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--PART THREE--

CHAPTER EIGHT: ELECTRONIC RECORDS

I. THE IMPACT OF THE COMPUTER ON RECORDS MANAGEMENT

- A. Widespread use of electronic computers has been the single most significant occurrence to affect records management during the past ten to twenty years.
 - a. Computers generate enormous quantities of records
 - b. There are numerous problems associated with the management of electronic records—problems that require records management solutions.
 - i. Electronic records still poorly identified
 - ii. Electronic information loses its value and needs to be systematically destroyed like hard copy records
 - iii. Electronic records are just as vulnerable as any other record to the risk of disaster and require special protection
 - iv. Removable media need to be stored and managed properly
 - c. Computers provide new ways of solving records management problems.

II. MAJOR TYPES OF ELECTRONIC RECORDS

- A. Definitions:
 - a. May be defined as records containing machine-readable, as opposed to human-readable, information
 - b. File: collection of electronic records
 - i. File is often used together with other terms denoting the physical storage medium on which the information is recorded
 - ii. The machine-readable information recorded on electronic records takes the form of character-coded electronic signals and exists in the following forms
 - 1. Text Files
 - a. Usually produced by word processing programs or by other software
 - b. Records consist of character-coded letters, digits, or other symbols
 - c. Most often created by keyboard entry, OCR, electronic messaging software, etc.
 - d. Each individual character is represented by a predetermined number and sequence of bits
 - e. Most created in
 - i. ASCII (American Standard Code for Information Interchange)
 - 1. Best for insuring that text files can be read and processed over a period of years on a variety of computer devices
 - ii. EBCDIC (Extended Binary Coded Decimal Interchange Code) coding
 - 2. Data Files
 - a. Computer-processable files that store numeric data as quantitative values to manipulate the arithmetic computations of numbers
 - b. Data files stored in a more structured manner

- iv. 3.5 inch disks typically provide 720 kilobytes (double-sided/dual density) or 1.44 megabytes (double-sided/high density)

B. Optical Media

- a. Platter-shaped storage devices
- b. Nonmagnetic recording devices: high concentrations of laser light
 - i. Laser light alters the light reflectance characteristics of the recording surface of the disk
 - ii. May form holes, pits, bumps or bubbles depending on the technology used
 - iii. Typically used in conjunction with magnetic storage in many RM system configurations
- c. Very high recording densities
 - i. Can accommodate storage capacities of up to 10 gigabytes
- d. WORM (write once read many times) (in large recordkeeping systems)
- e. Rewritable optical disk (personal computers)
 - i. From 3.5 to 5.25 inches

IV. ELECTRONIC RECORDS MANAGEMENT: PROBLEMS AND ISSUES

A. Major problems facing these systems

- a. Inadequate consideration is often devoted to the creation of records
 - i. Only create and maintain computer-generated records that are needed to accomplish some valid business purpose
- b. Inadequate attention is often devoted to the organization and identification of electronic records resident on-line on nonremovable media
 - i. E-records difficult to retrieve unless adequate attention is devoted to
 - 1. How those files are named and identified
 - 2. How tools are developed to facilitate their efficient retrieval
 - 3. How they are organized into directories, subdirectories, and other structures designed to enhance retrieval
 - 4. Other software tools available to enhance file search capabilities of users
- c. Inadequate attention often devoted to the organization and identification of electronic records resident off-line on removable media
 - i. Often removable media is mislabeled or not identified best
 - ii. These grow in volume and are poorly organized
 - iii. No inventory exists
- d. The protection and security of electronic records is often overlooked
 - i. Many vital electronic records are unprotected and their owners fully exposed to the risks of their loss from disasters or other causes
- e. The retention and disposition of electronic records is often overlooked
 - i. Because they are not a visible problem
- f. The relatively short usable life of many electronic records may be insufficient to meet the organization's retention and archival needs
 - i. May not be a suitable format for long-term retention or permanent archival preservation
 - ii. Useful life is significantly shorter than that of paper or microfilm records
- g. The ownership status and management responsibility for many electronic records is unclear.
 - i. Often unclear who has primary management responsibility for these records

V. INVENTORYING ELECTRONIC RECORDS

A. Same approach to electronic records as hard copy or microfilm

- a. The records series concept should be applied to electronic records
 - i. Parlay: records series=data set
- b. All electronic records series in each computer or electronic imaging system should be inventoried.

