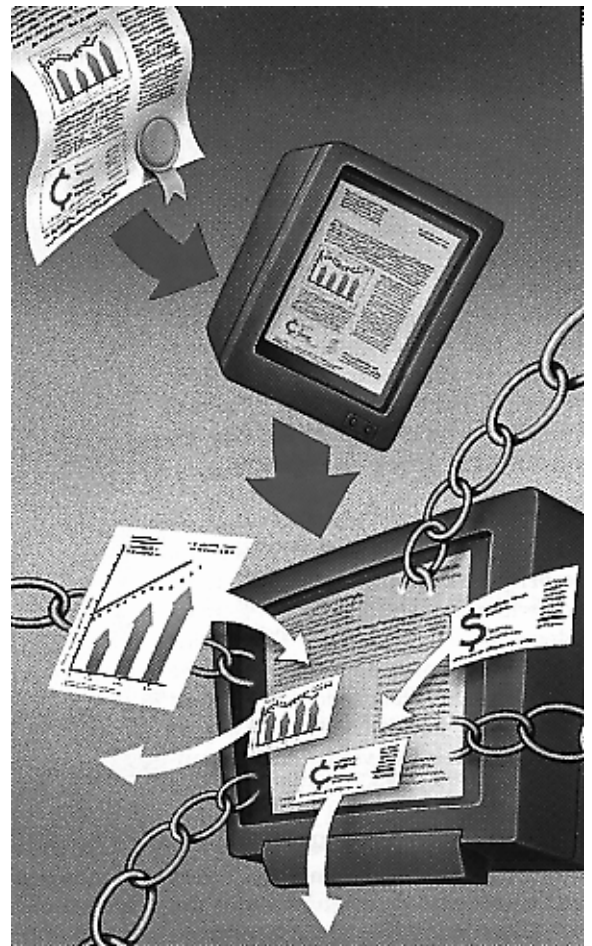


AS MORE ORGANIZATIONS IMPLEMENT EDMS TECHNOLOGIES, THE ELECTRONIC DOCUMENT BECOMES THE FOCAL POINT FOR CORPORATE REENGINEERING EFFORTS

THE DOCUMENT IS THE PROCESS



You are seated at your desk and discover that you are unclear over current market projections. You require additional documentation to formulate an opinion for today's meeting. You enter the corporate filing room and begin making inquiries regarding this matter. Like clockwork, you are directed to specific areas and documents. Certain documents pique your curiosity. You reach into the cabinets and turn them in such a way that documents of similar or related content cluster together.

ABOUT THIS REPORT

On June 24, 1994, a roundtable discussion co-sponsored by Delphi Consulting Group Inc., Boston, and InformationWeek focused on electronic document management. Participants on the panel moderated by Carl Frappaolo, Executive Vice President, Delphi, were: Jonathan L. Prial, manager, Document Management, IBM; Karan Eriksson, President, InText Systems; Glenn Magnell, Vice President & General Manager, Digital Prod. Group of Minolta Corp.; Philippe Courtot, CEO, Verity, Inc.; and Tom Dwyer, General Manager, Workflow, XSoft, a division of Xerox Corp. This special report is based on the group's discussion.

Moments later, a condensed version of all financial-related documents is sent to your desk; it includes predictions over future trends, using your premise statement as a springboard. You are about to leave for the meeting feeling much more prepared; suddenly you are tapped on the shoulder. It is another document, just published, which is crucial to the argument you are going to make. Sound too good to be true? Then consider this—you never left your desk. Impossible you say? Well, think again. The document management environment depicted in this scenario may not be commonplace

today, but the technologies necessary to create it are here.

