GILBANE
REPORT ™

on Open Information & Document Systems

ELECTRONIC DELIVERY — WHAT ARE THE IMPLEMENTATION ISSUES FOR CORPORATE APPLICATIONS?

There is a tremendous amount of excitement about electronic delivery of information these days. The computer, telecommunications, and consumer electronics industries are gearing up to provide the next generation home entertainment/shopping/information center that will replace the television as we know it. Internet subscriptions are growing by a million each month (as far as anyone can tell) and accelerating. And publishers are moving quickly to to provide electronic titles for entertainment, reference, and education.

But what about mainstream business applications? Can businesses use electronic document delivery technology to reduce costs, and provide better customer service and product support at the same time? Are the technology and the products there? Can they meet the demanding needs of corporate applications?

We think there is plenty of robust technology, and (now) a wide enough variety of products to support many corporate document delivery requirements without high risk — there are many examples of success stories. However, businesses have many different types of requirements, and there are many different kinds of products entering the market with different feature sets. How do you decide which product will meet your needs?

Our goal in this issue is to help you think about your requirements in the context of the the tricky issues unique to electronic document delivery. By understanding these issues you can put together implementation strategies that are successful in the short term, and won't lock you out of tomorrow's advances in technology.

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- The vast majority of important corporate information is created and stored electronically, yet is almost exclusively delivered in paper document form. The main reason for this imbalance is that paper serves as the lowest common denominator — everyone can process paper. However, the limitations and burdensome costs associated with paper delivery have become increasingly unacceptable to businesses.

- There are now many different products and approaches available for cost-effective electronic delivery of documents. Some are suitable for general purpose office documents, and some are designed for delivering large volumes of rapidly changing information.

- Businesses can benefit from moving to electronic delivery today, either in place of, or as a supplement to, paper document delivery. The challenge is to choose an approach that most effectively meets their current requirements without putting critical information at risk.

Electronic Delivery — The Implementation Issues

- "Electronic delivery" covers a wide range of requirements and products, even when focusing specifically on corporate, as opposed to "consumer" needs. There are not well defined categories that can be used to classify products. It helps to map your requirements to a continuum, and to use concrete examples to think about your own needs.

- Electronic documents have characteristics associated with them that make them significantly different from paper documents. These characteristics change the requirements for document delivery and (usually) demand different business processes. Three areas to consider carefully when analyzing corporate requirements are: the kind and level of interactivity required with the document, where the information comes from and how it is maintained, and how dynamic the information is.

Risks & Costs

- Unlike most new technologies, electronic document delivery implementations *can be* easy to cost justify based on straightforward and accessible metrics. But, because even simple applications can change familiar business processes, unexpected results are possible. Pay careful attention to the needs of the consumers of electronic documents.

- Although companies are already gaining substantial benefits from electronic delivery, the technology and market will continue to change, sometimes dramatically. There will not be a single electronic viewing format for the foreseeable future. Disastrous consequences can be avoided if critical information is preserved in source form.

Conclusions & Recommendations

- If you have a business problem that can be solved or helped with electronic document delivery, you shouldn't hesitate performing a serious analysis of available products. You are almost certain to find a supplier or integrator who can help you build a solution that meets your requirements.

- The first step is to define your own requirements. Consider both the different kinds of applications we describe, and the implementation issues we raise. Ideally, talk to someone else who has already implemented a similar solution to see what they learned.

- When looking at products, be sure to find out exactly how they address your requirements now, and what the vendor's strategy is for the future. They are aiming their products at different segments of the market. There is not a single best solution, and for demanding corporate requirements there is not likely to be. Look at a number of solutions — there are a wide variety of configurations, capabilities, and pricing structures.

STRATEGIC OVERVIEW

Many investments in new technology are difficult to cost-justify, because the payback is "soft" and hard to measure. The savings, however, that result from creating and shipping a 400 page manual on CD-ROM instead of paper are substantial and easy to quantify.

Today, almost all corporate information in document form is created electronically — certainly all *strategic* information, with the exception, perhaps, of a few hastily written notes (*e.g.*, "change the public offering date to . . ."). Even important "legacy" data is being converted to digital form. Some of this information is managed electronically (in databases), and some is not. Almost all of it however, is distributed in paper form.

It is time for this to change. Almost every business today can become more efficient with "just in time" delivery of electronic information. Most can also reduce information delivery costs by becoming less reliant on paper documents.

Why We Still Distribute Documents In Paper Form

Why this imbalance? Why is so much important electronic information reduced to paper for distribution?

The main reason is that a paper document is the lowest common denominator — the *only* common denominator. It guarantees interchange and, for most practical purposes, guarantees fidelity of content and appearance. Certainly questions remain about the security of sensitive electronic information, but these "problems" would surely be solved quickly enough by market demands (or ignored) if we had an electronic format rich enough and robust enough to rival paper in ease of distribution.

"Today the only commonly accepted electronic format we have is ASCII, which cannot begin to compete with paper as a way to present information."

Today the only commonly accepted electronic format we have is ASCII, which cannot begin to compete with paper as a way to present information. Still, electronic delivery of documents (as opposed to data) will not become universally accepted until we can boast an electronic format that approaches the same magnitude of support as ASCII.

The problem is bigger than any one vendor: neither IBM nor Microsoft nor Adobe can solve it for us. However, vendors have to lead the way by providing us with technology that moves us forward, and some will clearly have more influence than others.

Rather, it is time to take another step up the evolutionary ladder. What we need ultimately is nothing short of a multimedia *lingua franca* that "raises the bar" in the way computers share information and present it to humans.

What Can Be Done Today?

In anticipation of this massive shift in how we conduct business, several new viewing formats have recently entered the market — many of them hoping to be the new ASCII, an electronic equivalent of paper. We hear terms and phrases such as "digital paper", and the "PostScript of electronic delivery". A fierce battle is quickly developing for "viewing share."

As with any emerging market there is a healthy variety of approaches. Some firms will be content to carve out a niche serving a particular market, whether corporate (*e.g.*, product documentation, customer files) or consumer (*e.g.*, games, newspapers). There is also a wide range of capabilities, some targeted at specific kinds of applications. Some products, for example, will be fine for viewing a personnel procedures manual, but be completely inadequate for integrating with a real time diagnostic system.

The challenge for businesses is to choose among the approaches. This is tough. For one reason, any one of them can probably save money and improve information flow today, especially if the expectations are appropriate to the technology, to the way you do business, and to the degree to which your organization is receptive to change. You need to consider which approaches can open up new business possibilities and which ones will be a better fit in the longer term.

In this article we cover the different types of electronic delivery needs that corporations have, and the issues that they must consider in developing and implementing a successful electronic distribution strategy. In future issues we will also cover the mechanics of moving information onto appropriate media (*e.g.*, CD-ROM mastering), and some of the technical challenges that arise in controlling presentation and re-formatting information for electronic delivery. We will also return to this topic in a future issue to analyze in more detail how today's technology meets the challenges of electronic delivery.

ELECTRONIC DELIVERY — THE IMPLEMENTATION ISSUES

For the purposes of this article "electronic delivery" is the publishing and distribution of information intended to be accessed and viewed on an electronic display. (This may be either in place of, or in addition to, paper.) We use the term "electronic delivery" not because it is the most accurate term available to us[1], but because it is the one used most often to describe the set of functions we are addressing here. ("Electronic viewing" and "electronic distribution" are also frequently used refer to the same capability.)

