Understanding Electronic Records: the Basics

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- An electronic record contains recorded information on electronic media, that relates to the business(es) and operation(s) of an organization.

- The only criteria of an electronic record, is that the information is recorded or stored in a machine-readable form, as opposed to information recorded or stored in a human-readable form for paper records.

- There are three widespread electronic media (physical format):
  1. Magnetic 2. Optical 3. Magneto-optical

- There are four types of electronic files:
  1. Text 2. Image 3. Data 4. Multimedia

- There are four categories of computer systems (hardware):
  1. Main frame 2. Mini-computer 3. Micro-computer 4. Portables

- There are four categories of computer programs (software):
  1. Operating system 2. Application
  3. Database 4. Custom-developed software

- There are three levels of information retrieval:
  1. Online 2. Nearline 3. Offline

- A record is a record regardless of the medium.

- Most records management concepts and principles developed for paper records, equally apply to electronic records.

- Electronic records must be inventoried just like paper records. The best way to conduct an inventory of electronic records, is to identify and analyze the automated information system with which the records are associated.

- Electronic records must have retention periods established. Retention schedules also promote the efficient use of electronic storage media and devices.

- ASCII (American Standard Code for Information Interchange) text files minimize software dependance, and provide some protection against product obsolescence. Records managers should always consider the ASCII text format, instead of, or in addition to, proprietary formats for the archiving of electronic records.

Introduction

We are living in the information age. The frontiers between different paper formats (text, map, photograph) and traditional analog electronic formats (sound recording, film), are becoming increasingly blurred because digital technology can combine all the above formats in a single record. Also, Treasury Board Secretariat has indicated that electronic commerce is the preferred means for the government to conduct its business. Those are two of the reasons why organizations are moving towards automating their information systems and creating more electronic documents. Other reasons are the speedier access to the information, the facility to share it worldwide, and the decreasing cost of storing the information electronically.

Does this means paper records will disappear? Of course not. But now we live in an hybrid world in which electronic records will become more and more dominant.

What is an Electronic Record?

Electronic media is used for storing information in different formats (text, image, sound), just like “paper” is a medium for storing information in different formats (text, map, photograph).

Definitions

Before we define what an electronic record is, let’s go back to the basics.

1. Data = raw facts and figures.

2. Information = organized and meaningful data.

3. Record = recorded information regardless of physical form or characteristics.

4. Electronic Record = recorded information on an electronic medium, regardless of physical form or characteristics, which requires an electronic system for retrieving and reading the information.

Criteria for Electronic Records

There is only one criteria which makes a record, an electronic one. An electronic record contains ***machine-readable*** information, as opposed to a paper file which contains human-readable information. Machine-readable records cannot be read without the proper hardware and software. A coding process of the information (converting the data into an electronic signal) makes the record machine-readable.

Once an electronic document has been printed, the print-out is not an electronic record, since the information is now in human-readable form.

Information coding methods

There are two methods of information coding

1. Analog: A way of electronically storing information as multiple values. Audio and video tapes are analog devices because the value of the electronic signal stored on the tape is changing continuously (sine-wave shape). The analog method includes the traditional technologies for the telephone, radio, television, film, and sound recording industries.

   Analog = multiple values

2. Digital: A way of electronically storing information as two distinct values: 0-1, or On-Off, or Yes-No, etc. The values of the electronic signal are known as binary digits or bits (binary code). All computer systems work on the principle of the digital coding method. The digital method includes technologies for the computers (from main frames to laptops), telecommunications, and networks industries.

   Digital = two values

Since computer technology predominates, the trend is to label as “analog” everything that is not produced by computers or digital electronics.

Electronic Records Media

Types of Media

There are three widespread electronic media:

1. Magnetic: Tapes (audio, video, computer), disk/diskette, hard drive, cartridge.
2. Optical: Compact Disks (CD-ROM, CD-R & CD-RW), Laser disc.
3. Magneto-optical: Disc, cartridge, card.

The development of less costly recordable technologies for optical disks have reduce the usage of magneto-optical technologies as a medium.

There is a fourth electronic medium that is now obsolete:

Paper: Key-punched card, punched paper tape (even though the medium is paper, the information is in machine-readable form).

Microform

Is microform an electronic medium? Is a microfiche an electronic record? Microfilms and microfiches are not electronic records, because the information is not coded (converted into an electronic signal); the information is just reduced in size. Even though, we still need a microform reader (or a magnifying glass) to read the data, it is considered human-readable information. We do not need special equipment to convert the data from machine-readable back to human-readable form.