B. Electronic Records Inventory Data

- a. Name of Electronic Series
 - i. Terms should reflect type and nature of the records themselves

- ii. Should be both generic and specific as to nature of content
- b. Series Description
 - i. Brief description of series purpose, use, and detailed contents will be sufficient
 - ii. Note the details:
 - 1. Name of the automated information systems
 - 2. Type of files
 - 3. Copy type for removable media
- c. Medium Description
 - i. Must note the type of storage medium on which the electronic records series resides and physical size and recording format or capacity of the medium
- d. Date of Records and Medium
 - i. Inclusive dates covered by the series should be shown on the inventory
- e. Hardware and Software Environments
 - i. Type of computer equipment used to record and process the e-records must be shown, together with
 - 1. The operating system software,
 - 2. The applications software, and
 - 3. Specific brand names and versions of each of these components computing system
- f. Network Environment
 - i. WAN or LAN
- g. Volume of Records
 - i. Size and quantity of records consumed by the e-records series
 - ii. Series resident on fixed disks: volume of records is normally expressed in bytes
 - iii. Removable media: item count should be recorded
- h. Rate of Accumulation or Future Growth
 - i. Anticipated growth should be known
- i. Reference Activity
 - i. Include:
 - 1. Method and frequency of references to the files
 - 2. Nature and speed of the queries
 - 3. Who performs the references
 - 4. Other relevant details on access and usage of the electronic records series
 - ii. Distinctions should be made
 - 1. On-line:
 - a. Nearly instantaneous retrieval of data
 - 2. Near-line
 - a. Use of storage devices such as optical disk jukeboxes
 - 3. Off-line/on-site
 - a. Use of removable media stored near the computer, which must be manually mounted in drives
 - b. Retrieval time is in minutes
 - 4. Off-line/off-site
 - a. Storage of removable media in records centers or data vaults
 - b. Retrieval time measured in hours/days
- j. Retention Status
 - i. Analyst deems the e-records
 - 1. Active
 - 2. Inactive
 - 3. Ongoing need to retain the e-records after they become inactive
 - a. Ex. Audit requirements
 - b. Long-term research needs

- c. Litigation potential
- k. Protection Status
 - i. Vital records
 - 1. Creation of security copies of magnetic tapes, diskettes, other removable media
 - 2. Use of special software programs for on-line e-vaulting
 - l. Relationship to Other Records
 - i. Must include relationship to other related records
 - ii. Does it exist only in electronic form? Only note this.

VI. MANAGING ACTIVE ELECTRONIC RECORDS

- A. PC-Based Nonremovable Media
 - a. Pentium processors and the office of the future
- B. Fixed Disks, Directories, and Subdirectories
 - a. Created and managed by operating systems that control the computer's basic functions
 - i. Think of a paper-based file cabinet
- C. Applying Traditional Files Management Concepts to PC-Based Records
 - a. Organizing Directories and Subdirectories
 - i. Custom-designed hierarchy
 - b. Naming Individual Files and Documents
 - c. Establishing Filename Conventions
 - i. Develop a data dictionary or a thesaurus
 - 1. Designed to provide consistency in name files so that numerous computer users in multiple departments utilize the same indexing terms to identify documents in a computer database
 - ii. Relate the organization's file indexes for paper records to its electronic records
 - 1. Well-developed uniform file classification system
- D. Labeling and Identifying Removable Media
 - a. Create master inventory
 - i. Name of the department or organization which created the disk, tape or diskette, or organization responsible for the medium
 - ii. Names of the files by records series, including a listing or description of the files which the medium contains
 - iii. The name or type of computer on which the medium was created and can be processed
 - iv. The name and version number of the software used to process the data
 - v. The type and capacity or recording density of the medium
 - vi. A serial number or other unique identifier of the medium
 - vii. The date or range of dates on which the data were recorded and/or the inclusive dates of the records
 - viii. Any special security requirements or access restrictions applicable to the medium
 - ix. Whether the medium is a working copy for use on the computer a backup copy, or a storage copy
 - b. Don't mix records of different departments on the same disk

