



# *Transaction Documents and Electronic Commerce*

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## ***Executive Summary***

Before the advent of the Web and the major business and technology trends that it has engendered, document management was considered a niche technology and a product area geared to specific market sectors and application needs. The Web has effected a dramatic shift in how document management is now being perceived and the centralized role it will play in five major emerging trends. These trends include:

- ❑ Digital Document Repositories (DDRs) are becoming a vital element of electronic commerce
- ❑ Printing and the Internet are in the process of converging
- ❑ A new document-enabled architecture is emerging for electronic commerce
- ❑ ERP and on-line retailing are becoming document-enabled
- ❑ COLD and electronic bill presentment are converging

### ***The Digital Document Repository (DDR)***

Because it is document and data oriented (rather than strictly data oriented) and is capable of managing the large volumes of transactions associated with e-commerce, the DDR is becoming a necessary and critical element in the successful implementation of e-commerce applications. In fact, the DDR is becoming the back-office “backbone” or infrastructure upon which e-commerce front office applications are built.

### ***Printing and the Internet***

Print documents such as statements and orders are now being placed on Web sites for customer service, direct customer access, reprinting and a variety of other applications. The advent of the “Printernet” (as some call it) is affecting traditional printing strategies. Print replacement – with its convenience, timeliness and associated cost savings – is well underway.

### ***Document-enabled e-commerce architecture***

This new architecture is based on the premise that for every record there is a corresponding document and that document will be attached digitally to the associated record so that there is no need to go to paper or microfiche to find it. This implies that for every e-commerce database there will be a corresponding DDR.

### ***ERP and on-line retailing becoming document-enabled***

ERP (enterprise resource planning) is starting to embed documents as well as data. This enables documents to be directly associated with corresponding data. At the same time, a new category of system is emerging. This is the enterprise demand planning system, which is accompanying the emergence of online retailing. The enterprise demand planning system also is becoming document enabled. These two types of systems are becoming integrated in a new enterprise chain as organizations seek to optimize their ERP systems.

### ***COLD and Electronic Bill Presentment***

COLD (Computer Output to Laser Disk) technology is converging with Web-based document presentment. This is initially occurring with statements and bills -- hence the term electronic bill presentment. The presentation of these print documents on the Web is fast becoming an integral part of electronic commerce.

Of the five major technology trends mentioned above, INSCI Corp has either a leadership position or strong technology focus. This paper describes these trends in detail, shows what they mean for corporations that are moving to electronic commerce, and how INSCI can help in this crucial migration. A related paper, White Paper No. 4, is titled “Internet-Enabled Printing”. It addresses the printing aspects of electronic commerce and DDrs and is also available from INSCI Corp.



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## **I. INSCI: The Company and The Mission**

INSCI Corp is an award-winning provider of software solutions for use in a wide variety of business applications, including enterprise level customer service, electronic commerce, Internet printing and reprinting, electronic bill presentment, and on-line retailing.

These software solutions are used by businesses worldwide to achieve significant productivity and operational efficiencies, reduce and/or eliminate document warehousing and handling costs, improve customer relationship management, and generate additional revenue sources.

INSCI's COINSERV software product suite encompasses:

- Windows NT and Unix based digital document repositories (DDR) for managing very high volumes of transaction documents. Both versions incorporate robust Web browser capabilities for remote document access and viewing, electronic commerce, electronic bill presentment and on-line retailing applications
- workflow management
- document imaging
- data mining and analysis
- report conversion and management

These technologies are designed for archiving, managing and distributing massive numbers of high-value business transaction documents such as statements, invoices, accounting reports, policies and contracts. COINSERV software products are based on open client/server architecture capable of integrating with a wide range of computing platforms, data output streams, hardware storage devices and other Internet-based e-commerce, payment and retailing technologies.

INSCI has established strategic relationships with many leading technology and service providers including Unisys, Xerox, Fuji/Xerox, Moore North America, Storage Technology, First Data Investor Services, Swets Document Systems, Geneva Digital, and Media Knowledge Decisions (MKD). Today, INSCI technologies are managing billions of documents for companies in banking, financial services, insurance, telecommunications, utilities, manufacturing, healthcare, government and many other market sectors.

INSCI's focus going forward is on the continued development of innovative, industry-leading technologies backed by the highest levels of quality assurance and customer service.

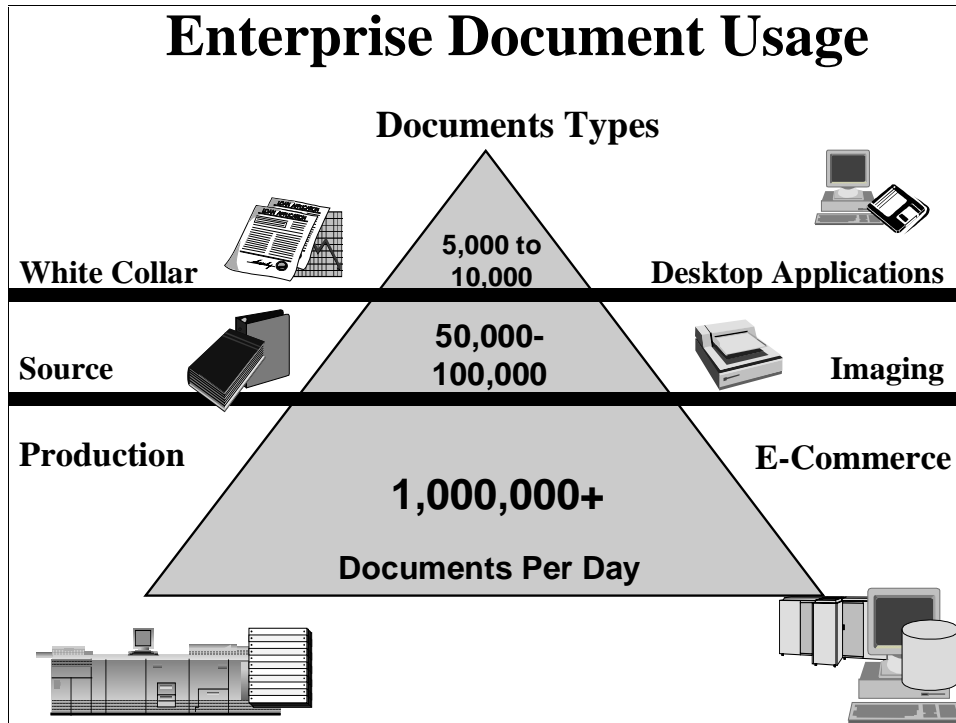
## II. Document Usage and Digital Document Repositories

In the typical business enterprise, document types and usage normally fall into three main classes. These include:

- ❑ *“White collar” documents.* These are documents generated by applications such as word processors, presentation software, graphics packages, spreadsheets, and so on. In the majority of instances, these documents are created by professionals for professionals and are used internally.
- ❑ *Source or Inbound documents.* Documents that are typically scanned into imaging systems.
- ❑ *Production or Outbound documents.* Documents that have been traditionally created by production printers and used to conduct transactions.

As Figure 1 illustrates, production-level documents are by far the largest category of documents handled by most organizations. Because of their sheer volume, they cost more to create, store and manage than any other document type. We call them transaction documents.

