COURT TECHNOLOGY REPORTS

Volume 5

Document Imaging

SJI State Justice Institute

National Center for State Courts

157293

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Document Imaging

by Carter C. Cowles

Funding Provided by the State Justice Institute

National Center for State Courts
Research Division, Court Technology Programs
Post Office Box 8798
Williamsburg, Virginia 23187-8798

SJI State Justice Institute

ISBN: 0-89656-153-4
NCSC Publication No. R-173

This report was developed under grant number SJI-93-06F-B-065 from the State Justice Institute. The points of view expressed are those of the author and do not necessarily represent the official position or policies of the State Justice Institute.

Acknowledgements

The National Center for State Courts gratefully acknowledges the contributions of its Advisory Committee on Technology (ACT) throughout this project. The committee assisted staff with the selection of imaging technology as the topic for Volume 5 and with selecting specific sites for review of their imaging applications. ACT members were also very instrumental in shaping the final product, through their reviews of drafts, their comments, and their suggestions.

We also wish to thank the individuals interviewed at each of the six sites that were visited, as well as the management at each organization. Their experiences with implementing imaging technology provided valuable real-world insights into both the benefits and limitations of this technology in a variety of settings.

Finally, the State Justice Institute is to be commended, not only for its financial support of this project through the Technology Information Exchange Services grant to the National Center for State Courts, but also for the contributions of its grant monitors in reviewing work products and providing advice throughout the project. We very much appreciate their assistance.

About the Author: Carter C. Cowles is a court information systems consultant and the former Director of Judicial Information Systems for the State of Illinois. Previously, he was a senior staff associate with the National Center for State Courts. Mr. Cowles has had many years of experience with implementing and managing technology in the courts and other organizations.

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CHAPTER ONE
Introduction and Summary

I.A. Background

For many years, courts have been contending with recordkeeping problems. Many clerks admit that lost or misplaced paper files are chronic problems. Most courts handle constantly increasing volumes of paper. How many courthouses have you seen with file cabinets occupying every inch of wall space? How many of those courthouses have basements filled with boxes of decaying records? We have talked about the paperless courthouse and other high-technology solutions at endless conferences and seminars, but we still have all those records. Why?

Computers may be the heart of our solution. Courts at all levels are progressing nicely with computer systems. Most courts now use computer case processing systems to perform their docketing, indexing, calendaring, notice generation, and financial operations. Courts supplement this with word processing to produce orders, letters, and other documents. Some even have integrated these capabilities. While these types of systems have addressed the basic case processing needs, they have not solved the recordkeeping problem.

Now the time is at hand to apply computers to recordkeeping. What will it take? A number of technologies now exist, or soon will exist, to attack the problem. One that exists now is imaging which--considered with case processing, word processing, and other technologies--will be a major part of the solution.

Solving recordkeeping problems using computers will not be easy. The migration to computer case processing systems took years, and so will the movement from manual to electronic records. But the recordkeeping migration will be much more rapid for several reasons. First, court personnel are no longer intimidated by computers. Computers are old hat--maybe even friends--by now. Second, while these technologies are complicated, they are easier to install and use with today's graphics and other user aids than full-scale case processing systems were with yesterday's technology.

Why is the time right for imaging and other recordkeeping technologies? First, the records continue to accumulate, resulting in the document loss, inefficient processing, and poor service that characterize recordkeeping operations that are out of control. Second, technologies are advancing rapidly and some, such as imaging, now are widely used. Third, their costs are decreasing so that they no longer are prohibitively expensive. Fourth, case processing and word processing systems, whose functions and information complement those of imaging and other recordkeeping technologies, are commonplace and ready for their recordkeeping counterparts.

I.B. This Report

The solution to the recordkeeping problem is multi-faceted. Imaging is only a step along the way. As things appear today in the constantly changing world of computer technology, court files of the future will be stored in computers and are likely to consist primarily of the contents of documents but not the documents themselves. In some instances, it still will be necessary to store the complete documents in the computer files.

Pleadings, warrants, notices, citations, and other present-day documents, therefore, would be stored as data but not as complete documents in the electronic database of the future. Except in unusual situations, the court may not need them as documents. They can enter and leave the court system electronically over telephone lines using emerging technologies that permit data to be exchanged through techniques such as the Judicial

Electronic Document and Data Interchange (please see discussion of JEDDI in Chapter Two).

On the other hand, even in the electronic databases of the future, actual documents will be stored in some instances. The documents may be highly textual or nonstandard, such as correspondence and court orders; they may contain essential graphics, signatures, or inscriptions; or system users may want to retain the complete document for some other reason.

When the choice between retention of document contents or complete documents becomes realistic, the essential question will be: Is it important to store only the information or both the information and its form in the computer?

To assist in making this choice, this report discusses imaging

- As an interim solution to the recordkeeping problem until JEDDI, or some other technology that accomplishes the same objectives, matures; and
- As a solution to the recordkeeping problem for those situations that require storage of complete documents.

Imaging should not be considered in a vacuum. If you regard imaging as an interim solution, you should know at least the general nature of your ultimate solution, how imaging relates to that solution, and how you intend to use imaging for special situations that require complete documents. In any circumstance, today's imaging should be integrated with other technologies such as data processing (e.g., case processing in courts) and word processing systems.

Most court managers regard imaging as a possible solution to recordkeeping problems. The preceding discussion should help you put imaging in the proper perspective as you look for solutions.

But exactly what is imaging? What are its functions? How much does it cost? What are its advantages and disadvantages? How do you evaluate it? How do you obtain it? How do you implement it? This report is intended to help you --as a court manager--answer these questions so that you can

- Evaluate the applicability of imaging to your situation; and
- Be familiar with the steps in obtaining and implementing imaging if it is applicable.

I.C. Court Technology Reports

This report is Volume 5 of the Court Technology Reports series, prepared by the National Center for State Courts (NCSC) under a grant from the State Justice Institute (SJI).

Volume 5 was prepared by Carter C. Cowles, consultant, with assistance from NCSC publications and secretarial staff. The project was managed by J. Douglas Walker, Director of Court Technology Research, under the overall management oversight of Lawrence P. Webster, Executive Director of Court Technology Programs. After internal NCSC review by Messrs. Walker and Webster and James E. McMillan, Director of the Court Technology Laboratory, the report was reviewed by SJI and NCSC's Advisory Committee on Technology (ACT).

The report is based on a wide selection of imaging reports, articles, and other publications, as well as visits to six imaging sites. These sites were selected to represent a variety of court, state agency, and corporate organizations and a cross section of imaging objectives and capabilities. We made no attempt to visit massive imaging operations such as the Internal Revenue Service, other large federal users, and the larger insurance companies for two reasons. First, it would be difficult and time-consuming to obtain a concise view of their operations. Second, such large operations would not be as relevant to the courts as the sites we visited.

I.D. Contents of This Report

The final sections of this introductory chapter clarify some of the basic terminology used throughout the report and then present a summary of imaging. The remainder of Volume 5 gives a comprehensive survey of imaging. It describes imaging as we know it today, imaging of the

future, and examples of imaging in court and non-court sites.

Chapters Two through Four describe today's imaging (although they also provide glimpses of tomorrow's technologies). They cover what imaging is, whether it is right for you, and how to acquire and implement it.

The chapters that describe today's imaging are organized as follows:

- Chapter Two, *Functions and Technology,* gives basic descriptions of imaging functions, equipment, and software. These basic descriptions constitute a summary of the technology for court managers and analysts.
- Chapter Three, *Is Imaging Right For You?,* explores situations in which imaging applies; the issues associated with imaging; its advantages, disadvantages, costs, and standards; the management considerations; and invaluable advice from the sites we visited.
- Chapter Four, *Implementation Strategy,* acquaints you with the steps in acquiring and implementing an imaging system, including analysis and planning, approval, procurement, and implementation.

Chapter Five, which describes *the future* of imaging, gives overall emphasis to integration and specific coverage to open architecture, client/server and desktop computing, workflow, optical character recognition, text retrieval, and compound documents.

Then, equipped with an understanding of what imaging is and where it is going in the future, you are ready to look at several examples of actual imaging applications. Each of the six sites we visited presents imaging from a different perspective. While each has impressive technical expertise, collectively they illustrate most of the current and some of the future technologies, as well as exemplary planning, development, and implementation strategies. Chapter Six, *Summary of Imaging Sites,* gives the features of each site in list and table form for easy comparison.

The main body of the report concludes with Chapter Seven, *Imaging In Courts,* which examines three California courts. We visited sites that use imaging in general jurisdiction civil, jury, and municipal court case processing applications.

To give a balanced picture of imaging in other government agencies and private industry, we visited two state executive branch agencies and one major transportation corporation. Appendix A contains descriptions of these visits.

I.E. Terminology Used In This Report

Several technical terms used throughout the report require clarification:

- **Computer Nomenclature**. Throughout this report, the term *mainframe* will refer to any single central large-scale or mid-range computer that supports processing within an organization. *Mainframe* will be used in contrast to smaller computers (e.g., PCs) in networks or functioning individually on user desktops.

  Computer System Character Representations. Computer systems and their character representations (i.e., letters, numbers, punctuation marks, and other characters) are of three basic types: office systems (e.g., word processing) that mainly process unformatted text; data processing systems (e.g., court case processing) that process formatted numbers and text; and imaging systems that store, retrieve, and disseminate imaged pictures of printed pages.

  Throughout this report, we will consider imaging, word processing, and data processing systems. Despite the fact that they all include data and text in their respective character representations, except when explicitly stated in unique situations such as indexing, we will refer to the contents of imaging systems as imaged documents, the contents of word processing systems as text, and the

contents of data processing systems as data.

- **Scope of Imaging Systems**. The scope of some imaging *systems* may be expanded to include functions with character representations outside the conventional definition of imaging. For example, indexing is an integral part of imaging. But indexes contain formatted text and data, which makes indexing a data processing function. Nevertheless, in some instances, the index may be regarded as part of a particular imaging *system.*

I.F. Summary of Imaging

I.F.1. Definition

The basic purpose of imaging, which is intended to replace manual recordkeeping, is to record and store document representations for reference purposes. Imaging systems capture, store, retrieve, display, process, distribute, and manage documents.

Imaging systems consist of scanners to get images of documents into the system, storage devices to store documents, printers and display devices to print and view documents that come out of the system, workstations to permit users to manage documents and work with images, and communications to distribute documents. A computer and its software make this technology work together. Additional communications technology permits the imaging system to transfer images and information to or from other systems, computers, and networks. Imaging systems have greatly enhanced value when used with other systems such as court case processing systems.

I.F.2. Imaging and You

The primary purposes of this report are to (1) guide you in deciding whether to use imaging and (2) help you obtain and implement imaging if you decide to use it.

The decision to use imaging should not be made lightly. Even though its costs are declining, imaging still is expensive. To evaluate whether imaging is the correct solution to your problems, you must know

- What you are trying to accomplish with imaging and how it fits into your organization;
- What technology you need, how and from whom you are going to obtain it, and how the imaging acquisition and implementation project will proceed;
- How imaging will affect the organization in terms of operations, equipment and software, staffing, and cost;
- How the change to imaging will affect your overall work environment, morale, and existing systems;
- How you will ensure that managers, users, and technical staff are committed to and support imaging and will communicate throughout the project; and
- Which of the advantages and disadvantages listed below apply to you and whether, after considering them, imaging represents a net advantage or disadvantage.

These considerations cannot be left to chance or passed off to someone else. You should address them explicitly. If imaging appears to be the right solution, you should identify the specific requirements to be satisfied by imaging, develop a detailed plan for the imaging project, and proceed carefully and systematically through acquisition and implementation of the system.

I.F.3. Advantages and Disadvantages

If you do it properly, imaging can yield significant benefits. Some of them are listed below:

- Dramatically improved turnaround time in recordkeeping, document retrieval, and document storage activities, yielding improved service to people who need information and records;
- Better control of documents and the work done on them (because of the central imaged document repository), better document

tracking and distribution, better control of staff workloads, and the ability of several people to access and work on imaged documents concurrently; and

- Reduced costs and more efficiency because staff can handle greater volumes of work more rapidly and accurately, with less paper handling and less office space.

Imaging has disadvantages that you should consider. Some of them are as follows:

- Potentially costly and complex technology that may be difficult to implement and maintain and may consume excessive computer resources;
- Difficulty in reading and using imaged documents because they must be viewed page by page on a computer screen, they can be unclear, and they generally cannot be modified or used as a source of extracted text;
- Potential staff increases because of the need for a separate work unit to scan documents;
- Feelings of enslavement and low morale by some imaging users because of feared staff cutbacks (other than in the scanning unit) and the perceived loss of control and decision-making authority; and
- Potential for the entire operation to be immobilized by system failures.

I.F.4. Use in Courts - Current and Future

The court clerk's office receives documents from many different sources and then must docket the filing (e.g., enter it in the register of actions), accept the accompanying fees and generate receipts, take the appropriate action, place the documents in the case file, and maintain records on attorneys and other parties in the cases. Case processing systems usually perform docketing, maintain party records, and assist in the action that results from the filing. Typical of these actions are scheduling hearings, generating notices and other outgoing documents, and assisting in other activities such as consolidating cases. Word processing systems generate textual documents such as correspondence and court orders.

Most of these activities involve documents in files and records. Many courts that maintain paper documents have recordkeeping problems. They attack the problem by reducing their paper usage. The emerging ultimate solution is, when possible, to enter, file, and send out the data contained in the documents but not the documents themselves. This leads to the JEDDI data interchange approach noted above and described later in this report. This should eliminate most documents altogether. Data would be entered directly into case processing systems from the interchange and would be output directly to the interchange from these systems. Otherwise, the case processing systems would function as they do today. Word processing would be partially supplanted by the direct data input and output between the case processing systems and the interchange.

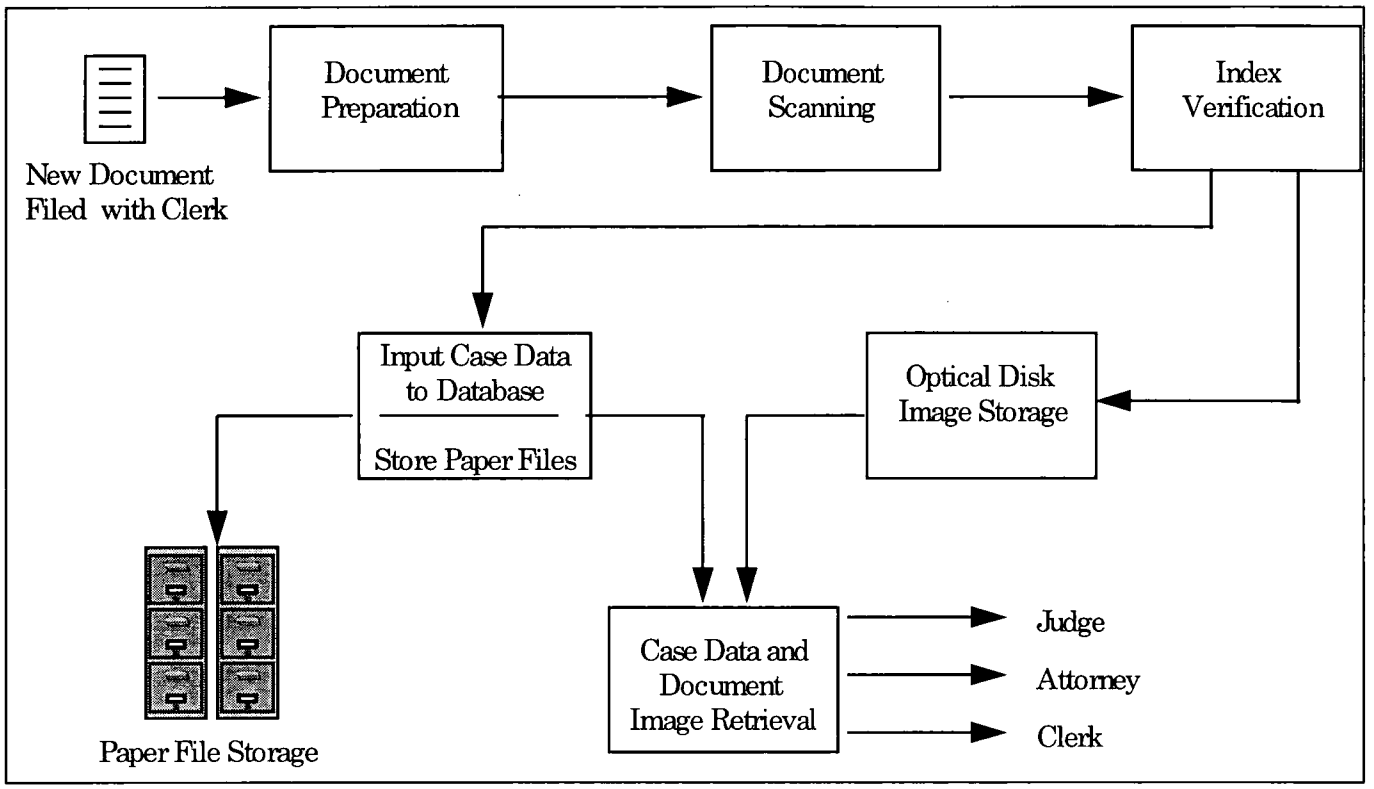
Until JEDDI becomes a mature technology, we will continue to be confronted with manual files unless we find an interim solution. This report discusses imaging as that solution.

I.F.4.a. Basic Court Uses

Most court imaging systems currently function as a document repository and a means to retrieve and display documents. Documents are imaged when filed, and imaged records substitute for the manual case records. While imaged records can be used for the same purposes as manual records, imaging used with case processing and word processing systems is even more likely to let courts realize the benefits described above. Figure 1 illustrates the flow of information in a court with such a combined system.

Under this combined approach, documents are scanned into the imaging system and used with the case processing system for data entry and information. During data entry, the imaged document usually is displayed on a split screen with the data entry screen from the case

Figure 1: Document/Image Flow in Court Data/Image Processing System



processing system (see Figure 2). When records are subsequently retrieved, the images can be used to supplement standard case information contained in the system to meet inquiry needs and to generate documents.

I.F.4.b. Imaging and Other Technologies

Imaging should not be regarded as an isolated technology. Its effectiveness can best be realized if it is considered in conjunction with complementary technologies, technology platform alternatives, and integration with other components of an overall technology solution.

➔ OCR

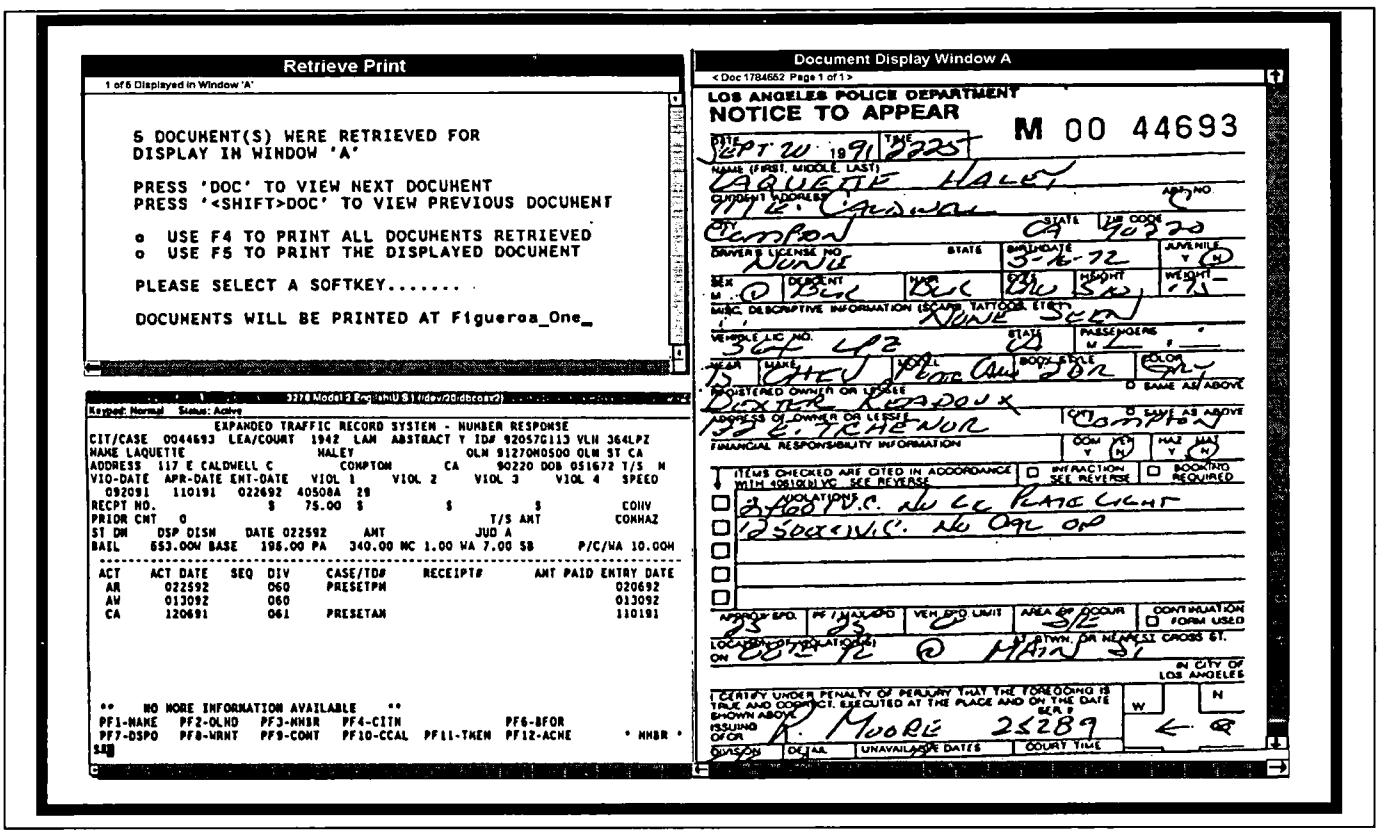
Where there was a data entry workgroup, now there is an imaging workgroup. A technique called optical character recognition (OCR) can permit the computer to extract information from the imaged document and transfer it into the case processing system, thereby eliminating manual data entry. This would enable the same clerk who receives pleadings to scan them into the system with no separate data entry operation. While OCR is reaching the point where it can be used in this manner with specific forms, it cannot yet be used efficiently with general-purpose forms.

➔ Compound Documents

Some imaging systems can create an official document by superimposing data from case processing systems into blank spaces on pre-imaged forms that contain the necessary inscriptions and signatures. Given the number of official documents (e.g., notices and orders) prepared by courts, this process--which could be regarded as the reverse of OCR--would yield significant benefits in document generation.

Compound documents consist of images, text (e.g., from word processing systems), and data (e.g., from case processing systems). Official documents created as described above are examples of rudimentary compound documents (see Figure 3). OCR raises possibilities for

Figure 2: Integrated Imaging System Displaying Document and Data



enhancing the compound document capability by permitting easy integration of images with text and data. This would, for example, permit judges and law clerks to assemble orders and opinions by combining parts of existing orders and opinions with new text and case processing data.

➔ Client/Server and Desktop Computing

Like other types of computing, imaging systems are available and becoming more widely used on local area networks (LANs) and individual personal computers (PCs). The mainframe computer, formerly the only option, now should be considered with LANs and PCs on users' desktops as one of several alternatives. Whether you are dealing with a case processing, imaging, or some other type of system, you should carefully consider which alternative is best for you.

➔ Workflow

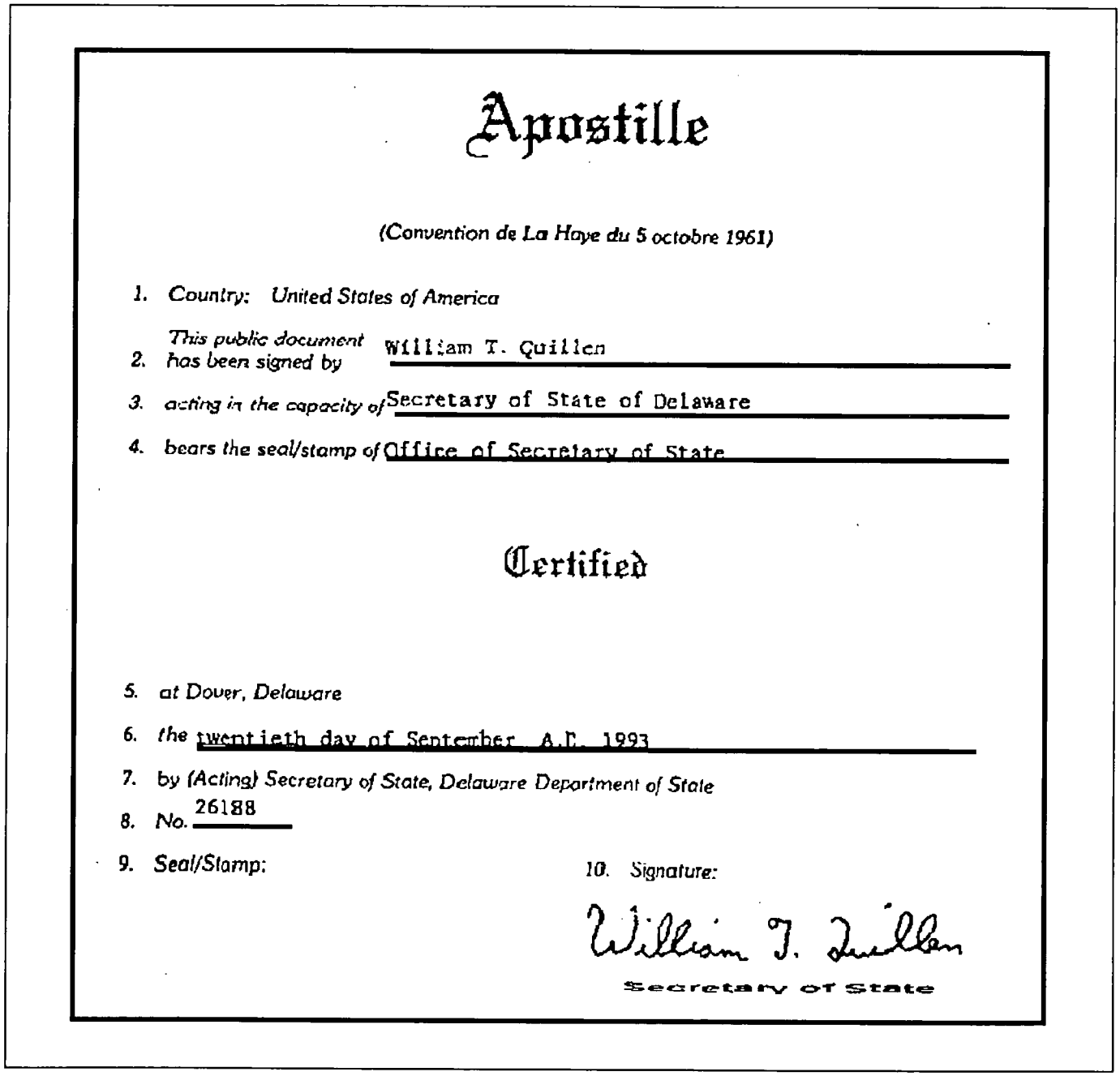
Imaging systems increasingly include automated workflow, in which the system routes documents around to workstations for processing. The choice of the appropriate computer for workflow in courts requires a decision whether to use a mainframe, LAN, or PC. In the clerk's office, where each type of document follows a standard route around the office, workflow would be on the computer that supports imaging for the entire court. In a judge's office, where orders, opinions, and other documents may follow a more flexible route based on staff availability, workflow could be on an intraoffice LAN.

➔ Integration

Imaging would best maximize its potential if documents, data, and text from imaging, case processing, and word processing systems were fully integrated. This level of integration would embrace all of the technologies summarized above.

For example, a court clerk helping a litigant should be able to see on his or her computer

Figure 3: Example of a Simple Compound Document



Apostille

(Convention de La Haye du 5 octobre 1961)

1. Country: United States of America
2. This public document has been signed by William T. Quillen
3. acting in the capacity of Secretary of State of Delaware
4. bears the seal/stamp of Office of Secretary of State

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5. at Dover, Delaware
6. the twentieth day of September A.D. 1993
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screen information from imaged documents and the case processing system as well as from systems external to the court, such as law enforcement, probation, and the state division of motor vehicles.

The clerk should have the capability to scan documents into the imaging system and, using OCR, automatically transfer the information into the case processing system. He or she should be able to form compound documents using extracted

parts of imaged and word processing documents and records from the case processing system. Workflows should be available to route documents to the workstations that perform these functions. Finally, these capabilities should be available on whatever computer platform--mainframe, client/server network, or desktop PC--is appropriate.

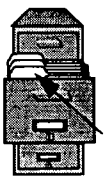
Integration of these various computers, systems, and capabilities means imaging systems should be able to share images and information with other systems that use standard communications, computer connections, and data formats.

While this concept is not yet a reality, imaging and the related technologies are moving toward this level of integration.

CHAPTER TWO
Functions and Technology

Two questions immediately arise when we think about imaging. What functions does it perform? How does it perform those functions?

Examples of Imaging Terms



Drawer--One side, or surface, of an optical disk

File--A portion of a drawer consisting of a group of related folders

Folder--The lowest component named in the database; a collection of one or more related pages

Matches--A list of folders whose index values match your search criteria

Staging--Process of synchronizing the optical disk and hard disk for faster retrieval

Escape Key--Interrupts a process (e.g., search and display of matches, printing or scanning) and/or returns you to the previous screen

This chapter will answer those questions in terms the non-technical person can understand. (The site reports in Chapter Seven and Appendix A contain more detailed technical descriptions of imaging equipment, software, and communications.)

At its most general level, imaging consists of the following functions:

- **Capture**. Receive a document (i.e., usually something printed on paper) from a source external to the imaging system and enter it into the imaging system;
- **Index**. Cross-reference the document so that, when stored in the system, it is associated with documents in the same group (e.g., same court case, party, and date filed) and can be found and retrieved from storage;
- **Process**. Perform the functions explicitly requested in the document (e.g., prepare a bench warrant according to a court order) or implicitly required because of the type of document, its source, when it was received, or some other factor (e.g., route court receipts to workstations that handle funds allocation);
- **Store and Retrieve**. Store a picture of the document in the system's storage, interpret inquiries to retrieve the document from storage, work with the index to find and retrieve it, route it to the proper workstation(s) or parts of the system for dissemination, and return it to the system's storage when the user has completed work on it; and
- **Disseminate**. Send the document to imaging system users and people outside the system who need it, either by printing it on paper or sending it through communications networks.

At a similar level of generality, the equipment and software that support imaging consist of the following:

- **Scanners**. Scan documents and other objects (e.g., photographs) into the computer;
- **Computer**. Contains imaging software and processes images according to instructions in the software;
- **Software**. Either automatically or with operator intervention, accomplishes the imaging functions noted above through coordinated use of operator information, computer and imaging equipment, other software, images and other data in the computer, and communications;

- **Workstations**. Permit imaging system operators (e.g., the scanning unit) to capture, edit, and index documents; to work on document images; and to display images with other information--including information to and from other computers and systems (e.g., case processing) that work with the imaging system;
- **Storage**. Stores images of the scanned documents--usually on optical disk but sometimes on magnetic disk;
- **Printers**. Print documents from imaging and other systems;
- **Viewers**. Permit imaging system users (e.g., judges, law clerks, other attorneys, and clerical staff) to view documents as they formerly would have referenced pages in printed books and other documents (e.g., court land records); and
- **Communications**. Permit imaging computer(s) to communicate (1) with imaging equipment so that operators can process documents and (2) with other computers through, for example, networks so that users and people outside the imaging system can have access to imaged documents (see Figure 4).

The remainder of this chapter describes imaging in terms of its functions (capture, index, process, store and retrieve, and disseminate) and the technology (equipment and software) typically required to perform those functions.

If your primary interests are whether imaging is right for you, how to acquire and implement it, and what the future holds for imaging, please skip to Chapter Three, *Is Imaging Right For You?* Otherwise, continue reading this technical description.

The description does not distinguish between the size and scope of imaging systems, which can range from stand-alone systems in small courts used for record searches to huge systems in government and industry (such as IRS, NASA, and insurance companies) used to enter, process, and disseminate massive volumes of documents.

Throughout the description, computers and software will be discussed only when unique features exist because they are intrinsic to each function described below. Computers provide the processing, and software makes the different equipment work together to accomplish the functions. For example, database management software helps the user create the index for an imaged document, and it works with the disk controller to store the document in the proper location and retrieve the document when requested by a user.

The chapter concludes with a summary of other technologies that relate to or could be used instead of imaging.