Electronic Delivery Is Not As Easy As You Might Think

We already know how to view and read documents on the screen from within applications, and we know how to create paper documents that look the same. Why do we need a different electronic format for electronic documents?

This is a reasonable question, especially for users of WYSIWYG authoring systems. Until recently there were basically three answers:

• For others to view your document electronically they needed the same software application that you used to create it. Even if cost were not a factor, it would still be impractical for someone to maintain versions of all popular word processing and authoring software. Besides, the readers of documents do not need all the creation and

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[1] The term 'electronic publishing' is actually more accurate. Unfortunately, it has been used for years to refer instead to the use of computers to create information for paper publishing.

editing features of these tools, which take up disk space and make these programs harder to use.

- For others to view your document as formatted they *also* needed the same fonts you have, with the same metrics associated with them (*e.g.*, the character widths and kerning values) that you used. This problem has grown worse as fonts become less expensive and more abundant, and as font creation and manipulation tools become more popular.

- For others to *reasonably* read your documents on their devices, they needed an electronic display with physical characteristics (*e.g.*, resolution, screen or window dimensions) similar to yours. The alternative is to re-format the document to fit their display or output devices.

How you create documents now is to pick a printer, launch the appropriate printer driver, and create a file that the printer can understand. The miracle of Postscript was that you

Same Page — Different Viewing Devices

Desktop Screen

Page
or
"View"

Laptop Screen

Page
or
"View"

PDA Screen

Page
or
"View"
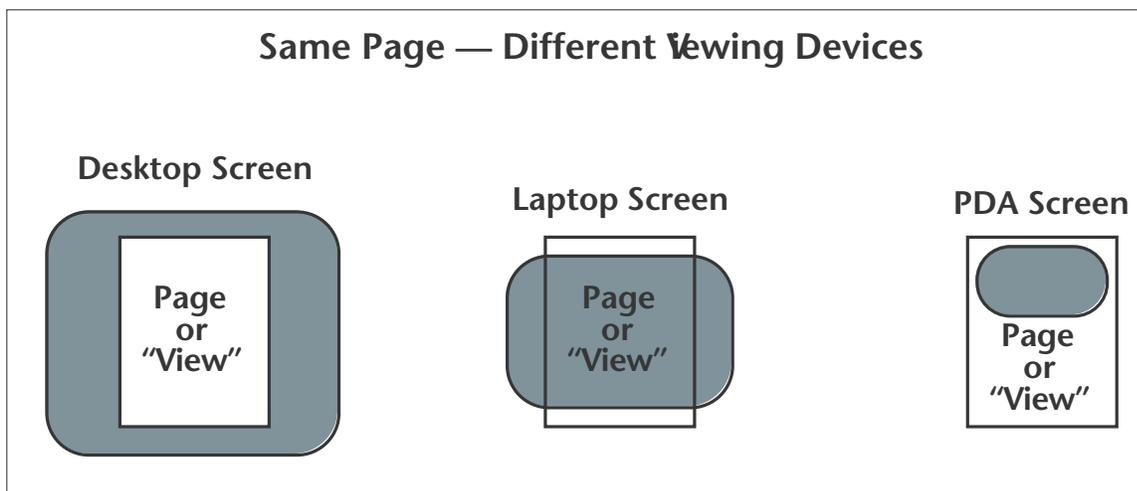
Figure 1

One Reason

Similar

Display

Characteristics

Are

Important.

could create a single print file and send it to many different types of printing devices — you did not need a separate file for each one.

Why is it so much more difficult to do the same thing for electronic devices? Technically it isn't, but there are other problems. No standard, *de facto* or otherwise, has the level of acceptance that PostScript has, and even if there were it would not be sufficient. A clear requirement of any widely accepted viewing format is that we can read it on *any reasonable* viewing device. What we need is something even more popular than PostScript. Electronic devices are extremely diverse, they range from character-based terminals that are much more limited than paper, to multimedia laptops and PDAs.

Furthermore, there are other features obtainable with electronic documents that quickly turn into market requirements. The most obvious examples are electronic navigation aids such as hypertext; we may also want to include time-sequenced information like video, animation, and sound.

In the meantime, while we wait for a standard viewing format, we can fortunately take advantage of the many capabilities provided in existing electronic viewing products.

And That's The Easy Part

All this assumes that you don't need to change the information. Among the possibilities that opens up with electronic files is the ability to interact dynamically with the

document, or to interact with a dynamic document. This means not only passively interacting with the information, but actively changing the information, or collaborating on the maintenance of a living document. This involves integrating the document-delivery process with the document-creation and management processes. While this integration can drastically increase the complexity of an application, it is what many companies need to achieve their information management objectives.

As more companies think about the possibilities of re-using (or "re-purposing") electronic information, they realize that substantial cost benefits are possible. But advanced information re-use also adds even more complexity to managing electronic documents.

Do Today's Products Solve These Problems?

There are dozens of electronic viewing products on today's market. Most of them, however, are tied to a particular application and are not candidates for enterprise solutions. A few companies offer viewing products that provide freedom from authoring applications (*e.g.*, Adobe, Interleaf, EBT, No Hands, Farallon). Some supply a way to deal with the font problem (*e.g.*, Adobe, No Hands, Farallon). These companies package their products differently. Some include all the pieces you need (*e.g.*, Frame, InfoAccess, Interleaf), and some company's offerings are specifically designed to be used with other products (*e.g.*, Adobe, EBT, No Hands, Farallon, Westinghouse).

Not everyone looking at electronic delivery must worry about re-formatting or re-using
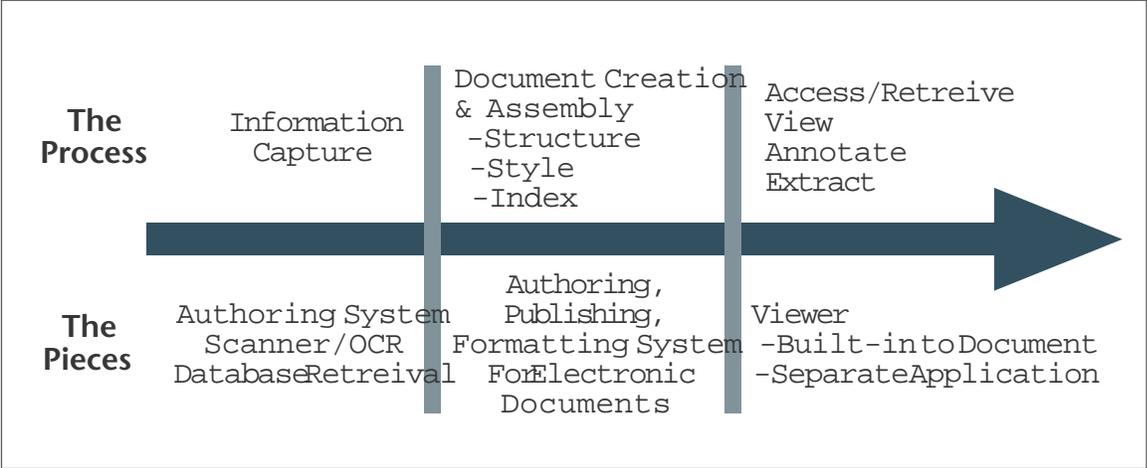
Figure 2

Functions Of

Electronic

Document

Delivery

Systems.

information, (although they should consider the benefits). But everyone should be concerned with the issues of application independence and font rendering.