It is precisely these types of documents, the transaction documents, that are starting to be stored and viewed on the Web. A large number of these documents are statements and invoices. Others are confirmations, tax documents, advices and so on. These documents are playing the largest role in electronic commerce, and are the primary focus of this paper.



**Figure 1 – Enterprise Document Usage**

Transaction documents need to be stored in repositories for a variety of reasons and purposes. Among these are:

**The Vault** – repository for long-term use. A repository that contains all customer-facing documents so that they can be accessed for whatever purposes over a number of years. When used in this way, the DDR functions as a giant digital filing cabinet. This may be the primary purpose of the DDR or one of several purposes.

**On-Demand** – repository for short-term use. Sometimes print documents get lost either by the company or the customer and need to be reprinted. In this instance, the DDR acts to provide print-on-demand functionality. It is also used by customer service to answer customer queries. Increasingly it is accessed by the customer directly through the Web to answer questions of their own.

**Impulse** – ad hoc repository. For document viewing at any time.

**Strategy/Curiosity** -- data mining for decision support, research, audit, demand analysis and so on.

Users of DDRs span the gamut of the organization, including its customers. They all have differing needs and differing access methods. Table 1 indicates the primary users of DDRs and their type of access.

Type of User	Type of Access
Customer Service	Local
Marketing and Sales	Local and Web
Finance	Local and Web
Employees	Ubiquitous Web
Customers	Web (Internet)

**Table 1 – Users of DDRs**

The direction of access is clearly moving away from a focus on customer support to ubiquitous employee access and ultimately towards ubiquitous customer access.

### ***DDR Outputs***

As access to the DDR expands to include new users, output functionality must expand to meet their needs and expectations. Output from DDRs will expand to include:

- Print-On-Demand
- Fax-On-Demand
- Broadcast-On-Demand
- Customer Access-On-Demand
- Customer Service Viewing On-Demand

Of the above, broadcast-on-demand will become increasingly important. As electronic bill presentment moves towards a push model -- and indeed as all transaction documents move to such a model -- we can expect that broadcast will become the preferred method of distribution for many document types. These documents will be broadcast from initial spool files and there will be rebroadcast requirements that will involve the documents coming directly from the DDR.

We can also expect a change in the paradigm for the target platform to which the documents are sent. Currently, the main target platform is the PC. In the future, another primary target will be the palm-size device. The means of distribution will become wireless and the distribution format will increasingly move away from legacy data-streams such as AFP and Metacode towards PDF and XML. It follows that the DDR will eventually have to handle XML and be aware of the characteristics of the palm-platform to which it is sent.

### ***DDR Performance***

In terms of DDR performance, we can expect the following to become fundamental requirements as electronic commerce expands and matures:

- Holds all corporate print documents on-line for at least 20 years
- Stores up to 5 million documents/day
- Supports a minimum of 5,000 concurrent users with the capability of expanding rapidly to support 50,000 users as more business is done on the Web
- Multi-petabyte DDRs particularly as digital print documents start to incorporate multimedia such as video and audio clips
- 2 Second response for short-term use
- 20 Secs to 1 minute from the vault

While this type of performance may seem difficult to achieve, INSCI has either implemented or benchmarked DDR components that demonstrate the capability for the performance characteristics mentioned above.

### ***DDR Types***

There are several types of DDRs on the market today. These range from desktop level DDRs through departmental DDRs to production-level and enterprise-oriented DDRs. For electronic commerce at the enterprise level, these DDRs will need to be production-ready, handling the volumes and performance requirements mentioned above. This is not to say that departmental level and desktop level systems will not be useful, but that the DDRs forming part of the ERP and enterprise level on-line retail systems (discussed below) will have to be enterprise capable. If they aren't, the enterprise's efforts to enable Web commerce will not be successful due to technical and performance constraints.

### ***The DDR Market***

The DDR market has seen several phases over the past few years. It started off as a market for microfiche replacement – fundamentally a niche market. Its technical paradigm was COLD. We can now safely say that we are moving into new growth market arenas.

The microfiche replacement market has now been superceded by the print replacement market. This is clearly a far larger market, many times the size of the microfiche replacement. Most customers want to reduce print requirements for cost reasons and to move to print replacement in parallel in an effort to generate more revenue.

Now the print replacement market itself is being superceded by an even larger market for electronic commerce. This new market, still in its infancy, will be the main driver behind DDRs in the future.

### III. DDRs and The E-Commerce Architecture

#### *Documents and Transactions*

The two fundamental entities in electronic commerce are documents and transactions. Until now, e-commerce has been primarily data-based. The emerging issue in the architecture for e-commerce is the relationship between documents and transactions. This issue is more than one of simply lowering costs. At its heart is the concern with ensuring auditability in environments where literally billions of documents (such as invoices and statements) are exchanged electronically. The questions involve the shape of the architecture, ensuring integration of a document with its associated record and ensuring end-to-end architectural integration. It is becoming increasingly clear that documents and DDRs will be leveraged as part of the competitive e-commerce strategy.

A crucial element in the implementation of comprehensive e-commerce strategies and e-commerce architectures will be the incorporation of the DDR back-office or infrastructure. This infrastructure is a mandatory requirement to accommodate the relationship between the document, transaction and record of the transaction. The back-office DDR will be the focal point to ensure auditability and more effective customer relationship building and management. This integration will also be key to customer service as customers increasingly access these documents directly on corporate Web sites.

There are three principal components involved:

- ❑ Data
- ❑ Documents
- ❑ Applications

Of these, data provides transaction information, the documents validate the transactions and the applications manage these transactions. The data provides current snapshots; the documents provide the historical record.

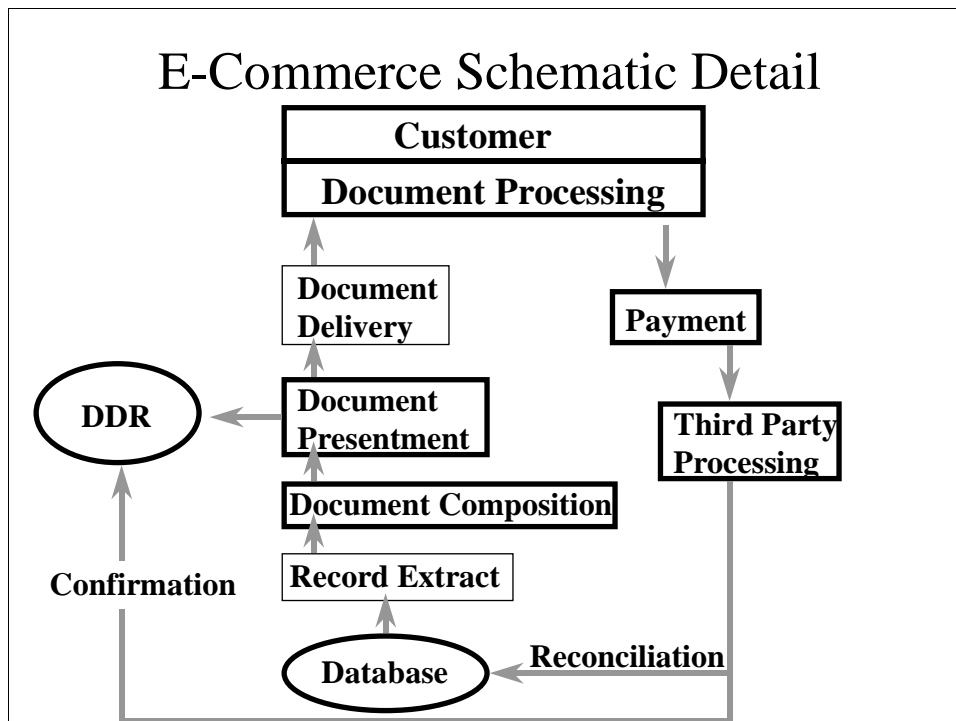


Figure 2 – E-Commerce Schematic Detail

At a minimum, the components of e-commerce will comprise the following:

- ❑ Database Engine
- ❑ DDR
- ❑ Electronic Bill Presentment
- ❑ Digital Payment Manager
- ❑ Security.