II.A. Capture

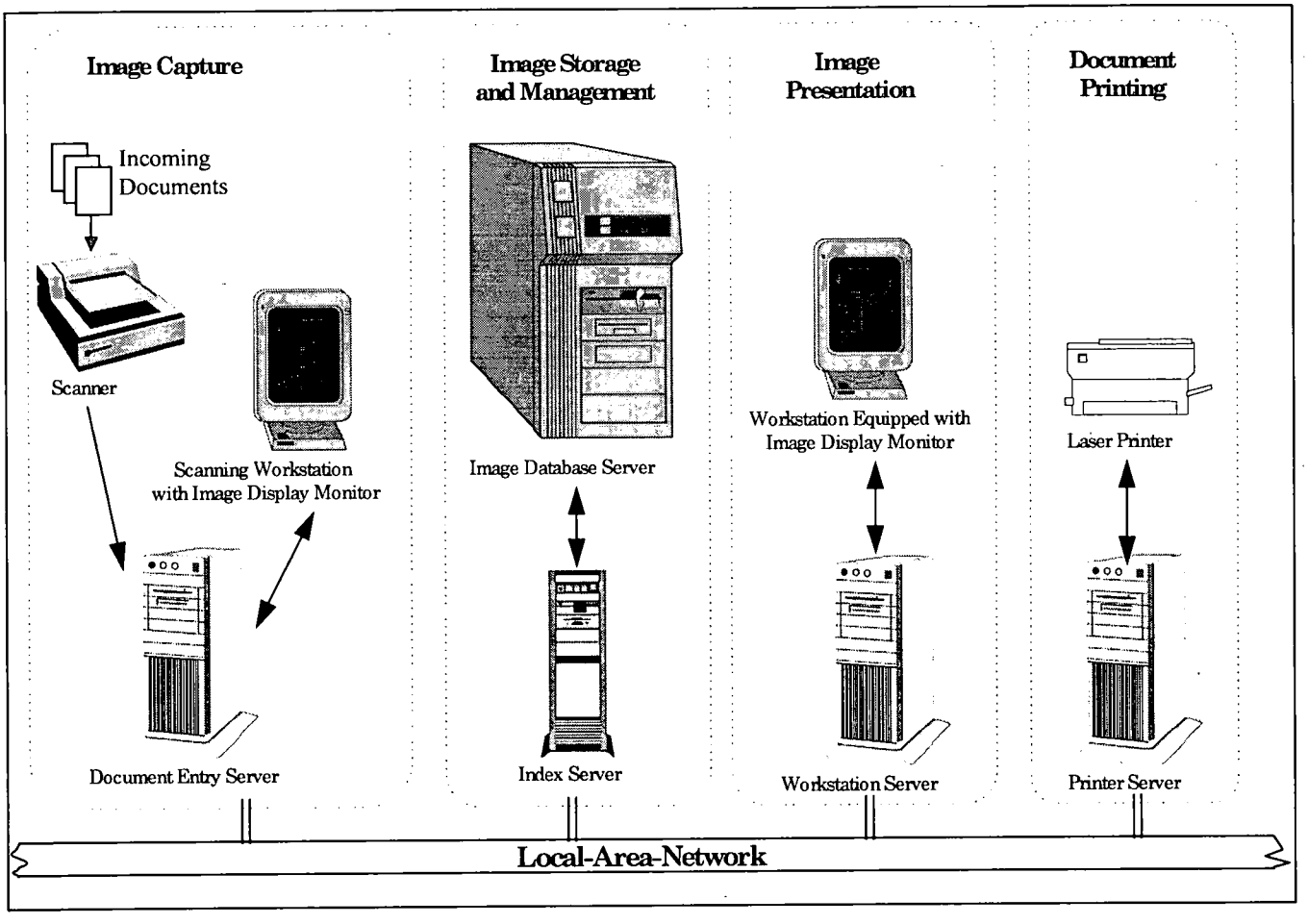
II.A.1. Functions

Documents are entered into an imaging system by scanner, facsimile transmission (fax), or imported image files; converted to images from data or text when initially scanned; and stored on disk storage devices.

If the person with a document to be entered is in the same location as the imaging system, he or she can scan the document directly into the system. This is called local document entry, or *local scanning*.

If the person and the system are in different locations, he or she sends the document to the system location. There are several ways to accomplish this. First, the document can be sent in paper form and scanned locally at the system site. Second, some imaging systems accept faxes, and since documents must be scanned into a fax machine to be transmitted, the document enters the system directly when it is faxed. Third, the person may have a scanner at his or her location connected to the imaging system. In this case, the document can be scanned directly into the system

Figure 4: LAN-Based Document Imaging System



from the person's location, which is called remote document entry, or *remote scanning*.

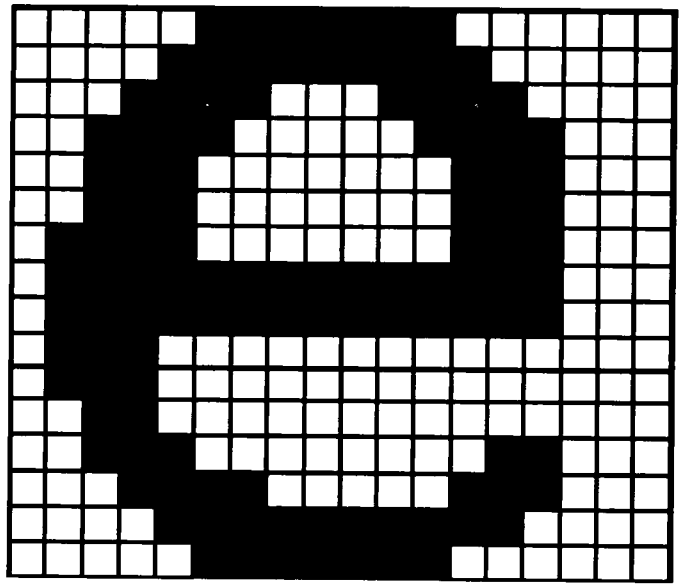
Documents can be transferred into imaging systems from other systems. These *imported documents* may be in imaged, data, or text form. Even though the documents are in the same system, truly integrated documents--that permit images, text, and data to be merged into one compound document--are uncommon. Current document imports usually are limited to, first, importing documents into a system that can store and retrieve imaging, office, and data processing files and, then, displaying images and outputs from the other two types of files together on a split screen.

II.A.2. Equipment and Software

Scanners, including fax machines that actually are scanners combined with a communications modem and printer, are the principal means of capturing documents in imaging systems. Some local and remote scanners can accept batches of documents, with no operator attention required while a batch is being scanned, and some can scan only one page at a time. Scanners can be stand-alone, combined with PCs, combined with fax machines, or combined with other equipment.

During scanning, each discrete element (e.g., letter, number, punctuation mark, and graphic mark on the paper) of the document is digitized. This means it is *bit-mapped* or transformed into a

Figure 5: Illustration of Bit-Mapping



pattern of bits (see Figure 5), each of which is either on or off (i.e., either one or zero). Scanning can be either *binary, halftone, grayscale*, or *color*. A higher density of bits permits shades of "gray," as would be needed for graphics, instead of the bitonal (i.e., black or white) that represents characters. A technique called dithering permits adjacent black and white images to be combined to simulate shades of gray so that, for example, photographs can be imaged.

Throughout image processing, workstations with monitors capable of displaying graphics (and therefore imaged documents) and data and text characters on a split screen are needed. These high-resolution monitors normally range between 17 and 21 inches. They must be accompanied by a keyboard and preferably a pointing device such as a mouse. PCs should be considered for workstations because of their low cost, flexibility, and increasing ability to display graphics such as document images.

Usually, imaged documents are stored permanently on optical disk. Magnetic disk provides a staging storage area for documents on their way to or from processing. Disk storage will be covered more fully later in this chapter.

II.B. Index

II.B.1. Functions

Like their manual counterparts, documents that have been imaged and stored by a computer must be retrieved from storage so they can be used. Since documents for a given case are stored wherever space is available (and not necessarily together), indexes, which contain information needed to reference and find documents in computer storage, commonly are used to accomplish file retrievals. Most imaging systems, therefore, have an indexing capability.

Imaging systems frequently operate with other types of systems--particularly in courts. For example, if imaging provides input, output, and storage for court documents, the imaging and court case processing systems should function together, just as the case processing system and manually filed documents supplemented each other. Sometimes the imaging system is subordinate to the case processing system; sometimes they simply provide data to each other.

Since the bedrock of imaging, data processing, and office systems is their ability to retrieve and use previously stored documents and information, they depend on indexes. Often these three types of systems use the same index, which makes the index one of their main intersection points.

The index contains data and formatted text that uniquely identify each document, and it associates these descriptors with the location of the document in storage. It is a data processing--as opposed to an imaging--function, which may be part of the imaging system or in a separate system. The image, which is a bit-mapped picture of a document, is in the imaging system, and the index, which locates the image, is in a data processing system. This means that when a document is scanned into the imaging system, the index must be entered on the data processing side.

Indexes have different forms:

- Some indexing software lets users define the number, titles, and types (e.g., data or text)

of document descriptors. A few products let the user design an index that can be tailored exactly to the organization's needs.

- Other indexing is fixed in that it permits only specific, predefined document descriptors. For example, such an index may associate storage location with case number and case style (e.g., Jones v. Smith).
- Many systems provide index entries, called *keywords,* from which the user can choose the words or phrases that best describe a document. The choice of keywords may or may not be restricted to a predetermined list.

The usefulness of index entries or keywords is only as good as the search capability of the software and the quality of the entries or keywords. Does the user have to remember the exact wording of the keyword or are prompts available? Are searches case-sensitive? Are Boolean searches with logical "AND" and "OR" statements permitted? Are nested searches permitted so that the user can conduct progressively more precise searches to home in on the proper document? Have the index entries and keywords been chosen appropriately and entered accurately?

II.B.2. Equipment and Software

Most data and text are entered into indexes by a keyboard. Generally, users work with a split screen monitor that shows the image on one part and the data processing system information on another part. Index information, and perhaps other information pertaining to the transaction, is entered into the data processing system using the latter area. For example, in a court case processing system, if a deposition is being entered, the image of the scanned deposition would appear on part of the screen and the case processing system data entry screen would appear on the other part. The data entry screen would be used to enter data and text pertaining to the deposition, from which an index entry would be created. Indexing and index processing may occur on either the computer that runs the imaging system or the computer that runs the data processing or office system.

Technology is being perfected to extract data and text for indexes from scanned images to avoid separately entering images and index data. This would result in a one-step scanning and indexing process. The method used to accomplish this is optical character recognition (OCR), which reads documents or parts of documents and converts the images into data or text.

OCR combines scanning with image analysis to convert scanned bit-mapped patterns into ASCII code, which is used to represent data and text in most data and word processing systems. OCR can be used with imaging software to extract data and text for indexes and for other purposes in data and word processing systems. For indexes, this is accomplished in two ways:

- Zones in an imaged document are converted into data or text for index fields so that the document does not have to be indexed by separate data entry. This can save time if an organization uses forms in which zones for fields can be standardized.
- All or part of an imaged document is converted into text so that keywords can be extracted and placed in the index.

The accuracy, and hence the usefulness, of OCR depends on its ability to recognize whatever lettering is used in the scanned documents. Clearly typed or printed characters with excellent contrast to the background are likely to be read correctly. While OCR technology is improving, its use remains limited except for applications in which scanning is restricted to specific, well-defined zones.

Bar code reading is a less versatile but more accurate cousin of OCR in which a bar code reader scans and interprets patterns of closely spaced vertical lines. Grocery stores and other retailers often use bar coding, and courts sometimes pre-number citations with bar codes. In these court situations, when the bar code serves

the dual role of case number and document identifier in the index, bar code scanning usually obviates key entry of the index.

II.C. Process

II.C.1. Functions

When the document is in the imaging system, it can be processed in the following ways:

- **Quality Assurance**. In most systems, the document undergoes a quality control check in which the user examines the scanned image, against the actual document if possible, and identifies any parts that were scanned improperly. Some imaging systems help the user identify problems through capabilities such as image enhancement, in which areas of the image are enlarged and clarified by different contrasts and degrees of gray (much like you would adjust your television).
- **Compression and Decompression**. Since optical images in imaging systems require more computer space (i.e., more bits) than data or text representations in data processing or office systems, most imaging systems compress the image before it is stored or sent over a network. In compression, the system eliminates as many spaces that do not contain useful information as possible. For example, many compression techniques eliminate margins, which they can recognize by a succession of "white" bits, in creating compressed images. This reduces the number of bits needed to contain the image, with a commensurate reduction in storage space and communications line usage. Before the image can be viewed, it must undergo a reverse, or decompression, process.
- **Database**. Many imaging systems are used with a database of information about or extracted from the imaged documents. These databases range from simple indexes to sophisticated keyword or topical document references. As described above, indexes locate documents in storage and may provide limited summary information. The more sophisticated databases reference documents by descriptors, such as keywords or topics, and may contain document abstracts. In addition to locating documents, such databases may provide information about documents or groups of documents without having to look at the actual documents. This type of database sometimes provides the capability to identify and store information at the summary or "folder" level rather than the individual document level. For example, information from documents about judicial applicants could be organized into a database "folder" containing a summary for each applicant to avoid looking up multiple documents. The system could then statistically analyze the information about applicants and automatically produce a summary sheet for each applicant.
- **Document Management**. Imaging systems permit vastly improved capabilities for document management--filing, distributing, displaying, and keeping track of documents. As anyone who has worked in a court clerk's office knows, strong document management is a necessity. Imaging systems allow the user to (1) find documents according to which electronic "folder, drawer, and cabinet" the file is in; (2) identify who has electronically "checked out" the file; (3) find documents by keywords, dates, and other index fields; and (4) display documents in imaged form instead of hard copy. Through strong document management, users know more about their documents and can use this knowledge to complete daily tasks more effectively.
- **Workflow**. The workflow capability in imaging systems routes images of documents around to workstations for processing. Automated workflow could be

regarded as a progression of electronic in-baskets along specific routes. (But that analogy does not imply that electronic in-baskets contain actual copies of documents; electronic in-baskets contain notifications that there is work to do and identifiers of assigned documents.) In establishing these routes and defining the work for the workflow, system designers can standardize the repetitive tasks requiring document routing. A workflow consists of the following four items: the workstations to which a given document is to be routed, the functions to be performed at each workstation, the information to be routed with the document, and the methodology to evaluate performance at each workstation. For example, in a court clerk's office when a case is ready for trial, suppose one location determines that the case is ready, another location schedules the hearing, and a third location prepares and mails notices. Each location, in turn, needs the case file. The workflow capability automatically sends, or sends with supervisor intervention, an electronic message to a staff member when a task needs to be completed. The message can include instructions, a copy of the documents necessary to complete the task, a deadline, and the identity of the next workstation in the processing sequence. Workflow helps an organization perform these tasks more effectively and provides the opportunity to review and improve the organization's work processes. Workflow procedures can range from simple rules, with fixed routing based on document type, document submittor, or other criteria, to complex formulas that enable the computer to

- Dynamically route or reroute work based on a document's situation (e.g., unusual contents or length, elevated priority), availability of qualified staff to work on the document, or other conditions;
- Automatically detect and rectify or alert user to delays in the work;
- Raise the status of a given task to expedite it;
- Save data on task performance; and
- Expand tasks into subtasks to handle unusual situations.

II.C.2. Equipment and Software

Image enhancement, compression, and decompression are accomplished by circuit boards installed in scanners or the computers to which the scanners are connected. Compression and decompression also can be done by software.

Database management, document management, and workflow are accomplished using software. These functions may be part of or separate from the imaging software.

Workflow usually is accomplished over a local area network (LAN) comprised of workstations staffed by individuals who perform the requested functions on imaged documents.

II.D. Store and Retrieve

II.D.1. Functions

Among the most basic functions of imaging systems are storing and retrieving imaged documents to and from computer storage, but imaging seldom functions in a vacuum. As noted above, imaging usually is combined with other systems to accomplish the work that must be done on documents.

This is especially true with database management that creates, uses, and maintains indexes and more complex databases. Databases, including indexes, permit documents to be referenced, stored, retrieved and, in more sophisticated applications, summarized and reviewed to help decide whether to retrieve an entire document.

The storage and retrieval capabilities of some sophisticated database management systems include highly advanced indexing techniques and document searches using keyword descriptors in Boolean and contextual retrieval statements. Courts seldom need such high-powered systems, which usually are found in large libraries or similar document repositories.

Images consist of bit-mapped pictures of documents, and database management systems contain text and data. While these different representations of their contents make imaging and database management systems inherently different, they sometimes are part of the same system--particularly with simple databases such as indexes.

II.D.2. Equipment and Software

The primary storage medium for images is optical or magnetic disk. Optical disk typically is used for permanent storage because its greater capacity is more suitable for images, which as bit-mapped pictures consume a great deal of storage space. On the other hand, because magnetic disk retrieves and stores data faster, it often serves as a staging area for images on which work is being performed.

Typically, while an image is being input, checked, and indexed, the system stores it on magnetic disk. When this work is complete, unless further work is imminent, the image is transferred to optical disk. When there is more work to be done on the image, the system copies it from optical to magnetic disk so the work, and the storage and retrieval that go with it, can proceed using the speed of magnetic disk.

Optical disks are of two types:

- Those for which a given recording area can be written onto once but read from many times (called Write Once, Read Many or WORM optical disk); and
- Those for which, like the more familiar magnetic disk, a given recording area can be both written onto and read from many times (called erasable optical disk).

Optical disk from which information can only be read (the most well known of these is Compact Disk-Read Only Memory, or CD-ROM) is a special type of WORM technology. CD-ROM is commonly used by publishing and reference services, and WORM or erasable units are more common with imaging systems.

Optical disk autochangers are control devices that move optical disks between their storage areas and the disk drive from which they are read from or written onto by the computer. Autochangers are known as jukeboxes.

II.E. Disseminate

II.E.1. Functions

Most imaging systems have at least three user groups:

- Operators who scan documents into the system and index the documents. In many organizations, there is a specific workgroup for these purposes.
- Operators who process imaged documents as part of the imaging workflow. For example, in a court clerk's office, this group would use imaged pleadings to assist in performing whatever activities were called for in the pleading, such as scheduling hearings and notifying parties.
- Users and people outside the system who are not part of the workflow but use information from the imaged document in their work or for other reasons. Many courts have public imaging workstations so that individuals outside the system can view records from their case files.

The tasks performed by the first two groups are within the imaging system as described above in the capture, index, process, and store and retrieve functions. In addition, imaged documents usually are disseminated, or at least made available, to people in the third group. Sometimes people in this group depend heavily on imaged documents. Such people include judges and other attorneys who need electronic case "folders" just as they

formerly needed hard copy case folders. Other installations use imaging primarily to help with data entry into a computer data processing system, and people in the third group need the imaged documents only if questions or problems arise.

The dissemination function primarily addresses the need to get imaged documents to this third group that consists of users and people outside the imaging system.

II.E.2. Equipment and Software

Dissemination to users outside the imaging system requires viewers, printers, communications, and software.

- **Viewers**. Those outside the imaging system may be able to use a general-purpose PC monitor for image display if that monitor (1) can display graphics, (2) has sufficiently high resolution and screen size to display legible images, and (3) can satisfy the display requirements associated with imaging for a particular user (e.g., display image and data screen simultaneously). Although many PC monitors do not have this functionality, such users do not necessarily need the high-resolution, special-purpose imaging monitors required by those who will be scanning images and performing quality assurance.
- **Printers**. Like any computer installation, printer requirements depend on the intended use of the printed documents. Typically, a laser or comparable printer is needed for high-quality reproduction of imaged documents. This is particularly true if official documents will be printed.
- **Communications**. In most imaging systems, dissemination requires that imaged documents be communicated to users not directly connected to the imaging computer (also known as the imaging server). Frequently, this requires a communications network, such as a LAN. Communications networks advance today's movement toward integrated processing, which embraces imaging, data processing, word processing, and other types of office automation. For example, if all court users are in the same building or nearby buildings, a LAN can be set up with the following elements:
  - Imaging system LAN with
    - Imaging workstation PCs to scan, index, check, and process incoming pleadings and other documents;
    - Image file server PC and disk units to manage image files and make imaged documents available to users;
    - Image print server PC and printers to print imaged documents; and
    - Image communications server PC to control imaging LAN and disseminate imaged documents to users over court LAN.
  - Court main computer that runs case processing and other centralized systems and serves as the overall communications server for court LAN and external agency computers.
  - Individual PCs and shared printers of court users that
    - Communicate with imaging system, main computer systems, and other users as part of court LAN;
    - Use court case processing system resident on main computer;
    - Use imaging system resident on imaging LAN;
    - Use word processing and other office automation functions through court LAN;
    - Use desktop applications (e.g., spreadsheet and customized programs) using PC as stand-alone device; and

  - Combine all of above LAN applications for integrated use on PC (e.g., imaged documents and case processing data displayed together for case processing system update).
- **Software**. The above functions require imaging, database management, and communications software within the imaging system; software to achieve integration at the PC level; and other computer systems, communications, and applications (e.g., case processing) software.

II.F. Other Technologies

Several other technologies can substitute for or complement the type of imaging covered in this report. The substitutes need not be "high tech"; photocopiers are a type of imaging. Micrographics can serve either as a substitute or complement, and Computer Output Laser Disk (COLD) and microform output are alternate output technologies. Text retrieval is an alternate method of storing and retrieving text and should be central to the future of imaging, data processing, and word processing integration. Judicial Electronic Document and Data Interchange (JEDDI) is an emerging capability that would permit courts and those who transact business in courts to exchange documents electronically. These technologies are summarized below:

- **Micrographics**. This includes familiar imaging technologies such as microfilm, microfiche, and other microforms. Like the imaging systems described above, micrographics produce representations of documents that can be stored, retrieved, printed, and displayed. They can include computer-assisted microfilm retrieval (CAR) that uses indexes to locate documents. Compared to the imaging systems described above, they are slower, more cumbersome to use, and more difficult to integrate with other types of systems. Their advantages are lower cost; higher potential for retaining accurate and stable images in storage for long periods; and independence from the hardware and software that store, retrieve, and display images. Some users seek the best of both worlds through a combination of micrographics and the imaging systems described above. For example, in the process of changing from micrographics to a new imaging system for which records must be converted, the old and new systems sometimes are used concurrently with a common index that locates each document regardless of where it resides. In another example, the new imaging system may be used for active documents and micrographics retained for archived documents.
- **Microform Output**. This output method is an alternative to those in the imaging systems described above. Imaging system output is placed on microfilm, microfiche, or other microforms as if it were the product of micrographics. A computer output microfilm (COM) recorder converts the image directly to microform (i.e, without an intervening paper copy). This method is useful to achieve the longevity of microform records for archived documents, but it is seldom used because COM recorders are expensive.
- **COLD**. Some imaging systems can store and retrieve documents in character (as opposed to image) representation formatted as computer-generated output pages. COLD technology provides this capability using read/write optical disk for document storage. It includes indexes and document retrieval capabilities. The documents can be displayed at general-purpose monitors (with no graphics required) since they are computer-generated output. COLD allows imaging systems to store documents more

efficiently because it uses high-volume optical disk, and computer-generated output pages consume less storage than imaged pages. It gives users on-line access to the output pages instead of manually distributing micrographics output or computer printouts.

Earlier it was noted that some imaging systems can create an official document by superimposing data from case processing systems onto pre-imaged forms that contain the necessary inscriptions and signatures. Some COLD systems provide this capability by storing images (e.g., of forms with inscriptions or signatures) that are superimposed on the output pages when they are retrieved. Other imaging systems accomplish this through, for example, customized software.

- **Text Retrieval**. Like imaging, text retrieval gives the capability to store and retrieve documents. Unlike imaging, the documents are stored in character (as opposed to image) representation. Whereas imaging preserves the appearance of the original document, including text and non-textual graphics such as pictures and exhibits, character representation contains only the text. To offset this limitation, text retrieval offers advantages over imaging such as more efficient storage, the ability to display documents on general-purpose monitors, and powerful indexing and retrieval capabilities that may include the full text of documents. Text retrieval is an alternative to imaging if the only objective is to store and retrieve documents, but some users need to see the original document. This leads to imaging or the integration of text retrieval and imaging as discussed later in Chapter Five.
- **JEDDI**. This technology, which is in the conceptual stage, would permit documents and data stored in computers to be electronically exchanged between courts, attorneys, and others who do business with courts. It would be a major step forward in the march toward the paperless court.

Filings created by attorneys on their office PCs would be formatted, checked for errors, and put in electronic packages consisting of the document(s), or simply the data in the document, and the accompanying docket and financial data for the court case processing system. Then the electronic package would be transferred to a preselected network that would have the added value or functionality of storing the package in a "mailbox" on an interchange computer. The clerk's office would "look in" the electronic mailbox several times each day (or be notified automatically) and, if something were there, transfer it into the computer. After reviewing the information on the PC screen to verify its accuracy, the clerk would enter the docket and financial information into the case processing system and either enter the data in the document(s) into an electronic file or, if necessary, convert the document(s) to imaged form and enter the image(s) into an electronic case folder. This would consummate the filing without an exchange of papers and perhaps without creating an actual electronic or hard copy document. The process could be reversed for communications, such as notices and receipts, from the clerk's office to attorneys.

Aside from the obvious savings in time, effort, and money to file pleadings and distribute notices and other court papers, JEDDI would permit (1) attorneys to put filings into the electronic mailbox at times other than normal clerk's office hours and (2) courts to coordinate and standardize electronic filing procedures.

Since JEDDI would involve electronic versions of documents, its users would gain the advantages of imaging described in Chapter Three.

Except where specifically stated (e.g., in the coverage of text retrieval), these other technologies will not be addressed again in this report.

CHAPTER THREE
Is Imaging Right For You?

Now that imaging has been defined, we will consider how it might improve the way your office functions and solve some of your problems. In other words, is imaging right for you?

This chapter covers topics that will help you answer that question. It begins with a discussion of the situations in which imaging usually helps and continues with the following subjects regarding imaging: the issues, advantages, and disadvantages; the costs; the standards, policies, and procedures; and the organizational and management considerations. It concludes with a summary.

III.A. When Imaging Helps

Information and the records that contain information are the life blood of most organizations. While the specific situations that call for imaging vary from organization to organization, they typically issue from recordkeeping problems. Poor recordkeeping usually translates into poor service to those who conduct business with the organization and depend on its records. Most organizations will not tolerate poor service to their "customers" for long.

The archtypical organization that needs imaging is one with an inefficient, labor-intensive, and high-volume recordkeeping operation. Such operations are characterized by piecemeal information recording, piles of paper on desks, excessive turnaround time to satisfy requests involving records, inability to track work in progress and records used in that work, numerous errors and other inaccuracies, excessive document handling, excessive staff overtime, and loss of documents. Documents are taken from storage frequently, passed from desk to desk to be worked on, and retained at each desk for lengthy periods. Within that wide range of recordkeeping offenses, some situations that typically suggest imaging are those in which

- Documents must be (1) retrieved rapidly from several places by more than one person, (2) routed to workstations for use in processing with other information (e.g., information in a computer data processing system), (3) worked on concurrently, and (4) stored;
- Incoming documents must be used for data entry into a data processing system;
- Large volumes of records must be received, handled, and retained for a number of years in a secure and reliable manner; and
- The organization must give better service through more rapid and accurate processing of requests for information that depend on document retrieval, inquiry responses, and output production.

Static documents with no internal changes are best for imaging use since the imaging technology scans the document and stores its picture. It does not allow for easy modification of the document, although compound document methods that permit data or text to be superimposed on an image, thereby modifying the imaged document, are gaining wider use.

III.B. Issues, Advantages, and Disadvantages

Do you recognize at least some of the above conditions in your organization? Are you ready to embrace imaging as the cure for all your recordkeeping ailments? Do not call your favorite vendor yet. The decision-making process is just beginning. You may have identified the problem, but you have not identified the solution. There must be more investigation into whether imaging

is the elusive nostrum for which your organization has been searching.

Like all advanced technology, imaging comes with its share of headaches. It also yields tremendous benefits. Before you commit to imaging, your organization must open its eyes to the issues, advantages, and disadvantages of imaging. Some of them are inherent in technology, and others are unique to imaging.

III.B.1. Issues

When an organization embarks on a complicated and expensive technological project, those who sponsored the project and those who must implement the technology have basic concerns: will it work within a reasonable period of time and for a reasonable amount of money? Those who must deal with "customers"--whether they are litigants and attorneys in a court or buyers of a product--are concerned that the technology will adversely affect their "customer" relationships and service. Management may be more concerned about how it will affect the organization's "bottom line"--whether that means cases disposed or monetary health. A cynic may contend that all of these concerns originate in an even more basic fear: "Will I lose my job or look like a fool if this thing does not work?" As anyone who has dealt with technology knows, these fears and that basic question are legitimate.

The issues and concerns with technology in general and imaging in particular fall into four categories: technological, customer service, user, and organizational and administrative. While most of the technological and customer issues can be addressed through analysis, many of the other issues are more subtle. They deal with topics such as organizational mindset, ability to make a decision and stick with it, and ability to function as a team. Some of the specific issues are

- **Technological**
  - Will the imaging system will work? This issue becomes more significant with the realization that the system will be complex and may involve different computer technologies.
  - Will the equipment specified for the new system have sufficient capacity? Nobody wants to buy an expensive new system and have to enlarge it within six months.
  - How will the organization deal with the changes and improvements that are inevitable in computer, communications, and imaging technology? Few, if any, organizations can keep up with the relentless advance of technology.
  - What is the best method of setting up communications networks, given the geographical dispersion of system users? The maze of LANs, direct connections, gateways, bridges, and protocols is bewildering.
  - What is the best method of addressing changing industry standards in areas such as image storage, fax transmissions, databases, image displays, and printed output?
  - What is the best method of ensuring the new system, equipment, software, and communications work with their counterparts that are already in use? Few organizations can afford to discard their existing computer resources when they install a new system.
  - What is the best method of integrating imaging with other systems, such as word processing and case processing systems, to achieve full functionality in the composite group of systems?
  - Does the organization have sufficient technical staff to devote to an imaging system project? If the proper people--either in-house staff or contractors--are not available to work on the project, it will fail.

- **Customer Service**
  - Can the organization ensure that credibility with customers will not be damaged because of lost imaged documents? Every organization is concerned about losing documents in a bottomless imaging pit with resulting degradation of customer service.
  - Will legal problems arise regarding acceptability and legality of imaged documents? This encompasses a definition of what constitutes a legal image, whether an imaged document is official if it has an imaged signature (e.g., on court orders), the degree of risk that images could be modified, access privileges, record retention requirements, and back-up storage requirements.
- **Users**
  - Will imaging system users accept a new way of doing things? Procedures that have been used for years may change. This *re-engineering* may be necessary to realize the full benefits of imaging. Things can get sticky here because re-engineering may affect staff assignments in both the allocation of tasks and how those tasks are performed. Sometimes users rebel because they prefer to continue doing things the old way and will resist change if the new system is going to dismantle their entire operation--*even if the re-engineered operation is better.*
  - Which documents are used often enough to justify being imaged? Perhaps some documents could be more easily used if they remained in hard copy form or were microfilmed.
- **Organizational and Management**
  - How much will imaging cost and how does the cost relate to the benefits of imaging?
  - Is the organization prepared to commit to imaging and persevere while it is being implemented? There must be commitment throughout the organization if the project is to succeed. Management often becomes frustrated because significant technology, such as imaging, cannot be implemented overnight. And, as will be described below, implementation consists of far more than installing an imaging system. For example, often massive files must be converted from manual or microfilmed records to images, and this can be unbelievably time-consuming. While all this is happening, the costs keep growing. So patience is not only a virtue, it is a necessity.
  - Can the organization work together to achieve success? The managers, users, and technical staff who will participate in the imaging project must work as a team toward the common objective of a successful imaging system.
  - Is the organization ready for imaging and willing to implement the re-engineering that may accompany it?
  - Can the organization assess realistically what imaging can and cannot do and discipline itself to work within the imaging system's capabilities in areas such as record storage and retention? Like new computer users who think the computer can do *everything* and try to apply it to tasks for which it is not suited, new imaging users may think *every* record can be retained because of the storage capacities of optical disk and the retrieval and display capabilities of imaging systems. This is a false assumption. With imaged records, as with manual records, the organization must establish record

retention policies and purge or discard those records that are no longer needed.

- Is the organization ready to make full use of imaging as a capability that is *integrated* into the other computer applications? The whole is greater than the sum of its parts. Imaging works *with* other systems, such as case processing systems in courts, and their data--not *instead of* these systems and data. Imaging and these other applications must move forward toward greater functionality and integration.

What these issues and concerns indicate is that imaging is a risky, high-cost venture--particularly for a highly visible, publicly funded agency such as a court. The decision to adopt imaging is irrevocable. Once the first documents are imaged, there is no turning back. To counter these risks, there must be a commitment to imaging throughout the organization.

While the commitment to imaging alone is significant, there is more. Since imaging seldom reaches its full potential in a vacuum, there should be an equally strong commitment to achieve a fully functional system. Such a commitment will lead to the integration of imaging with other systems such as word processing systems and, in courts, case processing systems. Each system serves its unique purposes and provides specific types of text, data, and functionality to the composite group of systems. Document images cannot substitute for highly formatted case data from a case processing system, and neither of them can substitute for the text that can be manipulated in word processing documents. Finally, as technology advances, each of these types of systems and their levels of integration must advance.

III.B.2. Advantages

Imaging offers significant advantages for high-volume, paper-intensive, service-oriented operations such as courts. As court officials are willing to integrate imaging with other systems and adopt procedures and technology that are becoming commonplace, the advantages can grow exponentially in the following ways:

- Courts enter information into case processing systems from numerous sources. Some documents are submitted directly to the clerk's office, and these could be scanned into the imaging system locally. Other documents come from external sources such as attorneys, law enforcement, probation, pretrial diversion, and community services. These documents could be scanned into the system remotely or faxed directly into the system.
- Imaged documents may be part of an integrated court information system that also consists of case processing and word processing. An integrated system would enable court clerks to switch between display screens containing document images, case processing data, and word processing text. Clerks could give better and more rapid service because they would have each type of information at their disposal on parts (or windows) of a single computer screen.
- Many official documents produced by courts contain signatures, seals, letterheads, and other inscriptions. These documents can be stored as images with blank spaces for data and text to be supplied later by case processing and word processing systems. When the data and text are available for insertion into an official document, they can be transferred to the imaging system and superimposed in the appropriate spaces to produce excellent-quality official documents that combine the data and text with the signatures, seals, letterheads, and other inscriptions. This would be a major benefit to courts.
- Judges and other system users may need customized case folders containing documents arranged in a particular order or only those documents pertaining to a certain part of the

case. These types of functions can be accomplished easily with electronic case folders containing imaged documents.

- Many clerk's offices, particularly the larger ones, have various options for document processing, and a workflow formula would assist in getting work to the proper workstation.