The Spectrum Of User Requirements

Electronic delivery refers to a *class* of applications, not just one. A large part of the confusion surrounding electronic delivery today comes from treating it as representing a single, common set of requirements. Even if we only consider business applications, we are left with a vast number of different requirements for distributing electronic information in different forms on different media to different audiences for different purposes.

Electronic delivery *seems* like a single phenomenon only because it is new to us. But all that various electronic delivery technologies have in common is that they all work with digital information.
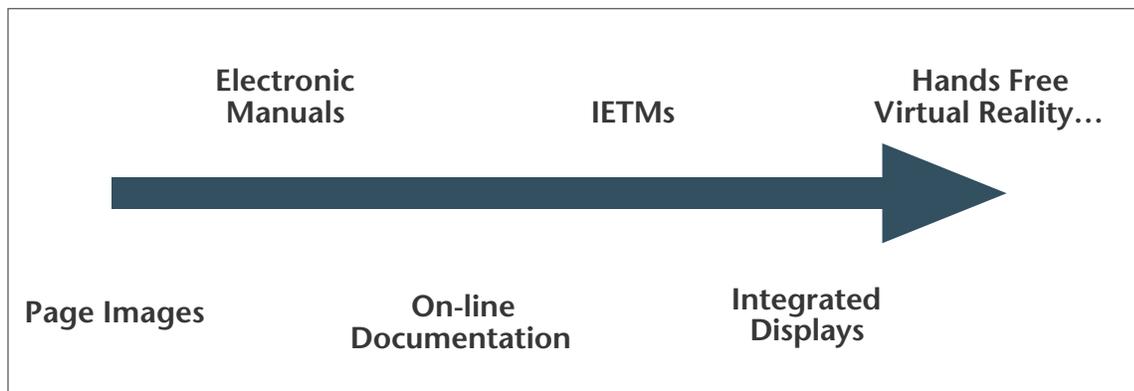
Electronic Manuals	IETMs	Hands Free Virtual Reality…
Page Images	On-line Documentation	Integrated Displays

The Illusive Big Distinction

It is also tempting to classify delivery technologies as those designed for human processing (*i.e.*, reading) *vs.* those designed for computer processing (*i.e.*, re-using). This distinction can be useful, but it largely breaks down when the requirements for computer re-processing *are* for reading (*i.e.*, re-publishing). And the largest demand for information re-use these days is for re-publishing information on multiple media for human consumption — reading.

It is more useful to think of requirements as a continuum. Let's look at three examples to see how different the needs can be.

Simple "Page-turners"

Perhaps the simplest set of requirements for electronic delivery comes from the need to simply replace or supplement paper documents with exact replicas in electronic form.

For example, a retail chain or bank may have field staff who are responsible for coordinating and resolving personnel issues at a number of branches. Furnishing them with laptops and simple electronic renditions of personnel procedure manuals (or employee handbooks) can provide immediate benefits. The agents can be more responsive because they are more likely to carry the information around, and they can locate information quickly when they need it.

Clearly, in this application the content of the electronic documents must exactly match the paper versions. But in many cases the *layout* of the documents must also match, for example, so that someone filling out a form does not have to learn a new procedure or interface.[2]

Integrated Electronic Documents

A more sophisticated application, one that takes more advantage of the digital nature of information, is on-line software documentation. Here, matching an electronic presentation to the paper version is not required, although there may be benefits to having them look somewhat similar, especially if some personnel still use the paper version.

What distinguishes this application from the simple viewer in the previous example is that the document and its viewer do not stand alone. To be effective and useful and competitive, software documentation must be tightly integrated with the software itself. The 'document' contains links from the software application that take the user directly to the appropriate task description. (It would also be nice to be able to go the other way,

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[2] A more advanced application would allow for filling in the form electronically and then printing out the completed form as well as sending the data back to the server database in the home office. But our point here is that even simple applications provide significant benefits. (Here, even providing straight page images would address much of this user's requirement.)

i.e., pick a topic in the documentation and have the application generate an example.)

This kind of electronic delivery application also requires reasonably rapid navigation (such as via hyperlinks), and an annotation capability. The latter is especially useful, as it allows users to write corrective or helpful notes to themselves or to others (*e.g.*, "Although the documentation says to do X, on *our* system you have to do X followed by Y.").

This kind of electronic presentation application is applicable to any situation where a display device is attached to a piece of equipment, not just to desktop computers. Examples could include an office building heating and cooling system or a manufacturing process control machine.

Our next example provides a glimpse of how this kind of application can (and will) be extended in the near future.

IETMs

The acronym "IETM", for interactive electronic technical manual, comes from the U.S. DoD's research and development efforts into more efficient and less costly ways to provide equipment maintenance information to technicians. In some quarters the term is already used generically to refer to *any* electronic manual, but to military contractors it refers specifically to the requirements for delivering electronic technical manuals to the DoD. (See the sidebar on 'DoD Tri-service IETM Specifications').

IETMs that incorporate the functions specified by the DoD are an example of the most
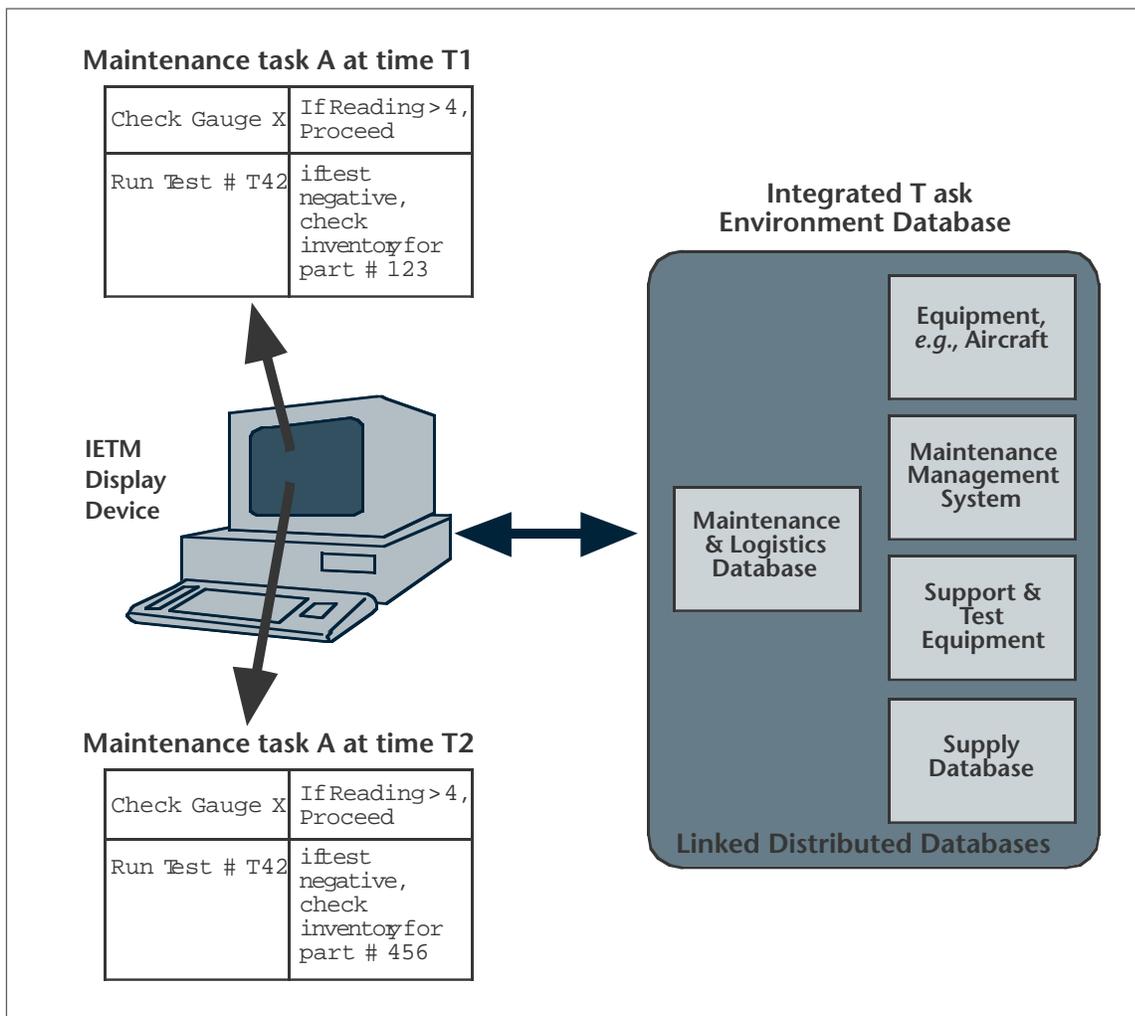
Figure 4