VII. SOFTWARE FOR MANAGING ELECTRONIC RECORDS

- A. Search Capabilities in Previously Installed Software
- B. Files Management Software for Standalone PCs
- C. Document Management Software for LANs and WANs
 - a. Ability:
 - i. To execute searches from any point on a local or wide area network regardless of the number of network files servers
 - ii. To transmit documents and their associated index data within and among any server on the network

- iii. To retain the documents of individual users on both the network servers and the users' workstation disks, etc.
- b. Provide a variety of sophisticated document search and retrieval features
 - i. Indexing the full text of documents and maintaining abstract description of each document in the db of the user's home file server
 - ii. Ability to conduct network-wide full-text searches by any word, phrase or combination of words in a document
 - iii. Computer-assisted indexing capability
 - iv. Network or user may assign the directory structure by selecting th appropriate data for fields such as document type, subject, author, and descriptive keywords

VIII. STORAGE AND HANDLING OF REMOVABLE MEDIA

- A. Storage Conditions for Magnetic Media
 - a. Air-conditioned facility capable of maintaining a constant temperature of 63 – 68 degrees F
 - b. Relative humidity of 35 – 45 percent
 - c. Tapes: rewind intervals of 3.5 years perfectly acceptable
- B. Storage Conditions for Optical Media
 - a. (Book admits doesn't have best guidelines)
- C. Guidelines for Handling Removable Media
 - a. Improper handling is common cause of physical damage to the information recorded on these media
 - i. Magnetic and optical media should always be handled by touching their protective housing
 - ii. Reels of magnetic tape should be handled and carried by their hubs
 - iii. Magnetic and optical media should never be placed under heavy objects or squeezed; don't store vertically or exposed directly to the elements
 - iv. Magnets should be prohibited from all areas where magnetic media are stored or utilized
 - v. Smoking prohibited
 - vi. Food and drink also prohibited

IX. RECORDS RETENTION IN COMPUTING ENVIRONMENTS

- A. Some Principles for Scheduling Electronic Records for Retention
 - a. The records series concept must be properly applied to records in electronic format
 - i. Retention period for each records series
 - b. The end users (owners of the records) must usually be consulted in formulating valid retention periods for electronic records
 - c. The principles of records appraisal and cost-risk-benefit analysis can be applied to electronic records
 - d. Government retention requirements may apply to but do not usually specify electronic records as an authorized or required retention medium
 - e. Computer files are just as vulnerable to the risks of litigation as other business records
 - f. Computer media used to retain electronic records are generally not considered to possess qualities of archival permanence in the same sense as paper and microfilm media
 - g. The principles of official and nonofficial records are relevant to retention determinations respecting computer records
 - h. The concepts of active, semi-active, and inactive hard copy records equate to on-line, near-line, and off-line computer data for purposes of establishing retention periods for electronic records
 - i. The total retention period for an electronic records series depends on how long the information needs to be retained in a computer-processable format
 - j. For computer records having permanent or long-term retention requirements, COM or COLD systems often provide the best retention media