The typical benefits of imaging in courts and other organizations are

- Better service to customers through dramatically improved turnaround time in activities involving recordkeeping, document retrieval, and document storage as follows:
  - Faster, more complete, and more accurate service;
  - Elimination of data entry and document processing backlogs;
  - Availability of documents and index information for rapid responses to inquiries--usually while the customer is still in the office or on the telephone;
  - Ability to manipulate "folders" of imaged documents so they are customized for specific users; and
  - Immediate, comprehensive, and concurrent access to documents.
- Cost savings and other efficiencies from
  - Reduced staff overtime;
  - Reduction in staff or avoidance of staff increases;
  - Higher volume of work completed;
  - Fewer data entry operator keystrokes and improved accuracy;
  - Less paper handling overall, including less paper usage, reproduction, and storage;
  - Less time spent retrieving documents, fewer telephone calls returned, and many repetitive processes eliminated;
  - Elimination of many document-handling problems and costs; and
  - Less space required for staff and document storage.
- Benefits to staff from
  - More challenging work assignments and consequently, a more professional work environment;
  - Improvements in worker motivation, self-confidence, and problem-solving skills; and
  - Continuing organizational benefits through growth in both individual and collective job skills as an indirect result of imaging.
- Better document and work management as follows:
  - Document control and tracking from the moment a document is received;
  - Better document sharing and distribution;
  - Fewer lost and misfiled documents;
  - Higher correlation of newly received documents with filed documents, active documents, completed work, and work inprogress because new documents are cross-referenced and can be associated with documents and work in the same group (e.g., same court case, party, and date filed);
  - Automatic retrieval of documents based on received documents or information;
  - Quicker and more accurate document routing to appropriate workstations;
  - Automatic tickler file and pending work capabilities;
  - Greater supervisor control over operator workloads;
  - Better audit trails at document- and work-in-progress levels;
  - Better operational reports leading to improved management of workloads with fewer peaks and valleys and more visibility of work queue contents;

- More uniform document handling and recordkeeping procedures; and
- More efficient imaging and overall computer system use through coordination of document storage on optical and magnetic disk to combine larger optical disk storage capacity when documents are not being used with more rapid access time to magnetic disk for documents on which work is underway.

III.B.3. Disadvantages

As in any situation, imaging has its disadvantages. Those issues and concerns described earlier in this chapter may become disadvantages if they are not addressed. Recall that those issues and concerns were categorized as technological (Will imaging work the way you want it to--individually and with your other systems and communications?), "customer" service (Can you maintain a good relationship with your customers?), users (Will imaging users accept re-engineering?), and organizational and management (Will the organization commit to, accept, and be realistic about imaging when things are going well and when they are going poorly?). If those questions that apply to your organization are not answered affirmatively, you may be headed toward serious problems.

Specific disadvantages of imaging are as follows:

- Imaging can be costly, and the costs can increase rapidly if (1) imaging is not the proper solution to your recordkeeping problems, (2) you are unclear of your objectives for imaging, or (3) the imaging project is poorly planned and monitored.
- The technology is highly complex and may be difficult to implement, "fine tune" so that it is working properly, maintain in proper working condition, and integrate with other systems and communications.
- The longevity of data without serious degradation on optical storage is unproven; optical storage is a new technology compared to paper, magnetic tape, and magnetic disk.
- As opposed to hard copy, lengthy imaged documents are difficult to read and comprehend when going through them page by page on a computer screen.
- Text in imaged documents is fixed; it cannot be modified, manipulated, or, more importantly for courts, copied to other, text-based documents (at least until OCR matures).
- Since images are not as clear as source documents, if the source document is difficult to read, its image may be impossible to read.
- Additional staff may be needed for a separate workgroup to scan documents.
- Potential for employee morale problems exists because of staff cutbacks in areas other than scanning.
- Even though it has freed them from many routine tasks, some users feel enslaved by imaging, because they think it has taken away their control of the work and their decision-making power.
- Users feel chained to their workstations because almost everything they need--imaged files, word processing files, information from data processing (e.g., case processing systems for courts)--is accessible at the workstation.
- When all documents are in imaged files, system failures can immobilize the entire operation.
- Imaging can consume an inordinate amount of magnetic disk storage (if not coordinated properly with optical disk) and computer processing resources.

III.C. Costs

By now, you probably are asking, "What will imaging cost?" You justifiably want to get to the "bottom line," but unfortunately that is impossible in a report such as this. Here is why.

Based on the imaging sites visited and the data collected in preparing this report, prices of imaging systems were found to fluctuate from very high to moderate. Among the factors influencing prices are whether the system operates alone or as part of a network, whether the main imaging computer (i.e., server) is a PC or a more expensive, larger computer, how many workstations are in the system, what types of equipment and software comprise the system, and whether imaging is integrated with case processing or some other system. Some sites hold their imaging costs down by using a combination of equipment they already have in service and new equipment and by developing some of the software in-house. Another dynamic at work is the drop in prices--in some cases, as much as 65 percent over the last three years. Imaging has been regarded as expensive, but that is not always true today--especially as it moves onto PCs and the desktop.

So it is difficult to predict imaging costs. The two sites that had most recently obtained complete imaging systems (i.e., equipment, software, and communications) paid, respectively, about $35,000 per workstation for a PC-based stand-alone system and about $44,000 per workstation for a LAN-based system using a mid-range computer as the server. The stand-alone system had only two workstations, which resulted in a higher cost per workstation than if the imaging software, disk, and computer costs had been spread over more workstations. Both systems were implemented between March and June 1993.

What, then, does the prospective imaging purchaser do to estimate imaging system prices? There are, after all, budgets to prepare and approvals to obtain. The best approach is to talk to imaging vendors about their systems' capabilities and costs. Some guidelines for those conversations follow:

- Price comparisons must be done carefully because pricing depends on factors such as whether a company charges a flat fee for a network installation, fees for every workstation connected to the imaging server and for the server software, or a fee for the maximum number of workstations that can use the server at one time. Such variations mean that comparative prices depend on the number of users and the level of use.
- The same company may offer two types of servers or other equipment for different prices. For example, a company may have a file server and a less expensive print server.
- Certain charges can be hidden. For example, there may be a base charge for particular software and an extra charge for a more efficient version of the software that, as it turns out, almost everyone needs.
- Imaging software pricing becomes even more complex because different products may require purchase of extra hardware.
- Some systems require that imaging cards (with varying amounts of memory), a fax card, and other cards be added to PCs for the needed functionality.
- An OCR capability usually requires separate OCR software.

When considering costs, many organizations focus only on the equipment, software, and communications that comprise the imaging system. These costs typically represent only about 60 percent of the total imaging expenditure. Costs for conversion, training, and changeover from the old procedures to the new system--which consume the other 40 percent--often are overlooked. Everything must be covered when you consider costs. Imaging is a new and complex technology. The linkages between the many different equipment, software, and communications pieces must fit together to complete the imaging puzzle. Even sophisticated users may have problems installing, using, and maintaining the system. Space and wiring requirements must be identified and met. Paper and other supplies will be needed. Most important, there must be suitably qualified staff or contractors to make imaging succeed.

Some costs occur primarily at the beginning of the project. System acquisition, site preparation,

conversion, training, and changeover are in this category. Other costs occur throughout the years imaging is used. These ongoing costs are system maintenance, system operations, staffing, and supplies. Projected imaging budgets are needed for the initial years when the system is getting underway and for subsequent years when costs have settled into an annual pattern.

The costs discussed above cover only the imaging system--the collection of equipment, software, and communications that supports users who capture document images and enter data from them. There is another universe of users--such as judges and other attorneys--who use images as they formerly used documents from manual files. If members of this latter group need new PCs and other equipment to view document images, then the cost of imaging rises--perhaps dramatically. They should be able to use the newer (i.e., bought since 1990) PCs they already have, but they may need to obtain monitors that can display legible images. Imaging costs can be reduced if both groups of users keep as much existing equipment, software, and communications in service as possible instead of replacing them.

III.D. Standards

Standards are regulations to which your imaging system should conform. There are two basic types of standards: those that apply to the imaging, computer, or communications industries, and conventions used within a given organization.

Industry standards are of varying specificity and comprehensiveness. Many are *de facto* standards established by leading vendors. In new technologies, such as imaging, there are few industry standards.

Systems that conform to the standards of the imaging, computer, and communications industries are more likely to be able to communicate and share images, text, and data with other systems that conform to those standards. When you need more capacity or functionality, you increase the chances of being able to add equipment, software, and communications if yours are industry-standard. Even with standards, communicating with other systems and adding new technology can be difficult and stressful. Without standards, you may be confronted with the even more daunting--and inefficient--installation or development of conversion equipment or software.

Some industry standards are set by governmental agencies such as the National Institute of Standards and Technology (NIST), quasi-governmental organizations such as the American National Standards Institute (ANSI), and professional associations such as the Association for Information and Image Management (AIIM). Other standards are de facto set by common use in the industry. In many instances, standards do not exist. NIST and ANSI recently announced a five-year project to link databases of some 400 technical standards organizations to form the National Standards Systems Network (NSSN). Users will be able to access NSSN by Internet for information to assist in dissemination and development of standards.

Conventions are set by your organization to control how it uses systems. The basis for these conventions is system performance. What system performance will ensure that the imaging system meets your needs? This goes to the heart of almost every standard you set for the system. Some explicit conventions are imaged document turnaround time, accuracy, accessibility, number and size, workflow, and dissemination. Conventions for user assistance, security, monitoring, documentation, and maintenance are not as obvious but also affect system performance.

When industry standards exist for a technology and are applicable, they may be adopted as organizational conventions. Other guidelines for and examples of organizational conventions may be available from groups such as AIIM or from other imaging sites, but there generally are no national or international standards analogous to industry standards. Organizational conventions

are your responsibility. They should be prepared and documented by a working group and distributed to everyone affected by them.

In evaluating the suitability of imaging for your situation, consider the organizational conventions that you want to set for the imaging system. To establish conventions that will result in the required compatibility and system performance, consider (1) tentative procedures for system use, operation, and administration; (2) plans to communicate and work with other systems; and (3) plans for future system growth and changes. Then see if imaging will meet your conventions.

While most organizations know the value of standards, they often lack a comprehensive list of areas that the standards should address. The following is a checklist of the areas in which organizational conventions should be considered:

- **Document Input and Output**
  - Scanning;
  - Tracking scanned document batches;
  - Input and output turnaround time;
  - OCR accuracy if OCR is needed;
  - Document quality and quality assurance;
  - Indexing;
  - Image compression and decompression requirements and how they relate to storage and communications requirements;
  - Where in the system compression and decompression are accomplished;
  - Document capture method such as local scanning, remote scanning, fax transmission, and other methods;
  - Document output presentation and method such as local printing, remote printing, fax transmission, image transmission over LAN, display, and other methods; and
  - Audit trails and logs of document inputs and outputs.
- **Document Storage and Retrieval**
  - Optical image storage device type (e.g., magnetic disk, optical disk, or both), capacity requirements, recording format, and physical and electrical requirements;
  - User definition, creation, and naming conventions for image files in storage;
  - Document file searches including whether index search only, full-text search based on keywords or other document identifiers, full-text search based on context of identifier, or other type of search; and
  - Document records retention, purge, discard, and archive policies for moving active records to inactive records, and purge and discard policies for inactive records that are no longer needed.
- **Document Processing**
  - Automated workflow if needed;
  - Display and screen swapping (e.g., between screens with imaged documents, case processing data, and word processing text) at user workstations (e.g., as would be provided with windows);
  - Electronic notes (sometimes called "stickies") if they are to be affixed to imaged documents;
  - Document tracking and status reporting;
  - Document imports and exports to computers or systems outside the imaging system if needed; and
  - Compound documents consisting of document images, other documents (e.g., word processing documents), and data (e.g., case processing data) or parts thereof.
- **Communications and Compatibility**
  - Imaging system LAN, if needed, and its constituent workstations, servers, and software;
  - Communications associated with computers, software, and networks outside the imaging system with which

the system will be required to communicate (e.g., courts case processing and word processing systems, the computer[s] on which these systems run, and the networks that connect the systems' users to the computer[s]);

- Conventions that, in addition to the communications noted in the previous item, ensure as much as possible that the equipment, software, and communications outside the imaging system are compatible with the system--particularly with respect to user PCs--so that these items do not have to be replaced when imaging becomes operational.
- Current or future imaging system compatibility with *any* computer, software, or network that uses standard communications and formatting without modifying either the imaging system or the outside computer, software, or network. This is called open architecture, contrasted with proprietary to one vendor, and it allows for future integration of imaging with an expanding collection of other systems; and
- If the imaging system will be required to communicate with other computers, software, and networks (such as with open architecture), the relationship of imaging system functions to the functions performed by the other computers, software, and networks. (In other words, both functional and communications integration must be considered to make sure the systems work properly together without modification.)

- **Other Areas**
  - Operating procedures for computer operators and others who work directly with the imaging system computer and software to
    - Give them a summary of the imaging system;
    - Show them how to use the imaging system and its documents;
    - Give them a summary of the other systems and automated capabilities (e.g., case processing for courts, word processing, communications) that work and exchange data and text with the imaging system; and
    - Show them how to use the imaging system and its documents with these other systems and automated capabilities;
  - File backup procedures;
  - System recovery procedures;
  - Performance reporting so that adjustments can be made to improve the imaging system's efficiency; and
  - Conventions that address imaging system user assistance and measures that will make the system easier to use.
- **Security.** In all of the above topics, conventions for establishing and maintaining appropriate levels of security for all documents and other materials being processed in or through the imaging system.
- **Maintenance.** If in-house staff members have technical expertise, they usually perform routine maintenance and troubleshooting, and vendors perform other maintenance for their equipment and software. Otherwise, vendors provide all maintenance. In any event, conventions must be set for preventive maintenance periods and expected results, as well as vendor contacts for remedial maintenance.

- **Scalability.** Because, like every computer system, imaging systems will get larger, conventions to make sure the system can grow with its workload (i.e., scalability).
- **Documentation.** Documentation conventions in all of the above topics to which they apply.

III.E. Management

Many technical projects fail because management has not made a total commitment to them and withdraws support when the going gets rough--as it inevitably does at some point. The organization must consider the depth of management's commitment and support as part of any assessment of whether imaging is appropriate. If the commitment and support are lacking, the project is likely to fail.

Management's expectations for the project must be realistic. Managers must understand how much the project will cost, how long the project will take, what the issues and risks are, what the potential benefits and liabilities are, and generally how the project will be executed. Managers should not approve the project until they are comfortable with all of this, but once they have approved the project, they should give total support.

This is not to say management should give the technical and user staff a blank check to overrun the schedule or costs or deliver an inferior product. Staff members should be expected to deliver what they agreed to on time and within budget.

This, then, is the agreement: managers will give their total support, and staff members will do what they said they would do. If either party backs out of its part of the agreement, trouble looms ahead for the project.

Once the project is planned and formally approved, management is not finished. It must track progress throughout the project. This means at least monthly status reviews. If management perceives a problem, the meetings should become more frequent and be at whatever level of detail management feels is needed to make sure the problem is resolved.

Even when the system becomes operational, management is not finished. It must monitor the operational system, albeit less often and with less detail than when the system was being obtained and installed, to make sure everything is proceeding satisfactorily.

Computers place an enormous amount of information at an organization's disposal. Each time a new system is added, the information and the options for using it grow--exponentially if, as is rapidly becoming the case, the various systems work together. Management must recognize this information resource, decide how to use it, and take measures to control it. This makes ongoing management involvement even more crucial.

III.F. Summary

If you and your colleagues have struggled through the process described above and concluded that imaging is appropriate, then you should proceed according to the implementation strategy described in the next chapter. Since you made your decision after careful analysis, you know what you are getting into and have concluded that it is worth the trouble and expense.

Before proceeding to Chapter Four, we offer the following advice for you based on the experiences of the sites visited:

- **Look At The Big Picture.** Examine the concept of imaging and identify where it fits into your overall operation.
- **Know The Application.** Study the functions in which imaging will be used, understand what you want to accomplish with imaging, determine how imaging will be applied toward this objective, and document it in a requirements analysis.
- **Make Sure You Need Imaging.** Is there a legitimate need? If not, look for something else to solve your problems.
- **Know Where The Project Is Going And What It Will Cost.** Develop detailed, not general, plans for obtaining, implementing,

and using imaging, and realistically assess the costs including staffing, space, supplies, and wiring as well as systems, equipment, software, and communications.

- **Make Sure You Know What Equipment and Software Are Needed.** Know what your imaging application will run on, make sure the equipment has sufficient capacity, and assess how it will be integrated with your other systems and computers. This is vastly more complex than some other computer applications such as word processing--particularly if integration and networks are involved. Everything probably will not work perfectly for awhile. So be prepared to persevere through a lot of work and frustration. As happened at the sites we visited, you will be rewarded if you do it correctly.
- **Know The Specific Technology You Are Considering.** Visit other organizations to learn about imaging and how they are applying it.
- **Know The Vendors.** Realistically determine vendor capabilities, what you want them to deliver, and whether they can deliver it by evaluating their previous work and talking to others for whom they have worked. Reach the point where you know the strengths and weaknesses of the vendors and their imaging systems and how they can and cannot satisfy your needs. You can do this by meeting with vendors until you are comfortable with your level of knowledge about each vendor and system and by observing each system in operation in a live setting. Be sure to clarify things if you get different answers from different vendors. Remember: You are the customer, and you--not the vendors--define what your system should do.
- **Look At As Many Vendors As Possible.** This can be tedious, but it may pay big dividends if you take at least a brief look at each vendor who has the potential to satisfy your needs.
- **Communicate With The Vendors.** Make sure the vendors understand your objectives for imaging.
- **Control The Project.** Make sure you know the amount of your financial and other resources; how they relate to the work you plan to accomplish with in-house, contractor, and vendor staff; and how you are going to control the work and expenditures.
- **Have The Proper Staff.** Make sure your staff has the proper skills, which usually include skills in records management, personal computers, networking, overall data processing, and management.
- **Get Management And The Users Involved.** This is central to the system's success. You need to work at it and make sure the involvement is there from the beginning and throughout the project.
- **Communicate Between Management, Users, And Technical Staff.** Ensure users and technical staff work jointly on the project from the start--and therefore have a joint investment in its success--and meet at least monthly with management, user, and technical personnel to apprise them of project status and obtain their reactions.
- **Be Prepared To Re-engineer.** At least some re-engineering of your operation will be required to get the full benefit of imaging. Procedures and staff assignments that have been used for years may change in a way that cuts to the core of how work is performed. Changes of this magnitude are threatening and will be resisted by some people. Be committed to the re-engineering and ready to be showered with contempt for awhile.
- **Be Prepared To Integrate Imaging With Existing Systems.** You seldom get the full benefit of imaging if you use it in a vacuum.

In court applications, for example, imaging should be integrated with existing case processing and word processing systems to move documents in and out of files so that they are available for docket information, notice and service of process information, and court events.

- **Get Management's Commitment.** Like most things involving computers, imaging is expensive and time-consuming to bring to full operational status. Management must be apprised of this before an imaging project starts so it can decide whether to proceed. If it decides to go ahead, it must be committed to complete the project unless something unforeseen happens. Otherwise, precious human and financial resources will be wasted.

If you succeed with imaging, you may have an experience similar to that at one of the sites we visited. Initial skepticism was replaced by enthusiastic realization that the benefits of the imaging system exceeded expectations. Lack of interest from other departments was replaced by requests from these units to use the system. Fear that the organization would fail at imaging (as did a comparable organization that tried it) was replaced by firm assurance that the system is a big success.

CHAPTER FOUR
Implementation Strategy

At this point, you have decided imaging will help your recordkeeping, and you plan to proceed. But all you have done so far is *preliminary*. Now you need to get *specific*.

For example, remember all the caveats put on the earlier cost discussion? You obtained *preliminary* cost *estimates* on the imaging you *think* you need. Now you must decide on *specific* equipment, *specific* software, *specific* communications, *specific* space. And you must decide *specifically* how much it will cost.

That may sound like a lot of complicated decisions, but you should know *exactly* where you are going before you start to implement imaging. This chapter on implementation strategy will suggest how to do it.

Implementation strategy is divided into the following phases: analysis and planning, approval, procurement, and system implementation.

In each of these phases, you must make sure managers and users are committed to imaging and working with the technical staff on the imaging effort. The best way to accomplish this with managers is, as noted above, through their participation in the preliminary steps, their approval of the imaging project, and their continuing participation through project review meetings, sign-offs, and other oversight activities. Users should work side by side with the technical staff in each phase described below. They should be major participants in analyzing what they want imaging to do for them and in planning for its procurement and implementation. As the system is being implemented, they need to be assured they are getting what they expected. This can be accomplished through frequent demonstrations and reviews as the system is being installed and fine-tuned. Any complex technical project will have its share of unpleasant surprises. They can be devastating to a user's perception of and confidence in a system. Minimize these problems by making the users a part of the continuing action. Finally, convince the users that the imaging system is not an abstraction that they can look at dispassionately from afar. It will be *their* system, and *they* have a big stake in its success.

IV.A. Analysis and Planning

In the analysis and planning phase, the organization identifies its imaging requirements and translates them into imaging systems options. Then, one of the options is selected based on system capabilities; attributes of vendors who offer those types of systems; compatibility of the system and vendor with the organization's staffing, space, overall culture, and other factors; and cost. Finally, a plan is developed based on the selected approach.

IV.A.1. Requirements Analysis

The steps in the requirements analysis are as follows:

- Review those work processes in the organization that would be affected by imaging. What are they? What documents do you keep in active files, how do you organize them, and when do you purge them to inactive files? Does your organization have paper-intensive or repetitive work that might benefit from imaging? What components of imaging--such as workflow, OCR, or fax--would be useful? What are the legal considerations? How does your document processing relate to other systems such as word processing and, for courts, case processing systems?
- Translate the results of this review into a list of needs, which defines what you want the imaging system to do. This is your wish list. Imaging will be able to satisfy most of these

needs, but some may be impractical or impossible. For example, it would be prohibitively difficult for the imaging system to permit editing of document images.

- Acquire a deeper understanding of imaging technology by continuing the process begun in your assessment of whether imaging is right for you. This continuing assessment covers imaging equipment, software, communications, and anything else needed to permit imaging to work in your organization. It will expand a superficial knowledge of imaging into the detailed knowledge needed to plan for, obtain, and implement imaging.
- Combine the needs and imaging technology assessment to establish requirements for your imaging system. These requirements translate needs into capabilities that actually exist in today's technology and are realistic for your organization. The analysis may reveal that some needs, while unrealistic or impossible now, may be more realistic in the future. Requirements embrace all facets of imaging covered in Chapter Two that apply to your organization.
- Translate the system requirements into a hypothetical imaging system that meets them; consists of equipment, software, and communications that actually exist on the market; and is expandable to satisfy future needs.
- Identify several approaches that will yield the hypothetical imaging system defined in the previous step. You may find workable approaches with different combinations of equipment, imaging software acquisition methods, and communications. For example:
  - Equipment options may involve scanners or disk storage with different capabilities and prices;
  - Imaging software acquisition options may be whether to purchase the software from a vendor, develop the software in-house, or a combination of the two; and
  - Communications options may involve whether to use an existing LAN or install a new LAN.
- Consolidate the above approaches into one that is recommended, along with several alternatives, for the entire imaging system. In your analysis, consider costs, advantages, disadvantages, and effect on the organization, as well as the technical attributes. The analysis can become complicated because it should include all reasonable combinations of approaches and their costs. A thorough analysis is worth the effort, since it yields invaluable information about the imaging capabilities and costs of various approaches, and it is essential to properly establish a strategy for the upcoming procurement phase.

The requirements analysis is critical to evaluating imaging technology and how it will affect your organization and its work processes. After completing this analysis, you should know where the organization is going with imaging and what technologies are realistic options to get there.

IV.A.2. Planning

A comprehensive, detailed plan must be developed to chart how the recommended imaging system that emerges from the requirements analysis will be obtained, implemented, maintained, and used. In addition to the technology, the plan should cover all other things that must be accomplished to support the system. This includes staffing, contractor assistance, site preparation, conversion, training, changeover from the old to the new system, maintenance, records retention, operations, re-engineering, and supplies. It also includes costs for all these items.

Legal considerations are particularly important to courts and many other organizations. For example, imaged records must be legally admissible in court, and the records of some other

organizations must be acceptable to government regulatory agencies. The plan must address whatever needs to be done to ensure the legality of imaged documents. This may entail development of written procedures for the imaging operation and for handling imaged documents, complete audit trails for the processing of each document in the system, retention policies for each type of document, complete specifications for all imaging system equipment and software to show how documents are processed, and perhaps a person designated as system administrator. Look to your legal staff, local court rules, state records and archives standards, professional publications such as the Records Management Quarterly, and professional organizations such as AIIM for guidance in legality issues.

The plan should show what is going to happen monthly until the system is operational and annually for the next three to five years thereafter. The monthly plan should be detailed by task, due date, and responsible person or group; annual budgets should be included; and the plan should be updated regularly. The annual plan should allow for ongoing operations and system growth. There should be decision points for management review and modification of the plan if problems exist or are foreseen.

The annual budgets should include each applicable cost category described above (i.e., equipment, software, communications, staffing, contractor assistance, site preparation, conversion, training, changeover from the old to the new system, maintenance, records retention, operations, re-engineering, and supplies) that applies. Unlike the discussion of costs in the previous chapter, the level of detail should be different because, now that you have completed the requirements analysis, you can give detailed and reliable cost estimates instead of the rough estimates discussed earlier.

IV.B. Approval

In keeping with the earlier discussion of management's support and commitment, management should not support and commit to a poorly-defined undertaking. The plan should tell management what it needs to know about the imaging system, the procurement and implementation strategy, the advantages and disadvantages, and the cost. Armed with this knowledge, management can make an intelligent decision on imaging. Of course, if management has been involved in the project from its inception, as recommended above, presentation of the plan will be just another step in its ongoing participation--not an all-or-nothing roll of the dice.

IV.C. Procurement

The first step in implementing the plan is to procure the equipment, software, and communications that comprise the imaging system identified in the requirements analysis. This discussion will be restricted to items purchased from outside vendors and will not address in-house development of imaging application software by staff or contractors.

Some organizations that need technology blissfully seek systems that do not exist. This may lead to the recourse of buying what the vendor offers but not necessarily what the organization needs. Because of the requirements analysis, you can avoid that trap. You should know what you are looking for and know that it is realistic.

You must decide whether the procurement will be competitive or sole-source. If it is competitive, you need to establish the procurement methodology, which usually consists of preparing and issuing a request for proposals (RFP), responding to questions from bidders informally and through a formal bidders conference,

receiving and evaluating the proposals, and making a selection. Much time can be saved by a sole source procurement, but there may be legal restrictions, procurement regulations, poor public relations, and fairness to all potential vendors that dictate a competitive procurement.

As much as possible within the constraints of procurement procedures and regulations, evaluate as many imaging systems as possible by talking to users and vendors, reviewing documentation, attending demonstrations, and--best of all--observing the system in a live operational setting. If, in that operational setting, you can try the system, that is even better. Despite all this, you will have a full understanding of the advantages and disadvantages of an imaging system only after you have purchased it and used it for several months. The above measures, however, reduce the risk of unpleasant surprises.

After fully evaluating the prospective imaging systems and vendors, purchase the imaging application software and compatible hardware, system software, and communications. Sometimes these may be procured as a package, and sometimes they come separately. If costs are comparable, you may increase the chances that the many complex parts of the imaging system will work together by purchasing it as a package rather than piecemeal.

IV.D. Implementation Steps

The big day has arrived. The imaging system has been delivered. There it is--sitting in those boxes in the hallway. What are you going to do now? This section will tell you about system implementation.

Assuming the building has been properly wired and otherwise prepared for the imaging system, the implementation steps are to

- Install the imaging system;
- Test it individually and with other systems with which it must communicate;
- Train users and technical staff;
- Conduct acceptance tests and documentation reviews;
- Convert files to the new system;
- Modify any procedures affected by the system;
- Obtain management sign-off;
- Change from the old system and procedures to the new system and procedures;
- Arrange for maintenance; and
- Arrange for file backup and system recovery.

Most imaging system vendors will assist with these steps. Many organizations supplement this with contractor assistance or, when imaging and other systems are integrated, a systems integrator.

After the building is prepared, the next step is to **install** the imaging system, which includes the equipment, application and system software, and communications. This usually is accomplished incrementally. The first step is to get the imaging system running as an individual system so that problems within it can be identified and corrected. Then the imaging system can be integrated with the other systems, computers, and networks with which it will operate.

Since ongoing **technical support** is important, consider building a long-term relationship with whoever installs your system because they will know the system and be able to maintain it and assist in problem resolution. After an initial period, most vendors charge an extra fee for this service. Telephone support may be sufficient if your staff is expert in diagnosing and fixing computer problems. Otherwise, on-site vendor support will be necessary when problems arise. Small to medium-sized courts should be particularly aware of the need for on-site support since they usually do not have their own technical staff. If this applies to you but you get good support from the county or city technical staff, and if that support is rapidly available when needed, then perhaps telephone support will suffice. But be careful. With imaging, even more than with other computer systems, there is a tendency to regard it as a "black box"--plug it in and watch it run. That assumption will lead to trouble.

File backup and system recovery provisions are essential to guard against system failures. Backup image files should be created at the end of each day and stored at a location other than where the operational files are located. If the imaging system fails, procedures must exist to resume operations from a specific checkpoint and re-enter all documents that had been scanned between the checkpoint and the time of system failure. Backup and recovery are often overlooked. Once again, with imaging, we have the "black box" syndrome. Black boxes do not malfunction, so why worry? Why indeed! Be prepared.

Training is crucial for all levels of staff who will maintain and use the imaging system. Imaging is like any other system in that it can be used effectively and fully only if staff know how to take advantage of all its capabilities. We need to see the big picture--not just how to image one or two forms. That means thorough training. Different types of training are necessary for technical staff who maintain the system, users in the workflow who scan documents into the system or use imaged documents to enter data into other systems or for other work, and users outside the workflow who need information from imaged documents. If these staff have been involved in the imaging project from its inception, as they should be, training will be a step in the evolution to imaging. Each staff member should be comfortable with the software and familiar with the system documentation as they relate to him or her. With the constant flow of paper coming through court clerk's offices and the public waiting at the counter to be served, there is a great temptation to keep staff on the job and cut corners on training. Resist the temptation. Figure out a way to handle the paper *and* train staff properly. It will pay big dividends.

System supervisors and administrators should receive more detailed training because they should know most user functions and enough about the system to answer questions and categorize problems. These people need to be involved in every stage of the implementation process. It is especially important that they work with the person installing the software and hardware so they understand that process.

Several things usually happen throughout implementation. **System tests** are conducted to make sure the imaging system is working properly--first as a separate entity and then with other systems, computers, and networks. You should carefully review, or ideally participate in defining, the tests so that you are sure *all* the requirements are satisfied. The statement that "tests should be conducted in a test setting" is not as simple-minded as it sounds. Not that courts are the only offenders, but how many instances can we name in which system problems have been found while processing an actual case in an operational setting? Then it can be serious and embarrassing. It may even lead to a lawsuit. If that happens in your court, you will wish you had tested the system more thoroughly.

File conversion, with an inventory of converted records, should occur throughout implementation if you are going to start the new system with active documents from the old system. For some organizations, this is a massive effort because they convert all of the old documents, whether they are on paper or an earlier image storage medium. Other organizations simply start the new system with documents received from that point forward and keep the old system in operation until all its records are closed. Still other organizations seek a middle ground by entering some old documents into the new system and retaining the old system for the other documents. If old documents are to be converted, which ones are converted first? Most organizations begin with the high-activity documents such as those that are retrieved frequently and worked on by several people. While these are among the main elements of the conversion strategy, the specifics depend on the imaging application in each organization. All organizations share at least one thing about conversion: it is critical and must be planned and executed properly, with appropriate staff, if it is to succeed. Many organizations relocate staff out of

their normal workplace so they can concentrate on the conversion. It is a tedious and systematic process to prepare massive volumes of documents for scanning, scan them into the imaging system, verify the scanned documents' accuracy, and prepare and enter indexes. The scanners seldom work as rapidly as anticipated. Momentum must be maintained. Some organizations use contractors because they cannot extricate staff from everyday work to concentrate on the conversion. For courts that retain and use records for many years, such as probate courts, imaging usually means either converting all documents to images or using a combination of microfilm and imaging. Such high-volume courts may require as much as one year to convert all documents to images. At the other extreme, traffic courts have short-lived cases and may convert none of their documents in a changeover to imaging. You must assess your situation and adopt the proper conversion approach.

One of the implementation steps is to **modify, or re-engineer, any procedures** affected by the imaging system. If the re-engineering is extensive, it probably will take place throughout most of the implementation period. If only minor re-engineering is required, it can be accomplished at the end of implementation. Although the actual modification is done at the end of the project, you should emphasize reevaluating work processes from the beginning of the analysis. As you analyze the work processes and how imaging could apply to them, you should envision and begin setting the stage for the re-engineering that will be needed to realize the full benefits of imaging. But go beyond imaging. A significant by-product of an imaging project comes from the process of evaluating the way an organization does its work. Use imaging as an opportunity to improve a wider group of work processes. Streamline as much of your operation as possible. And begin preparing your staff for the impending changes so that they will understand and feel less threatened by--and perhaps even support--the improvements that imaging will engender. Analogous to training, make re-engineering evolutionary as much as possible.

Implementation concludes with acceptance testing, changeover from the old to the new system, and management sign-off. **Acceptance testing** includes the system, its documentation, and all other vendor deliverables. During **changeover** you must phase out or, at a given moment, stop using the old system and phase in or, at that same given moment, start using the new system. Some organizations make changeover easier by gradually introducing system users to the PCs and other workstations that will be part of the system, by first using the system in a pilot test workgroup, or by installing a prototype of the system and gradually enlarging the prototype until the full system is achieved. In their excitement over the new system, organizations sometimes forget that implementation of new system policies and procedures is part of changeover. This includes maintenance, records retention, operations, and supplies. Changeover can become complicated in courts in which several existing systems will function with the new imaging system. For example, suppose imaged documents were to be entered into and used with separate civil, probate, and domestic relations case processing systems. In such instances, changeover to imaging--and perhaps the entire imaging implementation--may occur in separate phases. In its **sign-off**, management verifies that everything promised by the vendor or included in the plan and requirements analysis has been completed and is acceptable.