The Integrated Task Environment, and an Information Snapshot.

demanding requirements for electronic delivery of information, one that really stretches our notion of a 'document'.[3] The ultimate goal of the IETM effort is to provide a maintenance environment that allows for the safe, efficient, and rapid diagnosis and repair of complex systems by technicians with varying levels of expertise. While the DoD's interest involves weapon systems, the IETM approach can provide the same maintenance benefits for a power plant, telephone switch, car, computer, oil rig, or any kind of complex equipment.

This 'integrated task environment' contains all the information necessary for the maintenance of a piece of machinery. Such information may be stored in any number of separate physical locations, yet it is configured, linked, and dynamic: it always accurately reflects the current state of the system being maintained. The information presented to the user on the display may come from local display device memory, from the equipment being investigated, or from any number of remote linked databases.

An integrated task environment presents technicians with the most up-to-date and accurate information possible for the specific configurations of the systems they are working on. An IETM is essentially the user-interface between a maintenance technician and all the technical information needed to perform a maintenance task. FIGURE 4 shows some of the kinds of information that might be involved in a maintenance and logistics database.

Two critical characteristics of such an environment are:

• The information accessed is dynamic enough to reflect changes in the real world as they occur. A technician performing the same maintenance task twice in one day might see a different procedure each time, if, for example, new parts arrive, causing a pending engineering change order to go into effect.

• The information is physically independent of the device used to view the electronic manual. Information is located where it can be most effectively maintained and used. For example, a fault isolation test dialog may reside in firmware on the weapon system, but it is accessed by 'plugging in' the electronic manual device to the weapon system. The spare parts list, meanwhile, may be in a database accessed via microwave, while the tools available might be listed on a local disk. All the user sees is the integrated information on their display device.

Can Such Applications Be Built With Today's Technology?

It is important to realize that the technology required for all of our examples is available today, and in itself not especially mysterious. What makes an IETM application so complex is the level of interaction required between multiple computer systems, and with the human operators. This is a serious integration challenge. What makes it difficult to build an electronic delivery application is:

1. Determining what your requirements are now, and what they will be

2. Matching the right technology and product to those needs, and

3. Integrating the different technologies and products.

Our examples illustrate only three of the many things people mean when they talk about "electronic distribution," "electronic delivery," or "electronic presentation." Yet even

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[3] The IETM specifications are published and there are pilot systems built that implement them. The DoD's goals however go beyond even these specifications. The terms 'ACTM' (Advanced Concept Technical Manual) and 'integrated task environment' have been used by the Logistics Management Institute to refer to IETMs with the additional capabilities that will be needed as weapon systems and our ability to integrate distributed object databases become more sophisticated.

these examples have many variations. They serve to illustrate classes of capabilities to consider, and to help differentiate disparate kinds of requirements.

Key Considerations

Deciding where you fit on this spectrum requires an understanding of several issues that help narrow your choices.

Key differences between the different ends of the spectrum include the level of interactivity between the user and the document, where the document information is created and resides, who changes the document, and how often they do so. These are the areas to analyze when determining your requirements.

Level of Interactivity

In the context of electronic delivery, the term 'interactivity' is used in many different ways, and has a number of legitimate meanings. An "interactive" electronic manual could provide any or all of the following features:

• Allows the user to navigate freely within the electronic manual, or within certain constraints (there are also many forms and levels of navigation, *e.g.*, indexing, hypertext, electronic tables of contents, etc.)

• Allows navigation outside the boundaries of the current manual

• Allows the user to choose and re-arrange information at will

• Allows the user to annotate the manual for their own use, or for others

• Allows the user actually to correct or otherwise change information in the manual

• Allows the user to plug the electronic manual device into other systems or databases.

Developers must figure out ways to provide a flexible set of interactive features and controls without designing in limitations. For instance, it may not make sense in many situations to allow the end user to change the information, but this should not necessarily be a technical limitation designed-in to a product. Ideally, it should be a configurable option.

Where The Information Resides

If you have a need to do more than access a simple document on your local desktop for reference (as most corporate applications do) then you must think carefully about where information comes from and how it is collected and assembled. (See *Vol. 1, Num. 3* for a discussion of the varieties of document databases.) It doesn't make sense to select a document viewer without considering document creation and management issues, especially when you must pull together information from different documents and databases in many locations.

Of course, you need not buy all the pieces from the same vendor — it *is* possible to integrate authoring, document management, and viewing products from different suppliers — but such integration is not for the feint of heart.

How Dynamic The Information Must Be

Time is the most basic and critical difference between paper and electronic documents. Electronic documents can (more or less) keep up with the rapid changing of information in real time. In fact, computers are often more adaptable than humans; In some cases modifications to electronic documents have to be purposely slowed down so humans can deal with them (not to mention bureaucracies!). You need to consider not only how to

"Time is the most basic and critical difference between paper and electronic documents."

manage constantly changing information, but how often to deliver such changes to document consumers.

In many corporate applications, the information that makes up electronic documents is under the control of a document configuration management system. Here, the challenge is for the document management system to provide an appropriate version control capability, one that matches the application requirements. Authors and viewers in such an environment should be able to assume that their queries always return the correct version of each document.