- k. Retention periods for electronic records will usually (but not always) be shorter than those for records in hard copy or microfilm formats
- l. The small quantity of physical space consumed by electronic records does not, by itself, justify long retention
- m. Detailed transactional data versus cumulative summary data will often be the basis for short- or long-term retention decisions
- B. Records Retention in Mainframe Computing Environments
 - a. Main computer can keep track of all tapes and disks under its control
- C. Records Retention in PC Computing Environments
 - a. Scan the directory listings for files that match the records series in the schedules
 - i. Time-consuming and laborious process, particularly if users have not adopted systematic naming conventions consistent with the records series
- D. Applying Retention to PC-Based Electronic Records
 - a. Logically organize e-records by directory and sub-directory
 - b. Retention field has been programmed into the db
 - c. Disposal dates have been properly entered
 - d. Records managers must work with the end users
 - e. Be careful of the “undelete” function
- E. Archival Status of Electronic Records
 - a. Archival standards for electronic records media
 - i. See national and international standards
 - b. Media hardware and software dependence
 - i. Preserve the electronic records in ASCII format
 - ii. Rely on micrographic media for long-term and archival retention purposes
 - iii. Retain the paper records

CHAPTER NINE: AUTOMATION OF RECORDS MANAGEMENT SYSTEMS AND FUNCTIONS

I. AUTOMATION OF PAPER-BASED SYSTEMS

A. Benefits of Automation

- a. Provides a computer capability to establish total life cycle control over records on an enterprise-wide basis
 - i. Arguably, the central goal of records management
 - ii. Scan/barcode technology means capability to know of the existence and location of all its files
- b. Greatly improves the performance of the recordkeeping system, enhancing the accessibility of the information contained in the records, so that the goal of precise and timely retrieval can be achieved
 - i. Does the system consistently deliver precise and timely retrieval?
 - ii. 95% of the time, system must deliver the correct documents
- c. It provides multiple pathways by which the information contained in recordkeeping systems can be accessed which significantly optimizes the value of these systems to their users
 - i. Today, great majority of files are un-indexed
 - ii. Multiple pathways should be instigated as records are more valuable than ever before
- d. It provides significant benefits in work measurement, cost reduction, productivity improvement, and better services to customers and clients
 - i. Productivity increases because volume of work can be handled
 - ii. Work can be tracked and monitored, which enables it to be planned and scheduled more efficiently
- e. It provides a means of upgrading the status of the records management function and those who work in it
 - i. Enterprise-wide implementation can mean enhancement

II. RECORDS MANAGEMENT SOFTWARE: AN OVERVIEW

A. Introduction to Section

- a. The development of this software was made possible by the parallel development of the MS-DOS operating systems and database management technologies during the early 1980s and the subsequent explosion of microcomputers as major tools for business office computing.
 - b. This type of computing environment provided a practical platform on which to run specially designed applications software to index, track, and monitor the movement of file folders in active paper-based recordkeeping systems, as well as the storage cartons containing inactive records stored in records centers.
 - c. RM software is designed to operated on almost all major types and sizes of PC hardware and because of increasing competition and product maturity.
 - d. End result: Increased market acceptance and an excellent opportunity for records managers to take advantage of this situation to improve the quality of recordkeeping in their organizations.
- B. Software for Active Recordkeeping Systems
- a. Permit entry of descriptive data relative to the contents of individual file folders in the db, for subsequent retrieval by filename, number, keywords, or a variety of other search parameters
 - b. Store standard subject filing categories from a files classification scheme in the database for subsequent manipulation and retrieval
 - c. Manage the file folder charge-out and return function
 - d. Print bar code labels and monitor the movement of files by point to point tracking as they are passed form workstation to workstation in the processing cycle
 - e. Print new file folder labels (on demand or by batch) and a variety of reports showing the status of the organization's records
 - f. Oriented towards file units as the units of control
 - g. Some systems are geared toward extending control at a lower level
 - h. Level of record indexing requires greater computer storage requirements
- C. Software for Inactive Recordkeeping Systems
- a. Maintain the index or inventory of all records stored in the facility by showing the contents of each carton or other storage container and sometimes each file folder stored in each box.
 - b. Store other data required to effectively manage the records, such as the inclusive dates of the records in each carton, retention schedule data, and disposal dates.
 - c. Reserve shelf space for incoming cartons and report on free shelf space available to house them.
 - d. Monitor and track the movement of all records withdrawn from and returned to the center.
 - e. Print pick lists showing those cartons eligible for destruction, print destruction notification forms to obtain authority to dispose of records, and print certificates of destruction to show evidence of the actual destruction.
 - f. Print reports of user statistics and manage the charge-back function in cases where users are assessed fees for their stored records.
 - g. Bar code technology is particularly useful when integrated with RM software.
- D. Software for Records Retention and Total Life Cycle Records Management
- a. Fully functional software systems provide an enhanced records retention capability
 - b. May also integrate with the active file folder management function with the inactive records center management function to provide a greater degree of total life cycle records control.
 - c. May support the on-line development of records retention schedules, including
 - i. Entry of records inventory data,
 - ii. Inclusions of citations for statutory and regulatory retention requirements, and
 - iii. Maintenance of the approved retention schedules in the database.
- E. Other Software Functions
- a. Maintaining a listing of vital records in the db, together with instructions as to how to protect them against loss.