These components are discussed in more detail in Section VII – Electronic Bill Presentment (EBP) of this paper.

## **IV. Printing and E-Commerce**

INSCI's White Paper 4, *Internet Enabled Printing*, details how printing and the Internet are converging. This model has been coined the "Printernet," which we refer to descriptively as the digitally enabled printing solution (DEPS). This model is discussed in White Paper 4, but we will briefly outline it here.

The new print model is a hybrid model. In this model the new Web-based technologies do not compete with conventional technologies, but rather complement them. These two approaches to printing co-exist and reinforce each other, each meeting different business objectives and each capable of being used through different channels to reach different market segments in different ways. The new digital technologies extend the power and reach of conventional printing, allowing it to achieve objectives it could not achieve on its own. The new hybrid print strategies open up new competitive horizons for business and meet new sets of needs for consumers and print customers.

The new DEPS prints to multiple channels, not just paper. These channels include the Web, CDs, DVDs, email, and broadcast. Whatever the digital medium of storage and distribution, the new DEPS prints to it.

The new DEPS stores all printed documents digitally for as long as they are needed, for whoever needs to store, and for whoever needs to access them. It becomes the new warehouse for these documents. It is capable of providing reprints from the warehouse for whoever needs and is authorized to use them.

The new DEPS provides on-line viewing and access to single and multiple print documents over whatever period of time required by the operator. The access can be local or remote and provided through a proprietary access method such as Windows or through open Web browsers.

The new DEPS provides ubiquitous access to employees, both local and remote. It provides ubiquitous access, where required, to customers for their own purposes including viewing, analysis, reprints and expiration. It can serve as a virtual private filing cabinet for employees and customers

The new DEPS also incorporates other software capabilities that are essential for the efficient and effective use of these document repositories. In particular, it incorporates workflow and work management capabilities that allow these documents, either singly or collectively, to be routed via the Web and the processing of these documents to be monitored, analyzed and reviewed.

The new DEPS also allows for the storage of heterogeneous documents. This means that scanned documents can be retrieved along with the transaction documents they refer to so that customer service is made more effective and is not limited by technology constraints and applications peculiar to a particular type of document.

The DEPS is the new solution for printing that incorporates the new computer and Web technologies that are redefining all other industries. Far from being the antithesis of printing on paper, it is the means by which printing is becoming relevant to the new world of digital documents.

### ***Printing And Electronic Commerce***

The digital printed document is becoming an integral part of electronic commerce. Statements and invoices, which constitute one of the largest segments of printed documents, will become customer accessible on the Web. They will be used as marketing documents and will incorporate advertising and one-on-one marketing and sales messages, customized to the specific recipient. They will be integrated with other components of electronic commerce, as will be shown below. This revolution will accelerate and occur over the next two years.

## V. DDRs and Enterprise Resource Planning

### *The Supply Chain*

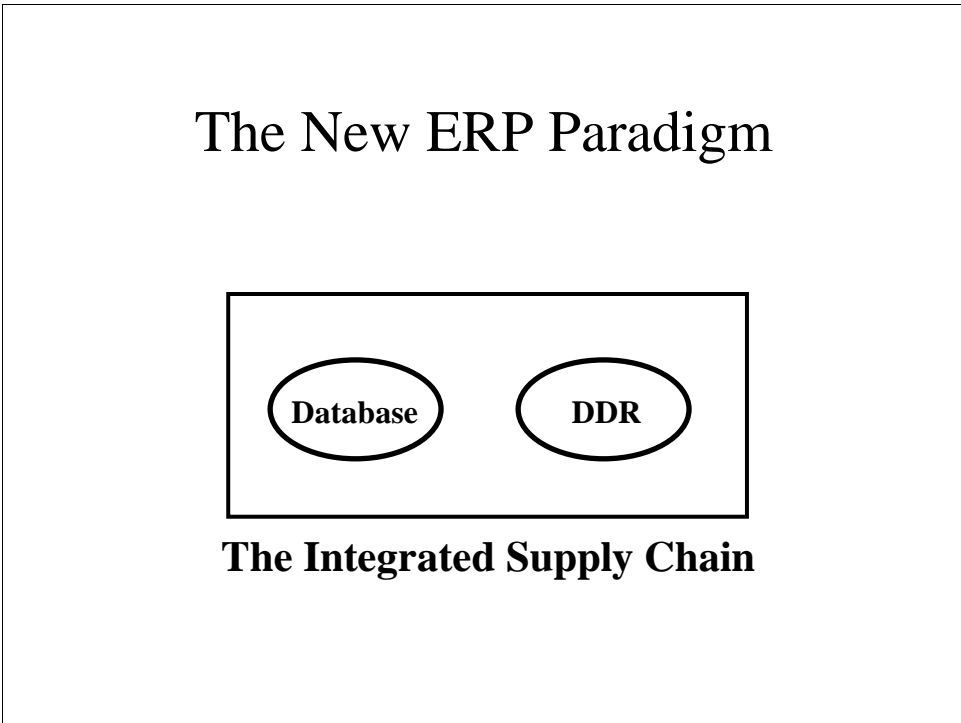
Over the past few years, companies have been introducing enterprise systems to integrate what has come to be known as the supply chain. The supply chain automates and integrates all the work processes of an enterprise between the manufacturer and the customer. The supply chain aims to reduce costs and make the supply side of the corporation much more efficient.

ERP systems are designed to automate much of the supply chain. They comprise a backbone database and applications for manufacturing, accounting, inventory, warehousing, logistics and so on. The benefits of such systems lie in their ability to make the product supply side of a corporation far more efficient and cost-effective. We should note two things about ERP systems. 1) Since they are data-based, there is no provision in the current ERP models for digital documents although this is starting to change. 2) ERP systems are not concerned explicitly with the demand side of the equation and how to grow revenues. We will discuss the significance of the second point later in this paper, but first let's deal with the data-based nature of ERP systems.

### *The New Document Management Paradigm: ERP and Document Management*

Since ERP is data-based we can draw the same conclusions about it as we did with e-commerce architecture. Clearly, an enterprise that still handles paper documents and does not integrate them with records has not made the supply chain as efficient as it could be. To make the supply chain more fully integrated and more efficient, ERP needs to become document enabled. In Figure 3, we show schematically the direction of the supply chain and ERP systems and their integration with digital documents.