Electronic Document Y
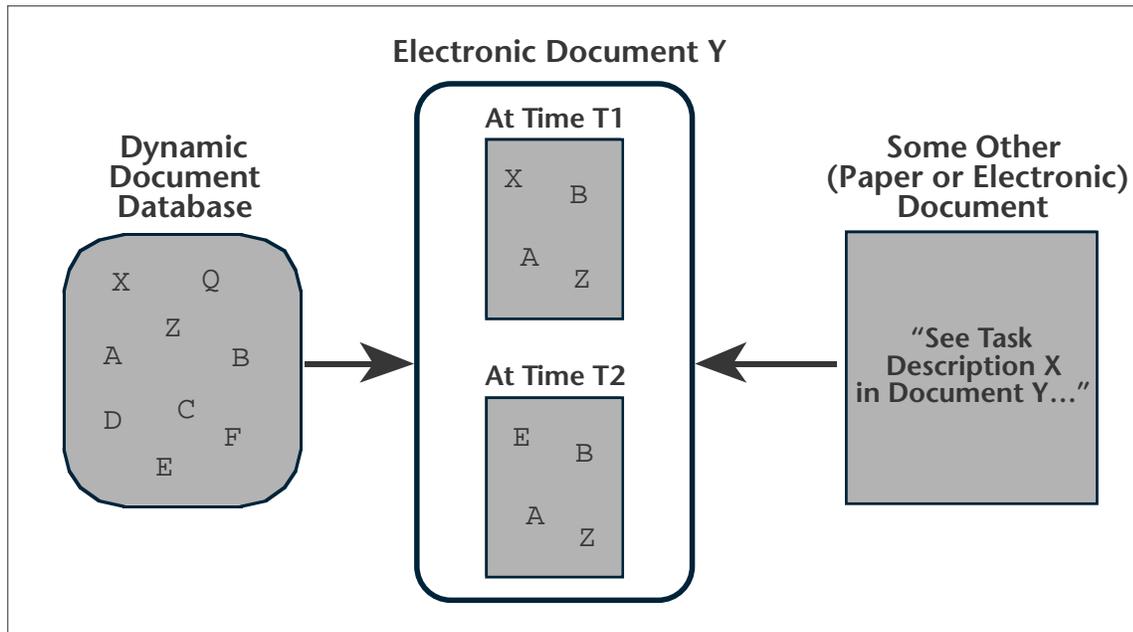
Figure 5

The Problem

Of

Referencing

Dynamic

Documents.

However, there will also be cases where electronic documents outside the control of a document management system must be referenced. In this case, how can a reader of a dynamic document be sure that the piece of information referenced by the author has not changed? There is a severe synchronization problem here, one that is exacerbated when there are multiple document sources and multiple contexts in which they can be referenced.

In the familiar world of paper documents change is easily manageable, in part because it takes time and money to re-publish a paper document. There is a built-in governor that restricts the number of potentially conflict versions in circulation.

General Implementation Issues

Matching Electronic Views To Paper Pages

For many applications it will be important that electronic documents have the same look and feel as their paper counterparts, as in our first example. Is it important for your application? Whether it appears to be or not there a number of tradeoffs to consider before deciding on a product.

The Problem With Relying On Pages

Displaying documents in traditional page form has built-in limitations that will become increasingly unacceptable as document consumers grow more accustomed to the features available otherwise. For example:

- Pages designed for hard copy documents are designed with the media in mind. A carefully designed paper page is likely to be too large (or the type too small) for electronic displays (*e.g.*, how many people have 8.5 X 11 or A -size display screens?). It is sometimes argued that electronic pages should match their paper counterparts because it is critical that the same information be presented to the user as a single chunk, *e.g.*, that a technician see a repair procedure and an illustration at the same time, one below the other. However, one should not assume that pages designed for paper can be force-fit into an electronic display with different physical dimensions or resolution. You can scale an electronic page up or down, but it might be unreadable when scaled down and might not fit on the screen when scaled up. So, you cannot be sure you will be presenting the same content to the reader at the same time without different designs that are optimized for different display media.

- Pages are not always relevant. When looking up a piece of information you probably don't care what page it's on, as long as you can find the *content* you need. Relevant information may, in fact, start on one page and end on another. Electronic viewers can provide more sophisticated and user-friendly navigation interfaces if they are not constrained by physical page boundaries.

- Pages in paper documents are limited to still text and graphics. Taking advantage of *any* electronic multimedia capabilities automatically means that the paper and electronic versions will not match. Note in particular that sound is already becoming common in word processors for voice annotations.

The Problem With Not Relying On Pages

Getting rid of, or ignoring, the notion of pages however is not the answer, at least not for all applications.

- Pages provide a familiar and accessible interface that humans are comfortable with. It is difficult enough to get people to change the way they do their jobs, especially where new technology is involved that forces them to think differently. This is not to say that change should be avoided, only that one must plan for the consequences of major changes.

- Pages provide the only way to synchronize paper and non-paper versions of documents for presentation purposes. This synchronization can be an important requirement (although it is often less important than it first appears).

- Pages provide a necessary function. Logically, a page is a sort of bite-sized container of information (ideally an aesthetically pleasing one). It is a "viewable unit", which is something we need just as much for electronic documents as we do for paper. Whether we call these "viewable units" pages or not is unimportant. What is important is that pages or "viewable units" be designed to satisfy the requirements imposed by the medium and the application.

Our notion of "pages", just like our notion of "documents," has to evolve to reflect the new realities of information technology. We may end up with entirely new concepts over time. In the meantime we should recognize how ingrained the ideas of "page" and "document" are, regardless of whether we want to model an electronic viewing application on them. It is important to look behind the curtain of the page versus non-page wars.

Legal Issues

One of the serious challenges we face with electronic documents is managing copyrights. One reason this is so difficult is that we cannot deal only with whole documents anymore.

Modern electronic tools, including viewers, allow users to copy arbitrarily small pieces of documents and reuse them in other documents and applications. Few of the people using these tools are well-versed in the intellectual-property issues that such reuse raises. (We will devote a full article to these challenges in an upcoming issue.)

Other legal issues arise from the ease with which electronic documents can be changed, combined with the difficulty in detecting such changes (*e.g.*, no tell-tale smudges from erasers or "white-out" lumps). Audit trails — critical in many applications — are difficult to maintain with electronic documents. How do you determine what a document looked like at a particular point in time, when it is changing every few hours (or minutes or seconds)? Even worse, from a legal point of view, how can you *prove* that a defendant based his decision on the version of the document officially current at 10:15 am instead of 10:18 am?

Issues Related To *Authoring* Electronic Documents

One cannot ignore the information creation process when looking at an electronic delivery application. There is not always a clear separation between authors and readers; worse, the electronic viewing features you might need may be dependent on the capabilities of a particular authoring system.

Creating or "authoring" documents for electronic distribution adds new challenges. For example, how do you author pieces of information outside of a linear narrative? How do you author self-contained information objects that may be combined in unforeseen ways?

Imagine, for example, a scenario where a technician pulls up instructions for disassembling an explosive device in the wrong order ("Oh, I had *that* instruction in the window at the *bottom* of the screen!"). Here is an area where ordered structural relationships play an important role (and prevent a disaster!).

A more subtle problem, is that authors often assume that the reader will draw certain conclusions from the relative proximity of a related illustration, table, or another paragraph of text. If the viewer does not present these items together, unforeseen problems can result.[4]

One way to deal with this is to control the environment so that information is never presented in ways that don't make sense or are inappropriate. This means limiting and defining all the possible hyperlink combinations available to the reader. (Notice that this is seldom a problem with page-turners). A related issue has to do with controlling how the information looks. To see how information is going to be presented, authors need access to the devices that readers will use, (or the ability to emulate these devices) . This can be a substantial cost issue, especially if there are many such devices.

We have already discussed the problem of synchronizing versions of documents in general. Some of the burden for keeping the content of electronic and paper versions synchronized belongs to a document management and distribution system. Some responsibility, however, belongs to authors and the tools they use, *e.g.*, for maintaining a single source from which you create both versions, and for producing both versions at the same time and releasing them to the management and distribution system.