- b. Managing the rotation schedule for the regular or periodic transfer of vital records to a vault or other secure off-site facility.
- c. Maintaining the inventory of the records protection facility and performing various other tasks associated with managing the facility.
- d. Some systems can perform archives management functions...

III. SOFTWARE ACQUISITION

A. Planning for Automation

- a. Question is not whether to apply technology to any sizable records management problem, but when and how.
- b. The most important precursor to applying this technology is that the organization must have good manual records management systems and programs in place before attempting to install records management software.

B. The Requirements Analysis

- a. Purpose is to determine whether and where records management automation is needed.
 - i. Conduct a survey of recordkeeping systems in one or more areas of the organization.
- b. Identify Poorly Performing Recordkeeping Systems
 - i. Users of selected software should be surveyed
 - 1. Questionnaire, possibly
 - 2. Design questions to identify performance of the systems
 - 3. Then identify the source of problems
- c. Identify Functions and Recordkeeping Systems Requiring Automation
 - i. RMs should
 - 1. Identify the mission-critical business functions of their organization,
 - 2. Determine the level of computer automation that has already been applied to their recordkeeping systems, and
 - 3. Determine whether new enhancements to these systems would contribute to the success of the business as a whole.
 - ii. RMs should always remember any effort to apply computer automation to the records management systems must begin by defining the business objectives of the potential application
- d. Conduct a Physical Survey of the Recordkeeping Systems
 - i. Type of records, how they are organized and arranged in the filing system, and the individual types of documents contained in the files.
 - ii. The sources of creation of the documents, how they are received and filed in to the system, the quantity of files, and their rate of growth.
 - iii. Who uses the files, how often, for what purpose, how this usage declines over time, when and why files become inactive, and what happens to them when they do become inactive.
 - iv. How the files are accessed and used, the existence and quality of any indexes, whether the retrievals are for single document or item lookup or whether the entire file must be reviewed, and whether usage of the information in the files could be facilitated if the files could be accessed by other search parameters now unavailable with the manual system.
 - v. The level of indexing required to facilitate access to the files, e.g., inclusive carton contents, file folder label data, or individual documents.
- e. Identify Internal Resources to Support Automation
 - i. A description of the existing computing environment, including the mainframe, PC, and LAN hardware, the computer operating environment, and major classes of software supporting the organization's computer applications.
 - ii. An analysis of the availability of in-house or consultant personnel to install the new records management application and to maintain the system over its service life.