CHAPTER FIVE
The Future

If the future of imaging had to be expressed in one word, that word would be *integration.* For imaging, integration has several different connotations. There is integration within a department (e.g., the claims processing department or the clerk's office) that combines imaging with data processing, word processing, communications, and other functions performed by computers at a given location as noted earlier in this report. There is integration throughout an enterprise (e.g., a company or court) that combines these functions as performed on a departmental computer with functions performed on other computers in the organization. And there is integration that goes beyond the enterprise and embraces many organizations or enterprises.

Now consider the future from another perspective. Assume you are a court user who has installed an imaging system. Aside from imaging itself (and excluding the JEDDI data exchange emerging technology discussed earlier in this report), what changes might you encounter? Each office now has access to imaged case records and can enter pleadings and other information electronically using the case processing and imaging systems. For courts that cover large geographic areas, this could lead to more branch courthouses and work from judges' offices not located in the courthouse. Similarly, attorneys could file pleadings from their offices using fax machines, remote scanners, and PCs. Official signed documents could be assembled and disseminated electronically by integrated imaging, word processing, and case processing systems without physically routing the documents to the judge and other participants. Financial transactions involving invoices, vouchers, and credit cards could be handled electronically. Appeals could be made with the electronic transfer of trial court records, thereby avoiding the transfer of voluminous records from the trial court to the appellate court. These are only some of the possibilities. They have obvious implications regarding security, authenticity of signatures, definition of official records, and other issues. Since they may be in your future if you use imaging, you should be prepared.

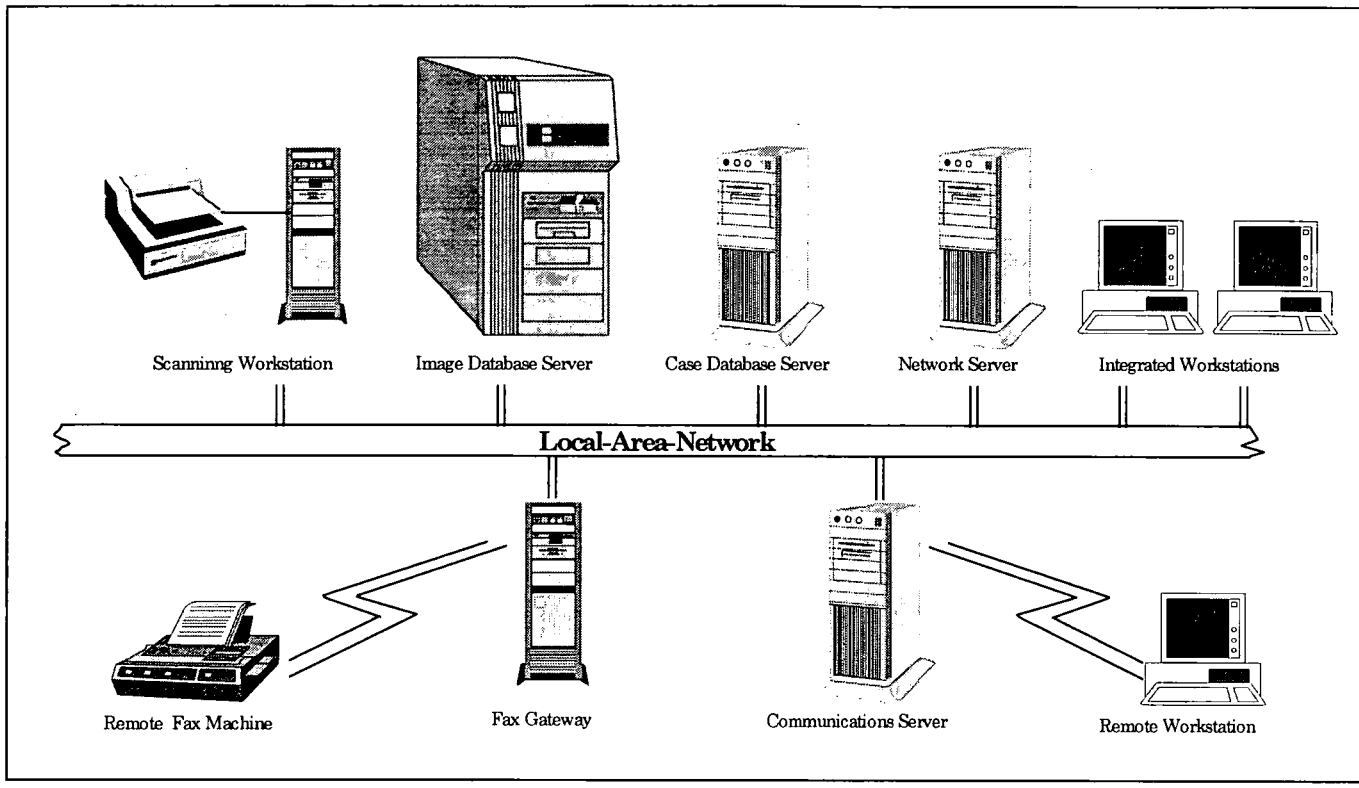
As you can see from these examples, integration of technologies will play a major role in the future. The integration should go beyond simply having these technologies on the same computers and networks (see Figure 6). It should encompass the time integration of applications, so that parts of data from data processing systems, parts of word processing documents, parts of imaged documents--perhaps even parts of voice messages --can be combined into the same document or screen presentation.

How will integration manifest itself in terms of the imaging functions discussed throughout this report? We can see this best by looking at open architecture, client/server and desktop computing, workflow, OCR, text retrieval, and compound documents relative to the future of imaging.

V.A. Open Architecture

Open architecture is a hot topic throughout today's computer industry. It means equipment, software, and communications from Vendor X must work with equipment, software, and communications from Vendor Y because an organization may be able to get the best combination of price and performance by using some items from Vendor X and other items from Vendor Y. (This assumes both vendors are major companies with products that conform to computer industry standards.) It also means the organization's equipment, software, and communications would work with those of another organization that uses the industry-

Figure 6: Integration of Imaging and Case Management System Components



standard products of Vendor Z. In the old days, organizations tended to buy proprietary products from a single vendor, and these products would work only with other products from that same vendor. That is a rapidly vanishing practice.

In imaging, open architecture means (1) the imaging system can receive images from and send them to standard networks and computers and (2) the networks and computers can process the images. In each case, a language--called a protocol--exists to make sure both sender and receiver know what is being sent, how long the transmission is, where it is going, and other transmission characteristics. Standard networks and computers use standard protocols and network setups, which are the keys to getting an image to its destination. Once at the destination, in order for the receiving computer to be able to process the image, the image must be in a standard format that can be understood by this computer.

Clearly, little integration of the multiple-vendor installations that are becoming prevalent today--in both imaging and computers in general--could be easily accomplished without open architecture.

V.B. Client/Server and Desktop Computing

Until recently, when a new system was contemplated, the instinctive reaction was to put it on the mainframe computer. Organizations lived by their massive mainframe computers. Those days are gone. Computing is getting smaller. Much of it is moving from the mainframe to the user departments and desktops. PCs and LANs make this possible. Powerful server PCs control LANs and coordinate network functions such as communications, database management, and printouts. Other PCs--called *client* PCs--are devices in the LAN that enable individuals to use the network's functions and to perform individual user applications, such as case processing, and desktop functions, such as word processing and spreadsheets. Client/server computing integrates the server and client functions so that each user

can perform work on his or her desktop using graphical interfaces (as in windows) without concern about which computer contains the programs and data needed for a particular user application and network function. Stand-alone PCs perform desktop functions independently of a network. Whereas in the past there was only the mainframe, now there is a triumvirate consisting of the mainframe, client/server networks, and stand-alone PCs.

Organizations are moving toward a more balanced processing approach in which some systems belong on the mainframe, some belong on networks, and some belong on PCs. The same will happen to imaging as it becomes more fully integrated into the organizations' other computer functions.

Here is a key element in the downsizing movement toward many smaller computers instead of one huge computer: the organization must decide which functions belong on each type of computer. Just as an instinctive gravitation toward the mainframe usually is inappropriate, so too is an unthinking bias toward client/server networks. This applies to computing in general and imaging as it becomes one of the functions offered, in an integrated fashion, on client/server networks and desktops.

The fact that the mainframe still should be part of any analysis of computer applicability does not reduce the profound significance and impact of client/server and desktop computing. The potential benefits are enormous. In imaging, think of the benefits to be gained from being able to retrieve and work on text from all types of documents, form compound documents, and define and use document workflows from your own PC through the LAN. Since these imaging capabilities would be represented by icons you could select, just as you now select word processing and spreadsheets, imaging would be fully integrated with the other client/server and desktop functions.

In addition to potentially improving functionality, *appropriate* downsizing of imaging to the desktop probably would reduce costs just as it seems to be reducing the costs of computing in general. (While the initial costs of client/server computing usually are less than mainframe computing, client/server technology is too new to assess its long-term costs.) One of the defining characteristics of imaging has been its cost. Downsizing has the potential to lessen this obstacle.

But note that imaging downsizing must be *appropriate*. Analogous to computers in general, it may be some time before client/server and desktop imaging will be sufficiently powerful and versatile to accommodate the massive organization-wide imaging functions. They should remain on mainframe computers in the meantime.

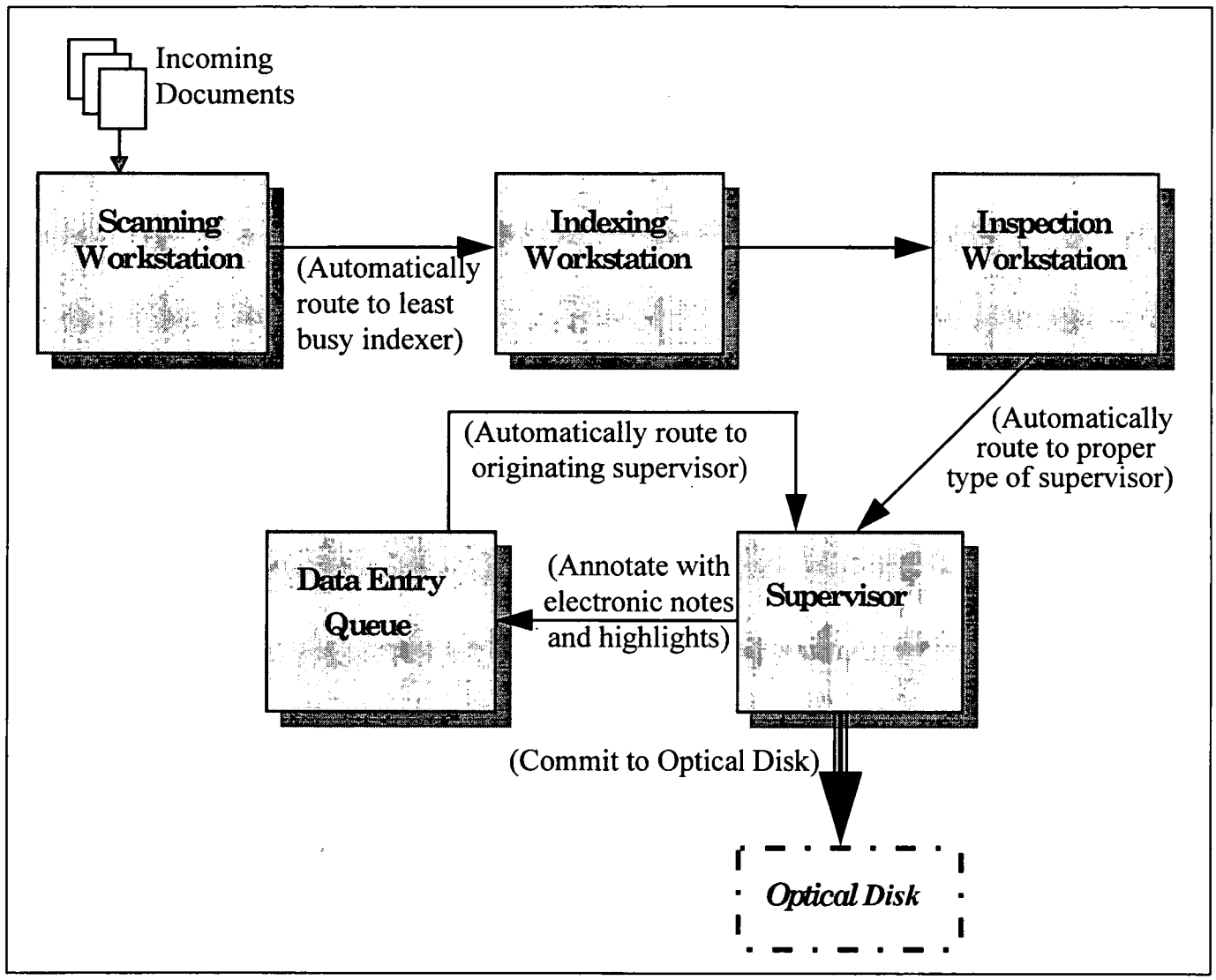
V.C. Workflow

As described earlier, automated workflow routes imaged documents around to workstations for processing (see Figure 7). There are two levels of workflows: organizational and workgroup. An organization may be the entire enterprise (e.g., a company or court) or a department within the enterprise (e.g., the claims processing department or clerk's office). A workgroup connotes a smaller group of workers doing the same type of work (e.g., the judge, law clerks, and secretary in a judge's office).

The organizational workflow in a department is most prevalent today, and it usually is processed on a mainframe computer. Use of workgroup workflows will grow as the capability becomes more common in client/server networks and desktop PCs.

Mainframe automated workflow products will be more widely used as their capabilities and flexibility are improved to (1) replicate the actual processes through which documents are routed and (2) accommodate exceptions to the normal workflow. The products should perform functions such as sending work to whoever is available and qualified to work on it, modifying priorities of work that needs to be expedited, creating subtasks

Figure 7: Example of Automated Workflow



when unanticipated situations arise, and recording information about workflow performance for later reporting.

Client/server automated workflow products will be moving toward the graphical interfaces that are prevalent in PC windows. In these interfaces, icons that represent specific functions (e.g., word processing and spreadsheet) appear on the PC screen and are selected to activate a function. In the workflow function, icons will be created to represent document processes. These icons then can be manipulated and linked to define the workflow for a given document or group of documents. After the workflow is defined and validated through simulation, it is ready for use in the workgroup. Steadily improving products that perform these workflow functions are appearing on the market.

These client/server workflow products will function as an *integral part* of client/server and desktop computing. In many respects, workflow will be the *agent* for integration since it will define work to be done on a document (e.g., convert using OCR, combine data and text with images to form a compound document) and will be linked, using icons, to the document.

Workflow is not unique to imaging. It applies to almost anything that goes from workstation to workstation for processing--such as preparation, review, and modification of an opinion prepared by several judges using word processing. In fact, many organizations are using automated workflow as a vehicle for re-engineering because it brings work processes into sharper focus and helps standardize them. Workflow reaches its full usefulness when imaging, data processing, word processing, and other technologies are integrated so that users can easily perform whatever work is required regardless of the technology.

Because of its wide applicability, workflow software is improving rapidly and being more widely used. Mainframe and client/server workflow products will provide more functionality, conform to previously undefined standards, and contain better workflow performance monitoring.

V.D. OCR

OCR is one of the keys to the future because it permits imaged characters (e.g., letters, numbers, and punctuation marks) to be converted by the computer to a form that can be recognized by other types of systems such as data processing and word processing systems. This avoids manual reentry of these characters. For example, OCR could be applied to parts of imaged pleadings to update the case processing system and to supply parts of court orders produced with word processing.

While, as noted earlier, OCR is improving, it has not yet reached its full potential. Two methods that have great promise are neural OCR and contextual intelligence. Conventional OCR attempts to match each individual character, or that character's features (e.g., lines, loops, and curves), with predefined characters or collections of features that infer the character's identity. Neural OCR, on the other hand, collects information about the character and attempts to deduce the character's identity by "learning" about the character, much like the human brain. Contextual intelligence deduces additional information about the character based on factors such as frequently used phrases or character combinations in the document, syntax and semantics, and document topics.

Some larger imaging systems, such as the one being developed for the federal Internal Revenue Service, increase the accuracy of OCR conversion by passing imaged characters through multiple converters with algorithms that key on different character features. Presumably, the complementary effect of these multiple converters will increase the probability of a correct OCR conversion.

V.E. Text Retrieval

If you are working with a document, you may want to see the document as it originally appeared and not simply a summary of the document or only its text. Data processing systems can index a document and display a summary of its contents but cannot easily display the complete document. If the document happens to be in your word processing system, you can retrieve its text, but you cannot display the document as it originally appeared. Imaging, integrated with data and word processing, opens a wider universe of possibilities for document retrieval and display.

Specifically, the three integrated technologies needed to input, index, store, retrieve, and distribute documents are text retrieval, imaging, and database management. Imaging and text retrieval, respectively, permit original documents and only their text to be input into a computer. Text retrieval permits the document to be completely indexed, using full text if necessary, and stored and retrieved, usually in full-text form. Using document locators obtained from text retrieval, imaging permits documents to be stored and displayed as they originally appeared. Database management provides the underlying control and support for the documents and indexes in storage.

This addresses problems such as finding information by subject or title as opposed to by

case number or some other numerical identifier. While indexes or summary database records will lead you to some information, you often need to search the actual documents to find the correct subject or title. We all have experienced this need with our manual files. Working with its index, text retrieval permits a full-text search as a preliminary screening, followed by a display of those documents for which matches were found. This process can be repeated until the number of matches is manageable. Finally, using imaging, the document(s) that you need are retrieved and displayed.

Text retrieval will greatly enhance the value of imaged documents as integral parts of multi-media repositories from which, for example, information stored in imaging, data processing, and word processing files can be retrieved and used.

V.F. Compound Documents

Much of the integration *reaches fruition* in compound documents in which parts of documents and data from imaging, word processing, and data processing systems can be combined into a single document without cumbersome format conversions or other manipulations. OCR will make this a reality, as noted above, by converting images into a format that is common to word processing and data processing.

For example, in preparing a court order, a judge may use the case processing system index to identify similar orders. Then he or she may retrieve the imaged orders (text retrieval and imaging), review and combine parts of them with data from the case processing system and new text, using word processing to create the desired order as a compound document. These steps may be predefined by a workflow linked to the order creation function.

Carrying the integration two steps further, if the above documents, or their parts, can be reduced to graphics similar to the icons in today's client server and desktop computing, it may be possible to create a compound document by manipulating the icons instead of lengthy text. Finally, with open architecture and the computer and network integration that it promotes, compound documents could be created across networks of computers as would be done by supreme court justices researching, writing, reviewing, and editing an opinion from their offices scattered around the state.

CHAPTER SIX
Summary of Imaging Sites

Up to this point, the report has covered imaging as it is now and as it is likely to be in the future in a generic treatment that could apply to any application. Now we turn to imaging in specific sites.

In preparing this report, we visited six imaging sites--three court sites, two sites in the executive branch of state government, and a corporate site. We selected these sites to show a variety of court imaging applications as well as several examples of how imaging is used in other branches of government and in industry. We concentrated on sites that were roughly equivalent to courts in size and to which courts could relate, and this eliminated massive imaging operations such as those at some insurance companies and federal agencies.

The six sites visited were the Riverside County Consolidated Superior/Municipal Courts, Orange County Jury Commissioner's Office, Orange County Central Municipal Court, Delaware Secretary of State Division of Corporations, CSX Corporation, and Virginia Retirement System.

At each of these sites, while imaging performs the basic functions of capturing, storing, retrieving, displaying, processing, distributing, and managing documents, it performs them in different ways and to different degrees. The key point is this: *imaging satisfies the need at each site*.

While the purpose of this report is not to evaluate the sites, each has attributes that are exemplary. When considered as a composite, they illustrate most of the imaging capabilities and considerations discussed throughout the report.

- The Riverside County Consolidated Superior/Municipal Courts have (1) open architecture that allows the imaging system to work with various PCs and networks and (2) strong supervision of the imaging section that enhances system efficiency and data accuracy.
- The Orange County Jury Commissioner's Office (1) avoids key entry by using OCR to convert the information in boxes on juror questionnaires to data and to enter it into the jury case processing system and (2) has strong technical support for its imaging project.
- The Orange County Central Municipal Court imaging system functions as a member of an integrated information system that has enabled the municipal court to give the public "one-stop shopping" at a single location instead of passing a person around to several clerks for different types of service.
- The Delaware Secretary of State Division of Corporations imaging system (1) allows input by either remote scanning, local scanning, or fax; (2) uses a sophisticated workflow formula to assign workers to requests based on a worker's capability and a request's priority; and (3) superimposes text in blank spaces on forms that contain signatures, seals, letterheads, and other inscriptions to produce excellent-quality official documents.
- CSX decided to eschew an expensive turnkey imaging system and form a development team comprised of its technical staff and vendor personnel, and this approach (1) gave CSX the best of all worlds by combining CSX staff who knew how the company applied technology with the vendors who knew imaging, computers, and networks; (2) saved CSX over $1.5 million because management knew exactly what equipment was needed and could order new equipment only to supplement what

already was installed; and (3) gave CSX direct project involvement and customized software.

- The Virginia Retirement System imaging is simply a good overall system that is right for that organization because it (1) needs to distribute specific types of documents to the workstations that process those document types; (2) has several operators working on a document concurrently; (3) needs to integrate imaging, data, and text; (4) needs to group information received over many years; and (5) needs to locate files and information rapidly.

The table given below will help you identify which imaging characteristics are highlighted in each of the six site-visit write-ups. The emphasis is on major features such as those noted above as exemplary, those that may be unusual, and those that illustrate major directions for the future covered earlier in this report. *Inclusion of a feature for a particular site indicates the feature is highlighted in the write-up for that site; it does not necessarily imply the feature is absent from the other sites.*

The court site visits to the Riverside County Consolidated Superior/Municipal Courts, Orange County Jury Commissioner's Office, and Orange County Central Municipal Court are covered in the next chapter. Appendix A consists of reports of the Delaware Secretary of State Division of Corporations, CSX, and Virginia Retirement System site visits.

While the three court sites are presented together in an integrated manner, the three non-court sites are covered in separate reports. In each instance, the presentations consist of

- A **Summary** of imaging at the site(s),
- A brief **Enterprise Description** of the environment at the site(s) in which imaging is used,
- A description of the main characteristics of the site's **Imaging Application** that
  - Gives an overview of the background, imaging functions, and equipment and software used for imaging and related systems;
  - Summarizes the planning, implementation, and management used in the imaging project;
  - Summarizes the operations and maintenance of the imaging system;
  - Gives the advantages and disadvantages of imaging from the site's perspective; and
  - Summarizes future plans.
- A **Detailed System Description** of how the site(s) performs imaging.
- A summary of the **Conclusions** derived from the site visit(s).

Feature	Riverside County Courts	Orange County Jury	Orange County Municipal Court	Delaware Division of Corporations	CSX	Virginia Retirement System
Local scan input	X	X	X	X		X
Remote scan input				X		
Fax input	X			X	X	
Document import						X
OCR		X				
Integrated image/film index						X
LAN or client server	X		X	X	X	X
Enterprise network	X		X	X		X
Enterprise integration			X			X
Workflow				X		X
Open architecture	X					
Compound document				X		
Strong technical support	X	X	X	X	X	X
Strong development & implementation strategy				X	X	

CHAPTER SEVEN
Imaging In Courts

What about imaging in the courts? How is it used? What are the courts' experiences with it? All three courts we visited to answer these questions are in California--the Riverside County Consolidated Superior/Municipal Courts, the Orange County Jury Commissioner's Office, and the Orange County Central Municipal Court.

This chapter covers imaging in these sites. As noted above, the three sites are covered together in an integrated manner to permit you to understand why and how different courts use imaging. It permits you to see, "side by side" for each court, the events that preceded imaging; how each court planned, procured and implemented imaging; the functions of the imaging systems; the computers, software, and communications used by and integrated with the imaging systems; and how each court operates and maintains its imaging system. You can see a composite of courts that exhibits strengths in many areas described in this report, including systems integration, use of open architecture, use of OCR, systems management, and technical support. Finally, you can see what each court regards as the advantages and disadvantages of imaging and the future plans.

VII.A. Summary

In California, the superior court has general jurisdiction over criminal and civil cases. The municipal court has jurisdiction over civil cases of less than $25,000; small claims; and traffic and criminal offenses such as driving under the influence of alcohol or drugs, driving with a suspended license, misdemeanors, non-support, unlawful detainer, and felony preliminary hearings.

Relative to larger imaging sites in the state agencies and a corporation covered in Appendix A, the three California courts visited for this report use basic imaging. To their credit, they have identified and obtained the level of imaging that they need and are using it successfully. They share four essential attributes: imaging has fulfilled the need that motivated them to obtain it; imaging has met or exceeded their expectations; they have added unique features where necessary to enhance their operations; and they have strong management, user, and technical support. It is significant that two of the three courts avoid manual key entries in indexing scanned documents. While the three courts have several things in common, how they enter the documents into their case processing systems and what they do with the images differ.

The Riverside County Consolidated Superior/Municipal Courts clerical staff keys information from civil pleadings into the case processing system, and the imaging section scans the pleadings and indexes them using an image key assigned by the computer. The pleadings are received over the counter or by facsimile transmission (fax) through the imaging system. This site has two exemplary features: (1) open architecture that allows the imaging system to work with various personal computers (PCs) and communications connections and (2) strong supervision of the imaging section that enhances system efficiency and data accuracy. The Riverside County courts purchased imaging to improve recordkeeping and document access efficiency and to provide better service to the public. These objectives have been realized, and, unexpectedly, imaging has helped the legal research assistants (law clerks) access documents more easily and rapidly. As a by-product, imaging will be the glue that holds recordkeeping together when records are dispersed to three locations because of seismic tests at the courthouse. The imaging system for civil cases in the superior court and three of the five Riverside County

municipal courts cost about $392,000. By the time the other two municipal courts are implemented, the system will cost approximately $550,000.

When the Orange County Jury Commissioner adopted one day-one trial juror service, it was apparent that the old methods of data entry would be inadequate to handle the dramatically increased volume of completed juror questionnaires. These questionnaires accompany the juror summons and are completed and returned by prospective jurors. Imaging was the solution. The questionnaires are designed so that prospective jurors print their information in specific boxes, and the imaging system scans the completed questionnaires and uses optical character recognition (OCR) to convert the information in the boxes to data and enter it into the jury case processing system. This avoids key entry of juror information, and it has achieved the expected results of improved efficiency and increased accuracy. In addition to the OCR capability, this imaging project is notable for its strong technical support. The system cost about $70,000.

After relatively straightforward scanning of citations for traffic and non-traffic infractions and local ordinance violations augmented by a bar code reader for case numbers, the use of document images permeates the overall Orange County Central Municipal Court information system. The overall information system combines a group of systems that are integrated using windows on users' PCs. The elements of this integration, in addition to the imaging system, are systems on large and intermediate-sized computers, desktop PC applications and software such as word processing and statistical reporting, and communications to other computers and information services. This, then, is the exemplary feature of the Orange County Municipal Court imaging system: it functions as a member of a multi-faceted and highly integrated information resource. Integration has enabled the municipal court to give the public "one-stop shopping" at a single location instead of passing a person around to several clerks for different types of service. For its part in the integrated process, imaging has achieved the objective of eliminating problems with manual document filing and retrieval and has permitted documents to be rapidly accessed and viewed in the integrated windows environment. The imaging system cost between $300,000 and $350,000.

In conducting the site visits, we received invaluable assistance from the following individuals:

Riverside County Consolidated Superior/Municipal Courts
Garry Raley, Assistant Court Executive Officer
Stan Gobozy, Judicial Services Supervisor

Orange County Jury Commissioner
Kambiz Kamiab, Systems Programmer Analyst

Orange County Central Municipal Court
Robert Gray, Assistant Court Executive Officer
Lana Dinh, Systems Programmer Analyst
Patricia Duffy, Systems Programmer Analyst
Dee Velasco, Senior Office Supervisor

We appreciate their assistance and cooperation.

VII.B. Enterprise Descriptions

Management, imaging users, imaging technical personnel, and computer personnel contribute to imaging in the three courts.

In the Riverside County Consolidated Superior/Municipal Courts, these activities are under the Executive Officer/Clerk. The imaging users and technical personnel and the computer personnel are under Mr. Raley, who is one of the two Assistant Executive Officer/Clerks. Mr. Gobozy supervises the seven-member imaging unit, and the imaging and computer system support are outsourced under a contract monitored

by Mr. Raley. There are two levels of management, the Director of Court Operations and the Operations Manager, between Mr. Raley and Mr. Gobozy. The average imaging volumes are between 2,000 and 3,000 eight-page civil pleading documents scanned each day and between 10,000 and 20,000 imaged pages printed each week. The courts' address and telephone number in Riverside County are

Consolidated Superior/Municipal Courts
of Riverside County
4050 Main Street
Riverside, CA 92501
909-275-5536.

The Orange County Superior Court Executive Officer is also the Jury Commissioner, and the 19-member jury unit, which scans between 700 and 1,000 summonses each day, is under the Manager of Jury Systems Services. This manager reports to one of the four Assistant Executive Officers. All imaging and computer technical support is provided by the Superior Court's information systems unit, with contractor assistance if required. Mr. Kamiab is a member of the information systems unit. The address and telephone number are

Orange County Jury Commissioner's
Office
700 Civic Center Drive
Santa Ana, CA 92702
714-834-2380.

Imaging in the Orange County Central Municipal Court is under the Municipal Court Executive Officer and is managed by Mr. Gray, the Assistant Court Executive Officer. Several members of the 22-person Data Control unit scan the approximately 96,000 citations for traffic and non-traffic infractions and local ordinance violations that are filed annually. The 26 clerks in the Traffic/Minor Offense Division who deal with the public on these types of cases use the images as an integral part of the overall information system. Members of the Administration unit's technical staff, with contractor assistance, support imaging and the municipal court computer equipment and software. Managers of the Data Control and Traffic/Minor Offense Divisions, as well as each member of the Administration unit, report to the Assistant Court Executive Officer. Some municipal court case processing is done on the Orange County mainframe, and the county information services staff and contractors support these systems. The court's address and telephone number are

Orange County Central Municipal Court
700 Civic Center Drive West
Santa Ana, CA 92701
714-834-3571.

VII.C. Imaging Applications

The imaging application in each of the three visited sites is described as follows:

- An overview of the events that led to the decision to use imaging and a summary of the functions of the imaging system and the equipment and software on which it runs;
- Descriptions of the planning and implementation steps that accompanied imaging and the management controls used by the site;
- Summaries of how the imaging system is operated and maintained;
- Summaries of the advantages and disadvantages of imaging at the site; and
- A description of the site's plans for imaging in the future.

VII.C.1. Overviews

VII.C.1.a. Riverside County Consolidated Superior/Municipal Courts

After discussing imaging with several vendors, the Riverside County Courts staff prepared imaging system specifications as a precursor to a request for proposals (RFP). They then prepared

the RFP and issued it to a number of vendors. They received 14 responses, of which 4 were for proprietary systems and 10 were for systems with open architecture. The courts preferred open systems that would work with computer equipment and software (primarily PCs) already installed in Riverside County, thereby eliminating sizable additional purchases. Another important criterion was that the system be in use somewhere so that Riverside County court personnel could see it in operation. The few vendors that could meet the latter criterion were evaluated on their system's scanning, indexing, retrieval, and printing features; its computer memory capacity; and the degree to which it could be expanded to process increasing caseloads and accommodate more users. This reduced the contenders to two, from which the Image-X Document Imaging System (IDIS) from Image-X was selected because of its indexing capabilities. The indexing capabilities would reduce indexing errors, and open architecture would allow the system to be used with the PCs (including IBM and various "generic" types) and network connections already installed. This process consumed most of 1991, and IDIS became operational in mid-1992.

Civil pleadings are received at the counter or by fax, entered into a case processing system that runs on a Data General mid-range computer, and assigned an image key by the case processing system. Later, the documents are scanned into IDIS, automatically indexed using the image key, subjected to quality assurance checks, and stored on optical disk. The images are then available for retrieval by clerk's office staff, legal research personnel, judges, and other court personnel as they work on cases.