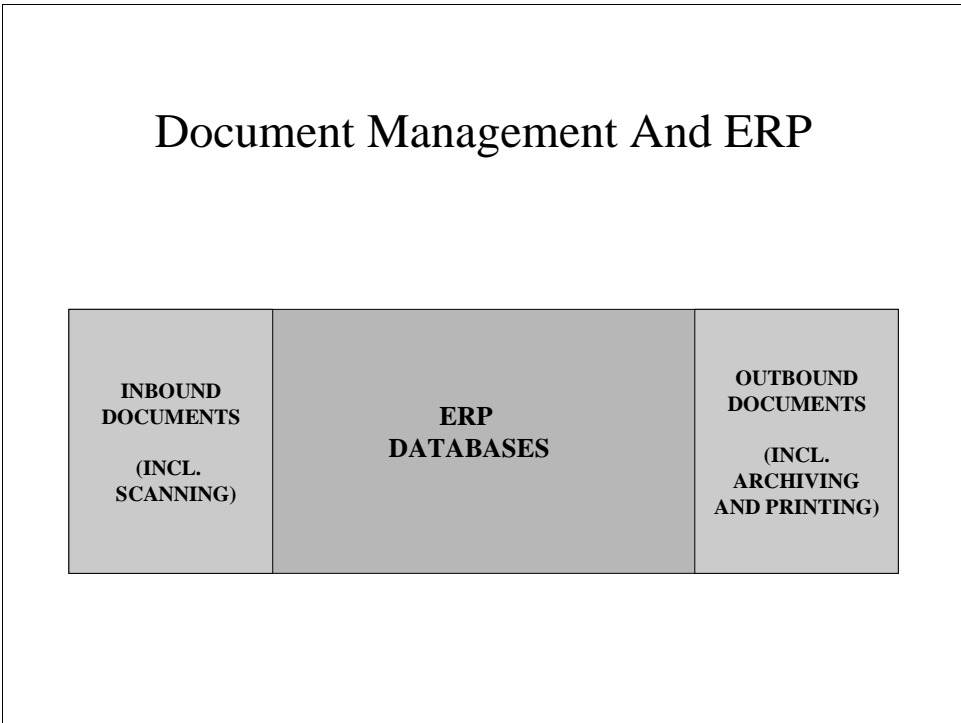
In this new architecture, a user can easily drill down to a document such as a human resource report or a statement simply by going to the database record. This means that there is no need to find a paper document. Further, because the digital document is now attached to a record it is possible to begin doing other things in an electronic commerce environment such as maintain electronic statements and other transaction documents.



**Figure 3 -- ERP Schematic: The New ERP Paradigm - Databases and Repositories**

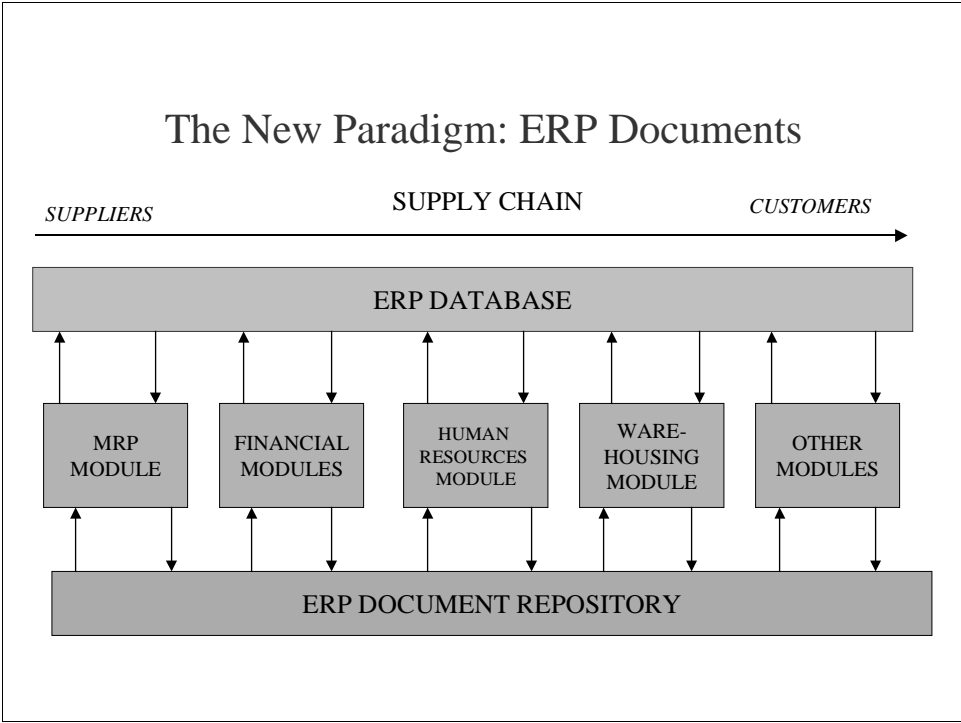
In the new model shown in Figure 3, every record that is associated with a transaction document is tied to that document digitally. This means that for every ERP database there will be a corresponding DDR. Each ERP module will have characteristic transactions and documents, which will be integrated.

Each ERP module will also have inbound and outbound digital documents. The inbound documents will include both digital transaction documents from external sources and also digital documents created by scanning inbound paper documents. This is shown in Figure 4.



**Figure 4 – Inbound and Outbound Documents and ERP**

For every application module of ERP, there will be both characteristic records and documents. In the ERP paradigm, individual ERP applications are both data-based and document enabled. This is shown in Figure 5.



**Figure 5 – The New Paradigm: ERP Documents**

### ***Implications for Document Management Strategy***

There are a number of important implications of the above for ERP systems. The first is that ERP systems will become document-enabled so that records and their corresponding documents will be associated. Secondly, imaged and printed documents should not be regarded as being separate and distinct but rather as being inbound and outbound documents from each of the ERP modules. Finally, documents should be treated according to their position in the supply chain and integrated with each of the elements of the supply chain to bring about more efficient business processes. Thus, document enabling of ERP systems is an extremely important element that needs to be incorporated into e-commerce strategies.

The trend for ERP to become document-enabled is also a natural outgrowth of an organization's attempts to optimize their ERP systems. ERP, once in place, needs to be optimized in order to ensure that the technology is leveraged effectively and put to its best use. Document-enabling of ERP is a vital part of that process.

## VI. DDRs and On-Line Retailing

### *On-Line Retailing*

On-line retailing has just recently burst onto the electronic scene. It represents a radically new way of doing business. A key question that needs to be addressed in this regard is how this affects the handling of transaction documents?

The emergence of on-line retailing heralds the emergence of a new paradigm in which, for the first time, systems are being focused on the expansion of revenues rather than just the containment and reduction of costs. In this new model, business processes are being redesigned in order to focus on the demand side of the equation rather than on the supply side. For this reason, we have identified the emergence of a new chain that we call the demand chain. The demand chain is the demand equivalent of the supply chain. Table 2 shows a comparison of the two chains and how they contrast:

<b>Supply Chain</b>	<b>Demand Chain</b>
Supply-oriented	Demand-oriented
Vendor-focused	Customer-focused
Cost-oriented	Revenue-oriented

**Table 2 – Supply and Demand Chains Compared**

### *The Demand Chain and Enterprise Sales Planning*

Like the supply chain, the demand chain links suppliers and buyers. But the demand chain, unlike the supply chain, is focused on selling and distribution processes rather than supply and delivery processes. Like the supply chain it includes both planning and execution. Similarly, it includes processes that are both internal and external to the enterprise. Just as the processes internal to the enterprise in the supply chain are subsumed within ERP, so will there be internal processes of the demand chain that will be subsumed in any planning system for it. We call this system the Enterprise Sales Planning system, or ESP. It is the mirror image of ERP on the demand side.