- iii. An analysis of whether the department which will operate the system has or can obtain sufficient staff and budgeting support to acquire and maintain the system.
 - f. Prepare the Requirements Analysis
 - i. Aka a “needs analysis”
 - 1. Written report containing a comprehensive analysis of the organization’s needs for automated records management systems.
 - ii. A preliminary planning document, primary purpose
 - 1. To advise the organization’s senior management of the need for automated records management systems
 - 2. To obtain approval to proceed with the subsequent system acquisition tasks.
 - iii. Contents:
 - 1. Always contains a definition of the problem posed by the current system and the business objective of the unit as related to the recordkeeping system.
 - 2. “Functional systems specifications”
 - 3. Detailed specifications for how the proposed systems is to perform in delivering information to the users
 - 4. Cost-benefit analysis
 - 5. Proposed hardware and software
 - 6. Other details of system acquisition and development
 - 7. Should conclude with a statement of priorities for records management automation
 - 8. Potential applications should be ranked in priority order as to where the needs for and benefits of automation are likely to be greatest
- C. Selecting Appropriate Hardware
 - a. Try to fit the application on a PC
 - b. PCs can usually process and store the data required in all but the largest automated records management systems.
 - c. PC platform provides the largest selection of packaged software programs from RM software vendors.
 - d. A decision to run the records management application on a higher-capacity platform based on the following factors
 - i. The size of the application (the number of records to be stored and processed) and the database required to support it are projected to be larger than can be handled on a PC, and
 - ii. The user community is large, and the users are located in disparate, remote sites and are already supported by mainframe-based or wide area network computing resources.
 - e. RMs often confronted with the question of whether a non-IBM platform should be selected to run the application.
- D. In-House Software Development Versus Purchased Software
 - a. First try to locate the packaged software that meets all or most of the important functional requirements of the application.
 - b. In-house software development should only be considered in cases where the needs of the application are unique or very specialized and packaged software is simply not available.

IV. EVALUATING SOFTWARE PRODUCTS

- A. Introduction paragraph
 - a. Analysis of two broad areas
 - i. Technical evaluation of product quality
 - ii. Business evaluation of product and supplier
- B. Technical Evaluation of Features and Functions
 - a. Ease-of-use Features

- i. Good user manual?
 - ii. On-line help screens?
 - iii. Illustrated example of system ops?
 - iv. Dictionary?
 - v. Help screen index?
 - vi. Tutorial disk?
 - vii. Menu-driven?
 - viii. Toggle between files?
 - b. Data Retrieval and Search Capabilities
 - i. Keyword searching—ability to search any single word within a field?
 - ii. Phrase searching—the ability to search two or more consecutive words in a field?
 - iii. Boolean logic—use of “and”, “or” or “not” to combine search statements to expand or limit the scope of the search?
 - iv. Wild card searching—the ability to use wildcard symbols to represent multiple prefixes or suffixes of words or alternate words spellings?
 - c. Data Field Characteristics
 - i. Max length of character fields and text fields
 - ii. Can they be searched
 - d. Data Entry Features
 - i. Full-screen editing—ability to move through the data entry fields to add and edit records?
 - ii. Code tables—the use of tables to store authorized field values which can be accessed during data entry?
 - e. Security Features
 - i. User password access—to limit access to the levels of the database to users with proper passwords?
 - ii. Multilevel security?
 - f. Reporting Features
 - i. User-defined reports?
 - ii. Does it print,
 - 1. File folder labels?
 - 2. Bar codes?
 - 3. Billing invoices?
 - 4. Statistical graphs and charts?
- C. Business Evaluation
 - a. Essential
 - i. To ensure that a particular product is a good value for the money,
 - ii. The supplier will stand behind his or her product with good after-the-sale support.
 - b. Product-price evaluation
 - i. Base price: refers to the price of the software only, exclusive of add-ons such as customizations, maintenance, installation, and training.
 - ii. The best products for a given application from a technical perspective should be compared with the prices of other products of equal or similar quality to arrive at a judgment as to which one offers the most value for the money.
 - c. After-the-sale support
 - i. The company should be capable of providing a number of post-sale services that are usually required for a successful installation.
 - 1. Customizing the software
 - 2. Providing on-site installation services
 - 3. Providing ongoing maintenance support
 - 4. Training system operators and users
 - ii. Above services usually priced as extras.