As shown in Figure 8 (the computer and network diagram), the Riverside County courts imaging system consists of the following:

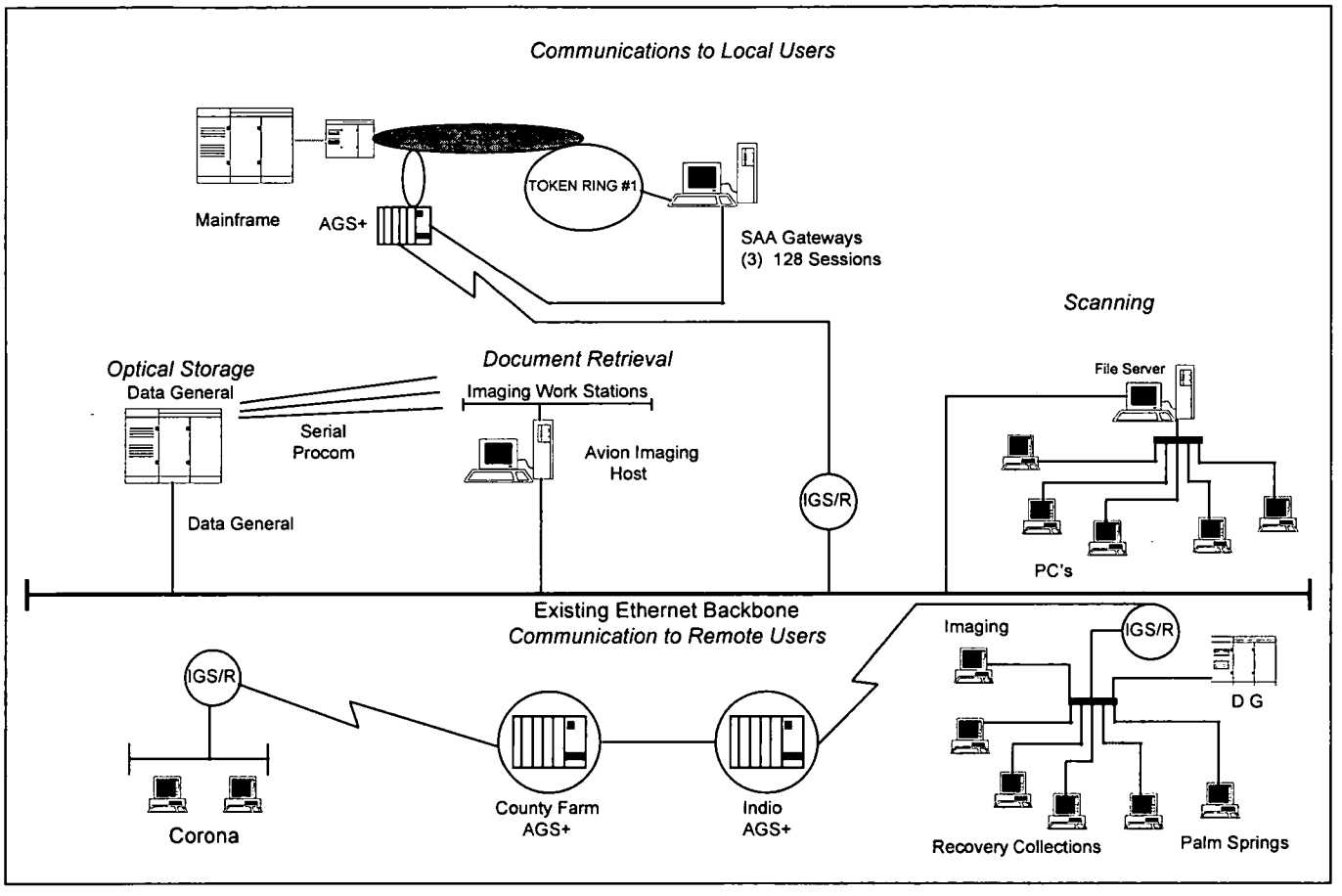
- Scanning with seven Data General PCs running under Windows, a scanner for each PC, a Data General print server with a Canon printer, and a Data General Aviion display terminal;
- Optical storage using two Data General jukeboxes running under OpStar with a total capacity of 64 billion characters;
- Document retrieval using a Data General Aviion file server running under Unix;
- Document display for users with Data General Aviion display terminals (civil clerks), IBM PCs (secretaries), and a variety of other devices on the local area networks (LANs) described below;
- Document display for other users (e.g., legal researchers and judges) who have gateway communications from their PCs into the LANs described below; and
- IDIS software consisting of a data processing application database (called Progress), image compression and decompression, image viewing, and optical file management (called Management Information Network Data Service, or MINDS).

Together, these components provide the capability to scan documents, store and retrieve images, link them to data processing applications, display and print them, compress them for more efficient storage and communications, and decompress them for display.

Other equipment and software shown in the diagram are used in imaging and for other purposes. The functions of this equipment and software in imaging are as follows:

- Case processing on the courts' Data General MV30000 mainframe computer running under Data General's AOS/VS2 operating system with eight billion characters of disk storage;
- Communications to connect the imaging system to the mainframe using an Ethernet network over fiber optic lines using the TCP/IP protocol;
- Token ring local area network (LAN) between the mainframe and its local users; and

Figure 8: County of Riverside--Superior Court Computer and Network Diagram



- Communications to remote court sites in Corona, the county farm, and desert locations using Ethernet over T-1 lines.

The Riverside County Courts use two civil case processing systems: an old system, called Court Management System (CMS), and a more recent system, called Genesis. The primary system used with imaging is Genesis, and except for the remainder of this paragraph, the procedures described herein apply to IDIS and Genesis. CMS is used only for judgments and orders pertaining to old cases that were not converted to Genesis. Unless a hearing results from the CMS judgment or order, the document is imaged into the IDIS Progress database. When a hearing results, the case is entered into the Genesis database and scanned into the system in the normal manner.

VII.C.1.b. Orange County Jury Commissioner's Office

The Orange County Jury Commissioner's Office began looking at imaging in early 1993 as a solution to an expected dramatic increase in juror data entry and recordkeeping. Jurors had been serving at least one day each week over a period of four weeks, and they were paid for each day they reported for duty. The court estimated that it could save approximately $500,000 annually by calling jurors for either one day or one trial, thereby reducing the number of jurors who reported but were not impaneled on a jury. One day-one trial juror service would at least double the number of jurors summoned, and help was needed entering information supplied by jurors on returned summonses into the Unicorn Jury+

automated jury management system. This led to a requirements analysis and implementation plan, from which five candidate systems were identified. The Image Forms Processing System (IFPS) from Wheb Systems was selected and became operational in mid-1993.

IFPS scans the questionnaire part of the returned juror summons forms, uses OCR to convert the scanned images in specific boxes on the form into data, edits the data, alerts the user to data that may have problems, and enters data that pass the edit tests into Jury+.

IFPS is a turnkey software system that runs on a PC with 16 million characters of memory, 500 million characters of disk storage, a 21-inch, high-resolution color monitor, a Mytech image recognition device, a Fugitsu scanner, and Windows workgroup software. One workstation currently is being used for both data entry and editing, but a second workstation was purchased because data entry and editing can be performed more efficiently on separate workstations. The Jury Commissioner's Office used a third-party systems integrator to configure and procure this hardware and software.

While IFPS functions as a stand-alone system most of the time, it is connected to an Everex workstation in the Novell LAN on which Jury+ runs. This permits IFPS to transfer juror data to the Jury+ database that resides on the LAN's Compaq server.

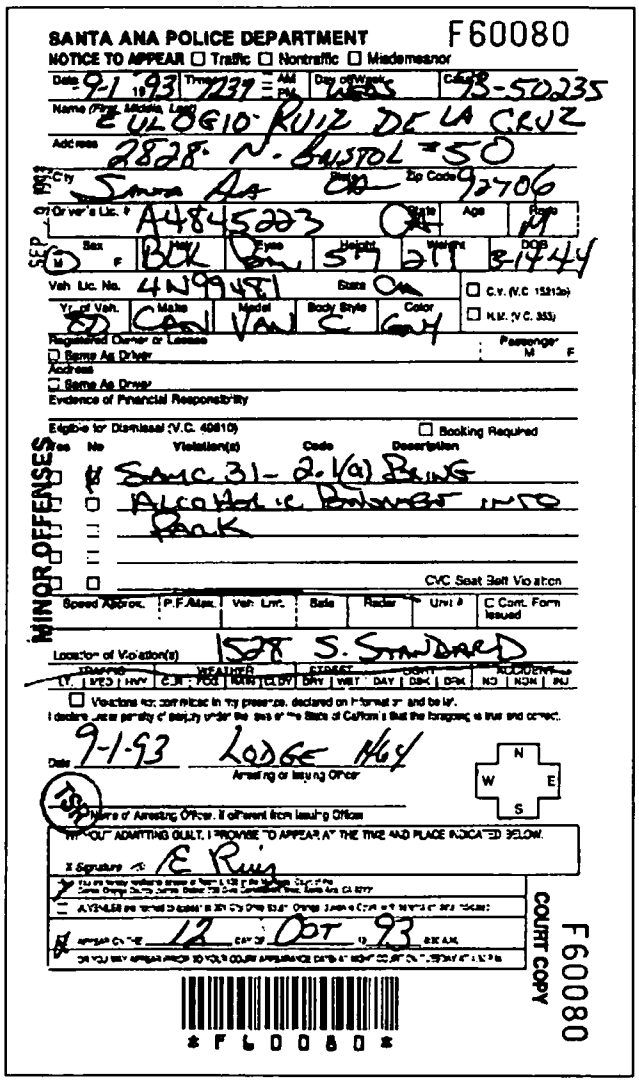
VII.C.1.c. Orange County Central Municipal Court

Imaging was prompted in the Orange County Central Municipal Court by a combination of the high caseloads that are typical of municipal courts and the lure of grant funding for innovative projects (which an imaging project was when the idea originated in 1988). While this exposure to imaging sold the court, the funding did not materialize as expected. Nevertheless, the court moved ahead and selected traffic cases for imaging because of their high volume, short duration from filing to disposition, and simplicity. They concluded that these conditions offered the best chance for success and monetary savings. The court issued an RFP in December 1990. In addition to the court's imaging workload and implementation strategy, the RFP described the reduced funding available for the project. After an evaluation of the five responses to the RFP, Adaptive Information Systems (AIS), which specializes in Hitachi imaging products, was selected in early 1991. The AIS imaging system, called AdaptFile, became operational in early 1992.

In the Central Municipal Court, imaging is only one part of a multi-faceted court information system that also embraces case processing; statistical reporting; desktop applications such as word processing and spreadsheets; legal research; and communications with state and local agencies. The information system is integrated through the capabilities of Windows on user PCs and includes a mid-range municipal court computer and a large-scale Orange County computer.

Citations, amendments, and correspondence are scanned in a two-step process. First, the documents are scanned in the normal manner. Then, the case number, which has been bar-coded on the citation (please see the bottom of the Sample Citation shown in Figure 9), is read as data with a "gun" that scans the bar code. The operator's display shows the imaged citation on the left and the entered case number on the right. This process yields the index key for both the imaged document in the imaging system and the case in the case processing system. Images are stored on magnetic disk until the end of the day when they are committed to optical disk and become available to the integrated information system.

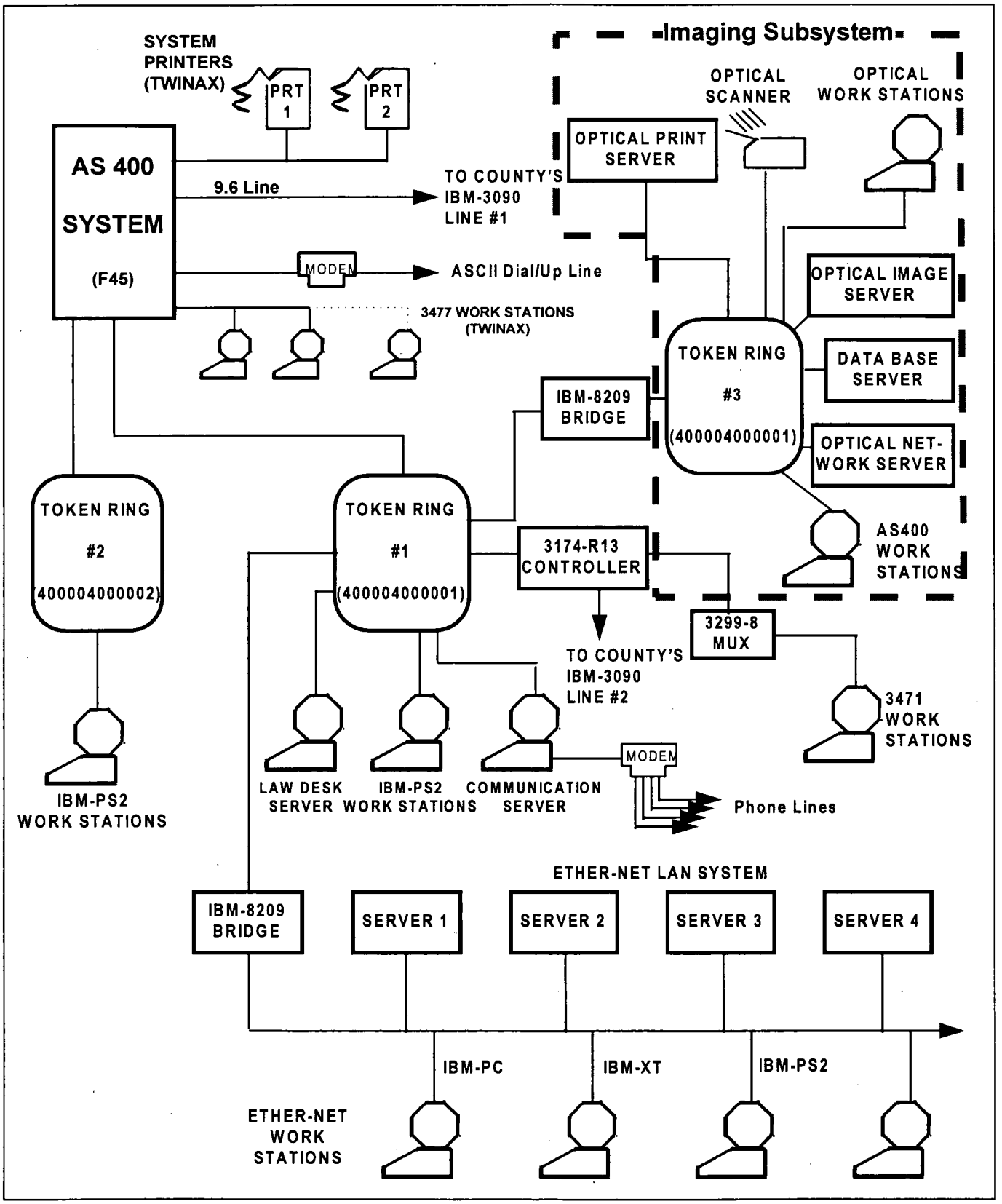
Figure 9: Sample Citation with Bar Code



As shown in Figure 10, the integrated information system consists of the following parts:

- Imaging, which runs on a PC-based token ring LAN with optical image, optical print, database, and network servers; Novell network software; workstations for scanning functions and to access information from the case processing system; a 20-inch high-resolution monitor; a bulk-feed scanner for citations; a flat-bed scanner for correspondence and odd-sized documents; a scanning "gun"; three laser printers; and the AdaptFile software. This network is connected to the overall information system by a communications bridge (a device to connect networks) to one of the system's other networks (described below). AIS developed most AdaptFile software, and Hitachi software controls the imaging equipment. The system uses the Oracle database software.
- Municipal Court case processing systems that include the Case Tracking and Calendaring System (TrACS) running on a court IBM AS/400 mid-range computer and the Municipal Court System (MCS) running on the county IBM 3090. MCS supports all five municipal courts in Orange County, and TrACS works with MCS to support Central Municipal Court case processing. These systems work with data as opposed to images.
- Overall communications, controlled by the AS/400, between token ring LANs that support imaging (described above), user workstations, and external communications; between these LANs and the Ethernet network to which some other court personnel are connected; and between the AS/400 and county 3090 computer.
- Approximately 175 PC workstations for the following system users:
  - Court staff to display, in separate windows, information from any part of the integrated system (e.g., document images, case processing system data, legal research information, word processing documents, and spreadsheets). These PCs are IBM-compatible, are connected through a token ring LAN, and run under Windows.
  - Judges to access case information and conduct legal research. These PCs are IBM-compatible, are on the same token ring LAN as some of the court staff described above, and run under OS/2.

Figure 10: Orange County Central Municipal Court Computer System



  - Other court staff for desktop applications and to access the information system. These IBM PCs are connected by a legacy Ethernet network, and this network is connected to one of the token ring networks by a communications bridge (a device to connect networks).
- Data entry terminals connected to the system through one of the token ring networks.
- Other applications and software running on either the AS/400 or the 3090 such as IBM's Officevision office automation system (running on both computers) and various customized applications (e.g., cashiering system running on AS/400).

VII.C.2. Planning, Implementation, and Management

The overriding reason the three courts adopted imaging was to improve their service to the public. In 1990 and 1991, when the Riverside County Consolidated Superior/Municipal Courts and the Orange County Central Municipal Court were considering imaging, it was a risky, high-cost venture for a publicly funded agency--particularly one with high visibility such as a court. These courts were acutely aware that, when the first document was imaged, there would be no turning back. While improved public service is a noble objective, it is almost impossible to justify the cost. So the prevailing sentiment in those two courts regarding imaging was, "It better work." The courts could not have their records floating around in an electronic nether world. To their credit, the imaging advocates forged ahead and were supported by their management. Their perseverance paid off. Imaging worked.

Things were not as tenuous in the Orange County Jury Commissioner's Office because the use of imaging, while crucial to operations, was more limited, and the technology had reached greater maturity by 1993 when the commissioner's office turned to it. Nevertheless, the potential users of imaging in the office resisted it; they did not trust imaging. To counter this, Mr. Kamiab analyzed imaging and used his findings to explain the technology and its advantages to the users. They were sold, and the resistance disappeared.

Although each court planned for imaging and prepared specifications for the prospective system, each had different approaches and experiences along the way.

- The Riverside County Consolidated Superior/Municipal Courts implemented only new or amended complaints, motions, judgments, and unlawful detainers for civil cases because they thought civil offered more cost advantages than criminal cases. They proceeded methodically through implementation and imaged only those documents filed after implementation--no existing records were converted to images. Predictably, implementation proceeded slowly and no improvements were noted for about six months. Then the positive effects of imaging began to appear. Now, some two years after the system became operational, imaging is a readily accepted way of life with about 80 percent of the civil cases in the system. A major legal issue confronted by the court during planning and implementation was the admissibility of imaged documents. The county's judges and court executive officer resolved the issue.
- The Orange County Jury Commissioner's Office prepared a requirements analysis, procurement plan, and implementation plan and proceeded with the procurement. The system equipment was installed by Hershey Business Systems, the integrator, and the software installation and training were conducted by Wheb Systems, the software vendor. The entire project is described by Mr. Kamiab as "very smooth."
- The Orange County Central Municipal Court addressed implementation in detail only after the imaging contract had been awarded to AIS. After apprising the vendor of the

court's needs, the court and the vendor jointly planned the imaging implementation, including how to integrate imaging into the existing computers, software, and networks. The court had developed benchmarks for imaging system performance, and the staff worked with AIS to ensure the system met those benchmarks. AIS provided training. The new imaging system was used concurrently with the old manual system for about two months. During this period, the manual system remained the primary system. There was no file conversion because the system was being used for traffic cases, which usually are short-lived.

The ability to switch between screens generated by different parts of the Central Municipal Court's information system (e.g., imaging, case processing, and word processing) was crucial then, as it is now. In the initial implementation, which was before Windows was available, swapping between PC screens and AS/400 screens was cumbersome. This made it difficult for clerks working with PCs at the counter to view document images and data from the TrACS and MCS case processing systems. The problem was never completely resolved by AIS until it was addressed with Windows and software called Rumba/400. Now PC users can switch, in the normal Windows manner, between screens from the AS/400 and any other parts of the information system that have been moved into windows on the PC.

The executive officer in each of the three courts strongly supports the imaging project, and this has been, and continues to be, crucial to the success of each project. Formal approval for imaging was obtained from the judges and executive officer for the Riverside County courts project, the executive officer for the Orange County jury project, and the assistant executive officer for the Orange County municipal court project. All counties illustrated progressive management, as will be seen below in a summary of their plans for the future, and strong technical support. The Riverside and Orange County courts continue to work closely with their vendors. Contact with the vendor has declined in the Orange County jury project since that system is more self-contained and more readily maintained in-house. The Riverside County site afforded a unique opportunity to appreciate the painstaking work necessary to make sure the images are accurate and of high quality and to maintain the operational efficiency of the system. It does not run by itself. Mr. Gobozy (the document imaging supervisor) spends much of his time working on quality assurance and system housekeeping. He submits to his managers a weekly statistical report of documents and pages imaged.

VII.C.3. Operations and Maintenance

In each court, a specific workgroup scans documents. The sizes of the scanning groups range from one or two people in the Orange County jury operation to seven people in the Riverside County courts. Court clerks, jury clerks, and other court personnel use the document images with information from case processing and jury management systems as they formerly used manually filed case records with information from the systems.

Each court maintains the imaging system using a combination of court and vendor staff. Given their small technical staff and mostly outsourced computer support, the Riverside County courts obtain maintenance primarily from Data General, the computer vendor who also supplied some of the imaging equipment; Image-X, the imaging vendor; or ISD, the outsourcer. They report no problems with this arrangement. The Orange County municipal court's situation is similar but less complex for two reasons: first, it has more in-house staff than the Riverside County courts; second, it has fewer principal vendors. AIS, as the imaging vendor, works with court staff to maintain the imaging system. IBM performs a similar function with respect to the computer

equipment and software. Things are simpler with the predominantly stand-alone Orange County jury imaging system. Mr. Kamiab handles most of the maintenance, and he calls on Wheb or the appropriate equipment vendor if he needs help.

VII.C.4. Advantages and Disadvantages

In general, imaging has given the three courts more efficient operations, enabled them to serve the public better, and helped them to continue functioning successfully in these days of tight budgets. To varying degrees, the courts have derived the following specific benefits from imaging:

- Easier, more rapid, and more accurate document entry and access by the public, court clerks, attorneys, and judges. A few examples are:
  - The Riverside County courts have experienced unexpectedly heavy use by research attorneys, who use the imaging system to access and review documents on their PCs, thereby saving the time formerly required to walk to the clerk's office and retrieve documents.
  - In Riverside County, the public can use equipment in the clerk's office to view a list of documents that have been imaged, select on the screen the desired document(s), cause the document(s) to be printed, and pay for the document(s) at the cashier's window.
  - In the Orange County jury unit, quality assurance has introduced a second check of the completed juror questionnaires, with a corresponding increase in accuracy of the data being entered into Jury+.
- Better document tracking and fewer lost documents, such as in the Orange County municipal court where imaging eliminated misfiled and lost documents.
- Cost savings and avoidance as follows:
  - In the Riverside County courts, at least four additional clerical staff positions and probably two more research attorneys would have been needed at a total annual cost of approximately $280,000.
  - Dramatically reduced time spent by Riverside County courts staff retrieving documents from manual files and dealing with people who need them.
  - Elimination of an entire eight-hour shift of temporary workers who formerly key-entered Orange County juror questionnaire responses at a cost of approximately $21,000 each quarter.
  - Expectations in the Orange County jury unit that the imaging system will pay for itself in about 12-14 months.
  - In the Orange County municipal court, impressive savings in staff time by eliminating misfiled and lost documents and in floor space by reducing paper document storage.
  - Capability in the Orange County municipal court to avoid hiring new personnel by reassigning staff, who became available because of imaging, to other duties.

By-products of imaging were initiatives to define the legality of imaged documents in the Riverside and Orange County courts; document filing by fax transmission through the imaging system in the Riverside County courts; and the aforementioned use of imaging to hold recordkeeping together while the Riverside County courts are dispersed during seismic tests at the courthouse.

In general, the disadvantages of imaging were typical of the problems encountered whenever new computer equipment and software are implemented--tinkering usually is necessary to get everything to work together properly. Like most organizations entering a new phase of computer use, the courts tended to underestimate the

complexity of imaging--particularly when combined with existing computers and systems. In addition to the Orange County municipal court's problem switching between AS/400 screens and other information system screens on user PCs (which was solved by Windows and Rumba/400), specific problems encountered by other courts were the following in Riverside County:

- The retrieved images of documents stored on optical disk sometimes differed from the actual document;
- Image transfer from magnetic disk to the optical disk jukebox occasionally was unreliable; and
- Because of image system software enhancements over the years, the system would not accept documents that exceed 256 pages unless they were separated into multiple "documents."

VII.C.5. The Future

Given their progressive leadership, the three courts are not resting on their imaging laurels. They have plans for the future:

- The Riverside County Consolidated Superior/Municipal Courts envision a paperless court in which pleadings are input by fax; attorneys access the court systems from computers in their offices; the public obtains information from court systems through inquiry devices in court facilities or perhaps other public places; payments to the court are made through credit cards or some other type of electronic funds transfer; the ubiquitous "information highway" is used to communicate with other courts and agencies nationwide; and information from case processing systems, text from word processing systems, and document images from imaging systems are easily integrated. Imaging clearly would play a major role in such courts. An example of data and image integration would be to superimpose electronically information retrieved from the case processing system onto a blank imaged form to produce an official imaged document, which then could be printed. (Please see Delaware Division of Corporations report in Appendix A.)
- The Orange County Superior Court has ambitious plans for a new, totally integrated case processing system that includes a full-scale imaging capability. As for the jury unit, it plans to enhance its imaging system to retain the imaged summonses on optical disk. These images currently are discarded after the personal information from the summonses have been scanned and transferred to Jury+.
- The Orange County Central Municipal Court plans to add workflow, remote scanning, and incoming fax to its imaging system. Workflow will be the main feature of the next imaging system release from AIS. Remote scanning and incoming fax will permit a case to be scanned by the agency that first encounters it (usually law enforcement), and workflow could be expanded beyond the court to cause the case to be routed to law enforcement, the prosecutor, the courts, corrections, probation, and other agencies as it proceeds to disposition. In addition, the court plans to expand imaging to civil and small claims cases, consolidate the IBM AS/400-based TrACS and IBM 3090-based MCS case processing systems, and modify its system so that (1) annotations can be made to images and (2) images can be committed to optical disk on line without interrupting imaging network operations.

VII.D. Detailed System Descriptions

VII.D.1. Riverside County Consolidated Superior/Municipal Courts

The court clerk's staff receives civil pleadings and other documents from the public and keys them into the Genesis case processing system.

This causes Genesis to assign the next available image identification key number to identify a specific document. The clerk then manually annotates the case number on the document and creates a manual case file if the document represents a new case. At the end of the day, all documents are grouped according to whether they are judgments, new complaints, answers, proof of service or summonses, amended or cross complaints, motions, orders, or stipulations. Then they are placed in their respective bins for imaging. The next morning, the imaging operator assigned to each bin picks up the documents in that bin, accesses Genesis and uses the case number to obtain the image identification key number, scans the document into the IDIS imaging system under that number, and verifies the scanning by checking the image against the document. A split screen display appears on the operator's PC with the IDIS image on the left and Genesis data on the right, and the operator can "click" (i.e., go back and forth) between these windows. When the document has been successfully scanned, that fact is entered in the Genesis window.

Faxed filings were authorized about one year ago, and the court has adopted procedures to process them. When there is an incoming fax, the imaging operator at the PC that can accept the fax switches from normal work to the fax mode. Because only one fax currently can be processed at a time, the fax is printed and given to a court clerk at the counter. The clerk uses Genesis to determine fees due and whether the filing is timely based on any hearing scheduled for the case. If the document is acceptable for filing, the clerk assesses the fees using the filing party's credit card number and files the document by entering information from it into Genesis. Then the clerk associates the document (which already is in imaged form because it was faxed) with the Genesis image identification key number and, unless there is a problem that necessitates re-scanning, notes that the document has been successfully fax-filed.

The court plans to install in the civil clerk's section four PCs capable of receiving fax transmissions. This will eliminate the imaging section from the above process and would obviate the need to print the faxed documents under normal circumstances.

At this point, in both the normal over-the-counter and faxed civil filings, information from the documents has been entered into Genesis, and the documents have been scanned and automatically indexed. They have not been stored on optical disk, which is done after the documents have passed quality assurance checks.

Quality assurance is conducted in the imaging section. It consists of searching summary lists of imaged documents for information that may indicate errors. Some errors can be detected by IDIS, and they are explicitly noted on the lists. Others are detected by alternative methods such as noting excessively high character counts for a given page. Errors usually can be corrected in the imaging section.

When a document has passed quality assurance, IDIS commits it to optical disk by transferring it from the PC to the jukebox that is then active. This gives rise to one final test in which data pertaining to documents transferred to the jukebox are examined for irregularities.

VII.D.2. Orange County Jury Commissioner's Office

The juror selection process begins when, based on the number of prospective jurors needed by the superior and municipal courts, individuals' names are selected randomly from Orange County voter registration and driver records. This service is provided by a computer processing contractor, who sends the names to the courts, where they are entered into the Jury+ jury management system. About ten weeks before each quarter begins, the courts decide the number of jurors needed during the quarter for each court date in the five superior and municipal court locations. Jury+ randomly selects the prescribed number of jurors for each date and court. This information is sent to a

business forms contractor who prints and mails the summonses (see Figure 11).

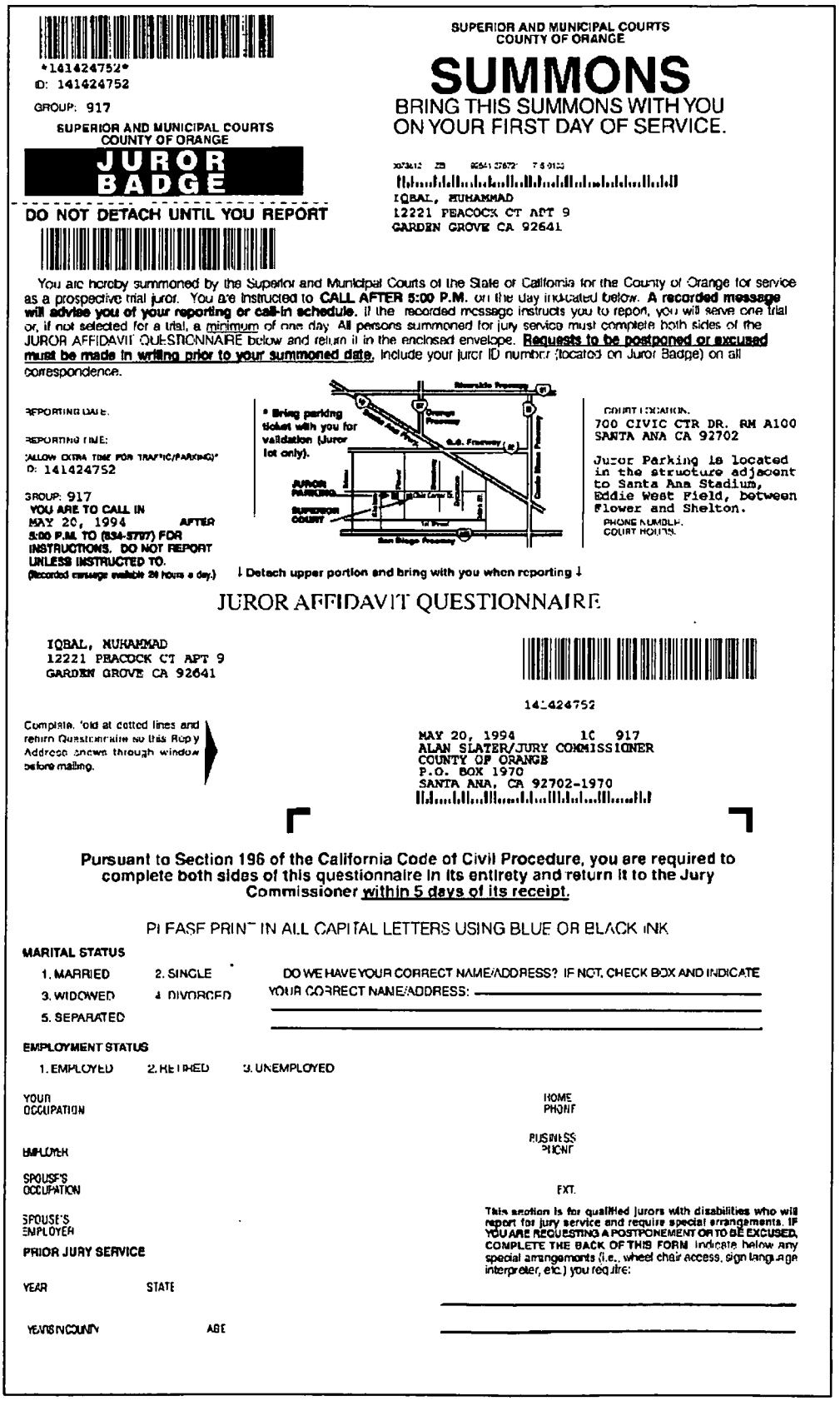
As in the sample summons, prospective jurors print their responses in specific boxes of the questionnaire and return the summonses. These completed forms are batched and fed into the IFPS imaging system, which accomplishes the scanning, processing, editing, data transfer, and reporting functions selectable from the IFPS Function Bar shown in Figure 12.

First, IFPS scans each form of the batch and produces an image of the form. Overnight, the system looks at each scanned image and, based on the clarity of the information in the boxes on each form, calculates the accuracy confidence level (set at 80 percent for this application) for each completed part of the form. The next morning, as shown in the sample Juror Questionnaire Display (Figure 13), IFPS highlights those parts of each form that are below the 80 percent confidence level. The operator reviews and, if necessary, edits these forms. Occasionally, a form is so poorly written that it must be reentered. Forms for which all boxes are above the 80 percent confidence level are not displayed. Parts of displayed forms above the confidence level require no further action and are not highlighted. IFPS then uses optical character recognition (OCR) to convert the information in the boxes on each form to data records and transfer the records into Jury+, which handles the remaining juror management, recordkeeping, and financial functions. As the operator progresses through these tasks, he or she activates the IFPS functions using the function bar shown above.

IFPS has been programmed to scan information in the boxes at specific locations on the summons questionnaire. Except for the bar-coded juror identification number, which is preentered on the form, the information must be printed clearly in capital letters using blue or black ink. Instead of the more generic term OCR, the vendor prefers to refer to the imaging technique as intelligent character recognition (ICR). Given the use of handwriting, others prefer to call it optical handwritten character recognition (OHCR). Regardless of its designation, the scanned information is converted to data format so that it can be automatically input into Jury+, which processes data as opposed to images. Please note that this is the only imaging system covered in this report that has data, not images, as its primary output. Since the accuracy of OCR scanning and image-to-data conversion are largely functions of the clarity with which the letters and numbers appear on the page, Mr. Kamiab conducted a benchmark test to analyze the accuracy and overall performance of IFPS. His results were as follows:

- IFPS scanned a batch of 122 forms in about 7 1/2 minutes, or about 4 seconds per form;
- Out of 8,595 fields (age and home phone number are examples of fields) scanned, 6,944 were scanned correctly, for an 81 percent recognition rate;
- The confidence level computed by IFPS for the remaining 1,651 fields fell below the 80 percent minimum confidence level established by the jury unit, which means that they would be displayed to the operator for possible edits;
- The average correction time for errors found during the edit was 15 seconds for each form originally scanned; and
- The average time to convert the scanned information into data records and transfer them to Jury+ was 14 records per second.