Just as the supply chain has numerous efficiency and cost benefits, the demand chain has numerous revenue and distribution benefits. These include:

- Maximization of marketing effectiveness
- More efficient retailing
- Faster sales
- Broader distribution
- Enhanced customer service

### *Modules of ESP*

Just as ERP contains multiple modules, which map to internal business processes, so too does ESP have its own modules, which map to the business process of the demand chain. Some of these processes are:

- Sales force automation
- Customer on-line shopping
- Demand analysis
- Targeted marketing
- Electronic bill presentment

Thus ESP requires several components including:

- Inventory Database
- Choice Module
- Purchase Module
- Confirm Module
- Billing Module
- Payment Module

By combining these modules into a chain, online retailing becomes faster and more efficient, distribution possibilities expand and revenue enhancement possibilities are dramatically increased. While the supply chain aims to make the organization leaner, the demand chain aims to make the prospect and customer base fatter. The integration of modules in the demand chain is therefore the direction for retailing generally.

### ***On-Line Retail Customer Requirements***

We've considered how the supply chain is becoming document enabled. This is a necessary consequence of making the supply chain leaner, by reducing the amount of paper and increasing the flexibility of documents by making them digital.

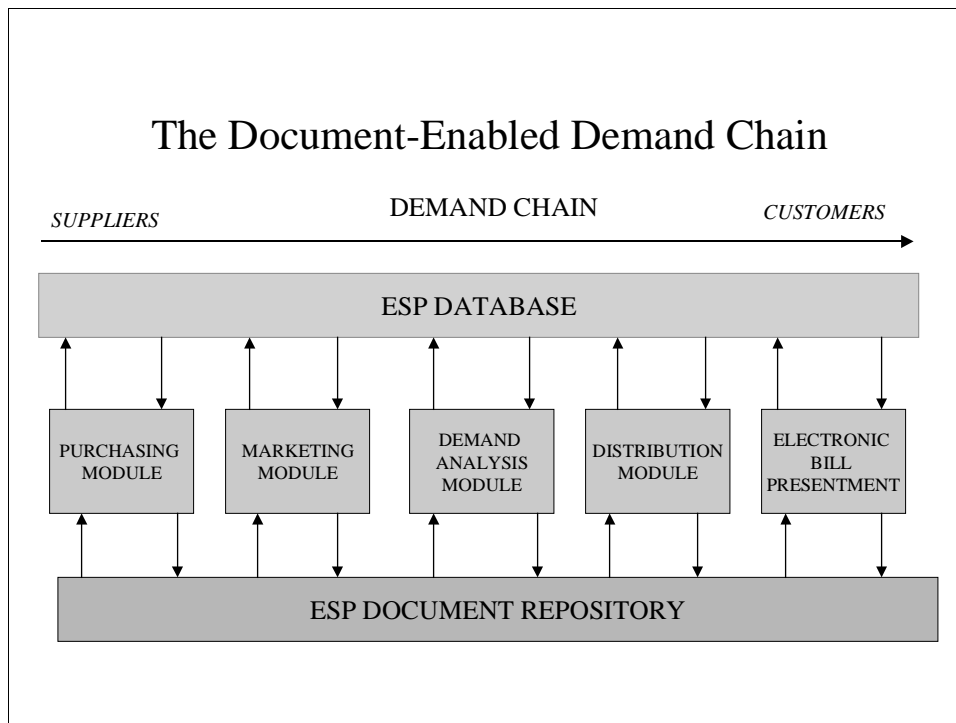
Similarly, the demand chain also has many characteristic documents. These include documents such as the following:

- Statements
- Invoices
- Confirms
- Transaction reports
- Delivery reports
- Extensive archive requirements

As online retailing becomes more pervasive, these documents will be required for access initially by users within the enterprise to make them more efficient (customer service representatives and also non-customer service personnel with direct links to customers) and then by the enterprise's customers. Initially, these documents will be sent in paper form and be made available on the Web for customer service purposes. Later they will be sent directly through electronic means to customers. In both cases, the documents need to be in digital form and stored in an on-line, Web-based DDR so that they are available for future use. They will need to be stored at a minimum for several years to enable them to be accessed for a variety of purposes, including legal, audit, customer services and so on. Essentially, the demand chain, just like the supply chain, will require DDRs and will need to be document-enabled.

### ***Architecture of ESP***

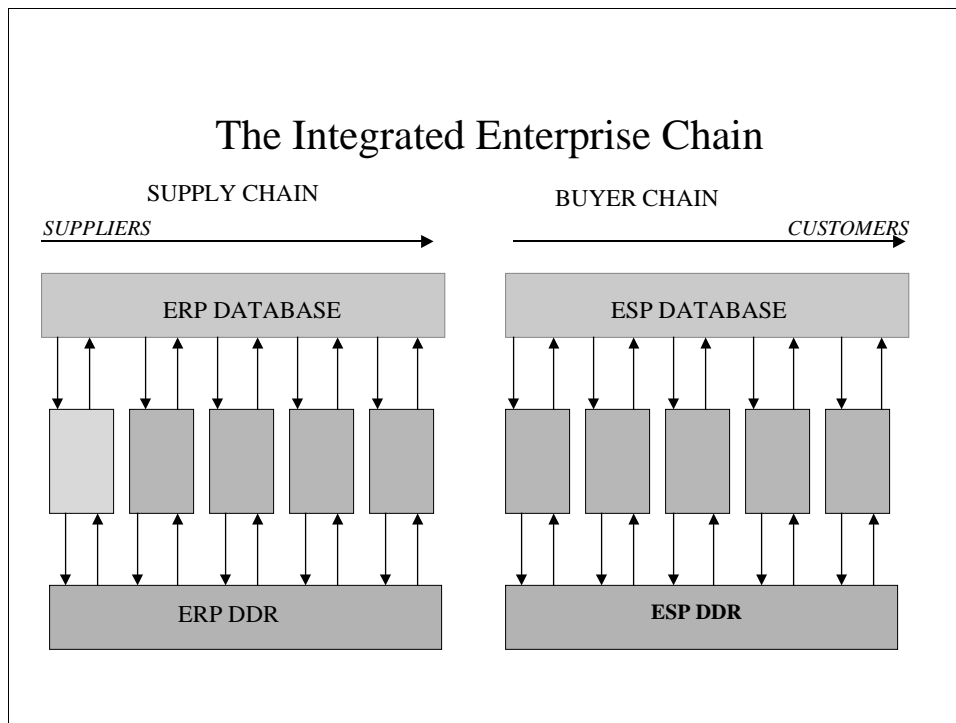
ESP systems will emerge in order to implement the demand chain, just as ERP systems emerged to implement vital elements of the supply chain. The architecture of ESP will in many respects mirror the architecture of ERP. It is data-based but also document-enabled. This is shown schematically in Figure 6.



**Figure 6 -- The Document-Enabled Demand Chain**

***Integration of Supply and Demand Chains***

It is clear that the supply and demand chains will increasingly be integrated into an all-encompassing enterprise chain. This integrated enterprise chain will have the same architecture of its component chains. That is, it will be both data-based and document-enabled. It will have a twin foundation of both databases and DDRs, each of which will be linked so that transactions and their corresponding documents will be linked. Likewise, ERP and ESP systems will be merged. In these merged systems, digital transaction documents will be made available for electronic commerce purposes. We show this integrated enterprise chain in Figure 7.