3. But, index data on inactive records can be entered as time permits or they can be entered at a basic rather than detailed level
- g. Data Validation and Error Correction
 - i. Data should be validated and errors must be corrected
 - ii. Incorrect data results in electronic misfiles
 - iii. Goal: error rate not exceeding 1 percent, .5 percent goal is preferable
- h. System Training
 - i. Training should range in scope from an introductory overview of the system to more in-depth, hands-on work directly with the database, including
 1. Data entry
 2. Search and retrieval functions
 3. Report generation, etc.
- B. Ongoing System Maintenance
 - a. Records manager or system operator
 - i. Should continually monitor the performance of the system and
 - ii. The level of satisfaction of the users

VI. BAR CODE TECHNOLOGY FOR RECORDS MANAGEMENT

- A. History and Description of the Technology
 - a. First used in railroad industry during the 1960s as means of facilitating the location of railroad cars
 - b. Design
 - i. Consists of lines and spaces of varying widths
 - ii. Lines are positioned in a vertical format to create an optical code field
 - iii. Codes are scanned and read by a device utilizing laser light to sense the light and dark areas in the code field
 - iv. Each vertical line or section of lines in the bar code field represents a single numerical digit or letter
 - v. Most also include printed characters to permit sight recognition of the code
 - vi. Symbolologies of bar codes:
 1. Code 39 most common, incorporates the full 128-character ASCII data set
 2. Offers greater compatibility
 3. Large body of supportive software is written for it
- B. Benefits of Bar Code Technology
 - a. Keyless data entry provides faster, more accurate circulation control
 - b. There is greater accuracy in record location monitoring
 - c. Misfiles are reduced
 - d. The records disposition process is facilitated
 - e. Records "lost in transit" are tracked
 - f. Productivity benefits are possible through work flow analysis
- C. Specific Applications for Bar Code Technology
 - a. Single Forms or Loose Paper Documents
 - i. Process:
 1. Processed in an unfolded manner at one, or several, workstations
 2. Rapid location can be difficult
 - ii. Benefits:
 1. Point-to-point tracking can show the exact location of any given document at any point in time
 2. Enhances work flow
 - b. Documents Housed in File Folders
 - i. Process:
 1. Bar codes replace card indexes and manual log books
 2. Affixed to file folders and scanned when withdrawn or replaced
 - ii. Benefits:
 1. Portable scanners may be placed at the remote user points, increasing the folder tracking capability

- c. Records Housed in Storage Cartons in Records Centers
 - i. Process:
 - 1. Each carton assigned a bar code
 - 2. A separate bar code may be assigned to the particular shelf where the carton is housed
 - 3. Bar codes can be affixed to both the cartons and the shelves
 - ii. Benefits
 - 1. Maximizes the efficient use of a record center's shelf space
 - 2. Easy to move cartons from one shelf location in the center to another
- d. CAR Microfilm Systems
 - i. Process:
 - 1. Bar code affixed to the paper documents prior to filming and read by the scanner as it is filmed.
 - 2. Roll and frame numbers are simultaneously assigned
 - 3. Bar code number and microfilm image identifier stored in the db of the CAR system's computer
 - 4. Computer interfaces
 - 5. Documents are automatically indexed
 - ii. Benefits:
 - 1. Increases index production
 - 2. Decreases data entry error rates that occur during manual, keyboarding indexing

D. Bar Code Equipment

- a. Printers to generate bar code labels
 - i. Laser printers the best
 - ii. Special font cartridge needed
- b. Recognition hardware to read them
 - i. Readers, scanners, or wands to read the bar codes for transfer of the data to the db for processing and storage
 - ii. Platform scanners are stationary
 - iii. Portable scanners are used away from the computer
 - 1. Used to perform tasks away from the central processing station
 - 2. Data periodically uploaded
 - iv. Scanners may be contact units in which the device must be brought into contact with the label as it is read
 - v. Noncontact laser gun units can effectively read labels held several inches away from them
- c. RM software