***From this point on, we will be talking about the digital method of coding information, or digital electronics, or computer technology*.**

Types of Electronic Files:

There are four main types of electronic files based on the type of information they contain:

1. Text files (word processing, desktop publishing, electronic mail).

2. Image files (picture, graphic)

3. Data files (database, spreadsheet).

4. Multimedia files (animation, audio, video)

With each file type, the information may be recorded in a proprietary or non-proprietary format. Proprietary format is also referred to as "native format". One of the major non-proprietary format for text files is ***ASCII***. An ASCII text file is also referred to as a ***flat file*** because it contains no text attributes or formats.

Most word processing programs use the ASCII text file format as the base for a document, and apply their own proprietary format to the text. The file extension identifies the proprietary format of a specific application (e.g. document.wpd, the extension identifies the file as having the proprietary format of WordPerfect). Major word processing software comes with special import/export filters to display documents created with other word processing applications.

On the Internet, text editor and web authoring software (Front Page 98) apply the HyperText Markup Language (HTML) to a ASCII file (flat file), to generate a document with standardized format codes, so that any browser (Netscape Navigator, MS-Internet Explorer, Mosaic, etc.) can display the document in the same fashion.

Information Elements of Electronic Records

The information elements relates to the medium and the format used to record or store the information.

Information coding methods

What coding method is use to create the electronic record?

1. Analog 2. Digital

Media Types (physical format)

What medium is use to store the information?

1. Magnetic (tape, diskette, hard drive, etc.)

2. Optical (compact disc, laser disc, etc.)

3- Magneto-optical (cartridge, card, etc.)

File Types

What kinds of files are we dealing with?

1. Text 2. Image

3. Data 4. Multimedia

File Formats (logical format)

What is the format used?