**Figure 7 -- The Integrated Enterprise Chain**

#### ***The Strategic Enterprise***

Given the trends described above, there are two key questions that must be addressed. What is the strategic direction that enterprises will be taking over the next few years? And how will this impact transaction documents and electronic commerce?

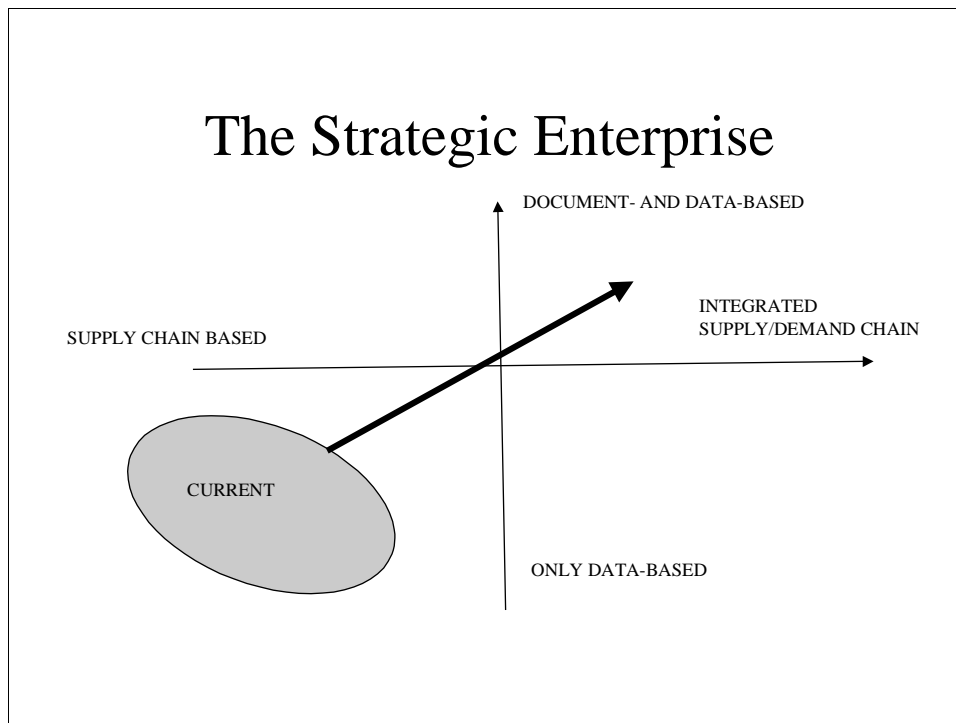
There are two main strategic thrusts:

- ❑ The integration of the supply and the demand chains
- ❑ The integration of transaction documents into enterprise systems

Currently most enterprises are just starting to move into the supply chain phase. The advent of on-line retailing has also started a move towards the demand chain. But we are clearly at the beginning of this trend.

Likewise we are just starting to see a move to integration of transaction documents into enterprise systems. The Web has accelerated this trend.

This is summarized in Figure 8. This shows these two directions on axis. Currently enterprises are in the lower left-hand corner of the graph but the direction is to move towards the upper left-hand corner.



**Figure 8 --The Strategic Enterprise**

Transaction documents will increasingly factor in as they become digital and are integrated into enterprise systems.

### ***Technology Directions***

Several new technology directions will become very important in enabling these new strategic direction for corporations. These are:

- **XML:** XML will become the glue for integrating databased and document-based systems.
- **BizTalk:** This new Microsoft standard will allow the building of interoperable XML-Based systems, accelerating the speed with which they are implemented and in which they penetrate business systems.
- **BizTalk Server:** This new type of server will BizTalk based systems to become server-based, scaleable and the basis for large-scale deployment of XML-based electronic commerce systems.
- **RosettaNet:** RosettaNet is a new consortium, which is developing standards for the integration of ERP and enterprise systems with other systems including document systems. These standards will be XML-based. We can expect Rosetta standards to accelerate the document-enabling of enterprise systems and the integration of the supply and demand chains.

## **VIII. Payment Systems and Electronic Bill Presentment (EBP)**

### ***Electronic Payments Business Directions***

The business of making payments is undergoing dramatic change. These changes can be summarized as follows:

- move from checks to electronic payment
- from paper to digital bill documents - electronic bill presentment
- from manual to electronic workflow processing.

### ***Payment Systems Directions***

These changes are resulting in the integration of what were heretofore seen as disparate systems. The movement in systems is proceeding as follows:

- Integration of payment and bill presentment systems
- Integration of customer personal financial management systems into payment systems
- Integration of payment systems with one-to-one direct marketing systems.

The emergence of electronic bill presentment must be seen in the wider context of the emergence of integrated payment systems. EBP, while important, is but one component of these systems. The various components will form an integrated payment chain stretching from the vendor to the consumer and back to the vendor. Systems will be integrated at both the vendor and client ends and workflow processes will play a vital role in this integration and in the corporate business processes that will mediate these systems.

### ***Electronic Bill Presentment***

How digital documents and transactions will be merged is seen in the rapid emergence of electronic bill presentment (EBP) systems. As we'll describe, EBP is just one element (albeit an important one) in demand chains. However, since EBP promises rapid economic payback, and is quickly expanding the gambit of electronic commerce, it is worth examining in its own right.

We define EBP as Web viewing or delivery of statements and invoices.

### ***The High Level View of EBP in the Integrated Enterprise***

At a high level, let's consider what the bill payment flow will look like in the integrated enterprise chain. In Figures 9 and 10, we show that the billing and payment cycle will include both the transaction and the document. These will be sent to the consumer/payer. The payroll will deal with these on the target platform using a variety of components. These include the PFM (personal financial manager), the digital Wallet, and the payment dispatch component.