Over the last few years, organizations have been migrating to using electronic documents. Many companies still mired in paper-based paradigms, however, continue to think of these documents only as replacements for their paper predecessors. But some more progressive organizations are realizing that the electronic document carries with it innate qualities and characteristics that spell the end of the paper-based business world as we know it. As panel moderator, Carl Frappaolo, pointed out, "As we become acclimated to the electronic media, the document is taking on new properties. Forward thinking organizations, in an effort to achieve competitive advantage and leverage their technology investments, have undertaken a reengineering effort whose aim is to take full advantage of the intrinsic properties of electronic documents." In their electronic format, Frappaolo stressed, documents will no longer be relegated to backroom record keeping applications and viewed solely as static repositories of testa-

ment. "The document has become a live entity with an active responsibility to the organization, in many ways equal to that of the employee," he pointed out. "Documents are no longer viewed as peripheral to the business process, but have come to embody the process itself." The panel agreed.

AN INTELLIGENT STAFF MEMBER

If this is the case, why are the majority of organizations still struggling with the migration to an electronic document environment? The origins of the electronic document can be traced back several decades. Yet, most individuals are only beginning to appreciate their full value. All the panelists agreed that the elusive nature of the electronic document is founded in the fact that the electronic document is not a single product technology. Users need to educate themselves about the components of the electronic document before they can appreciate its underlying value and capabilities.

Tom Dwyer of XSoft pointed out that there are three main categories of technology that need to be addressed. "One is objects, ranging from tabular data to text, graphics and voice. The second component is the linking technology and intelligent document processing that make sense of the objects and their interrelationships. The third component is the indices and attributes about the documents."

IBM's John Prial added, "If you have objects and links, then a document management system, a means to store and maintain documents while providing controlled access across an enterprise, becomes critical."

But this level of understanding is only the beginning of user education. In order to strategically deploy the Electronic Document Management System (EDMS), an understanding of the separate technology genres emanat-

ing from each category is required. There are myriad issues ranging from the conversion of paper into electronic media with the use of scanners and OCR software, to the implementation



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—Jonathan Prial
IBM

of information agents that analyze document content and make decisions. Some of these technologies have made the transition into mainstream departmental applications, such as imaging and text retrieval. As Philippe Courtot of Verity pointed out, however, "Although the technologies that will make the intelligent document happen seem embryonic, the need is so compelling that these will mature rapidly in the next five years."

Key among these emerging technologies is the "concept-aware" document. Heuristics, statistical analysis, lexical analysis, and morphological tools are being used to create documents that can determine the nature of their content, and then use that knowledge to make decisions, spot trends, make entries in databases, automatically route themselves to individuals that should be aware of the information, or trigger another business process.

"There's a lot of work going on in this area under

two principal schools of thought," noted InText's Karan Eriksson. "One is the area of structural or semantic recognition and the other one is the application of linguistic recognition to a document. Users will ultimately benefit, since either of these techniques can be applied in an EDMS." When the technology is not only applied to the corporate information repository, but within the framework of the Internet, then the knowledge worker is going to get access to virtually all this information. So the mail that has arrived now becomes an intelligent document.

"Technologies such as EDI are brought out of the back rooms and into the forefront, where they belong," Eriksson said. "Suddenly, we stop thinking in terms of 'it's an EDI transaction' and start thinking in terms of 'this is a business transaction' (regardless of the technology behind it). It has become relevant information, that is integrated into the intelligent document management structure."

The group concurred that workflow technology is a fundamental element which holds this new office metaphor of the intelligent document together. By embedding process logic and rules within the document object, workflow cements the idea that the document is the process. "We have found," said Prial, "about 50 percent of the time in the operational imaging environment when reengineering took place, workflow came first. The other half of our customers replaced the paper first with a straight imaging application. But, once the electronic form was in hand there was a natural evolution to thinking: 'How can I move this from place to place and automate my process?' The technology is allowing the professional to begin to integrate desktop applications using work management technologies to define their processes on the fly."

SINGLE POINT OF ACCESS

But despite all the technology, the group agreed that the bottom line is the

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delivery of a toolset that makes it possible for IS to integrate this new functionality into business applications, and front-ends that make the technology transparent to the end user. Document management is very different from other technologies such as traditional database applications because users are dealing with documents not data. Documents are authored and owned by the end users. Therefore, out of necessity, these tools must be placed in the end users' hands.