Some of these issues require changes in the kinds of skills we expect of authors. Others require new authoring tools. In a future issue we will deal with the questions of what kinds of features authoring systems need to generate electronic documents.

> *"… how can you prove that a defendant based his decision on the version of the document officially current at 10:15 am instead of 10:18 am?"*

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[4] This is an area where some research in the cognitive sciences would be useful, *e.g.,* how our brain processes different configurations of text and graphics.

Issues Related To *Viewing* Electronic Documents

Beyond the obvious questions about the platforms we use to view documents, it is important that we think about the physical characteristics of the display devices, the kind of information that will be viewed, and the formatting and presentation software that will be used.

For most people, commercial display devices are still physically too primitive for extended reading. The resolutions are not fine enough, and the lighting and reflective characteristics of computer displays can tire the eyes. Even the noise of attached disks can be distracting when one is trying to understand a particularly complex argument or procedure (whether in Kant's *Critique of Pure Reason*, or even a light scientific or technical journal).

On the other hand, the technology is more than sufficient for referencing documents or occasional reading. Even regular reading of short documents such memos and email messages is not asking too much of readers.

Not only is hardware still primitive, but the software is not good enough to make up for it. Technologies like Adobe's ATM and Microsoft and Apple's TrueType have drastically improved the viewability of characters on screens, but this is not enough. The composition and layout software that allows us to create readable and aesthetically appealing paper documents needs to be applied to electronic documents. We need to learn to develop designs appropriate for electronic displays to ensure readability and good communication. Margins, character spacing, type size are examples of formatting characteristics that should be applied differently to electronic devices.[5] We are also still in the early stages of discovering the best user interfaces for electronic documents.

Is A Standard Format Necessary?

In an ideal world we would have a common way to distribute and share all digital information (including text, graphics, and digital movies etc.) without having to worry about any kind of conversion. We want to reduce all digital information to a something we can present on any device. (Television is a good example of the *kind* of standard we want, but it of course, is much too limited.)

We need to ask ourselves three questions. Do we need a standard *viewing* format? Do we need a standard *interchange* format? And, must they be the same?

If we had a standard viewing format that was robust enough, we *might* not need a separate interchange standard — it might be possible to combine them. Whether this is practical or not, it certainly will not happen quickly. There will be a number of competing electronic viewing formats in the market for some time — we have not even heard from some of the most likely players in this market yet.

Since we won't have a standard viewing format in the near future, there will be times when we need a way to interface with information in a particular viewing format. Over time the market will force suppliers to provide filters for competing products, and it will become easier to share information between viewing formats. (This is much like the phenomenon today among popular word processors, where each can read each others' files.) Also, most major electronic format suppliers plan to support SGML *within* their viewing format; once this happens, information content and structure can be inter-changed and utilized by many different applications, including viewers. (This, by the way,

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[5] See the excellent article on this topic by Paul Kahn and Krzysztof Lenk in the *Seybold Report on Desktop Publishing,* volume 7, number 11.

is the reason that SGML and viewing formats do not compete. A standard interchange format *allows* for and facilitates multiple viewing formats.)

Notice, however, that for many applications the viewing format is the "final form" the information takes. If the information will no longer change, interchange is less of an issue. However, it is still important to be able to read, annotate, navigate, and extract such information.

Authored Order

Retrieved & Viewed Order

Different Context Could Imply Something Very Different!
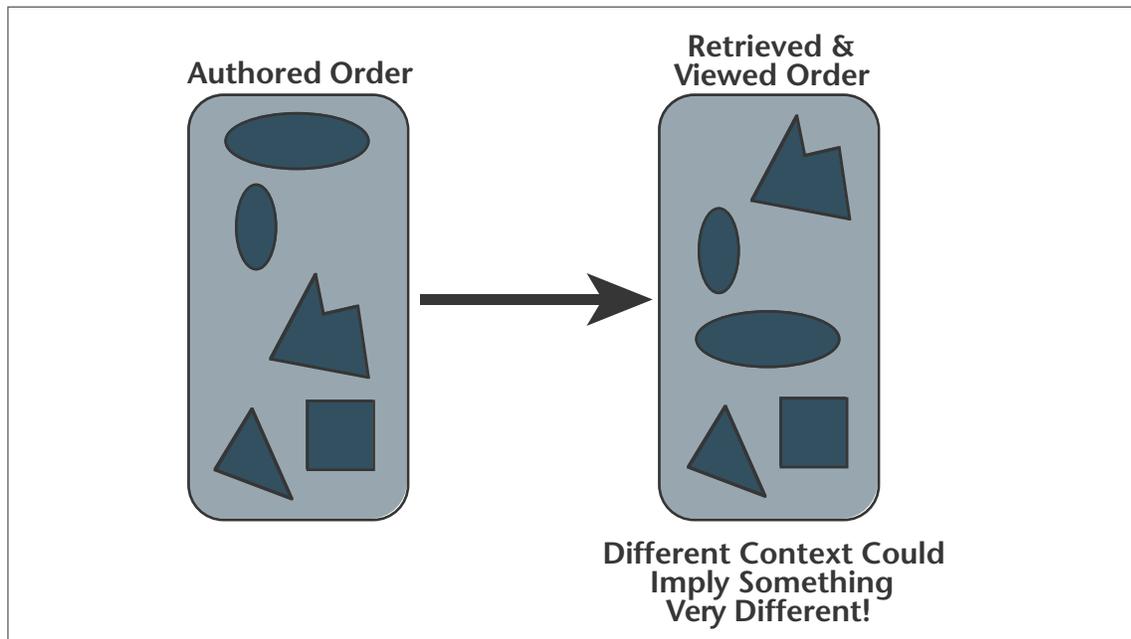
Figure 6

The Problem

Of Authored

Objects Being

Viewed Out

Of Context.

The Future Of Electronic Delivery

The technology and underlying architectures for managing document information will undergo profound change in the next few years. Viewing technology will be affected, possibly even led, by the consumer market, where economies of scale will force rapid development and acceptance of technology for distributing digital information. What happens if Nintendo or Sony or Microsoft or Apple comes up with an electronic viewing format that captures the interest of information content developers? This (multimedia) format will feed itself as it pushes backward on information creation and management processes. The more popular the format, the more distribution possibilities there are, and the more demand there will be for content development tools.

How real is this possibility? Certainly the influence of consumer technology will be great, especially with all the interest of Apple, Microsoft, SGI and other platform and communication suppliers. However, there is no reason to think that there will not continue to be a difference between the user requirements of a large corporation and those of an individual consumer.

Why The Native Application Becomes Less Important

Current electronic viewing products do not generally require that you have a copy of the authoring application used to create the document. They do, however, require a copy of a viewing application, although some provide a certain number of licenses at no charge.

Even this requirement will change over time. Eventually — if you follow current trends to their logical conclusion — there will no longer be files and applications as we know them. You will not choose a file and then open it with a particular application, nor will you start-

up an application and then open a file that can be read by that particular application. Instead, you will have a collection of "documents" that you may have organized in a particular way. These documents will consist of information from various sources residing almost anywhere—on a local disk, network, or maybe somewhere on the Internet. Documents, and the different "information objects" that make up documents, will know, or perhaps contain, the "application objects" they need to present themselves for viewing or editing (imagine tiny style sheets with context sensitive presentation information).

This is what we (and others) mean when we talk about "document-oriented interfaces". The problems of not having the application, —as we currently know it, —will go away, (or at least look very different).