Figure 11: Juror Summons/Questionnaire



*1414247521
ID: 141424752

GROUP: 917

SUPERIOR AND MUNICIPAL COURTS
COUNTY OF ORANGE

JUROR BADGE

DO NOT DETACH UNTIL YOU REPORT

SUPERIOR AND MUNICIPAL COURTS
COUNTY OF ORANGE

SUMMONS

BRING THIS SUMMONS WITH YOU ON YOUR FIRST DAY OF SERVICE.

IQBAL, MUHAMMAD
12221 PEACOCK CT APT 9
GARDEN GROVE CA 92641

You are hereby summoned by the Superior and Municipal Courts of the State of California for the County of Orange for service as a prospective trial juror. You are instructed to **CALL AFTER 5:00 P.M.** on the day indicated below. **A recorded message will advise you of your reporting or call-in schedule.** If the recorded message instructs you to report, you will serve one trial or, if not selected for a trial, a minimum of one day. All persons summoned for jury service must complete both sides of the JUROR AFFIDAVIT QUESTIONNAIRE below and return it in the enclosed envelope. **Requests to be postponed or excused must be made in writing prior to your summoned date.** Include your juror ID number (located on Juror Badge) on all correspondence.

REPORTING DATE:

REPORTING TIME:

(ALLOW EXTRA TIME FOR TRAFFIC/PARKING)*
ID: 141424752

GROUP: 917
YOU ARE TO CALL IN MAY 20, 1994 AFTER 5:00 P.M. TO (834-5707) FOR INSTRUCTIONS. DO NOT REPORT UNLESS INSTRUCTED TO.
(Recorded message available 24 hours a day.)

* Bring parking ticket with you for validation (Juror lot only).

COURT LOCATION:
700 CIVIC CTR DR. RM A100
SANTA ANA CA 92702

Juror Parking is located in the structure adjacent to Santa Ana Stadium, Eddie West Field, between Flower and Shelton.

PHONE NUMBER:
COURT HOURS:

↓ Detach upper portion and bring with you when reporting ↓

JUROR AFFIDAVIT QUESTIONNAIRE

IQBAL, MUHAMMAD
12221 PEACOCK CT APT 9
GARDEN GROVE CA 92641

141424752

Complete, fold at dotted lines and return Questionnaire so this Reply Address shows through window before mailing.

MAY 20, 1994 1C 917
ALAN SLATER/JURY COMMISSIONER
COUNTY OF ORANGE
P.O. BOX 1970
SANTA ANA, CA 92702-1970

Pursuant to Section 196 of the California Code of Civil Procedure, you are required to complete both sides of this questionnaire in its entirety and return it to the Jury Commissioner within 5 days of its receipt.

PLEASE PRINT IN ALL CAPITAL LETTERS USING BLUE OR BLACK INK

MARITAL STATUS

1. MARRIED 2. SINGLE
3. WIDOWED 4. DIVORCED
5. SEPARATED

DO WE HAVE YOUR CORRECT NAME/ADDRESS? IF NOT, CHECK BOX AND INDICATE YOUR CORRECT NAME/ADDRESS: _____

EMPLOYMENT STATUS

1. EMPLOYED 2. RETIRED 3. UNEMPLOYED

YOUR OCCUPATION

HOME PHONE

EMPLOYER

BUSINESS PHONE

SPOUSE'S OCCUPATION

EXT.

SPOUSE'S EMPLOYER

PRIOR JURY SERVICE

YEAR STATE

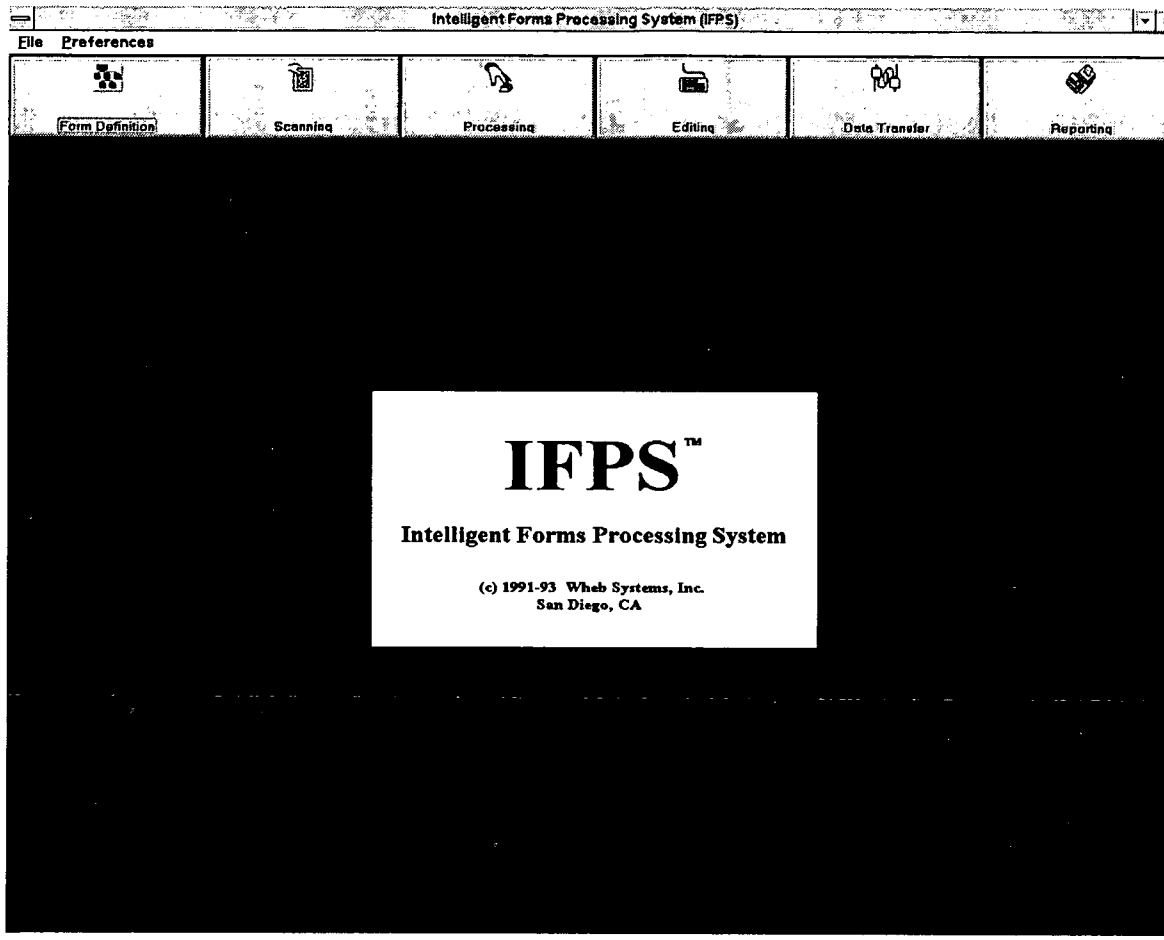
YEARS IN COUNTY AGE

This section is for qualified jurors with disabilities who will report for jury service and require special arrangements. IF YOU ARE REQUESTING A POSTPONEMENT OR TO BE EXCUSED, COMPLETE THE BACK OF THIS FORM. Indicate below any special arrangements (i.e., wheel chair access, sign language interpreter, etc.) you require:

_____

_____

Figure 12: Orange County Jury Commissioner's Office--IFPS Function Bar

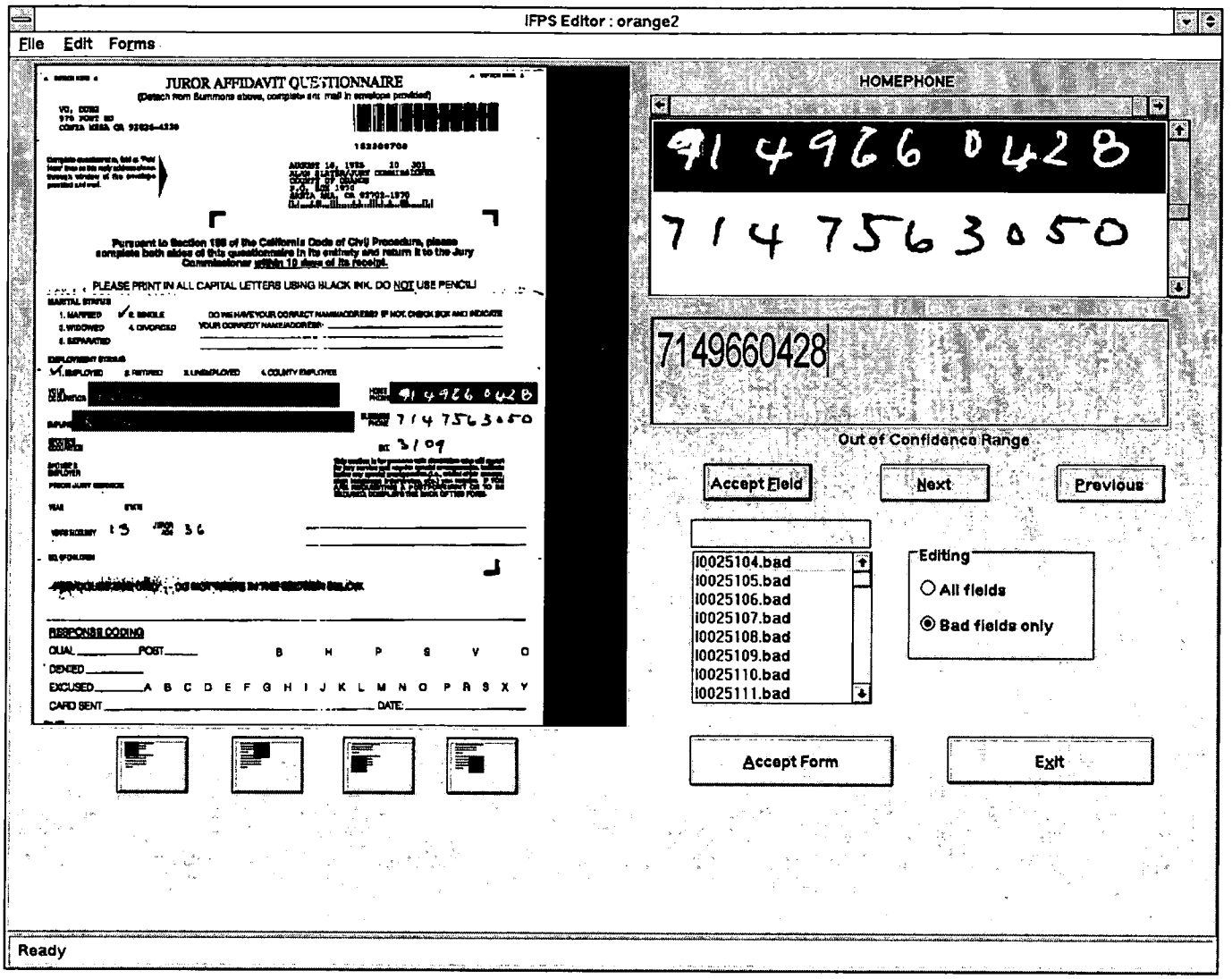


VII.D.3. Orange County Central Municipal Court

After citations, amendments, and correspondence are edited, scanned, automatically indexed, stored on magnetic disk, and committed to optical disk as described earlier in this report, their images are available to the integrated information system. Most facilities strive for integration of data from data processing systems, text from word processing systems, and document images from imaging systems across communications lines in a manner that can readily be used. In its purest sense, integration means viewing data, text, and documents together and being able to join selected parts of each to form a consolidated document.

The Orange County Central Municipal Court information system does not achieve this ultimate form of integration, but its level of integration is nevertheless impressive. As shown in the Municipal Court "House" diagram (see Figure 14), the municipal court has brought information from different computers, networks, and systems under the same "roof." Each user's PC can have programs from the imaging system, the court IBM AS/400 computer, the county IBM 3090 computer, PCs around the courthouse, and outside information services running concurrently. In

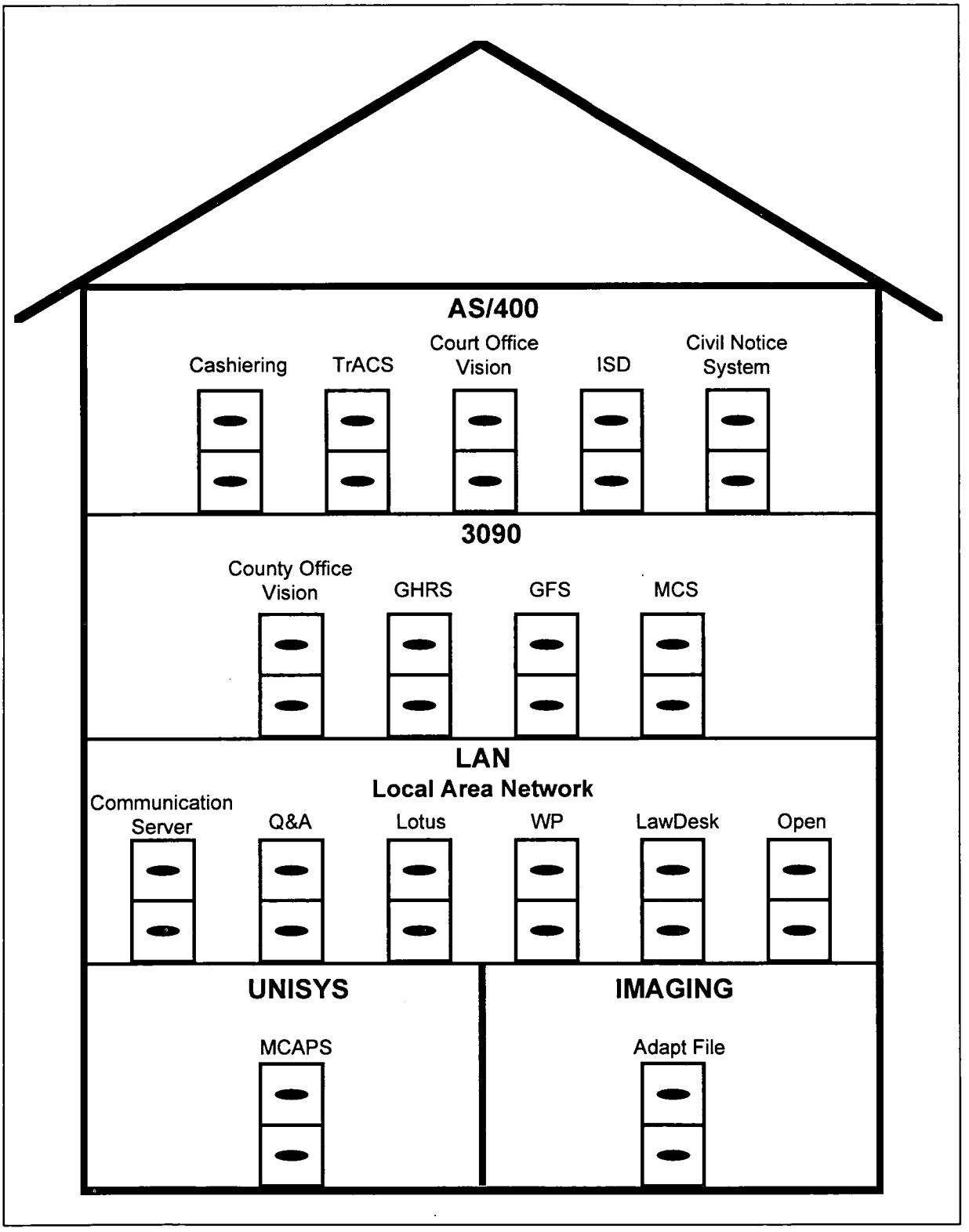
Figure 13: Orange County Jury Commissioner's Office--IFPS Juror Questionnaire Display



computer jargon, these programs are called "sessions," as in an imaging "session" or an AS/400 "session." As shown in the system schematic earlier in this report, this integration is possible primarily because of the interlocking communications networks and the fact that the sessions are running in different windows.

When a litigant comes to the municipal court counter, for example, he or she may need information or may have something to file in connection with an open case. In order to serve the person, the clerk--who is on a token ring LAN--may need to use the AS/400 TrACS or 3090 MCS case management systems, the AS/400 cashiering system, the AdaptFile imaging system running on the imaging LAN, and the statistical system running on the Ethernet LAN. The clerk can put sessions from all of these on his or her PC concurrently and then, using the PC's mouse, "click" (i.e., go back and forth) between these sessions or display several of them at one time in smaller windows. This relieves the clerk of the cumbersome process of backtracking out of one session and working into another session, or perhaps even worse, sending the litigant to several counters for different types of service. It clearly enables the clerk to give the litigant faster, more accurate, and more complete service.

Figure 14: Orange County Central Municipal Court Technology Systems



VII.E. Conclusions

The three courts reached the same basic conclusion on their imaging: it satisfied their needs (1) to improve the service that they give the public, (2) to function more efficiently, and (3) to handle increasing caseloads with little or no budget increases. Their collective advice to other courts contemplating imaging is reflected in the summary at the end of Chapter Three.

In addition to those points, the experiences of the three courts suggest one final word of advice: **Avoid unrealistic expectations and politics.** Of all the recommendations compiled from the site visits, this one may be the most difficult to follow. If you successfully incorporate the rest of the advice--particularly the points about management and user involvement--and communicate effectively throughout the project, you may be able to avoid unrealistic expectations and politics. But we all know that sometimes people hear what they want to hear. So do not despair. None of the sites we visited could claim perfection in their approach to imaging or in the implementation of their system; yet all were successful in their endeavor.

Finally, in closing, if the above considerations lead you to imaging, jump in. It is true that the technology will be better tomorrow. It is true that there will be more vendors to choose from tomorrow. And it is true that tomorrow you may find a system that meets 98 percent of your needs instead of today's 96 percent. But if you need it today, start down the path today. The way computer technology moves, all of those things that are true about tomorrow will be true about tomorrow's tomorrow.

Appendix A: Non-Court Site Visit Reports

1. **Delaware Secretary of State, Division of Corporations Imaging System**
2. **CSX Bill of Lading Image Processing System**
3. **Virginia Retirement System**

1. Delaware Secretary of State, Division of Corporations Imaging System

Summary

Although Delaware is one of our smallest states, it is home to approximately 300,000 corporations. How can such a small state have such a concentration of corporate power? That apparent contradiction is possible because few of those companies have either headquarters, offices, or plants in the state. The companies simply are registered there.

Corporate registry and franchise tax services are big business in Delaware. Together they bring in approximately $300 million in annual revenue to the state's government. This represents a sizable part of the government's annual revenue of about $1 billion.

The Division of Corporations, within the Delaware Secretary of State's office, registers corporations. Corporate registry includes creation and dissolution of companies, corporate mergers and acquisitions, stock and bond issuance, actions involving limited partnerships, and changes in corporate constitutions. The division also issues franchise tax bills, collects the taxes, and maintains the tax records. A vast amount of recordkeeping and correspondence go with these corporate services, and where recordkeeping and correspondence go, imaging usually follows.

Imaging enables the division to give its corporate clients better service through more rapid and accurate transaction (i.e., request for services) processing, inquiry responses, and output production. The imaging system receives information from clients or their authorized agents, enters it into the mainframe-based Delaware Corporate Information System (DCIS), and prepares and groups documents received from DCIS for output to the clients or agents.

The Division of Corporations imaging system has several exemplary features. It allows input by either remote scanning from agents' offices, local scanning in the division, or facsimile transmission (fax) from agents' or clients' offices. It uses a sophisticated workflow formula to assign workers to requests based on a worker's capability and a request's priority. And it creates output packages from DCIS print files that formerly generated disparate output on several printers.

Courts share with the Division of Corporations many of the needs that make these features so useful. First, courts enter information into case processing systems from numerous sources. Some documents are submitted directly to the clerk's office, and these could be scanned into the system locally. Other documents come from external sources--such as attorneys, law enforcement, probation, pretrial diversion, and community services. These documents could be scanned into the system remotely, or the documents could be faxed to the clerk. Second, many of the documents produced by courts contain signatures, seals, letterheads, and other inscriptions. When the imaging system groups output into print packages, it can superimpose text on templates that contain signatures, seals, letterheads, and other inscriptions to produce excellent-quality official documents. This would be a major benefit to courts. Finally, many clerk's offices, particularly the larger ones, have various options for document processing, and a workflow formula would assist in getting work to the proper workstation.

Division of Corporations staff say the imaging system is "definitely worth" the $5 million it cost. They feel the system has dramatically improved the service the division gives clients in Delaware's crucial corporate registry "business."

After four years in operation, the system has almost outgrown the two Wang minicomputers on which it runs. The Delaware Legislature and Secretary of State approved funding for a larger computer, and the Division of Corporations is procuring the computer now.

Information on the imaging system was provided by Mr. Bob Kasman, a consultant on long-term assignment at the Division of Corporations. Mr. Kasman, Mr. Jim Ravis, the project leader, and Mr. Philip Fred, a software specialist comprised the imaging system development team. Messrs. Ravis and Fred are employees of the state computing and information services agency. At the time of the imaging system development, Mr. Kasman was a software specialist with Wang. We appreciate their assistance.

Enterprise Description

In addition to its corporate registry and franchise tax functions, the Delaware Secretary of State Division of Corporations provides archiving service for other state agencies, issues and maintains trademarks, maintains notary public lists, and maintains records of uniform commercial code filings. The division has about 100 employees, most of whom work in the imaging operation. Its address and telephone number are

Townsend Building
Federal and Duke of York Streets
Dover, DE 19901
302-739-4111.

Generally, in corporate registry, the division works through registered agents and not directly with the corporations. There are about ten such agents. The division charges the corporations different fees for different types of service, with most fees based on turnaround time requested by the corporation or agent.

Within Delaware state government, the head of the Division of Corporations reports to the Secretary of State, who reports to the Governor. The head of the Division of Corporations has the title of Assistant Secretary of State. The Office of Information Services (OIS) is the state computing and information services agency and supports the Secretary of State as well as other state agencies.

Seven OIS technical staff provide on-site support for the imaging system at the Division of Corporations. OIS runs the state mainframe computer, and like other agencies, the Secretary of State rents time on it. The minicomputers and their accessories on which the imaging system runs are owned by the Secretary of State.

Imaging Application

Overview

In early 1989, the Secretary of State realized something had to be done to improve the service given to corporations. Most processing was manual, records were microfilmed after a request had been completed, and mainframe files contained corporate histories so that records could be correlated. The Division of Corporations was plagued by all the symbols of such an operation: piecemeal filing; piles of paper on desks; six to nine months turnaround time to complete a request; inability to track work in progress; excessive staff overtime; and loss of documents. This low-quality, inefficient, and labor-intensive operation translated into one major liability: poor service to the corporations whose "business" means so much to Delaware.

In early 1989 the Secretary of State set out to improve this situation. Suspecting imaging was at least part of the solution, he arranged for Wang and MECA Group to analyze the Division of Corporations requirements. The analysis included

processing volumes; storage, formatting, and legal requirements; OIS mainframe communications; staffing; management; and costs. At this early stage, and throughout the project, work proceeded with heavy management, user, and technical staff participation. Armed with the requirements analysis and approval from the Attorney General and OIS, the Secretary of State and Division of Corporations went to the Legislature and obtained funding. They then planned the development, implementation, training, and conversion and proceeded to execute their plans. The Division of Corporations began to use the imaging system in June 1990, and the system was fully operational and had passed all acceptance tests by the fall of 1990.

In performing request processing and DCIS entry, the imaging system receives requests either automatically from faxed documents or from locally or remotely scanned documents. It applies a sophisticated workflow formula to separate each request into work units and route the request to the appropriate workstation. The formula causes requests to be routed based on priority, document type, and qualifications of Division of Corporations users available to work on them. Imaging system screens are divided into four quadrants that enable users to work with the imaging system, retrieve data from and enter data into DCIS, and view current and historical document images. As users complete work, the system applies the workflow formula to retrieve the next request.

In grouping outputs into print packages to respond to a specific request, the imaging system receives print files from DCIS and superimposes the print file contents on preimaged templates that contain the necessary inscriptions and signatures. Then the system prints the package, creating official papers and supporting documents.

The imaging system supports the Division of Corporations franchise tax processing by scanning, indexing, and storing tax billing and payment information.

The imaging system runs on dual Wang minicomputers (VS-8480 and VS-12000) with 64 million characters of memory each. The system runs under Wang operating system and imaging software. Support software includes:

- Cobol programming language;
- Pace, which is Wang's database management software;
- Adabas database software, which also is the mainframe's database management system;
- Natural, which is the high-level programming language used with Adabas;
- Wang communications software;
- Wang office automation and word processing systems; and
- Software from MSG to superimpose ("forms flash") text on imaged templates.

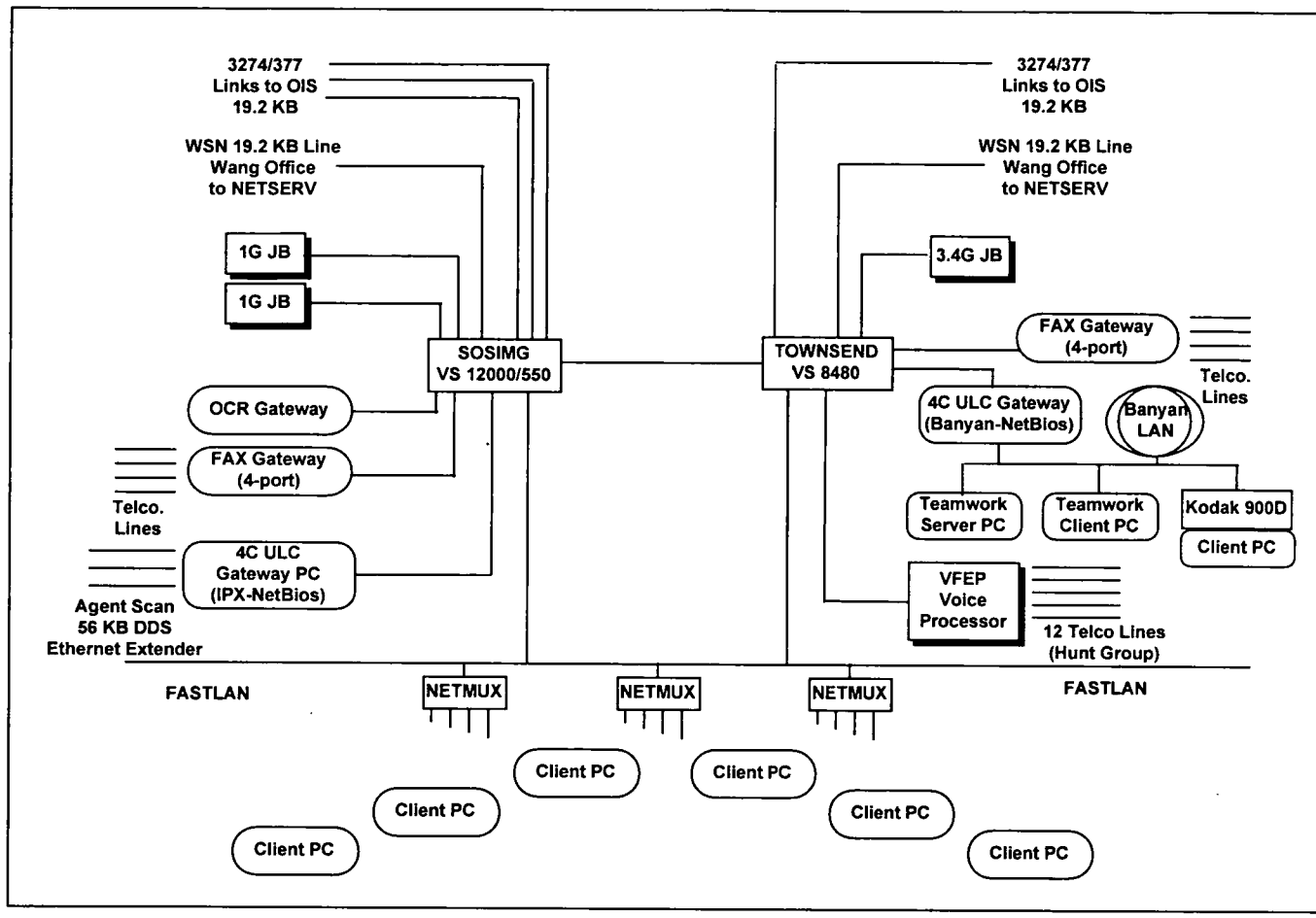
Collectively, the minicomputers have three system printers; a variety of other printers for local work; approximately 13 billion characters of disk storage; a Cygnet optical jukebox; several tape units; three Wang scanners; a high-speed Kodak scanner; several communications controllers and modems; and fax, optical character recognition (OCR), and voice processors.

There are approximately 85 PC workstations with Wang image terminal emulation software, and these currently are being replaced by more powerful PCs running under Microsoft Windows.

The OIS mainframe is an IBM 3090.

As shown in the Network Diagram (see Figure A - 1), several types of communications exist to connect the parts of the imaging system to each other and to the mainframe. The principal networks used in imaging are SNA, which connects the minicomputers and the mainframe; an Ethernet connection between the minicomputers; Wangnet, which is the communications backbone between the minicomputers and the PCs; and Banyan's Vines between the Kodak scanner, its workstations, and the minicomputers. In summary, connections exist between:

Figure A - 1: State of Delaware--Division of Corporations Network Diagram



- The two minicomputers;
- The minicomputers and the OIS mainframe;
- The minicomputers and special-purpose PC workstations linked to the Kodak scanner used to enter franchise tax documents;
- The minicomputers and a special-purpose PC used to enter faxed documents;
- The minicomputers and a special-purpose PC used to perform OCR;
- The minicomputers and a special-purpose PC used to enter documents scanned remotely;
- The minicomputers and special-purpose PCs used to enter documents scanned locally;
- The minicomputers and PCs used by most Division of Corporations users for request processing; and
- The standard state office automation network that embraces the mainframe and most PCs.

On a typical day, the imaging system receives about 1,300 pages from all sources, processes approximately 500 service requests, and produces about 350 print packages.

Planning, Implementation, and Management

The overriding objective as the Secretary of State ventured into imaging was improved service to corporations. If imaging did not accomplish this, the state risked loss of revenue and

degradation of its preeminent position in corporate registry.

The Secretary of State and Division of Corporations addressed these concerns by involving managers, users, and technical staff in each part of the imaging system project; carefully planning for imaging; and by adhering to a disciplined, but flexible, execution of the plan, adopting improvements along the way.

At the beginning of the imaging project, the Secretary of State and Division of Corporations established the following design criteria for the system:

- It would not require changes in the OIS mainframe equipment;
- It would run independently of, but communicate with, the mainframe;
- It would contain a workflow capability whereby, (1) requests could be routed to any Secretary of State employee based on a prearranged formula, and (2) each request could be tracked to identify its status; and
- It would reduce request turnaround time, the use of paper, and the need for operator intervention.

The imaging system was developed by a combination of OIS and Wang personnel. OIS completed the workflow capability, programmed in Adabas Natural, by the middle of 1990, and Wang completed the print packaging capability, programmed in Pace Cobol, by the end of 1990.

By the end of 1989, enough programming had been completed for data conversion to begin. Using a contractor hired specifically for the conversion, an off-site operation was established to convert the microfilm records onto paper so that poor-quality documents could be enhanced and successfully scanned onto cartridges. Then the cartridges were transported to the Division of Corporations and entered into the new system. The massive volume of pages to be converted--about 6,000,000 initially and 4,000,000 after unnecessary pages had been eliminated--led to an around-the-clock operation. The off-site approach was chosen for most of the conversion to minimize disruption of normal client services. All documents in the old system had been converted by April 1990, and random samples revealed this was accomplished with 99 percent accuracy.

To realize the full benefit of the imaging workflow capability, Division of Corporations users adopted a radically different approach to handling service requests. Before imaging, a user addressed one discrete part of request processing. The imaging system induced each user to become aware of, and to achieve a level of proficiency in, each part of request processing.

A prototype of the workflow capability gave users exposure to the imaging system in early 1990 and was so successful that, with minor changes, the prototype became the heart of the actual system. Then the other major part of the system--print packaging--was completed, and enhancements to both parts continue to this day as opportunities for improved service arise.

Recurring issues for the Division of Corporations are the following:

- Legal issues in imaging regarding acceptability of various storage media, definition of what constitutes a legal image, validity of modified images, access privileges, and backup storage requirements;
- Access frequency issues that dictate whether documents of a certain type should be imaged or microfilmed;
- Technology issues regarding how to allow for the changes and improvements (e.g., in image storage formats) that are inevitable in computers, communications, and imaging;
- Communications issues regarding how to set up networks given the geographical dispersion of the corporations and their agents; and
- Standards issues regarding how to address changing industry standards in areas such as image storage, fax transmissions,

databases, image displays, and printed output.

While Secretary of State and Division of Corporations management exercises overall control of the imaging system, the workflow supervisors and their first-line managers control day-to-day operations. Working closely with Division of Corporations management, OIS supervises the technical support group.

Operation and Maintenance

The imaging system runs for two shifts each workday. File and system housekeeping runs begin on the second shift and continue without operator presence into the third shift. Division of Corporations supervisors diagnose and correct most minor problems. On-site OIS personnel handle more serious problems.

Advantages and Disadvantages

The Division of Corporations has derived the following benefits from imaging:

- Corporations receive improved service;
- A three-month request backlog has been eliminated;
- Approximately $300,000 has been saved by reduced overtime;
- User personnel have been reduced by almost 25 percent; and
- The staff and their work environment have become more professional.

Division of Corporations staff cite no problems or disadvantages with the imaging system other than the usual difficulties in connecting the system's numerous and varied types of equipment and communications and making sure they remain fully operational.