InText's Eriksson asserted, "To get anything broadly installed we have to move users beyond the acceptance of a word processor and 'everything is on a C drive.' At the PC level of the business, the single biggest problem is just finding something. But the real benefit of this technology wave is to deliver to organizations the ability to not just find documents, but to get them to execute tasks or monitor tasks. If you can make a decision, based on collection of E-mail messages that have moved



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InText Systems

through the enterprise over several days, or be alerted that there is an issue that your organization needs to take action on—that's good business."

Panelist agreed that meeting users' expectations in terms of information access through a graphical interface—bringing it "to the glass" with a click or keystroke—is a critical element in document management delivery by vendors. "Most IS organizations are not going to be in the position to customize the desktop," Prial said. "Access has to go beyond the document—the data access has been imminent."

Dwyer noted that selection of underlying technologies is still very important to IS managers. "You still see a lot of desire to standardize on certain databases and imaging solutions within corporations if, for nothing else, just cost of maintenance.

"But, for the end user the ease-of-use characteristics of technologies that are coming into the marketplace can make those underlying technologies invisible. So they don't know what's underneath that solution; they just know how to get to it, how to establish that heuristic without knowing whether or not it's based in some relational database technology or a heuristic content analysis methodology," said Dwyer.

When a knowledge worker asks a question about a client, for example, he not only wants documents—the letters of complaint from that customer—he also wants the phone calls that went into the support database, the invoices, a credit history, etc. Eriksson commented, "I think one of the things this industry promises is that we can solve this problem of single-user interfaces across multiple data and document repositories and bring information to users in a way that it can then be actually used ad hoc. That's fundamental."

SEEING BEYOND THE PAPER

"You are describing what we at Delphi call the Single Point of Access," Frappaolo pointed out. "Users are not looking for technology, they come to us looking for solutions." Single point of access applications do not distill the



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Delphi Consulting Group

value of information by enforcing structured traditional approaches to data management. Rather, they provide direct access to data and documents in their complete and natural form through one simple interface.

The panel agreed, however, that even in cases where the organization is using these technologies, the full potential of the intelligent document is generally not being achieved. Users are often blinded by old paradigms, causing a significant underutilization of technology. "For too long the business community has been taught to view the document as a static information resource with limited capabilities for change, and no inherent intelligence," observed Dwyer. Thus, established business processes have been built around this model. The document is relegated to a role of record keeping. But the electronic document is dynamic, allowing image, text, voice and video to be added and deleted at will. More importantly, the electronic document is capable of embodying the business process. Information agents, text analyzers, workflow objects all have the ability to not only augment existing

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processes, but completely redefine them. "A key area of benefit," Eriksson commented, "is the self-creating document, a concept with absolutely no precedent in the paper-based office. The answer to user's need to know might exist in pieces of information found throughout the network in a variety of file types. The document needs to be thought of as a stream or string of events. Thus a series of E-mail messages and memos may be retrieved as a single virtual document, offering evidence not just of an end result, but the process and reasoning used to get there."

The virtual document is just one such example. "Electronic documents let users communicate in an asynchronous fashion, to seize control of process flows, and shift the burden of knowing from the author to the reader. These are radical departures from business as usual," said Frappaolo.