# The Integrated Payment Chain

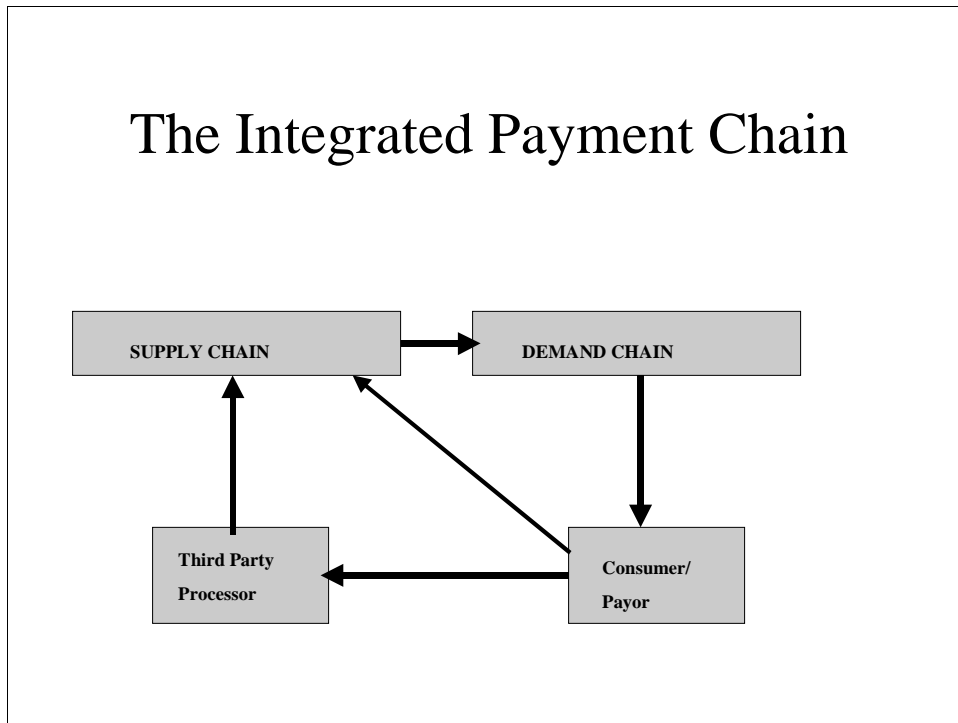
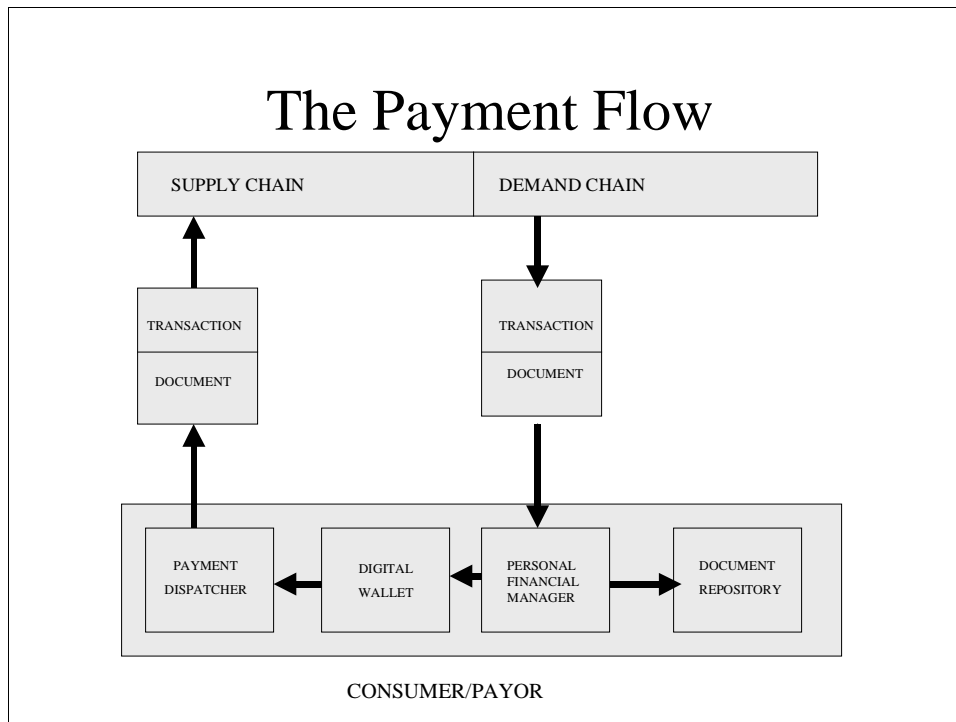


Figure 9 – The Integrated Payment Chain

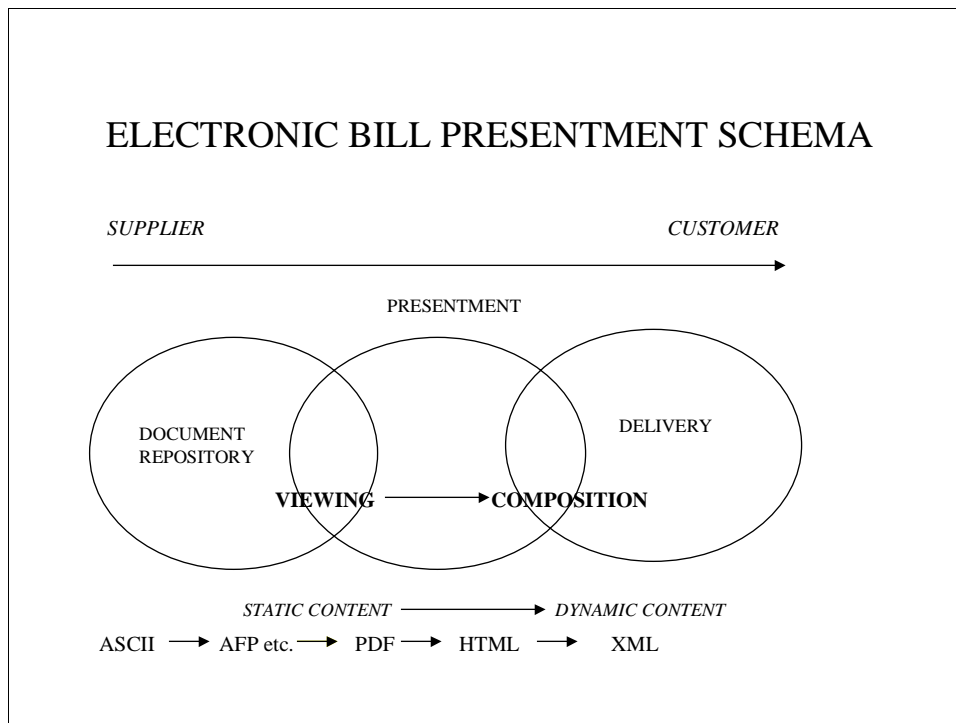


**Figure 10 -- The Integrated Payment Flow**

The packet containing the transaction and the document will be sent to the payer. Here the PFM (such as Quicken and Money) will register the transaction in accounts payable. The bill itself will be stored in a personal DDR. The payer will then, at his or her discretion, emit approval for the payment to be taken out of the digital wallet. This will be sent to a dispatch application and then transmitted to the originating vendor, there to be processed and reconciled against both the supply database and the corresponding DDR.

### ***The Lower Level View of EBP***

Figure 11 shows the main components of EBP and that there is considerable overlap between these components. DDRs may be in the business of presentment, as may presentment managers and bill deliverers.



**Figure 11 – Electronic Bill Presentment Schema**

Currently presentment formats are based on legacy print formats such as AFP and Metacode. We can expect these increasingly to be converted to a format suitable for viewing on the Web. At this time this format is PDF from Adobe. Over time we can expect this to be supplemented by XML. As this occurs we can anticipate the paradigm to move from static documents to dynamic documents; that is documents that are prepared on the fly for specific, individual customers.

***EBP Components***

EBP will have several components, all of which are necessary for the functioning of a complete EBP system. These are:

- Workflow Layer
- Ingestion Layer
- Conversion Layer
- Digital Document Repository
- Presentation Layer
- Viewing Layer
- Delivery Layer

Any vendor in this space will need to offer this complete architecture. Otherwise the problems that ensue with the integration of third party components by a user will make it difficult to effectively deliver, implement and maintain EBP systems.

***Workflow Layer***

Workflow is the vital enabling layer for any electronic commerce solution involving documents. It allows both incoming and outgoing documents to be routed, monitored and tracked. Case flow management can be automated, an especially important requirement in electronic commerce where large numbers of cases are handled. Workflow allows vertical solutions to industry problems to be developed to vastly increase productivity and efficiency. Systems for handling exception processing, disputes handling

and the like can be built to handle otherwise time-consuming and potentially customer-unfriendly tasks. Workflow is the vital layer in the electronic commerce architecture.