For this to work the viewing (and other) technologies need to be part of the operating environment.[6] So some kind of rich document viewing will be ubiquitous. You may however, still want your own special purpose (higher quality) set of viewing features. Viewing "feature-sets" will be the electronic version of book designs — this is how publishers will compete against each other. The features will include many other things besides appealing typography and layout. The quality (relevancy) of the hyperlinks and the ease of navigation and information extraction features will be equally important.

The Font Problem Goes Away

There are already solutions to the problem of missing fonts based on font substitution, shared metric and vector information, and intelligent rasterizing. These solutions will just get better, and more in-grained in platform solutions. Cross-platform operating environments that solve this problem transparently will win in the market.

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[6] We like to use the term 'operating environment' to refer to what the user is confronted with, whether they can see it or not. Users don't care whether they are dealing with an operating system, a piece of middleware, a window, or an application.

THE U.S. DoD IETM SPECIFICATIONS

The DoD published a set of specifications last year that describes how weapon system suppliers will have to deliver electronic technical manuals to the government. These manuals, or "view packages" as they are called in the specifications, will primarily be viewed electronically on many different types of devices — paper output is optional. It is anticipated that these specifications will replace existing documents that have been used for years to specify how to deliver paper manuals.

The specifications are noteworthy for a number of reasons:

• They were developed by a tri-service committee with active members from the Army, Navy, and Air Force. This level of cooperation between the rival services suggests an important consensus on the urgency of improving management of technical information.

• They are very sophisticated, and extremely ambitious in the level of integration with databases expected.

• They use HyTime — the ISO standard that uses SGML to describe multimedia time-based information — to define the complex relationships between the many pieces of information in a technical database.

• They do not require new technology that is government specific. Products that support the specifications have as much applicability, and are just as marketable, to private industry as they are to the government.

Corporate users have no patience with this kind of an impediment to enterprise information systems, and will not tolerate it. This does not mean there will be no market for high-quality or unique fonts that may not be covered by a general solution. But they will not be used very often in corporate environments outside of marketing and graphic design departments.

RISKS AND COSTS

New technology can often be difficult to cost-justify. This is especially true when it changes the way you do business — there are too many unknowns. Initial assumptions turn out to be faulty, and unforeseen side-effects (both positive and negative) are inevitable.

Fortunately, electronic delivery technology is an exception of sorts. You can easily measure the costs of printing storing and distributing paper documents (e.g., square feet of warehouse space multiplied by lease cost, etc.) and compare them against the costs of electronic delivery (e.g., weight of a CD-ROM disc versus even a few hundred pages of documentation). You can frequently come up with a ROI scenario that is difficult to ignore. You may not even need to attempt to attach dollar values to "soft benefits" (such as "more responsive customer service") that are notoriously hard to quantify.

In some cases the printing and storage savings alone will be enough to justify a complete document system, not only the electronic delivery component. This is often necessary, since older publishing systems are not likely to have the required tools for generating electronic documents, such as adding hyperlinks.

Your Worst Nightmare

While investing in an electronic-delivery system is one of the safer bets these days, one can still make costly and potentially disastrous mistakes. Suppose you put all your

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The IETM specifications are not yet in widespread use, and no commercial packages available today fully support them. However, IETM capability can be built using commercially available components with some software integration, as government pilot programs (such as the Air Force's F-22 fighter program) demonstrate. Other national governments, including the French Navy and Australian Navy (with assistance from Sweden), have similar projects underway.

The three specifications published so far cover: how to structure and define a data dictionary for weapon system support information, how to present information on the screen, and how to deal with the unique quality-assurance issues that IETMs present.

The set of IETM specifications is not yet complete. Other documents will provide more guidance in the areas of user interfaces and display-system characteristics. Technical work also must still be completed in the area of specifying and exchanging "view packages." (The issues here mostly involve formatting and presentation.)

How To Find Out More

The IETM specifications are available from Carderock Division, Naval Surface Warfare Center, David Taylor Model Basin (301-227-1358). Other information about CALS activity can be obtained from the CALS Office (703-697-0051). Many other national governments have their own CALS offices — a complete list can be obtained from the U.S. CALS office or from the CALS Industry Steering Group International Task Group.

strategic information into an electronic-delivery format and then build internal or customer applications that are dependent on it. If the viewer you have chosen does not survive the market over the next year or two, you could be stuck with files in an unsupported format. If you did not save the original source files, you will have a nightmarish conversion problem.

This wouldn't be a problem if you could predict what the viewing formats of the future will be. Unfortunately, there will not be a single such format, at least for the foreseeable future — as we have seen, there are just too many different needs.

CONCLUSIONS & RECOMMENDATIONS

Should you invest in electronic delivery today? If you have a business problem that can be solved with electronic delivery, you should not hesitate. As long as you can get a handle on the cost savings and your organization is up for the change, the technology is available. Even though the market will continue to develop rapidly and is bound to take a surprise turn or two, low risk solutions can be put in place today that can serve you well for the foreseeable future.

First you need to define your requirements, and perform the necessary analysis to determine the extent you will need to re-engineer your business processes:

• Make sure you understand whether and how the available technology will solve the application and font problems. The better products are at this, the more flexible and open your solution will be.

• Be clear about which pieces of the problem each product supports, and which pieces you need and want. The products are all configured and packaged differently.

• Analyze how well they meet your interoperability requirements. Even if you buy all the components from a single supplier to ease integration, you will want to make sure your application can interoperate with your other systems (and those of your key customers or suppliers). If buying components from separate companies, make sure you see them working together first.

• Evaluate the cost structures, platform support, and licensing issues. There is tremendous variation among vendors at the moment.

• Make sure you understand the process your organization goes through in creating electronic documents, and how long this takes. Anticipate the problems you will experience in introducing new authoring or viewing systems into this environment.

• Involve those who will be using the viewers to ensure the interface can meet their requirements.

• Find out the vendor's strategy for helping you protect your information, in the form you need it. Will they provide built-in viewers that stay with the document? Will you be able to extract information in SGML form?

Finally, remember that the best way to ensure the long life and integrity of your information is preserve and guard the *source*, preferably in a neutral standard like SGML, but perhaps also in a word processing format that has a strong enough market that there will be ways to get at the information for as long as you will need to.

Tell Us What You Think?

Do You Want To Receive This Report Electronically?

We have had a number of requests from subscribers who would like to receive our report in electronic form. We are eager to do so, and in fact have already experimented a bit with one of the newer products (No Hands' *Common Ground*).

We would like to know: if you would prefer delivery in electronic form; whether you would still want a paper version; which electronic format you need, or would like; whether you would be willing to pay more where there are licensing fees involved; and how you would like to receive the electronic version (*e.g.*, email, diskette, bulletin board).

We would also love to hear from other newsletter publishers who would like to share their experiences with electronic distribution.

Should We Add A News Section?

We are looking at adding a section to the report covering industry and product news. The focus of course, would be on document management, document computing, and open information standards.

Should we add this section? If so, what should it contain? What should we call it? Or, should we provide a separate service, perhaps delivered via fax or email? Let us know what you think. (Please send your views to the editor.)
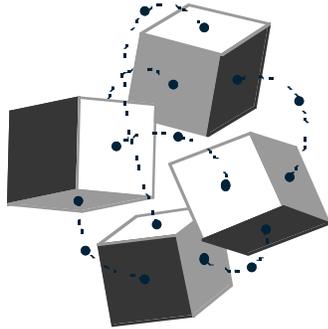
DOCUMATION '94

UPDATE

Because of the synergy between the Documation Conference and the topics covered in this report we will provide regular updates on the conference program and exposition.