Yet, in spite of the strengths these documents can deliver, users can quickly become lost in a pool of technobab-



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*—Glenn Magnell
Minolta*

ble, and fall back on familiar business practices for security. It is imperative that the organization not only embrace technology, but appreciate the changes that the technology will bring. Users

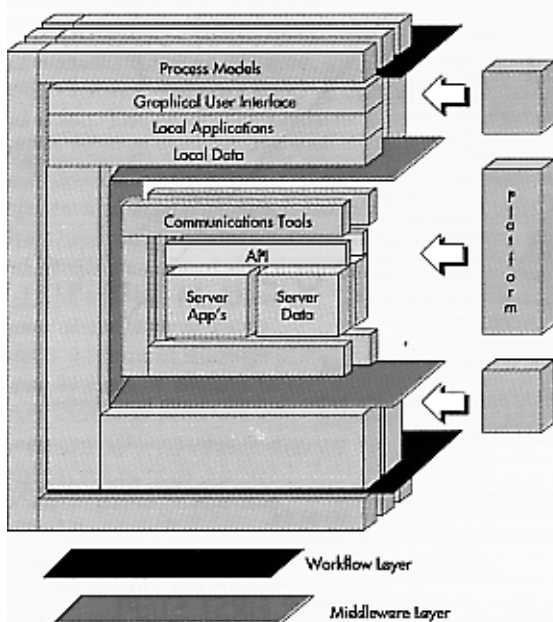
are being asked to make quantum leaps in thinking: to define the document in terms of objects, content, value added, delivery mechanisms, viewing, and the related business process.

GAINING MAXIMUM IMPACT

Until users open up to the potential of the electronic document and its ultimate benefit, technology will have little impact. "This is a major obstacle for many," commented Frappaolo, indicating that market research conducted by Delphi has shown that user resistance to change is by far the number one obstacle to reengineering within an EDMS implementation. If this obstacle is not overcome and the organization does not force itself to evaluate and improve current processes by exploiting the capabilities of the electronic media, "organizations risk automating bad processes and ending up with nothing more than a faster bad process," said Magnell.

Courtot advised companies to look to applications such as E-mail and

REDEFINING INFORMATION SYSTEMS



The full potential of the intelligent document requires an infrastructure able to properly support it. At the heart of this infrastructure are enterprise-wide server platforms which house and manage enterprise-wide data and applications. A layer above these servers is a series of APIs such as SQL and WAIS that serve as conduits to these servers. Communication Protocols such as EDI and networking standards sit above the APIs, providing a means of communication between the various platforms in the system. The white ribbon which appears to wrap around the servers, APIs and Communication Tools is a layer of middleware. These are tools that let the client talk to and access any server or multiple servers. RPCs (remote procedure calls) fall into this category. Above this sits the client environment (i.e. GUIs, local applications and data). The black ribbon which surrounds the client environment in this graphic is workflow. Workflow is separate from the uppermost level, the process models, which define and instruct the workflow. This is the configuration that organizations should be working toward, although it is not possible to completely achieve yet. Organizations such as ODMA, the DMA group, the Workflow Management Coalition, the SQL Access group, and others are working to provide some of the missing pieces that will make this vision a reality. The task of the systems designer is to determine how closely to this picture they can come, while simultaneously meeting the business needs of the organization.

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Lotus Notes as examples of how electronic documents can change the way we do business. "We are entering an era where the rate of change is further



accelerating and thus will make reengineering a routine task," he said.

Prial explained that specific business problems often determine basic approaches to reengineering. "If it's more of a production process-oriented world," Prial said, "such as an insurance claim application being reengineered, they will probably lead with an imaging-type solution in which routing procedures are redefined.

If it's a broader, information-access type of solution they will typically start with a text retrieval/hypertext approach, challenging how and when people should be made aware. "Eriksson added, "The important thing is that technology is there to solve a wide variety of different problems, and we're getting to the point where the business pressures are forcing each customer to solve these problems, particularly by exploiting the power of the desktop."

Magnell agreed in principle, adding: "You also have to look realistically at where most organizations are today; there are very few organizations that are going—poof!—we're going to have intelligent documents and instantly create a new work environment. Instead we're seeing our customers take an

incremental approach: trying to bring some intelligence, some process automation, rather than a total transition. So, the underlying elements are very important in terms of how easy it is for your organization to begin to take these steps and the capabilities that those basic layers will have." Indeed, panelists concurred that more often than not, EDMS is deployed in stages.