### ***Ingestion Layer***

The Ingestion Layer will ingest any type of printed or digital document. It will store the document in its native (original format) or convert it to a form capable of being presented on the Web. It will handle print formats such as AFP, Metacode, DJDE, PCL, XGF and Postscript.

### ***Conversion Layer***

The conversion layer will convert native print documents to a Web-viewable form for storage in the DDR or it will take the native document at the time of Web presentment and convert it on-the-fly to a Web-presentment format such as PDF and XML.

### ***Digital Document Repository***

The DDR will hold documents for presentment, viewing and analysis. It will probably hold these documents for a period of at least several years. It may store as many as several million documents a day. It will store data in the range of up to several petabytes (the level after gigabytes). It will act as on-line service with performance requirements similar to those of databases, requiring response times of under 2 seconds for the majority of accesses.

### ***Presentment Layer***

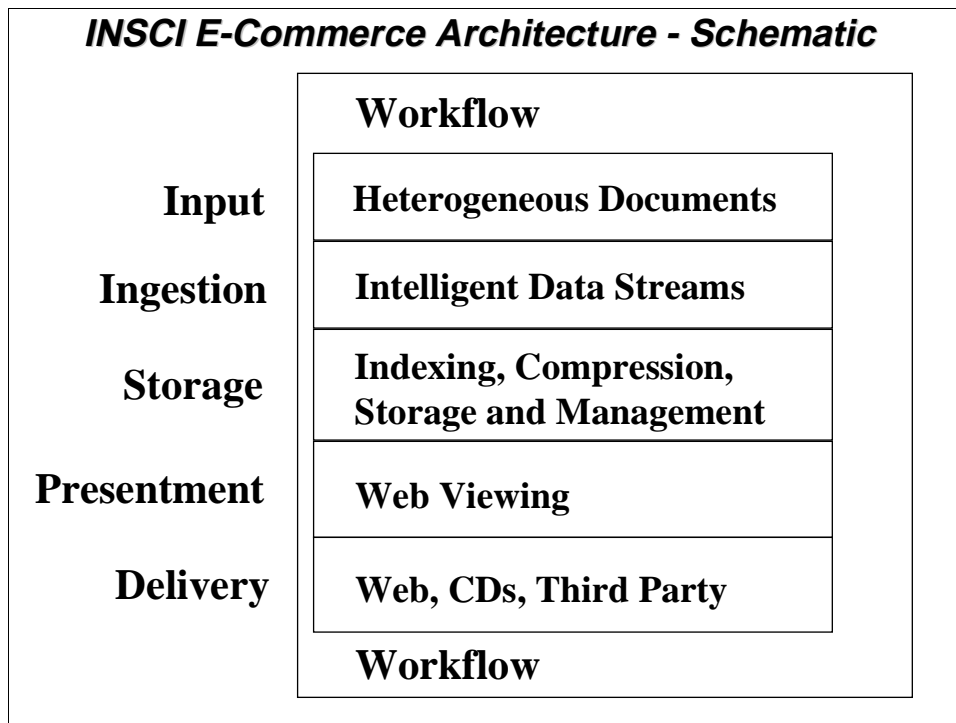
The presentment layer will enable any of the stored documents to be presented on any type of Web viewer. It will include not only character data in print format but also images. Eventually we can expect the presentment layer to include audio and video as bills and statements are delivered with audio and video clips to enhanced sales and marketing efforts.

### ***Delivery Layer***

The delivery layer will include a variety of mechanisms to bring about electronic delivery of digital documents. These will include traditional methods such as print-on-demand but also emerging methods such as broadcast-on-demand. Workflow must be included in this layer to ensure that more granular control is available for individual documents grouped by both individual cases, groups of cases and groups and by individual and group case management.

### ***The Emerging E-Commerce Architecture***

These layers will be integrated into electronic commerce architecture. This architecture will look as shown in Figure 12.



**Figure 12 – INSCI E-Commerce Architecture Schematic**

***INSCI Products***

INSCI has a complete range of products that implement the layers of this architecture. These products are:

- ❑ COINSERV – Digital Document Repository
- ❑ WebCOINS – Web Presentment
- ❑ WinCOINS – Windows Viewing and Presentment
- ❑ COINScan – Presentment of Scanned Documents
- ❑ COINSflow – Web-based Case Management
- ❑ COINS CD – CD-Based DDR and Presentment

***COLD and EBP***

Traditional COLD implemented only a passive data store. Modern DDRs require this store to become an on-line service. Traditional COLD dealt with ASCII documents only but modern Web presentment and electronic commerce require sophisticated presentment methods. EBP requires this advanced presentment for dealing with intelligent print data streams.

***Phases of EBP***

In EBP, the direction is for statements and bills to be delivered electronically to customers. In its initial stages, technical and user limitations will dictate that customers only view statements and invoices. The former model is known as a push model, the latter as a pull model. The emerging consensus is that it is highly unlikely that EBP will evolve to a push model for at least two more years. Instead, we can expect that in the initial model statements and invoices will be sent to customers on paper but that they will be provided with the capability if supplementing this with Web viewing. In the second phase of

the pull stage, the customer will be informed by e-mail that a statement or bill is available for Web viewing. Only after these stages are implemented will we see a full push model develop.

For the present, the key requirements for EBP are the DDR and the availability of Web presentment of printed bills and statements in their true native format (exactly as they were printed). In any case this presents some technical challenges and for the moment only a few vendors will be capable of doing this. Conversely, since the push model for EBP will definitely come, it is important that companies start implementing EBP systems incorporating DDRs and advanced Web presentment so that they are ready for the push model once it arrives.

### ***Back Office Infrastructure for E-Commerce***

While the current model for e-commerce is data-based and not document enabled, it is inevitable that the architecture will evolve to a document-enabled orientation. Further, where enterprise systems have been implemented in organizations, they have been supply chain oriented and not demand chain oriented. They too will evolve to a demand chain orientation. We can see that the dynamic is for organizations to evolve, where they will be both document enabled and demand chain oriented. This movement will occur in parallel in the most advanced organizations. As described previously, we call this type of company the "Strategic Enterprise."

Document enablement of enterprise systems provides the vital infrastructure for electronic commerce. We view these infrastructures as absolute requirements for electronic commerce and for on-line retailing. Our view is that e-commerce systems can only approach maturity if such systems exist. Otherwise the overhead of dealing with paper-based print documents that are not linked with associated transactions will incur prohibitive costs and put an organization at a competitive disadvantage and highly vulnerable position.

## **VIII. Conclusions**

In this paper we have attempted to demonstrate how the handling and management of digital transaction documents has now moved from specialized and limited application to center stage in the implementation of electronic commerce systems. The emergence of demand-driven electronic billing systems and on-line retailing is a powerful force which is dictating that e-commerce systems build a solid, robust back office infrastructure for digital documents. The rapid evolution of the Internet-driven demand chain dictates that this digital transaction document infrastructure be capable of integrating with supply chain technologies and of handling the massive volumes of transaction documents associated with e-commerce applications. Acquisition of the required technology complement – production-level DDRs, presentment methods and workflow – is no longer a matter for future contemplation and evaluation but a mandatory requirement for companies to position themselves as competitors in this new e-commerce environment.