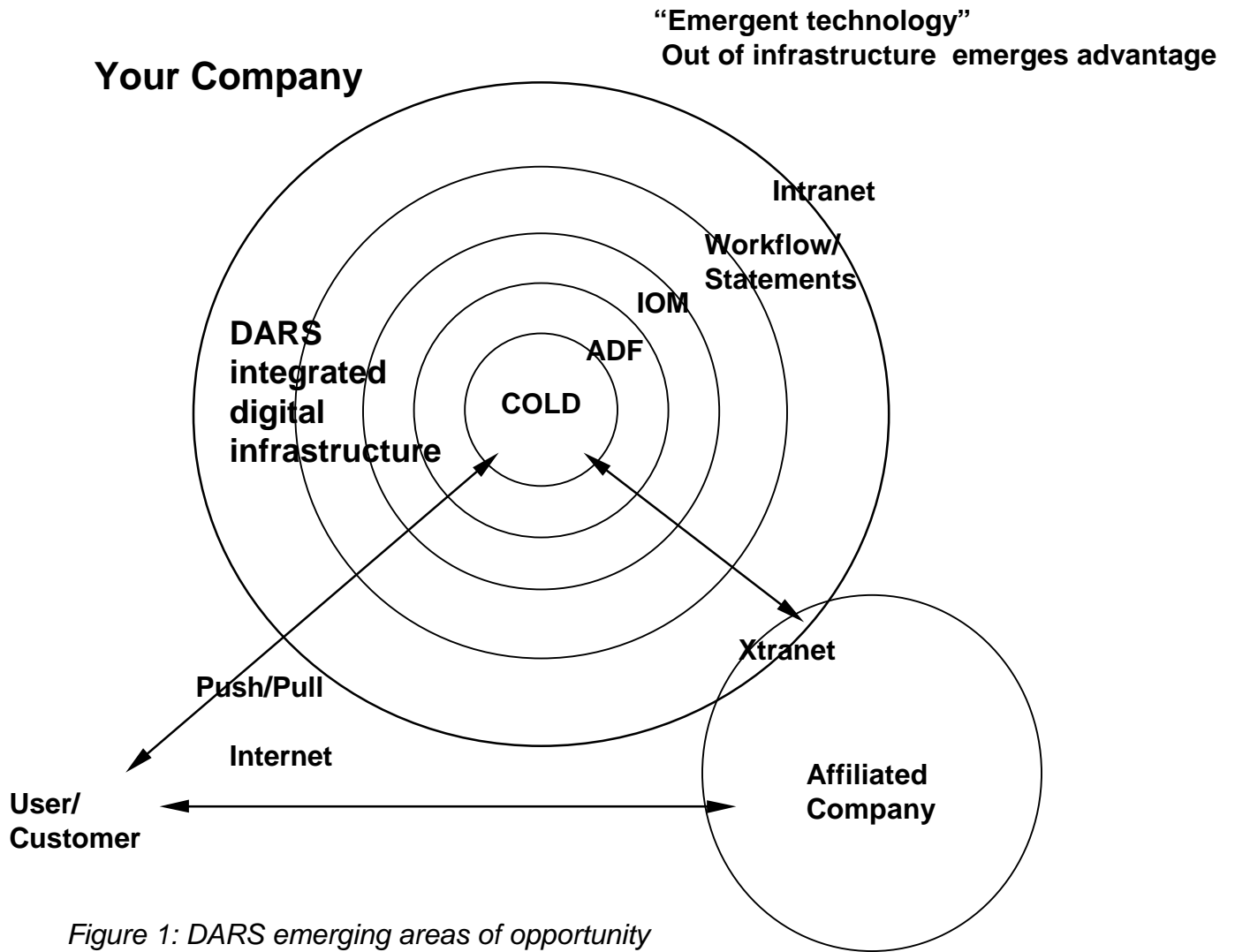
## **Use DARS in new and innovative ways**

A DARS infrastructure integrated effectively into an intranet, extranets or the Internet provides many opportunities to evolve new technologies, including:

- Broadcasting of documents through “push” technologies.
- Switch from passive to active documents -- documents that are more than passive source of information, but provide some kind of value-added through the customer’s interaction with them, whether that be through a hyperlink to another related document/application or through gathering information on customer behavior.
- Switch to intelligent documents -- documents that “change themselves” via customer interaction or customer profiles -- documents that customize the type of information presented based on who is being presented to.
- Incorporation of video stream in documents -- video-based graphics can be used for marketing and educational purposes.
- Incorporation of hyperlinks into documents -- documents can provide instant links to other related documents, web sites, or other applications.
- Computer output documents as source documents for electronic commerce -- provide easy means to generate a sale or information request through documents that would previously be thought of as “informational only.”
- Changing role of output documents from “internally-oriented financial documents” to “customer-facing documents” with sales and marketing purposes -- again, documents become active mechanisms for marketing, commerce, intelligence gathering, and the like.
- Use of computer output documents as way of empowering the customer and making them a part of the organization -- create value-added services through giving your customer access to critical data and market information.

These are just a few of the ways we think you can use a DARS infrastructure in conjunction with the Internet or intranets. As the technology evolves, there are sure to be dozens of other uses that are only limited by the creativity of your organization.

Figure 1 shows the new DARS environment. It shows how DARS technology emerges into ever increasing areas of opportunity and advantage through the Internet, intranets, and extranets.



## **IV. Integration of Workflow and DARS**

Workflow that is effectively integrated into a DARS environment offers several benefits, including:

- Routing and tracking internal reports to end users
- Tracking documents through a document management system and archiving these documents to your DARS
- Capturing corporate e-mail messages, routing these messages to the DARS and archiving these messages
- Distributing and tracking documents within a corporate Intranet
- Document repurposing
- Proactive document delivery

### **Routing and Tracking Internal Reports**

We all know how reports are distributed. Every morning, somebody either drops off a report on a desk or number of desks or every morning personnel go by the data center or report distribution center and pick up their daily report.

All this is changing.

With new DARS technology, reports can be delivered electronically via e-mail. The notification comes that the report is ready, and with a click of mouse the report attachment is available for work.

The report remains digital. It is also archived and indexed, and available for later use at any time. It is stored textually -- meaning that the body of the text is available for intelligent queries or use in data and report mining. The report is leveraged for the future.

In keeping with traditional paper based report distribution, end users typically wait for the report before they start working. By utilizing workflow technology in conjunction with a DARS infrastructure, workflow systems are now capable of mimicking the traditional report distribution method electronically.

### **Tracking LAN documents for permanent archive**

Dynamic LAN generated documents may be tracked by a workflow sub-system and then archived to the DARS, once these documents are ready for permanent archive.

## **Capturing and archiving corporate e-mail**

Using workflow integrated with DARS makes it possible to capture all incoming and outgoing e-mail messages. Once these e-mail messages are captured, these e-mail messages may be routed to the DARS for permanent archive.

## **Distributing and tracking documents within an intranet**

As your DARS is enhanced to handle routing and tracking in an internet / intranet and extranet environment, this same technology may be used to provide corporations with an alternative to traditional report distribution. The new paradigm, Internet Document Delivery (IDD) will provide customers with a much more cost-effective method of routing and tracking documents.

## **Document repurposement**

Once documents are captured, indexed and archived in a high speed archived system (COLD or CD) they can then be “repurposed” much more easily. What does this mean? It means that documents can be brought together, synthesized, massaged, and repurposed into another document.

Today, this is done manually on a daily basis, requiring extensive manual labor to hunt down documents, rekey in information, and analyze information so that it can be “repackaged” into a new document.

Report mining tools and data mining tools allow for intelligent searches on documents so that much of the manual task of gathering disparate documents together can be automated. Further, intelligent agents can be used to automatically create certain kinds of documents based on pre-defined rules and objects.

## **Proactive document delivery**

Let us paint a picture. Faxes come into the company. They are fed into the COLD archive and indexed appropriately so that they can be retrieved intelligently later. Other documents as well are captured, indexed, and stored on your COLD system. Reports are generated and stored as well, again indexed and ready for repurposement.