The Future

In the next year, as part of a continuing program of improvements, the Division of Corporations plans to obtain badly needed computer capacity by upgrading the Wang imaging system computers to a Hewlett-Packard HP 9000. It also plans to modernize the software and communications by installing the Unix operating system on the HP, installing Windows on the PCs, and adopting the TCP/IP standard for the networks. This will permit:

- Satisfaction of existing needs in addition to allowing for more storage and a 15 percent increase in the number of corporate users;
- A wider variety of outputs;
- Addition of imaging system software, equipment, and communications functionality as the need arises and technology becomes available;
- More straightforward communications;
- More modern image storage standards;
- Easier system maintenance;
- Open operability (i.e., without special-purpose connections) with other existing and emerging technologies; and
- Easier data sharing between the computers that perform imaging functions (e.g., imaging computer and mainframe).

The Division of Corporations plans to install the existing imaging system software on the new computer and then move to a client-server network, with the HP 9000 as the server and the PCs as clients.

In the next two to five years, the division plans to

- Permit all registered agents to send requests directly into the imaging system workflow using fax or remote scanning;
- Give all registered agents on-line access to stored images;
- Fully integrate uniform commercial code (UCC) filings into the corporations workflow and provide on-line access to Delaware banks, law firms, corporations, and registered agents for UCC filings;
- Provide more extensive incoming fax capabilities as well as credit card and outgoing fax capabilities;

- Open a full-function satellite office in Wilmington;
- Allow electronic filing; and
- Expand to a 24-hour operation to allow for international companies and agents.

Detailed System Description

Client requests enter the imaging system in three ways: automatic entry of fax from clients; direct entry of images scanned remotely at an agent's workstation; and entry of images scanned locally at the Division of Corporations. The objective is to get the images into the workflow and enter their contents into DCIS.

Faxed images undergo an OCR process on a dedicated personal computer to extract the priority and document type (corporate filings, corporate certifications, uniform commercial code filings) from the cover page. The Wang minicomputers use this information to create a master control sequence (MCS) workflow record for the group of images.

Since local and remote scanning are done during a personal computer session, the priority and document type are key-entered and routed to the Wang minicomputers. The OCR process is unnecessary in this situation.

The MCS workflow record, with the MCS number as its key, controls workflow processing on the Wang minicomputers. Whereas the MCS identifies a specific transmission, service request (SRV) numbers define the work requested in the transmission. Each MCS package contains one or more requests for work. During remote scanning sessions, agents assign SRV numbers. Otherwise, Division of Corporations users assign SRV numbers to faxed and locally entered requests.

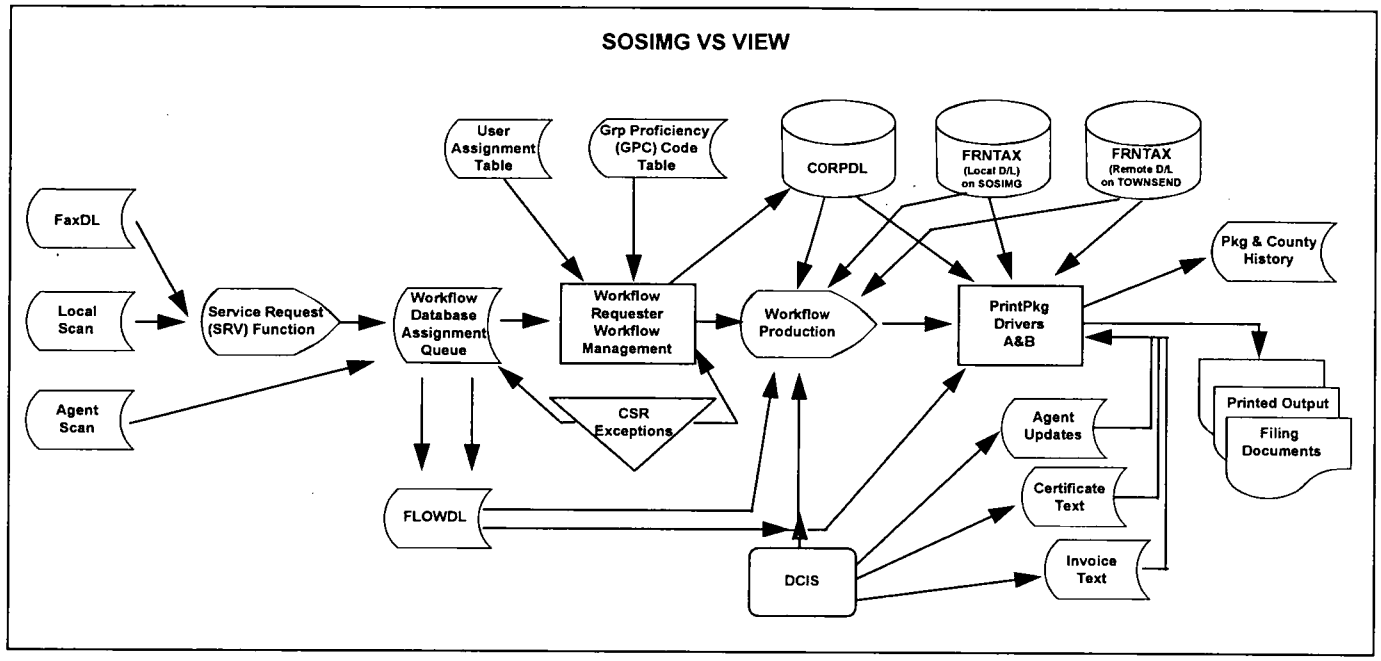
At this point, the user verifies information entered with remotely scanned documents, creates an SRV workflow record for all documents, and groups the SRV workflow record with the associated document images and locations in the system.

The system applies a formula that assigns a Division of Corporations user to work on each task within the SRV. For each user, the system contains a record that specifies the priorities and types of documents (e.g., initial notice, incorporating, and resignation of agent) on which the user is qualified to work. Another record groups each document by the type of work necessary to process the document (e.g., cash management, certificate issue, and new company processing) and, within each work type, the level of complexity. The system, therefore, defines the document types, maximum priority, and maximum level of complexity each user can work on and, unless overridden by the supervisor, assigns work accordingly. As a user completes work, the system checks the work queue for work of an equal or higher priority that the user is qualified to work on and, if none is found, goes to lower-priority work. The above processing is shown in Figure A - 2.

When performing work on a request, the user sees a screen divided into four parts, called windows. The top left quadrant is the window in which the corporations workflow application appears. This controls work that the system brings before the user as well as operations performed on the images--such as affixing official stamps, deleting unnecessary imaged pages in the request, creating print packages, assigning SRV numbers, and making entries in workflow records as work proceeds. The bottom left quadrant is the window in which the user works with the mainframe DCIS. Data can be key-entered or moved into the DCIS database for the corporation to which the request applies, and information in the database can be reviewed and modified. The two quadrants on the right contain images used in processing the work request. One of these quadrants displays images for work underway, and the other shows images of historical documents.

DCIS output resulting from requests includes certificates attesting to the filing of various corporate documents, invoices for the services performed by the Division of Corporations, word

Figure A - 2: Delaware Corporation Filings -- Database Entities

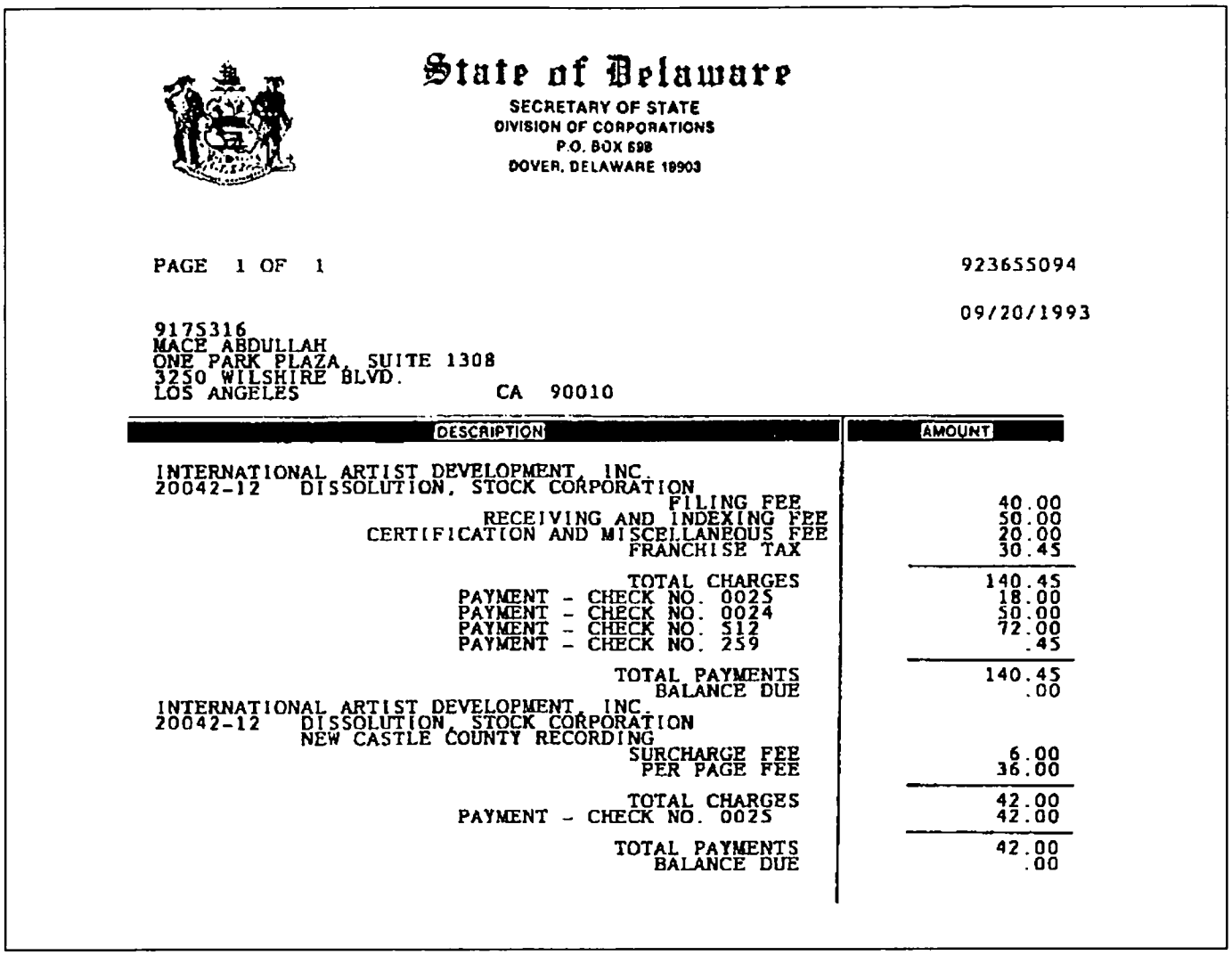


processing documents on state letterhead, and other types of documents. Generally, each group of output consists of at least an invoice, a certificate, and several pages of images of filed or historical documents. Outputs can originate in many places within the mainframe and can be output to numerous devices. So that users do not have to run from device to device for the outputs to a given request, system outputs are grouped into print files on the mainframe and downloaded to the imaging system. There, each output is superimposed on the appropriate template (e.g., certificates, franchise tax documents, invoices, and images of the documents submitted with the request) and printed to obtain the package needed to respond to the request. This Wang-based capability is known as print packaging. Examples of the output are given in Figure A - 3 and Figure A - 4 (Figure 3 in Chapter One shows another example).

Whereas most documents are added to the workflow, initiate specific actions on corporate records, initiate DCIS database updates, and generate specific outputs, franchise taxes are handled differently. These taxes are paid by the franchisee in response to bills generated by DCIS. The money is deposited, and the bills and related information are stored in a lock box. Later, the bills and a transaction log are sent to the Division of Corporations, where they are scanned into the imaging system using the high-speed Kodak scanner. Then the franchisee's bar code is added to the scanned material, and the package is indexed and archived on optical disk in the imaging system.

As described earlier, the imaging system consists of dual minicomputers, PCs, peripheral equipment, communications, imaging software, systems software, and support software. The equipment and software perform most of the functions described above. The mainframe, on which DCIS resides, primarily provides database management and report file generation for information uploaded from or downloaded to the imaging system. For example, the mainframe creates, maintains, and updates files; verifies information contained in service requests; downloads information as needed for workflow management and processing; and assembles information to be included in print packages and downloads it to the imaging system.

Figure A - 3: Invoice Produced Through "Print Packaging"



State of Delaware
SECRETARY OF STATE
DIVISION OF CORPORATIONS
P.O. BOX 898
DOVER, DELAWARE 19903

PAGE 1 OF 1

923655094

09/20/1993

9175316
MACE ABDULLAH
ONE PARK PLAZA, SUITE 1308
3250 WILSHIRE BLVD.
LOS ANGELES CA 90010

DESCRIPTION	AMOUNT
INTERNATIONAL ARTIST DEVELOPMENT, INC.	
20042-12 DISSOLUTION, STOCK CORPORATION	
FILING FEE	40.00
RECEIVING AND INDEXING FEE	50.00
CERTIFICATION AND MISCELLANEOUS FEE	20.00
FRANCHISE TAX	30.45
TOTAL CHARGES	140.45
PAYMENT - CHECK NO. 0025	18.00
PAYMENT - CHECK NO. 0024	50.00
PAYMENT - CHECK NO. 512	72.00
PAYMENT - CHECK NO. 259	.45
TOTAL PAYMENTS	140.45
BALANCE DUE	.00
INTERNATIONAL ARTIST DEVELOPMENT, INC.	
20042-12 DISSOLUTION, STOCK CORPORATION	
NEW CASTLE COUNTY RECORDING	
SURCHARGE FEE	6.00
PER PAGE FEE	36.00
TOTAL CHARGES	42.00
PAYMENT - CHECK NO. 0025	42.00
TOTAL PAYMENTS	42.00
BALANCE DUE	.00

Conclusions

In the Delaware Secretary of State Division of Corporations, the overriding purpose for imaging was to improve service. The imaging system has enabled the Division of Corporations to improve service dramatically and will continue to do so as the division searches for ways to use technology for even better corporate service.

As noted above, the following three aspects of the Division of Corporations imaging system would interest courts:

- Images automatically enter the system by fax or by local or remote scanning;
- The system produces excellent-quality official documents by superimposing text on imaged templates that contain signatures, seals, letterheads, and other inscriptions; and
- The system has a workflow formula with various options for document processing to assist in getting work to the proper workstation.

Figure A - 4: Certificate Produced Through "Print Packaging"

State of Delaware

Office of the Secretary of State

PAGE 1

I, WILLIAM T. QUILLEN, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE CERTIFICATE OF INCORPORATION OF "S. DENERO INSTITUTE" FILED IN THIS OFFICE ON THE SIXTEENTH DAY OF SEPTEMBER, A.D. 1993, AT 9 O'CLOCK A.M.

A CERTIFIED COPY OF THIS CERTIFICATE HAS BEEN FORWARDED TO NEW CASTLE COUNTY RECORDER OF DEEDS FOR RECORDING.

* * * * * * * * * * *

William T. Quillen

William T. Quillen, Secretary of State

693259016

AUTHENTICATION: 4061922

DATE: 09/20/1993

2. CSX Bill of Lading Image Processing System

Summary

CSX Corporation is a diversified transportation company best known as a major railroad that serves the East and Midwest. CSX Transportation is the unit of CSX Corporation that handles railroad operations.

As with all of today's railroads, most of CSX Transportation's business comes from freight service. Shipments are recorded on bills of lading prepared by customers and sent to CSX by facsimile transmission (fax). Most customers have direct fax connection to CSX. Electronic data interchange for computer-to-computer bill of lading transfer also is available from some customer sites.

The railroad translates the bill of lading information onto waybills, which contain all pertinent information--such as the origin, shipper, destination, consignee, route, payer, and freight charges--about each shipment on a given rail car. When you consider the number of rail cars owned by a major railroad such as CSX, you get an idea of the enormity of its waybilling operation. Imaging plays a large part in enabling the railroad to process approximately 2.3 million bills of lading annually.

The waybilling operation is centralized in Jacksonville, Florida. CSX previously used regional sites to gather bills of lading but needed to reduce document handling and improve data entry. With imaging as the obvious solution, the regional sites were deemed to be prohibitively expensive and difficult to coordinate.

Waybilling is the focal point of recordkeeping and control for the vast number of CSX shipments, and the nerve center of waybill processing is the Automated Waybilling System (AWS). Each bill of lading is entered into AWS, which runs on the CSX IBM mainframe. AWS produces waybill data that are sent to rail yards nationwide. The imaging system vastly simplifies and expedites the process of gathering and grouping bills of lading and entering them into AWS.

Images of the faxed bills of lading are received automatically in the CSX imaging system in Jacksonville and routed to the customer representative who handles that type of account (e.g., coal, chemicals, automobiles, and grain). The representative, working with a split screen showing a bill of lading on one side and AWS input screens on the other, enters the data into AWS. As each bill of lading is entered, the image is stored on optical disk.

After considering several vendor cost estimates for a turnkey imaging system, CSX decided to form a development team comprised of its technical staff and personnel from Apple and Digital Equipment Corporation (DEC). This approach combined the best that CSX could offer with the best of Apple and DEC, and it saved CSX over $1.5 million.

CSX enthusiastically endorses the imaging system and says it has exceeded expectations. The system, which cost approximately $1.6 million, has enabled the railroad to process its huge volume of bills of lading and enter them into waybills quickly, cost effectively, and at a central site. As a by-product, CSX now can satisfy requests from other railroads for documents.

At first, the railroad's main concern about imaging was whether its credibility with customers would be damaged because of lost documents. Just the opposite has happened.

Courts can relate to several elements of the CSX imaging experience. First, many documents are received in clerk's offices from external sources

such as attorneys, law enforcement, probation, pretrial diversion, and community services and other alternatives to incarceration. Information from these documents must be entered into the clerk's case processing system. Increasingly, these documents are being faxed to the clerk. CSX improved data handling and entry by receiving faxed images from customers and displaying them with input screens for more efficient data entry. Second, like most potential imaging users, the courts need to know there are alternatives to expensive, off-the-shelf solutions from vendors. CSX realized this and cut its costs in half.

Information on the CSX imaging system was provided by Mr. Albert Lancaster, the CSX Director of Waybilling Operations. We appreciate his assistance.

Enterprise Description

CSX Corporation has headquarters in Richmond, Virginia and, in addition to CSX Transportation, consists of American Commercial Barge Lines, an inland waterways barge operator; Sealand, a container steamship operator; and several non-transportation divisions. CSX Transportation has annual revenues of almost $4.5 billion and approximately 30,000 employees. Its headquarters address and telephone number are

500 Water Street
Jacksonville, FL 32202
904-359-3100.

Within CSX Transportation, there are finance, sales and marketing, transportation, and technology units. Waybilling Operations is in Customer Service and Systems, whose vice president reports to the head of the transportation unit. Information Services, which supports computer activities throughout CSX Transportation, gave Waybilling Operations technical support in the imaging project. Information Services is in the technology unit.

Imaging Application

Overview

In 1987, CSX implemented regional waybilling, through which customers faxed bills of lading to regional locations to be keyed into AWS. The volume of documents (2.1 million annually in 1987) and the need to retain them for three years caused CSX to consider imaging in early 1989. The railroad realized central waybilling was the best approach because of the document volumes and the costs and difficulties of establishing, coordinating, and maintaining regional imaging sites. The central imaging project that resulted in the current system began in September 1989 and was completed in January 1990.

At Waybilling Operations in Jacksonville, each bill of lading is processed by a dedicated IBM PS/2 set up to receive fax transmissions. Since it is received by fax, the bill of lading already is in image form and scanning is not required.

All imaged bills of lading received from the customer in a fax transmission are automatically given an image reference number and routed to a waybilling representative assigned to handle that type of customer (e.g., coal, chemicals, automobiles, and grain). With the images on the left side of the screen and the AWS data entry forms on the right, the representative successively enters each bill of lading in the transmission into AWS. Since the customer profile automatically displays certain basic information for each customer, the representative must enter only what either differs from the norm or varies with each bill of lading. Each representative, and their supervisors, have Apple Macintosh microcomputers.

When data entry has been completed for a bill of lading, the AWS screens are committed to that

system's database on the IBM mainframe and the images are stored on optical disk. The optical disk is accessed through a jukebox connected to a DEC VAX 3900. Data files used for imaging and data entry are stored on the VAX's magnetic disk storage.

Since the main purpose of the imaging system is to receive imaged documents and enter them into AWS, there is minimal retrieval of stored documents from optical disk for subsequent processing. There is no provision for rapid document retrieval and processing by using magnetic disk for intermediate storage of optical images. User workstations retrieve documents directly from optical disk.

The image processing flow is shown in Figure A - 5, and the equipment and configuration of the image processing network are shown in Figure A - 6.

The specific equipment in the imaging system is as follows:

- The IBM PS/2 fax receivers are Model 80s running under DOS, with 1 million characters of memory and 128,000 characters of disk storage. There are six of these personal computers.
- The Apple Macintoshes used by the representatives and supervisors are IIcx's, with 8 million characters of memory and 40 million characters of disk storage. Two shared Apple Laserwriter II printers are available to this group. There are about 100 of these microcomputers.
- The DEC VAX 3900 functions as a dedicated file and database server and runs with Sybase database software.
- The IBM, Apple, and DEC equipment function together in a DECNET local area network for which the VAX is the server.
- The network is connected directly to the IBM mainframe through a communications controller.
- The Apple Macintosh used for retrieval is a stand-alone IIcx, and it has an Apple Laserwriter II printer.

The imaging software in the system is customized and was developed by Apple and Information Services personnel.

Planning, Implementation, and Management

Waybilling Operations had to contend for scarce Information Services resources before they could be sure there would be an imaging project. Once this was decided, the primary concern became whether documents would be lost in some bottomless imaging pit, resulting in damage to customer service. Tension was heightened by the knowledge that another major railroad had failed in a similar endeavor.

After the project was approved by CSX Transportation's upper management, Mr. Lancaster searched for the most cost-effective imaging solution. Cost estimates from and meetings with several vendors who were proposing turnkey systems persuaded him to look to Information Services for much of the work.

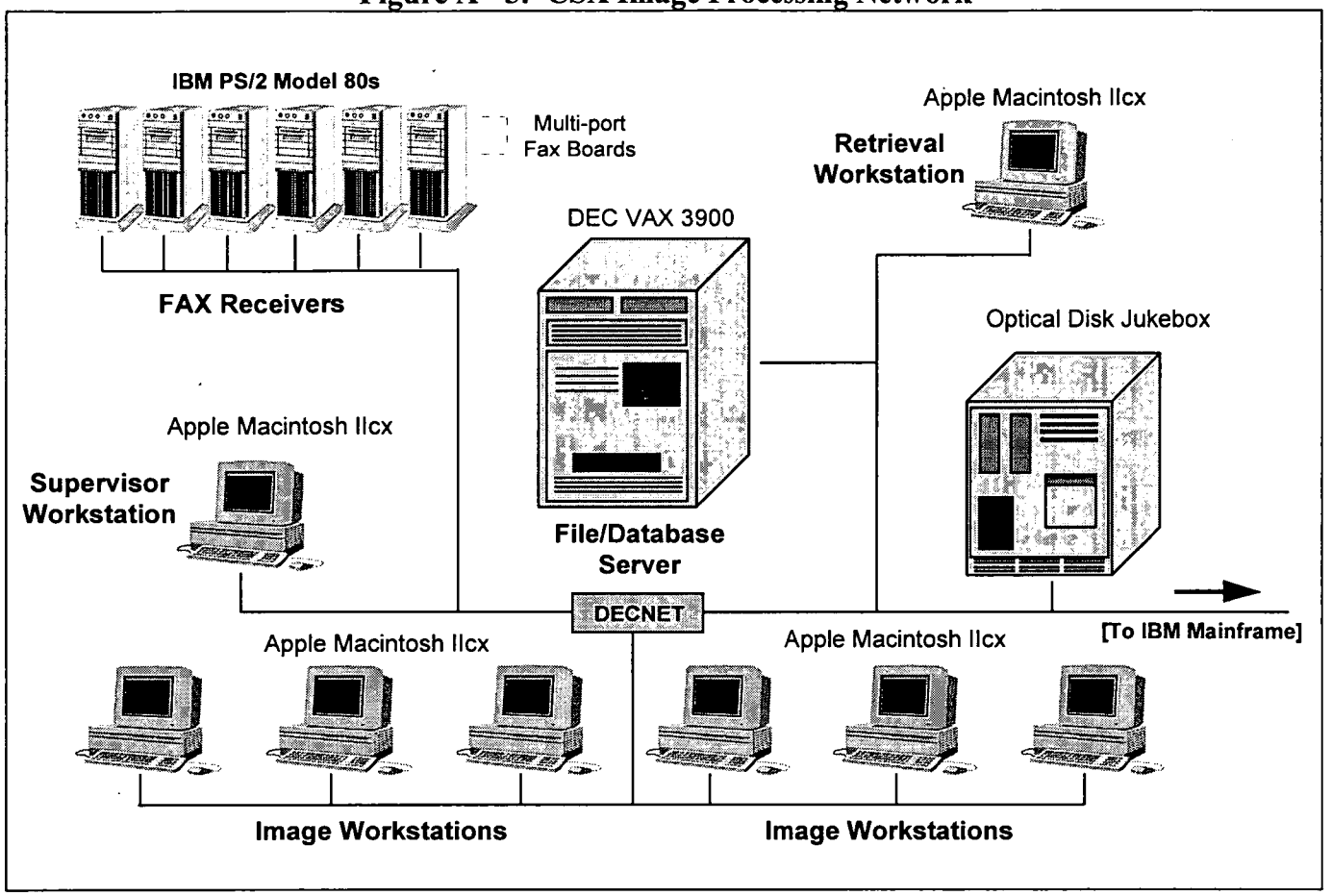
This led to a combined effort with Information Services, Apple, and DEC. In many ways, Mr. Lancaster got the best of all worlds by using Information Services, who knew how CSX applied technology to waybilling, and the two vendors, who knew imaging, computer, and network technologies. There were other benefits; because of this approach, CSX

- Had direct project involvement, which meant better project control;
- Got customized software; and
- Dramatically reduced costs because CSX knew exactly what equipment was needed and ordered new equipment only to supplement what already was installed.

Against this backdrop, Waybilling Operations and Information Services devised the following strategy:

- Acquaint Information Services personnel with concepts of imaging in waybilling data entry;
- Acquaint Waybilling Operations personnel with the technical considerations;

Figure A - 5: CSX Image Processing Network

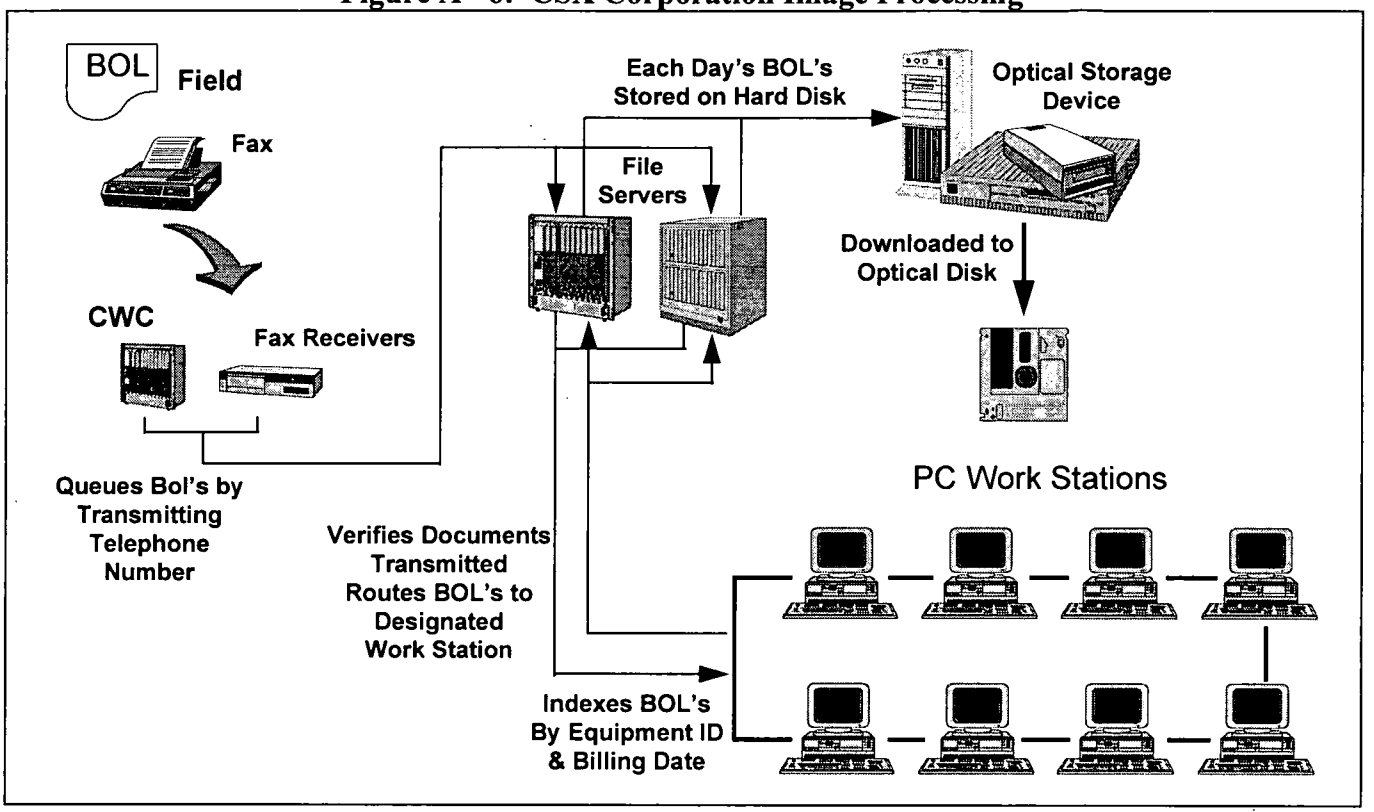


- Conduct a requirements analysis to document the functions the imaging system would perform and the volumes of documents it would handle;
- Use the requirements analysis to communicate with vendors and CSX staff; and
- Make sure CSX Transportation management supported the project and was apprised of its progress through initial presentations to obtain approval and monthly status presentations thereafter.

Even though CSX had no formal implementation plan for the imaging system, it proceeded systematically through the project one step at a time. Other significant elements of the implementation are described below.

- Since direct entry from faxed documents was a new feature, some modification of AWS was required to process image reference numbers;
- Procedures in waybilling operations were adjusted to accommodate the new system, but this was delayed until the system had been used long enough to produce meaningful operational reports showing what changes were needed;
- The system was tested in a "laboratory" environment before it was available to users; and
- The Macintosh computers were installed before other equipment so the representatives and supervisors could become familiar with them and the main interface software.

Figure A - 6: CSX Corporation Image Processing



Management and control of imaging system use are exercised through the users manual, mainframe procedures for updating and using the database, and supervisor functions. The system produces management reports that assist in monitoring performance.

The representatives' supervisors are important elements in system management. Although the preset criteria for automatically assigning bills of lading to representatives by customer type seldom require modification, supervisors can control workloads by adjusting work queues. When representatives have a problem or question about a document, they can route it to the supervisor for assistance.

Quality control of data input into AWS is handled informally by representatives and supervisors. Problems with bills of lading usually are detected as the representative goes through each page of a transmission during data entry. Normally, the representative calls a customer if there is a problem or, alternatively, he or she asks the supervisor to call.

Standards for the waybilling operation are high. The system must be operational 24 hours a day, 7 days a week, and the goal is to have each bill of lading entered into AWS within 2 hours of its receipt. This means that each representative should process at least 65 bills of lading each day.

Security is achieved through:

- Normal system passwords and user sign-on procedures;
- Supervisor control over the representatives' work queues;
- Restriction of representatives from automatically receiving documents other than for the customer types they are assigned to work on; and
- Limitation of no more than one representative working on a document at any given time.

Operation and Maintenance

Waybilling Operations and Information Services staffs operate the imaging system, and Information Services provides maintenance. The only problems cited by CSX so far are (1) a frightening total system outage about three months after it became operational (caused by an accidental severing of the main power cable) and (2) system glitches following the addition of the optical jukebox.

Advantages and Disadvantages

CSX has derived the following benefits from imaging:

- Improved customer service;
- A reduction in the number of representatives needed to enter waybills from 165 to 87;
- An increase in the number of waybills entered daily from about 65 to an average of 90 and, in some instances, as many as 150 to 200;
- A reduction in the amount of space required for staff;
- A reduction in the amount of space required for document storage;
- Better operational reports, leading to improved management of representatives' workloads with fewer peaks and valleys, more visibility over work queue contents, and better document tracking; and
- Elimination of many paper- and fax-handling problems and costs.

There are some disadvantages of imaging at CSX:

- System failures immobilize the entire waybilling operation;
- Software problems can be difficult to isolate and fix;
- Document retrieval by customer identifier would have been easier if it had been based on customer name instead of fax (or other) telephone number; and
- There is the potential (so far unrealized) for employee morale problems because of staff cutbacks and the feeling that control has been lost to the system.