The very introduction of these technologies will bring about change that needs to be managed and understood. It is better to approach this piecemeal, learning and benefiting from acquired expertise and knowhow than to try and predict the bottom line result this can have on an entire enterprise. IBM's Prial projected a business scenario in which far fewer people will be in process-oriented roles, as document tasks become more automated—with knowledge workers handling the exceptions. "Already," he explained, "you're noticing knowledge workers saying, 'I've got more work to do, and fewer people on my staff.' They are the ones ready to take advantage of these technologies."

"There is a significant difference," Magnell said, "in that the process-oriented environment is being strategically planned and implemented; in the knowledge-worker environment, it's happening in an ad hoc way. In the latter case it may be part of a grand strategy that's being implemented, yet users are counting on technology to grow underneath them. For instance, incorporating an element such as SGML (Standard Generalized Mark-up Language) into your word processing environments is an important step in beginning to do some of the things that we're talking about. People are just assuming these things are going to come along in their next software version—that's why I say change is more ad hoc in some environments than others."

ACHIEVING STRATEGIC ADVANTAGE

Panelists generally concluded that large-scale, strategic implementations

of EDMS aimed at cost-effective, more rapid and efficient use of corporate data can continue to coexist with shrink-wrapped applications and techniques that bring the benefits of intelligent documents to the ad hoc user. But, achieving critical strategic competitive advantage typically will only happen when there is a top-down commitment to the improvement of the business through reengineering. To this end, there was agreement that the pressure for integrating solutions within a standardized document management infrastructure is growing.



► "Customers absolutely don't want a vendor to dictate their document infrastructure or standard."

—Tom Dwyer
XSoft

PUTTING THE "I" BACK INTO MIS

Because this infrastructure is built around the new intelligent document-based metaphor, the role of MIS is also being challenged. "It is time for MIS or IS to live up to the "I" (information) component of their name," pointed out Magnell. "The acronym started as MIS/IS but was subliminally changed to DP—the emphasis on the 'D.' It was never information that MIS was responsible for, it was data."

The group predicted a resurgence of MIS, not unlike the fate of the phoenix. With the advent of the EDMS, MIS as

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►“Enterprise networks need to grow further. Global addressing needs to become a reality or this discussion is moot.”

—*Philippe F. Courtot*
Verity

it is defined today is dying, but it will rise from its ashes and reestablish itself closer to its roots, as a curator of information, not data. As the document becomes the process, the role of MIS is crucial, interwoven into the very foundation of the business. Although users

may implement and control their own document management empires, the underlying architecture is going to have to support them. That fundamental requirement, the underlying architecture, will cause vendors and users alike to look seriously into open standards. But open standards imply a degree of integration, which is the realm of IS.

The majority of XSoft’s customers absolutely don’t want a vendor to dictate their document infrastructure or standard,” Dwyer said. “So, yes, there will be a requirement to do integration into the total infrastructure because it’s not going to be defined by a single vendor.” It will be MIS’ responsibility, Eriksson added, “to ensure that these systems develop strategically. This movement is too important to go the way of the Fax market. It just happened. No one planned it.” MIS’ task is not an easy one, concluded the panel. There is no single approach to EDMS. The focus must remain on the needs of the business and the infrastructure developed to support it. There is no definition of the optimal or the minimal system configuration. That is depen-

dent on the business need. MIS must think in terms of open systems and focus on scalability horizontally and vertically.

“A critical component of that infrastructure is the network,” Courtot stated. “Enterprise networks need to grow further. Global addressing needs to become a reality or this discussion is moot.”

In conclusion, the panel agreed that document technology is well ahead of systems implementation. The word processing, simple imaging, traditional text retrieval, and E-mail systems being delivered today have given users a real sense for the promise of intelligent documents, but few have aggressively acted upon it. Greater IS involvement with making the business more competitive will continue to drive this process of discovery and eventual implementation.