Program Update

The program is nearing completion, and a full brochure will be mailed in early October. The speakers confirmed include some of the document computing industry's most knowledgeable and influential leaders and implementors. There is a healthy split of users and vendors - about 50-50 in the general session. Come and participate in a dialog between senior executives from some of the largest users and most influential suppliers of document system technology.

Exposition Update

Over 35% of the exhibition space was reserved within three weeks after mailing out the exhibit kits by a wide range of companies with document system technology. If you are a vendor don't wait too long!

The Documation '94 Media Advisory Board

The following editors are some of the members of our Media Advisory Board. They have a strong interest in Documation '94, the topic areas we will be covering, and the products that will be demonstrated at the expo. We will be working closely with them before, during and after the conference.

Colin Brace - Language Industry Monitor (The Netherlands)

Dave Churbuck - Forbes

Les Cowen - Micropublishing Report

Esther Dyson - Release 1.0

Janet Endrijonas - Managing Automation

Jeff Hill - CALS Journal

Chris Locke - Internet Business Report

Ronni Marshak - Workgroup Computing Report

Carolyn Pinola - Database Advisor

Karyl Scott - InfoWorld

Yves Stern - Argos (France)

Richard Stover - Document Mangement & Windows Imaging

Thomas Temin - Government Computer News

John Verity - Business Week

Dale Waldt - TAG

Mark Walter - Seybold Report on Publishing Systems

Documation '94 Country Agents

We are signing up well known consultants in different countries who will be hosting visiting groups at Documation. We expect to reach agreements with 10-12 agents. Current members of the program include:

Pamela Gennusa - UK

Ping-Shia Kung - Taiwan

Catherine LeLoup - France

Eric van Herwijnen - Switzerland

Akira Mizobuchi - Japan

Tibor Tscheke - Germany

Per-Olof Jonasson - Sweden

Further Information

To receive more information on the conference, or to receive an exhibitors kit, call Marion Elledge or Tanya Bosse at (703) 519-8160. If you have proposals for topics or speakers, call Frank Gilbane at (617) 643-8855, or fax your proposal to (617) 648-0678. Documation '94 will be held at the *Westin Century Plaza in Los Angeles, February 21-25, 1994.*

CALENDAR OF EVENTS

Below is a selection of key events covering open information and document system issues. There are many other conferences and shows covering related topics. We will attempt to keep this list to those events that focus on areas most directly related to the areas covered in our report.

Document Imaging '93. September 21-23, 1993, Brussels, Belgium. European Document Imaging Conference & Exhibition. Call IMC (303) 440-7085, Fax (303) 440-7234.

CALS Europe '93. September 22-24, 1993, Berlin, Germany. Conference and exhibition on CALS-related activity in Europe. Call (202) 775-9556, Fax (202) 775-8122.

CALS Pacific '93. Fall 1993. Conference and exhibition for CALS activities in the Pacific Rim. Call (202) 775-9556, Fax (202) 775-8122.

Pharmaceutical Conference. October 13-14, 1993. GCA conference on Document Management for the pharmaceutical industry. Call (703) 519-8160, Fax (703) 548-2867.

Seybold San Francisco. October 20-23, 1993. San Francisco, CA. The enormous computer publishing exhibition and conference. Call (310) 457-8500, Fax (310) 457-8510.

CD-ROM Expo. October 27-29, 1993, Boston MA. Conference, tutorials, and exhibition. Call (617) 361-8000, Fax (617) 361-3389.

CALS Expo '93. November 1-4, 1993, Atlanta, GA. The annual conference and exhibition. Call (202) 775-1440, Fax (202) 775-1309.

Hypertext '93. November 14-18, 1993, Seattle, WA. Conference covering research in applications of hypertext-related technology. Call (212) 869-7440, Fax (212) 944-1318.

CALS Australia '93. November 17-18, 1993. Conference and exhibition for CALS activities in Australia. Call +61 3 819 6860, Fax +61 3 818 3129.

Explor. November 14-19, 1993, Denver, CO. The annual conference and exhibition on electronic printing systems. Call (310) 373-3633, Fax (310) 375-4240.

SGML '93. December 6-9, 1993, Boston, MA. The annual event in North America for SGML developers and enthusiasts. Call (703) 519-8160, Fax (703) 548-2867.

Documation '94. February 21-25, 1994, Los Angeles CA. The new annual international event for document management applications and document computing. Call (703) 519-8160, Fax (703) 548-2867.

Seybold Seminars '94. March 22-25, 1993. Boston, MA. The annual gathering of the computer publishing elite. Conference and Exhibition. Call (310) 457-8500, Fax (310) 457-8510.

OnLine Publishing '94. April 10-13, 1994, TBD. GCA conference on online publishing issues. Call (703) 519-8160, Fax (703) 548-2867.

EDD '94. May 10-12, 1994, Somerset, NJ. Bellcore's forum for discussion of issues relating to the exchange of technical information in electronic form. Call (201)829-4135, Fax (201)829-5883.

SGML Europe. May 15-19, 1994, Montreux, Switzerland. The European counterpart to the SGML '93 conference in the U.S. Call (703) 519-8160, Fax (703) 548-2867.

Topics Covered In Previous Issues

Vol. 1, No. 1.

What The Report Will Cover & Why — An Introduction To "Open Document Systems", And A Description Of The Report's Objectives.

Imaging, Document & Information Management Systems — What's The Difference, And How Do You Know What You Need?

Vol. 1, No. 2.

SGML Open — Why SGML And Why A Consortium?

Document Query Languages — Why Is It So Hard To Ask A Simple Question?

Vol. 1, No. 3.

Document Management & Databases — What's The Relationship?

Topics To Be Covered In Future Issues

The subjects listed below are some of the areas we will be covering, in no particular order. If you have an opinion about which topics you would like to see added or covered sooner rather than later, let us know.

Office Workflow Systems — Can They Handle Strategic Information, Or Are They For Casual Or *Ad Hoc* Use Only?

Documents As Interfaces — Is This An Option For Today? What Will The Future Bring?

SGML & Presentation Interchange — What Standards Are Available Or Appropriate? (DSSSL, OS/FOSI, HyTime, ODA, etc.)

Authoring Systems — Do You Need Different Kinds For Different Media?

"Middleware" — What Is This Layer Of Software In Between Operating Systems And Applications? Is It The New Proprietary Trap? What Does It Mean To Your Decisions About Document Systems?

ISO 9000 — What Kind Of Document Management System Do You Need To Meet This Quality System Standard?

Open Systems & Client Servers — What Are They? How Do They Relate To Document System Technology?

Imaging Technology — How Is It Evolving?

The Airframe And Airline Industry's Strategy For Sharing Product Information — What Can You Learn From It?

New Drug Applications — What Document System Strategies Make Sense For The Pharmaceutical Industry?

Object & Relational Databases — Which Approach Is More Suited To Your Document Systems Needs?

Compound Document Architectures — Why Do We Need Them? Who Will Define Them? Will They Do What We Expect?

SGML Versus ODA — How Do They Differ? Is There A Reason To Have Both? What Can They Do? Which Approach Is Right For The Future?

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