1. Text: i- ASCII ii- Proprietary

2. Image: i- Bitmap ii- TIFF iii- Proprietary

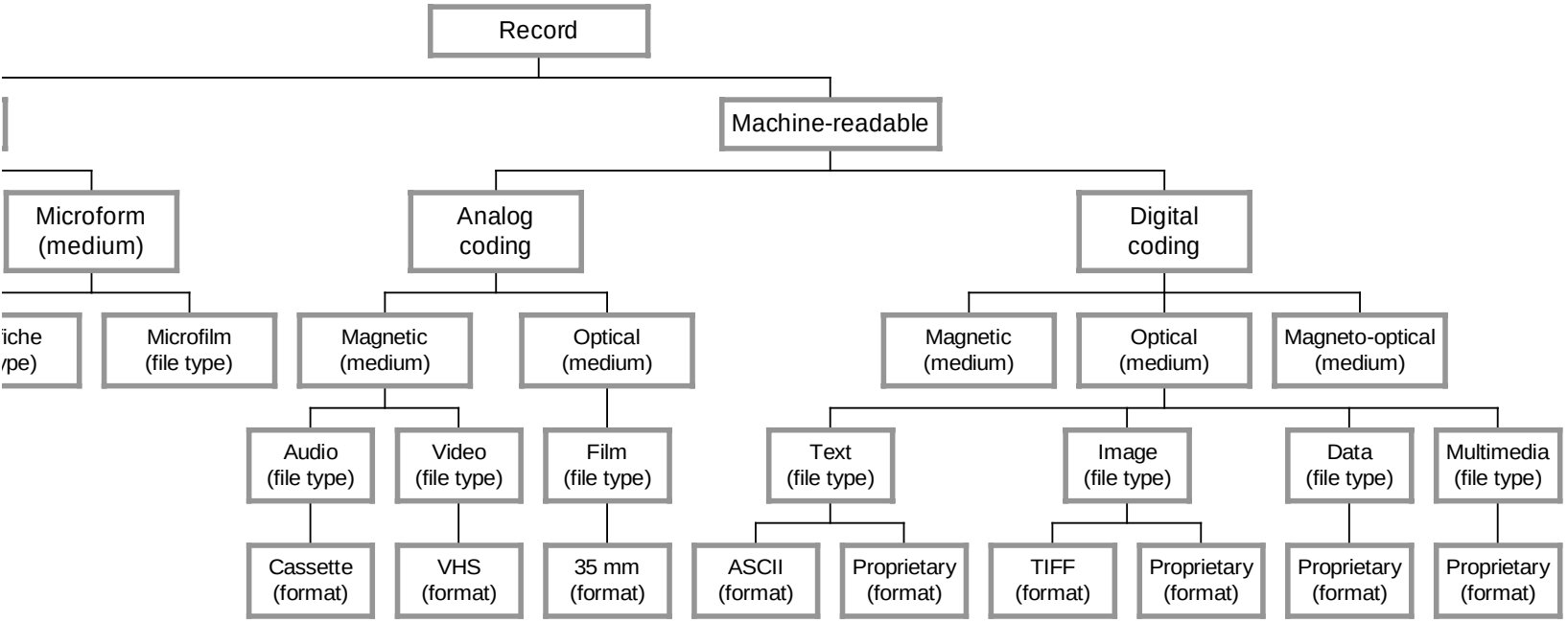
3. Data: i- ASCII ii- Proprietary

2. Multimedia: i- AVI ii- MPEG iii-Proprietary

See diagram on the next page.

Information Elements of Electronic Records

(this diagram does not contain all existing file formats)



Technology Elements of Electronic Records

The technology elements relates to the hardware and software used to read and manipulate the information recorded or stored on a given medium.

Hardware

Refers to the electronic equipment used for producing information in bits and bytes (1 byte = 8 bits). There are four categories of computer systems (relating to their physical size, and computing/processing power):

1. Main Frame/Super Computer (IBM, Cray)

2. Mini Computer (Digital, Hewlett-Packard)

3. Micro/Desktop Computer (Apple, Compact, Dell)

4. Portables - Laptop, Notebook, Personal Digital Assistant (Toshiba, NEC)

Software

Refers to the different programs (set of instructions) used to process the information created in bits and bytes. The four broad categories of software are:

1. Operating systems (Windows, Unix, DOS, MAC)

2. Applications (WordPerfect, Excel, BeyondMail, PhotoShop)

3. Database (Access, Paradox, Oracle)

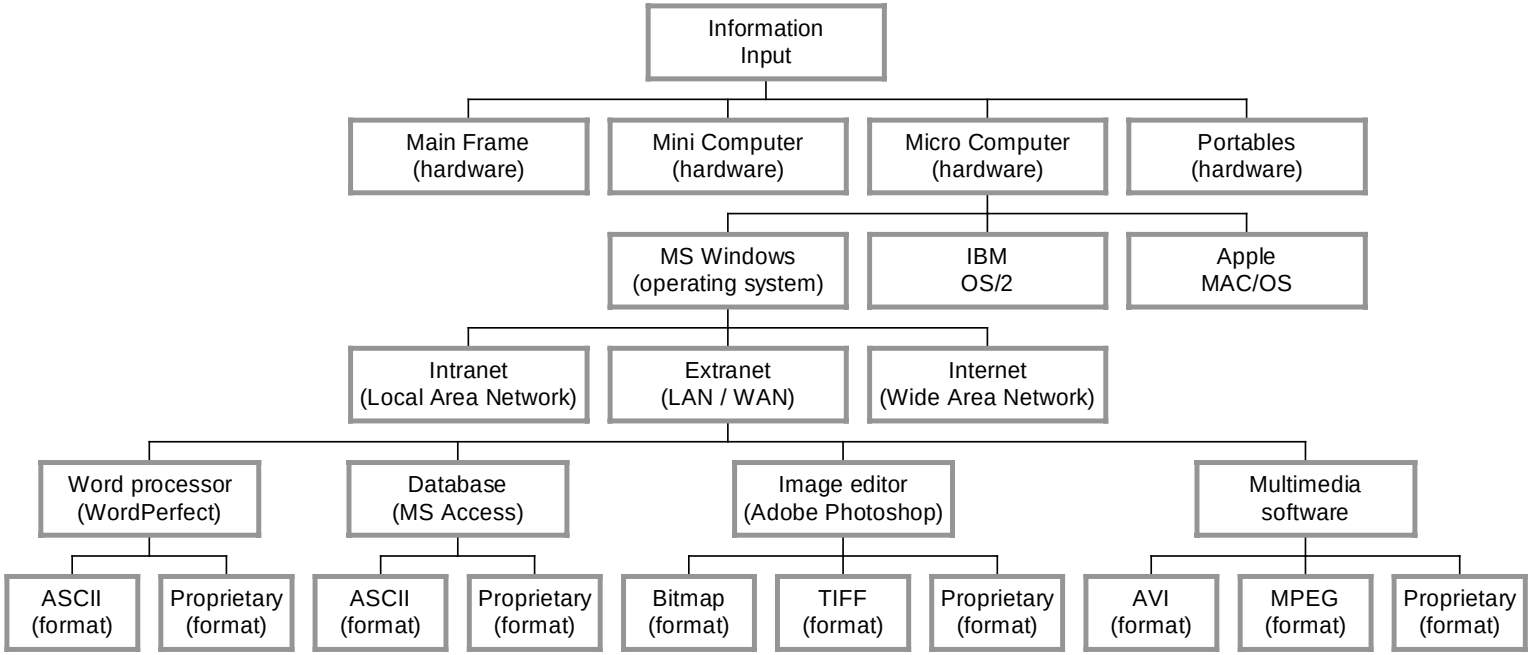
4. Custom-developed software (RDACS, MIKAN)