The indexing of these documents essentially adds value to them by allowing a variety of intelligent searches on them, instantaneously and at any time. Add an intranet-based intelligent search and distribution engine to the mix that proactively packages, notifies and delivers documents to users on a daily, weekly or monthly basis (what we call proactive digital document delivery) and you've got power. You've taken an archive technology, coupled with a powerful indexing scheme and retrieval capability, added an intelligent search engine or agents, and you've got the future of workflow.

Now if we have a predefined, stable process that is the focus of this manual effort, we certainly have a candidate for automation. Daily reports, for example. As mentioned previously, what if the paper report delivered every day could be delivered every day through e-mail? The document is digital and remains digital throughout the work process. The paper is eliminated; the whole process of tracking and routing the document is handled through the network, with the "hard copy" only existing digitally, on the COLD system.

But what about ad hoc requirements? We suggest the equivalent of the Digital Yellow Pad (DYP). In a nutshell, the convergence of COLD and workflow can help here too because indexed digital documents can be accessed so much quicker and easier, and "repackaged" using data mining tools that can extract discrete levels of information from them quickly. You can "repurpose" a variety of documents into a new document much more quickly. And do so while remaining completely digital in the process. Your personal digital assistant finally will do more than hold phone numbers, because you'll download documents to the PDA, or access them at home later over the Net.

## V. Summary

The rise of the Internet, intranets and extranets, coupled with advances in DARS technology, provides new opportunities to create competitive advantage. The primary driver behind this opportunity is the availability of the truly digital document.

The rise of the digital document will have a profound impact on businesses and their customers. It will also create new opportunities to market to and attract customers to other products and services.

The internet provides a way to “push” statements to customers, but once pushed, customers can then “pull” selectively from the statement. Further, this “push/pull” model balances the need to delivery documents with the opportunity to exploit your customer’s attention once you’ve got it. Statements are a tried and true method of getting your customer’s attention, and once you have it on an internet-based documents, the possibilities to marketing to your customer are only limited by the imagination of your technologists and marketers. Statements become “active” and can be used in new and innovative ways.

Internally, workflow must be redefined. Report distribution needs to be automated, streamlined -- and documents captured and archived in such a way that they can be leveraged across the enterprise over time. This is what DARS offers to you.

INSCI is committed to a vision of the truly digital document based on the foundation of the automated document factory (ADF) that extends the value chain of digital documents beyond the printed paper document we see today. Digital documents will allow us to create not only the “paperless office” but the “paperless customer” -- and it is likely, in fact, that the customer will be paperless long before the office.

For more information about how INSCI can help you integrate DARS into the Internet, intranets and extranets, feel free to give us a call at 508-870-4000.

### *Definitions*

ADF -- automated document factory, as coined by the Gartner Group to describe an integrated set of technologies that allow for the seamless input, processing and creation, and output of digitally-based documents.

Browser -- a commodity (usually shrink wrapped) thin client that is used to access applications and information over the world wide web.

IDARS -- Integrated digital archive retrieval system, again as coined by the Gartner Group. Describes an integrated method of storing and retrieving digitally maintained documents throughout the enterprise, as well as to give access to documents to customers and other companies.

Intelligent Agent -- software that can “learn” over time. Most commonly used to learn a user’s work and behavior patterns in order to perform intelligent searches over the Web. An absolute requirement as the Web gains in complexity and size.

Internet -- based on the government-backed military network, the Internet is the “information superhighway” of networking between people, companies, and organizations of every stripe.

Intranet -- when companies want their own “private Internet” they build an intranet with security protection through a firewall. They can allow people to get out to and in from the Internet on a selective basis.

JAVA -- the development language of choice for Internet and Web applications. Originated by Sun Microsystems.

PDF -- adobe's page description standard for documents that allows for high quality printed documents on the Web... "Postscript for the Web."

RDS -- report distribution system.

Thin client -- a small, "shell application" that accesses (like as through a browser) an application of which the memory intensive part (the "fat") is stored on a remote server.

Extranet -- when two or more company intranets communicate, they do so through an extranet. extranets theoretically need no access to the Internet.