“The irony in all this,” mused Frappaolo, “is that in the end, we will not have to struggle over standards and ways to fit the electronic document within existing operating systems and application models. The document will become the office paradigm into which everything else must fit.”

COMING TO TERMS WITH THE INTELLIGENT DOCUMENT

As electronic documents proliferate throughout the corporate mainstream, individuals and organizations alike are realizing that the electronic document does not have to be relegated to a life as the on-line counterpart of its paper predecessor. The new media of the electronic document has caused many to rethink the definition of the document itself, and thus challenge the role that the document plays. Concepts such as The Intelligent Document, Evolving Documents, Live Links, and Intelligent Agents are creeping into business vocabulary, but for many these concepts represent nothing more than the latest technology buzzwords. To fully appreciate the potential of the electronic document, however, it is necessary that you begin to explore these concepts and become familiar with the functionality they represent.

The Intelligent Document, Live Document, Evolving Document—These phrases are used to describe the on-line document as a dynamic information source. This is the most basic difference between the Intelligent Document and the paper document or the electronic document, which is nothing more than an on-line version of a printed page. The Intelligent Document is not a repository of static information, but a container of pointers to various sources of information that are subject to change. Thus the document matures as its information assets do. In this way, the document becomes an evolving and intelligent entity capable of keeping itself up-to-date. The Intelligent Document is further refined and enabled along three separate, but not mutually exclusive applications of technology: linking, workflow and information agents.

Live Links, Intelligent Links—Linking, the mechanism used by the intelligent document to track and monitor the components of the document takes two forms. Live Links are links to a relative file and its application. By utilizing live links, the document automatically retrieves and displays and/or prints the latest version of each of its components. The live link can transcend levels of processing. For example, if a document contains a bar chart which was created by a spreadsheet package with graphics capabilities, and a change is made to the spreadsheet data, a new version of the bar chart would automatically be generated and placed in the document.

With Intelligent Links, the level of knowledge imparted on the document is much higher. Intelligent links not only track the latest version of the documents' components, but the relationships between the components. A change in one component may cause the automatic change to another. For example, a bar chart is complemented with a caption depicting its contents. A change to

the caption automatically updates the chart or vice versa. Minimally these links will issue a warning when the document is accessed, indicating components that are potentially out of sync.

The Self-Managing Document, Proactive Document Management—The application of Workflow technology to an electronic document provides another level of intelligence by transforming the document into a document object. The document is referred to as an object because it is not only the information and intelligence about the information that is stored in the document, but information or rules regarding the life cycle management of the document as well. The document includes intelligence necessary to proactively route itself through the organization, maintaining audit and/or usage trails, and supervising activities such as its associated deadlines and default actions. Thus the document becomes a self-managing entity and a manager of the business process in which it is used.



Information Agents, Intelligent Agents, Knowledge Agents—Information Agents (also known as Intelligent Agents or Knowledge Agents) make the document self-aware by analyzing its contents and comparing these to user profiles, or interest levels. Based on users' needs, the information agent dynamically determines which documents need to be routed to which individuals in a real time manner. With Information Agents, the onus of communication is shifted from the authors or managers of information to the reader or consumer of information. The key to Information Agents is the underlying methodology and technology approach to determining the basic content and value of information within a document. Several approaches exist, ranging from simple word-based schemes to sophisticated text analysis tools.

An advanced form of the Information Agent is the Information Refinery, also known as Staff Technology and Text Abstracting. Information refineries not only ascertain the value of information to particular individuals, but also interpret the data and present it in the most logical or expedient manner. For example, if a document contains extensive text regarding sales trends, the refinery may reduce this to a single pie chart and route the chart to interested parties. A 30-page document may get abstracted into a three-paragraph overview. The refinery can also be used to spot trends across incoming documents and use this information to make calculated predictions, or suggest alternative and related areas of interest to a user.

Carl Frappaolo
Executive Vice President
Delphi Consulting Group