Network Environment

It is not the goal of this document to cover the different network topologies and protocols. From an information management point of view, we need to know where the records are stored: online, nearline or offline (see Information Retrieval on page 11).

See diagram on the next page.

Technology Elements of Electronic Records
(this diagram does not contain all existing file formats)



Information Retrieval

The four major levels of information retrieval are:

1. Online: The information/records are stored on hard drives/network drives, for online access in fractions of a second. This makes electronic records continuously available for immediate reference.

2. Nearline: The information/records are stored on optical disk autochangers, for nearline access usually under 20 seconds. This makes the storage of voluminous information more efficient. It slows down access time, but frees-up space on network drives for more current information.

3. Offline: The information/records are stored on removable electronic media (optical disks, diskettes, magnetic tapes or cartridges), for offline access usually within the hour. Manual intervention is required for media retrieval, installation and reshelving (usually main frame computers).

Dealing with Electronic Records

First of all, a record is a record regardless of the medium.

Records management concepts and principles developed for paper records, equally apply to electronic records.

Electronic records like their paper counterparts, must be organized for timely retrieval, effective storage, and proper protection.

Electronic records are also subject to the life cycle of information, from creation, to distribution, use, maintenance, storage, and disposition or preservation.

Inventory

The first step in a Records Management program is to perform a complete inventory of the organization's records. Electronic records must be part of the inventory process. They must be identified, described comprehensively, and linked or associated with the other records.

The best and most used method to conduct an inventory of electronic records, is to identify and analyze the automated information system with which the records are associated.

Electronic records are typically inventoried at the records series level, and then by program unit.

At the inventory stage, identification and protection of essential electronic records is imperative. For organizations which the technology infrastructure is not part of their Essential Records program, it is a prudent practice to print their essential records, to have them in human-readable format, and to store them off-site.

Retention Periods

Electronic records must have retention periods established. The retention schedule must list all of the following characteristics of electronic records:

- the retention periods for all records series
- the medium used to record/store the information
- the location where the records are stored
- the date and method of records disposition, where applicable
- storage of records transfer instruction, if disposition is not authorized.

Properly formulated retention schedules ensure the availability and use of electronic records for appropriate periods of time, while preventing the accumulation of obsolete records. Retention schedules also promote the efficient use of electronic storage media.

Archiving

Product obsolescence and the discontinuation of technologies imperil future access and use of electronic records.

File compression softwares are used to reduce storage space on hard drives or back-up units, and bandwidth (amount of information transfer in a unit of time) on network systems. However, data compression adds another layer of software dependency to the management of electronic records. To minimize future problems, file compression should not be use for electronic records intended for long-term retention.

ASCII text files minimize software dependance, and provide some protection against product obsolescence. Records managers should always consider the ASCII text format, instead of or in addition to, proprietary formats for electronic records needing a long retention period.

E-mail

Even though E-mail messages are usually written in a less formal fashion than letters or memos. They are potentially important records for the organization.

E-mail is increasingly used to circulate draft documents for review, or to disseminate official documents. This kind of documentation constitutes a record.

Typically, the IT people have the responsibility for making decision about e-mail use. The IM and IT people have to work together to create and revise the organization's e-mail policy, so it contains sound records management principles.

The National Archives will not accept E-mail messages from electronic mail programs. It will accept the E-mail messages only if they are part of a computer-assisted records management system (CARMS) such as ForeMost of RIMS.

Conclusion

Remember that:

1. A record is a record regradless of the medium.

2. Records management concepts and principles developed for paper records, usually equally apply to electronic records.

3. Many electronic documents are records because of their content and meaning or value to the organization; not because they are stored electronically.

The above statements should help us deal with the techno-jargon, and the ever changing technology associated with electronic records.

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