The Future

In its continuing quest to eliminate keystrokes, CSX is increasing its use of the following:

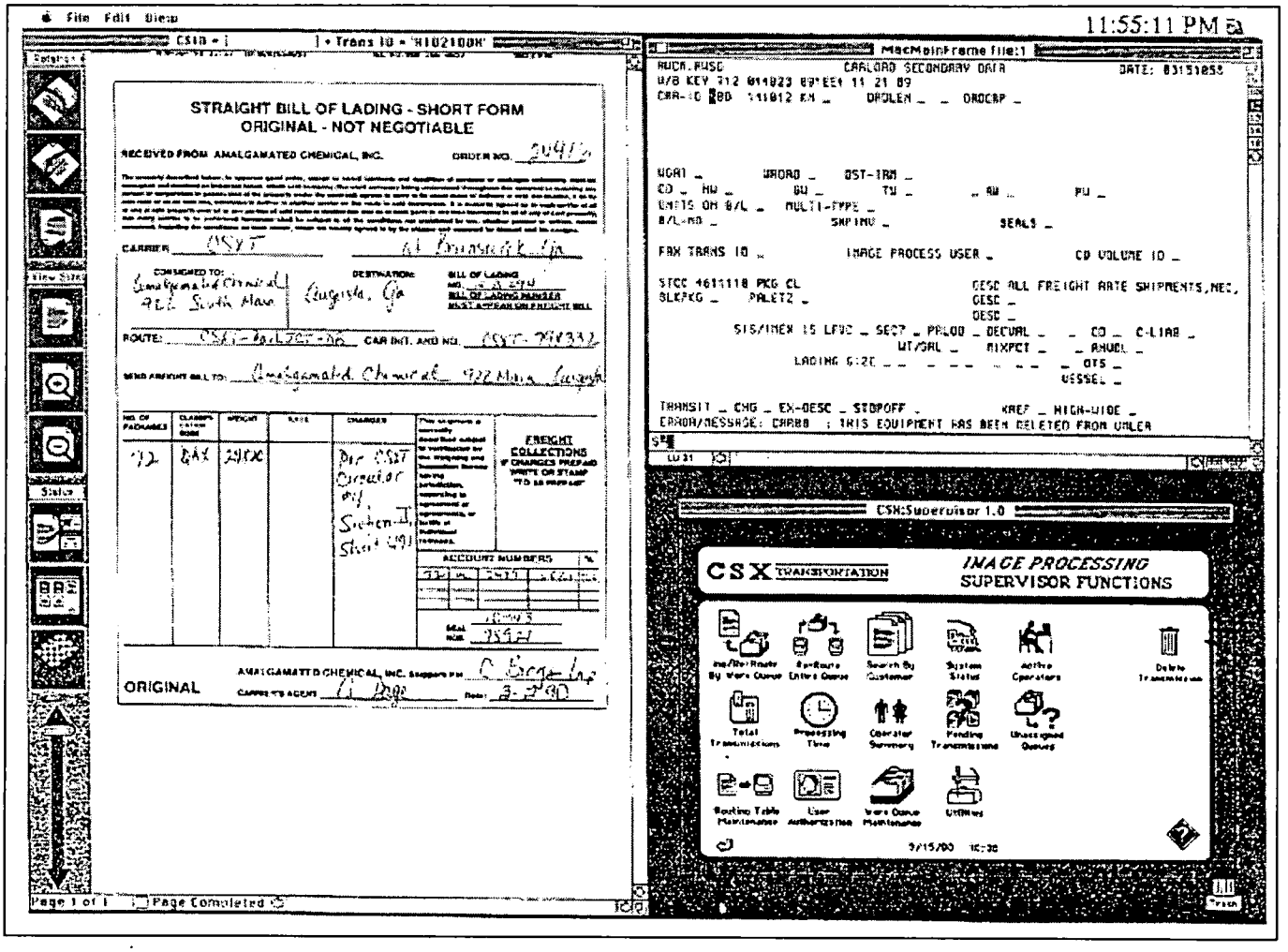
- Electronic data interchange in which an industry-standard bill of lading is defined and installed on customers' computers so that bills of lading are transmitted directly from these computers into AWS. Eventually, this will eliminate the necessity of faxing the documents to CSX and entering the imaged data into AWS.
- An intermediate approach whereby optical character recognition (OCR) permits automatic entry of specific data from the faxed documents into AWS. This eliminates keyboard entry of these data unless there are errors or unreadable data. CSX is pilot testing this capability now.

Detailed System Description

The faxed bills of lading in a transmission may consist of many pages, and an entire transmission is routed to the work queue of a representative for processing. When the representative completes a transmission, the system automatically brings the next transmission from his or her queue onto the computer screen for processing. The first page of the first bill of lading in the transmission is displayed on the left of the screen, and two AWS data entry screens are displayed on the right, as shown in the Imaging System Workstation Display (Figure A - 7).

The representative processes each bill of lading in the transmission by entering its contents into corresponding AWS screens on the right side of the monitor. The system contains a profile for each customer, and basic information is copied automatically from the profile onto the data entry

Figure A - 7: CSX Imaging System Workstation Display



screen so that only changes and variable information need to be key-entered.

At any time during entry of a transmission, the representative can:

- Look through its pages either individually or all at once with each page reduced;
- Select specific pages to work on;
- Change the displayed image (e.g., rotate it or enlarge specific parts of it for closer inspection);
- Add and review comments;
- Route the transmission to the supervisor if help is needed; and
- Look at previously entered transmissions.

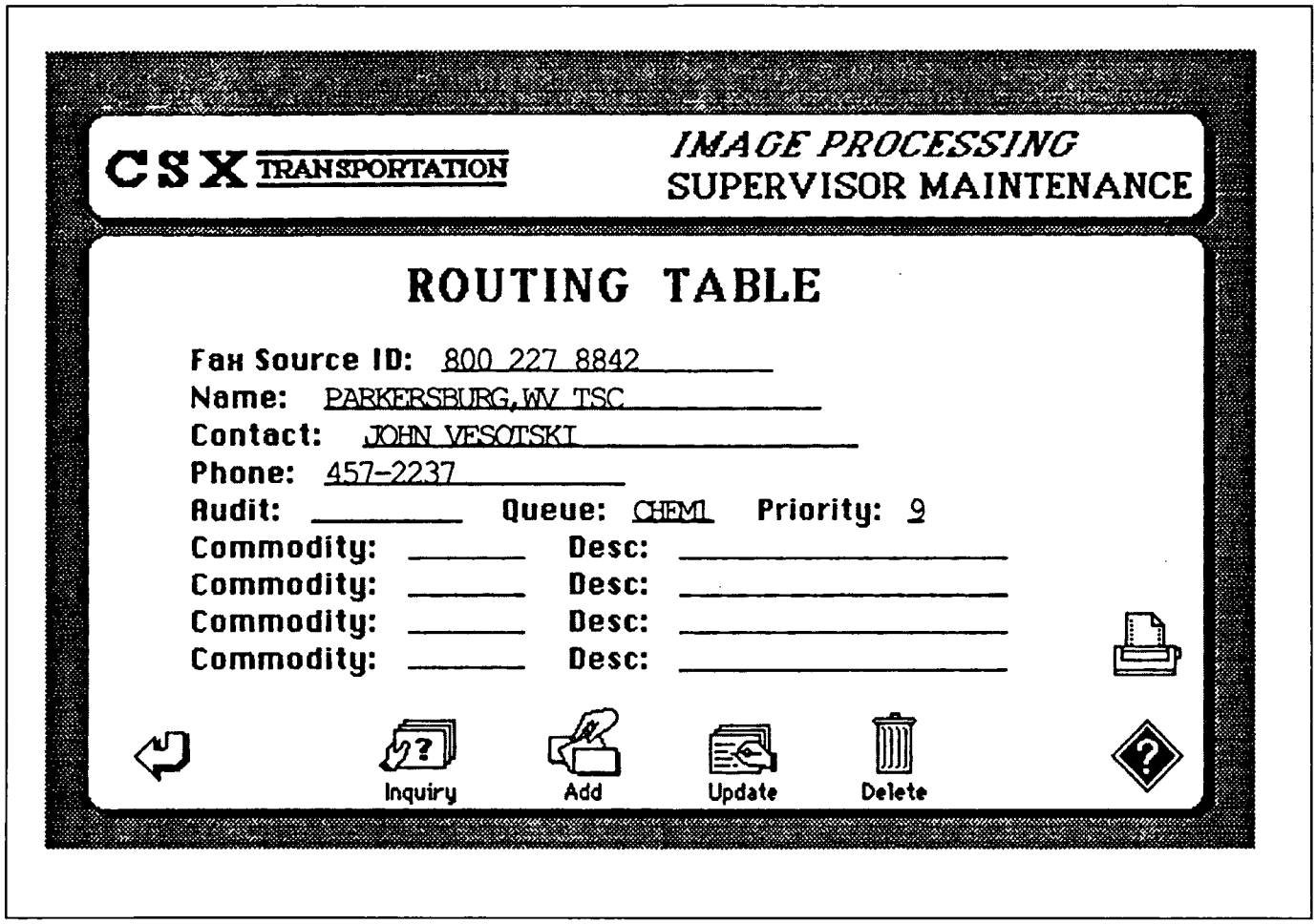
Since each transmission can generate several waybills, the representative indexes each waybill as it is completed. Indexing enables the system to associate the image reference number of the transmission with the waybill.

When the representative designates the transmission as "finished," the first page of the next transmission in the queue appears on his or her screen.

Previously entered documents are archived as they are processed and can be retrieved from any workstation. Documents are retrieved based on their image reference and rail car numbers, which are available from AWS.

Supervisors perform their functions using a screen that has the document image on the left half, supervisor activity selection icons or information displays on the lower right quarter,

Figure A - 8: CSX Supervisor Maintenance Screen



and information from the mainframe on the upper right quarter. Samples of the Supervisor Maintenance, Supervisor Operator List, and Supervisor Inquiry screens are shown in Figures A - 8 through A - 10.

Conclusions

CSX is delighted with the imaging system and states emphatically that it was worth the money, time, and effort expended to obtain the equipment, develop the software, install the system, and make it work. The system was right for CSX for one simple reason: it solved the major operational problem of how to establish a cost-effective and reliable method to receive bills of lading from customers and enter them into AWS to create waybills.

Initial skepticism has been replaced by enthusiastic realization that the benefits of the system have exceeded the railroad's expectations. Lack of interest from Waybilling Operations' sister departments has been replaced by requests from these units to use the system. Fear that CSX, like the other major railroad that tried bill of lading imaging, would fail at its endeavor has been replaced by firm assurance that the system is a big success.

Figure A - 9: CSX Supervisor Inquiry Screen

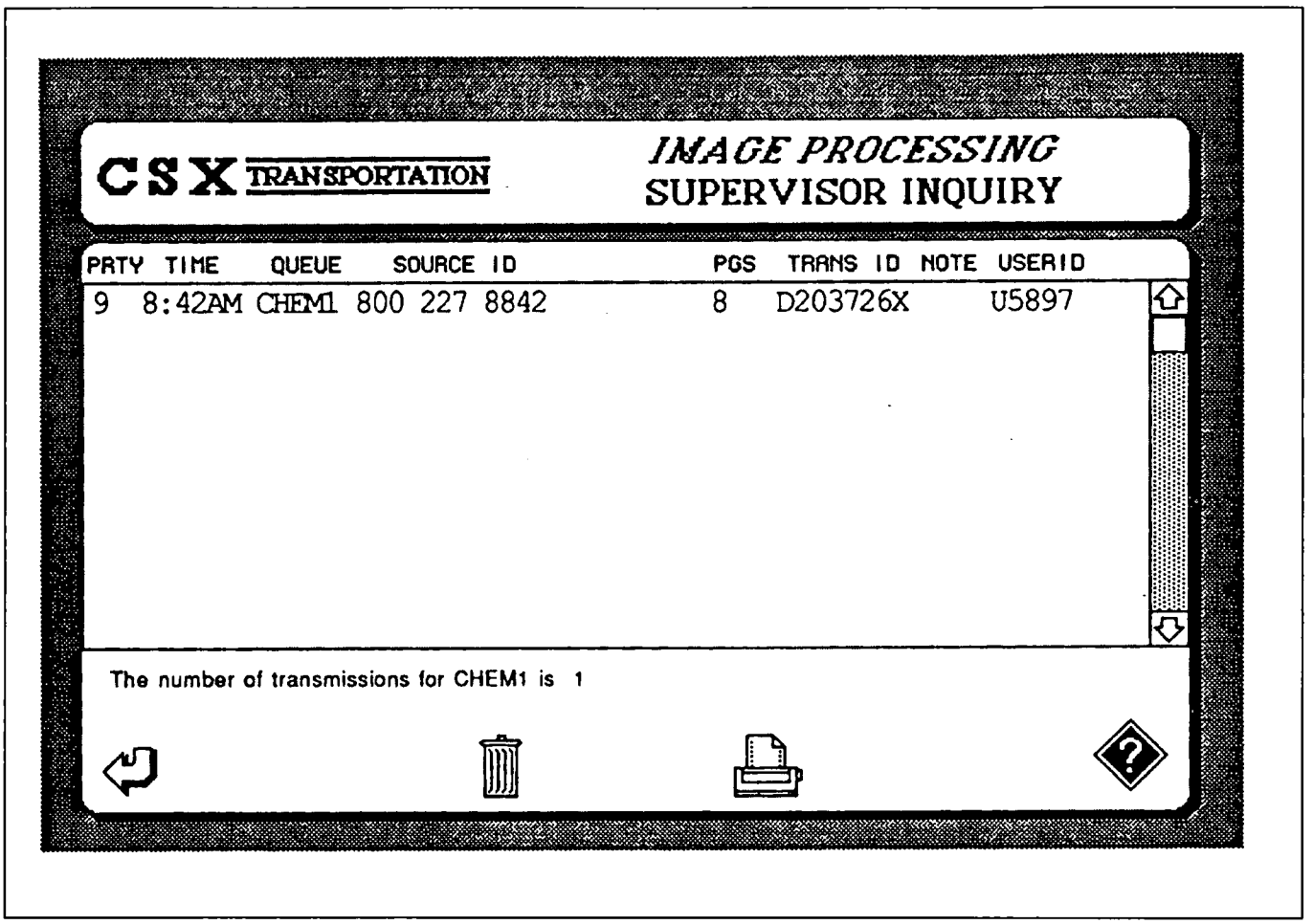
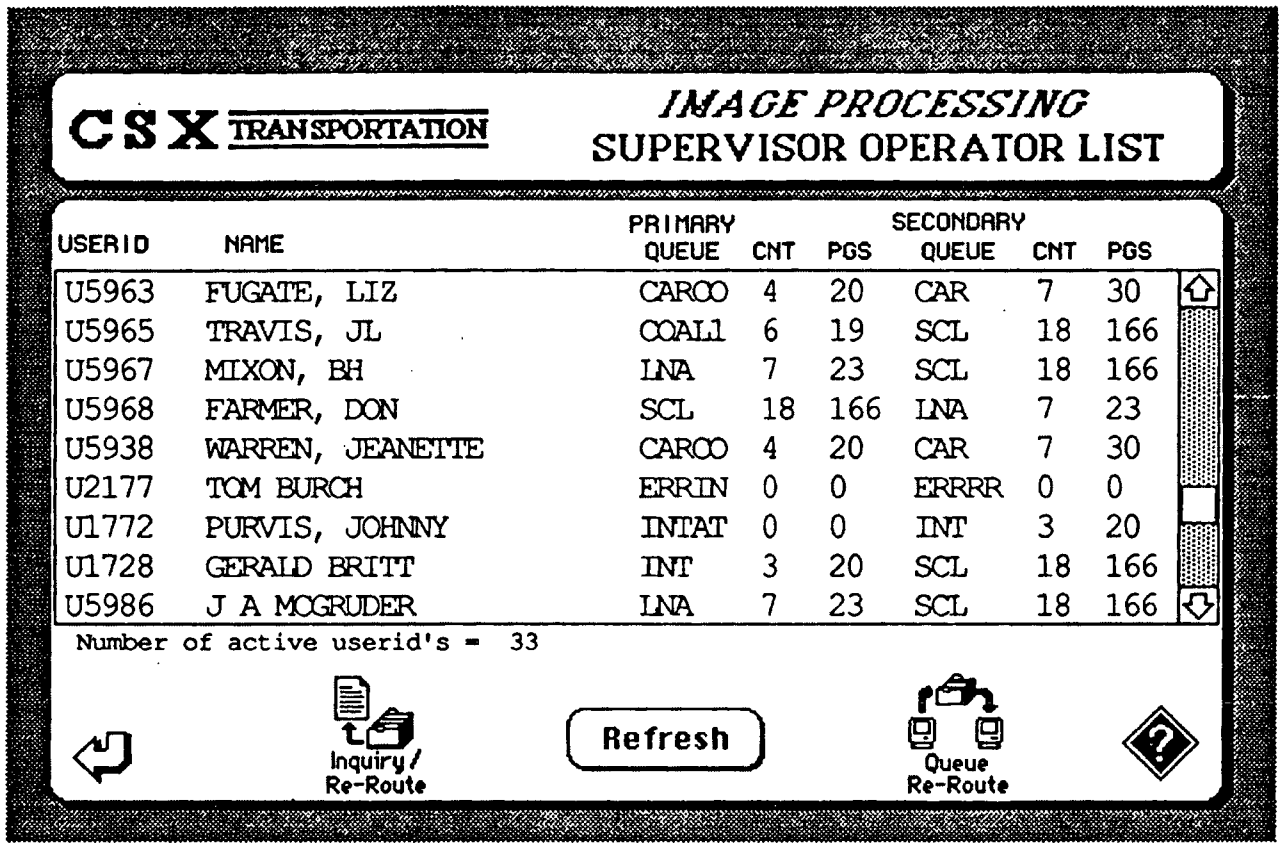


Figure A - 10: CSX Supervisor Operator List Screen



3. Virginia Retirement System

Summary

The Commonwealth of Virginia Retirement System (VRS), the retirement agency for state employees, supports activities such as health insurance, taxes, monetary refunds, disability processing, death claims, retirements, retirement estimates, field counseling, deferred compensation, member accounting, and investments for its 310,000 active and inactive members, 72,000 retirees, and 800 employers. The agency handles a high volume of incoming and outgoing documents that initiate (1) retrieval of documents and information from existing files, (2) changes to existing files, (3) creation of new files, and (4) storage of documents and information in files. Frequently, several VRS employees must work on a document concurrently.

Imaging is uniquely suited for such a situation because it dramatically reduces the endless and inefficient paper shuffling indigenous to the retrieval and storage of high volumes of documents and concurrent use of those documents by several workstations. VRS wanted imaging to improve the efficiency with which documents were retrieved, routed to workstations for processing, worked on concurrently, and stored. The agency needed to be able to look at all the records for a given individual without first having to gather them from several places.

VRS states emphatically that these expectations were realized in their imaging system, not only in the improved efficiency that it sought, but also in improved member service. The system makes documents and index information available for responses to inquiries -- usually while the member is still on the telephone, thereby dramatically improving service and avoiding the inefficiency of follow-up calls.

In addition to the performance of the system, the strong support of VRS management and users is cited as a major reason for the system's success. The technical staff worked closely with these other employees to develop plans and requirements for the system and to apprise them of progress during system development and implementation. This close association is continuing so that managers, users, and technical staff members can be sure the system is functioning properly and future needs are met.

While the $1.76 million imaging system has improved the efficiency with which VRS operates and the service the agency gives its members, there are liabilities. The system is highly complex, it will be difficult to maintain, and some agency staff feel enslaved by the system even though it has freed them from many routine tasks.

Like VRS, courts receive many documents that they must index, store, retrieve, group with other information, route to different workstations, and work on concurrently to answer questions and prepare cases for the next stage of litigation. The VRS imaging system, therefore, should be of interest to court officials.

Information on the VRS imaging system was provided by Ms. Jane Pugh, the agency's Plans and Operations Manager, who has been in charge of the system since its inception. We appreciate her assistance.

Enterprise Description

VRS members include employees of the state agencies as well as teachers, judges, firefighters, law enforcement officers, and various employees of political subdivisions in the state.

The agency is located in Richmond, Virginia, and consists of 120 employees. Its address and telephone number are

1200 East Main Street
Richmond, VA 23219
804-786-8785.

Agency files contain almost 1.7 million images on approximately 500,000 individuals.

In the Commonwealth of Virginia hierarchy, VRS is under the Secretary of Administration, has a Board of Trustees, and is run on a daily basis by the Director and Deputy Director. As Plans and Operations Manager, Ms. Pugh is on the next management level. She has a full-time staff of six.

Imaging Application

Overview

In the early 1980s, VRS implemented a microfilm system, called the computer assisted retrieval (CAR) system, to support recordkeeping. While the CAR system was state of the art at the time, it was labor intensive and fell far short of eliminating the paper blizzard. On a typical day, more than 1,000 documents were moved from microfilm to paper for reference work at a cost of approximately $.10 per page and untold hours of staff time. Documents pertaining to a given individual could be scattered throughout the CAR system files, and a massive effort often was required simply to gather all documents when work pertained to that person's records. Finally, since documents were microfilmed after they were processed by VRS staff, and the microfilming required ten days, either copies or originals of many documents were held by staff until they were reasonably sure there would be no follow-up inquiries. This increased the amount of paper being handled and made documents unavailable to other staff.

To address these problems, VRS began to consider imaging in the early 1990s. Imaging was first regarded only as a replacement for the microfilming system, but its wider applicability became apparent as the project progressed. A request for proposals was issued in September 1991 for an imaging system, and this resulted in an award to IBM in June 1992. The system became fully operational in March 1993.

The VRS imaging system:

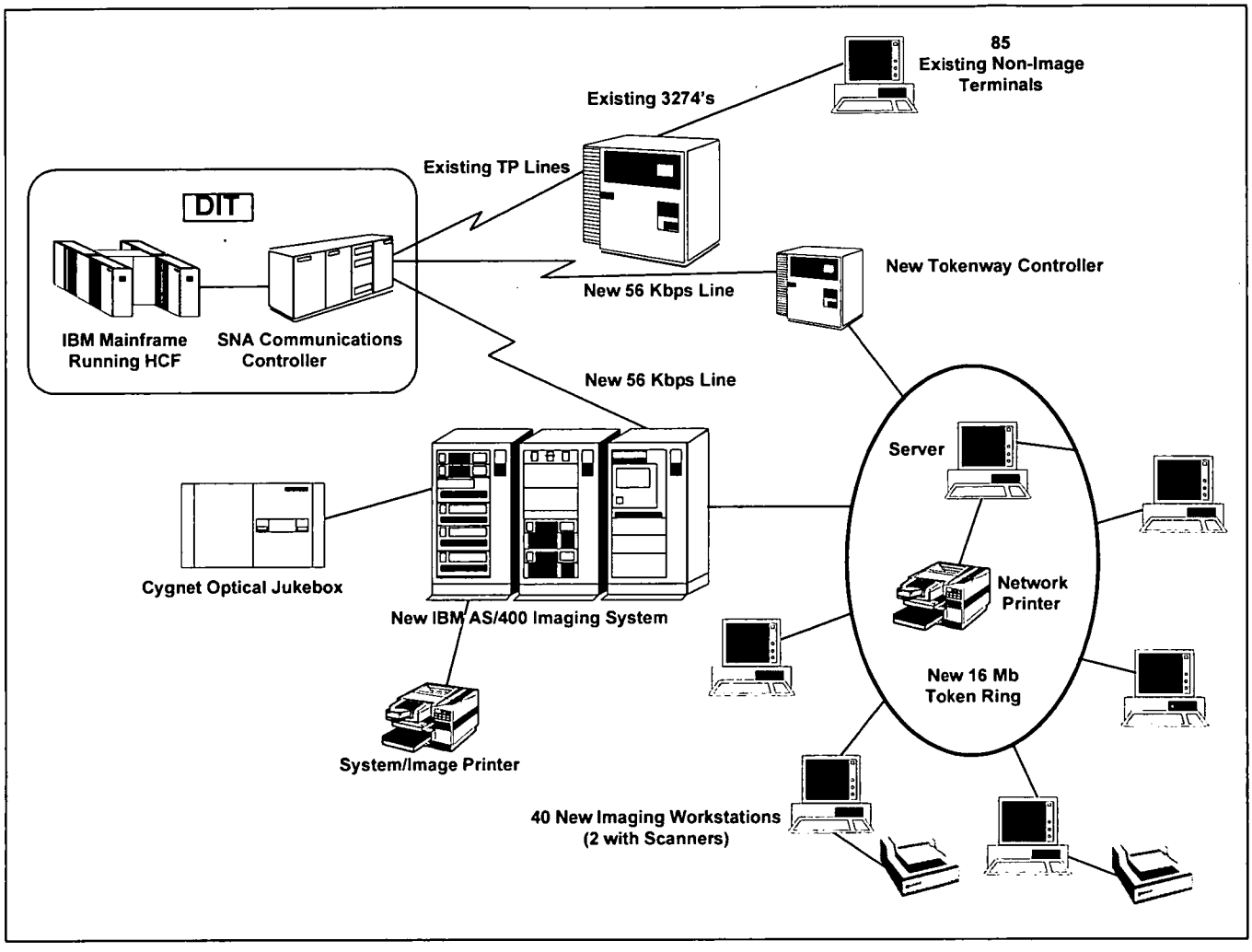
- Scans incoming documents;
- Helps the operator index the documents;
- Stores the document images on optical disk for retention and magnetic disk for upcoming work;
- Stores the indexes on magnetic disk;
- Determines which workstations will handle each document;
- Retrieves related documents, groups them with the new document, and routes the entire package to the appropriate workstations;
- Tracks pending follow-up work;
- Helps supervisors control the workload of each operator; and
- Makes documents and index information available for rapid responses to inquiries.

The VRS Imaging Network computer setup is shown in Figure A - 11.

The imaging application and database use IBM ImagePlus software and run on an IBM AS/400, Model E45, mid-range computer. The AS/400 file server is connected to a local area network (LAN) comprised of an IBM PS/2 network server and 40 PS/2 workstations. The PS/2s run with the OS/2 operating system, and the LAN runs under IBM's token ring topology. The LAN includes two scanners and a printer. A printer, 16 billion characters of magnetic disk storage, and a Cygnet optical jukebox with four optical disk storage units are attached to the AS/400. All of this equipment and software is dedicated to imaging.

Other than imaging, all VRS applications run on the Virginia Department of Information Technology (DIT) IBM mainframe. (DIT is the state computer services agency.) The VRS AS/400 is connected to the DIT mainframe, and VRS users not on the LAN are connected to the

Figure A - 11: Virginia Retirement System's Imaging Network



DIT mainframe and, through the mainframe, to the VRS AS/400.

The VRS operational staff who process documents and inquiries from members have LAN workstations. These users work directly with the images. Through terminals and personal computers, VRS users not on the LAN can look at anything from the imaging system (i.e., index information, comments, and audit trails) except the actual images.

Planning, Implementation, and Management

The primary concerns at the outset of the imaging project were:

- Whether VRS users would accept a new way of doing things;
- Whether the shortcomings in the CAR system and related procedures could be eliminated;
- Whether the new system would work--particularly as it became apparent that the system would be complex with many different computer technologies to be integrated; and
- Whether the equipment specified for the new system would have sufficient capacity.

The VRS Plans and Operations unit addressed these concerns by:

- Making sure all users and managers, and DIT as appropriate, participated throughout the new system project;
- Conducting a thorough requirements analysis in which the processes that must be performed were identified, the applicability of imaging to those processes was examined, and the equipment and software comprising an imaging system that addressed the requirements were identified; and
- Developing a realistic working plan to obtain and implement the system.

A major part of implementation was to convert CAR system data to the new imaging system, and this began in July 1992 when enough new equipment had been installed. First, using the CAR system index, discrepancies in CAR system data were identified and corrected. Then, to improve inquiry and retrieval, VRS developed and put on the new AS/400 an overall and expanded index. This gave VRS an index of all cases regardless of whether they resided on optical disk, magnetic disk, or microfilm. Given the magnitude and complexity of the conversion, VRS decided the more cost-effective approach would be to automate it. The agency engaged a vendor to accomplish this task.

There was no prototype or pilot testing of the new system; VRS simply started using the new system on March 1, 1993. Operators had been using personal computers with windows and mouse technologies and image displays since September 1992 to become familiar with those features. Even though the implementation was successful, VRS recommends an imaging prototype if (1) sufficient funds exist to cover the loss should imaging turn out to be the incorrect solution and (2) the prototype can be expanded into the real system if imaging is the correct solution.

Throughout the planning and implementation, and continuing now that the system is operational, VRS has used a number of management controls. Initial management approval was necessary from the VRS Board of Trustees, Virginia Department of Planning and Budgeting, Virginia Council for Information Management, and DIT. As noted above, management and users participated in the planning and implementation. Now that the system is operational, the following controls exist:

- Audit trails for each document in the system showing date submitted, time stamp, size, person who submitted, microfilm cross-reference if converted from microfilm, and cross-reference to document received if scanned into the system;
- Restricted system access whereby data can be entered or modified only by VRS operators on the LAN or by being imported (i.e., transferred) from the DIT mainframe;
- Restricted system deletion whereby only the VRS system administrator can make deletions;
- An audit trail of all deletions;
- Duplicate storage of each image on optical disk to the journal platter, which contains chronological entries, and the cluster platter, which contains all documents for a single member;
- Weekly backups and off-site storage of the index; and
- Each VRS operator can access only his or her work queue.

Unlike the situation in some courts, there were no immediate legal issues that VRS needed to address before imaging could proceed. Long-range unresolved issues concerned data retention on optical disk.

Operation and Maintenance

IBM provides support for the equipment and software, and the VRS Plans and Operations unit handles tasks such as system administration, LAN administration, print management, and minor problem correction. The VRS computer staff

provides support in activities such as file backups and problem resolution.

System operation and maintenance so far have been trouble-free except for minor problems with the optical jukebox.

Advantages and Disadvantages

VRS has derived the following benefits from imaging:

- Improved indexing through fewer operator keystrokes and improved accuracy;
- Greater coordination of documents on optical disk with documents and information (e.g., documents imported from DIT mainframe; index; name, social security number, and retirement date changes) on magnetic disk;
- More efficient use of disk storage by being able to integrate documents on magnetic disk with documents on optical disk through the index, thereby eliminating the necessity of storing all documents in less efficient image form on optical disk;
- More efficient staff usage because of the integrated disk storage noted above by permitting some documents to be retained on magnetic disk, thereby eliminating the need to scan all documents onto optical disk;
- Better inquiry capability;
- Less paper usage, reproduction, and storage;
- More efficient staff usage because of time saved searching for documents, fewer returned telephone calls, and elimination of many repetitive processes;
- Immediate and concurrent access to documents;
- Better document control from the moment they are received;
- Better coordination of newly received documents with related open cases;
- Automatic retrieval of documents when certain types of cases are created;
- Automatic document routing to appropriate workstations;
- Automatic tickler file and pending work capabilities;
- Better supervisor control over operator workloads; and
- Better audit trails at document and case levels.

The disadvantages of the imaging system are as follows:

- Slower data entry because of the need to use multiple windows on the computer screen (but this is more that offset by the overall speed of processing a document from its receipt to the time the case it initiated is closed);
- Some VRS operators are disturbed because the system has taken away their control of case processing and relieved them of most decision-making; and
- The system is complex and will be difficult to maintain.

The Future

Enhancements being considered by VRS for the future include:

- Input and output to facsimile transmission;
- Notebook computers linked to the imaging system for field personnel; and
- Links to other agencies and companies with which VRS has operational ties.

Detailed System Description

This section describes the operational flow of the VRS imaging system as documents are processed at the LAN workstations. The system has the following special capabilities:

- Document images from optical disk are displayed on one part of the user's screen, and data from the database and text from word processing or other system facilities are displayed on the other part of the screen. Through these windows on the

screens, the user can integrate optical images with data and word processing text.

- The system can import WordPerfect word processing documents from personal computers and computer-generated letters from the DIT mainframe, store these documents as data or text files on magnetic disk, and use them with documents from optical disk in case processing.
- Telephone slips and notes can be appended to cases, and comments can be added to cases and documents.
- In some functions, such as indexing and entering tax information, programs have been set up to work with the personal computer's mouse to perform specific groups of entries. Known in VRS as a programmable mouse, this saves operator keystrokes and is being expanded as other opportunities arise.
- There is a menu-driven capability to revise system settings for workflow routing, document retrieval when preparing a case to be processed, and maintenance procedures.

When a document is received at VRS, it is batched by document type, scanned into the imaging system, and indexed. This creates an audit trail and permanent record of each document.

Indexing is accomplished using the programmable mouse. The document type and date are obtained automatically during scanning. Upon entry of the member's social security number, the programmable mouse causes a search for the member's name. First, the AS/400 database (which contains data on imaged and microfilmed documents) is searched, and if the member is not found, the DIT mainframe database is searched. After visual verification of the retrieved name against the name on the document, the indexing is completed by clicking the mouse. As an example of the keystrokes saved by the programmable mouse, the entire indexing is accomplished by entering the social security number and clicking the mouse twice.

As a result of scanning, the system automatically performs the following:

- Assigns a process type to the document based on the nature of the document;
- Checks to see whether there is already an open case for that member and, if not, opens a new case;
- Subject to user override, routes the document to predefined workstations based on its process type;
- Retrieves from optical disk any documents that will be needed with the process type, associates them with the case, and places them on magnetic disk for faster retrieval while the case is open; and
- Determines whether there are other open cases to which the new document should be sent and distributes the document accordingly.

Then the VRS operator, whom the supervisor designates by placing the document in his or her work queue, can work on it. When the document comes to the top of the queue, which can be sorted in various sequences, its image is displayed on the right side of the operator's screen while data from the database (e.g., on the member or the case), text from relevant word processing documents, and controls to initiate other system functions are displayed on the left side. The operator processes the case using these screens to retrieve and display the needed images, data, and text.

Many cases cannot be completed in one step because they require follow-up documents and other activities. The system maintains a pending file of such cases, which are removed from the operator's active queue while they are pending. Alerts are automatically generated if the case remains pending more than a predefined number of days, or the case is returned to the active queue if the required documents are received.

When all work on a case is completed, the case is closed. The system maintains an audit trail of

everything that happens during the case, and VRS has purchased report generation software to produce management reports based on the audit data.

The system provides a special screen that permits the supervisor to monitor and control operator workloads.

Conclusions

VRS is delighted with its imaging system. It says it was worth the money, time, and effort expended to plan for it, obtain it, install it, and make it work. Imaging in general and its system in particular were right for VRS because it (1) needs to distribute specific types of documents to workstations that process those document types; (2) has several operators working on a document concurrently; (3) needs to integrate imaging, data, and text; (4) needs to group information received over many years; and (5) needs to locate files and information rapidly.

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ISBN: 0-89656-153-4
NCSC Publication No. R-173