MANAGING PUBLIC SECTOR RECORDS

A Training Programme

Managing Electronic Records

INTERNATIONAL COUNCIL ON ARCHIVES

INTERNATIONAL RECORDS MANAGEMENT TRUST

MANAGING ELECTRONIC RECORDS

MANAGING PUBLIC SECTOR RECORDS

A STUDY PROGRAMME

General Editor, Michael Roper; Managing Editor, Laura Millar

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Managing Electronic Records

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Managing Electronic Records

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University of British Columbia

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INTRODUCTION TO MANAGING ELECTRONIC RECORDS

Managing Electronic Records introduces the basic principles of electronic records management.

> ***Electronic record:*** A digital record that can be manipulated, transmitted or processed by a computer.

Computerisation has led to rapid and dynamic changes in the way governments and businesses operate. Records managers today encounter a much wider range of records, paper-based and electronic, than they dealt with even ten years ago. Even the strategies adopted for integrating and managing paper and electronic records will be subject to change over time. As a result, this module offers only an introduction to the management of electronic records and should not be viewed as a comprehensive training programme that will equip records professionals for all situations.

Students of this module are strongly advised to seek more detailed information from the sources listed in Lesson 6 and the bibliography and to take every opportunity to keep abreast of emerging records management issues.

This module focuses primarily on the management of electronic records in the public sector, but it will have relevance to other sectors. It is particularly concerned with the management of electronic records in current and semi-current use. When the records become archives some of the principles covered in the module on *Managing Archives* will need to be adapted.

It is vital that students should be familiar with the use of computers before studying this module. The module *Understanding Computers: An Overview for Records and Archives Staff* provides an introduction to the basic issues involved, but in order to gain real value from the module, students will need to gain more in-depth experience using computers. Moreover, it the module is to expose the student to what it means in practical terms to manage electronic records, it must go beyond the theoretical concepts involved. Therefore, several of the lessons seek to challenge students to understand technical concepts.

The module is composed of six lessons:

Lesson 1:	Electronic Records: Basic Concepts
Lesson 2:	Electronic Record-keeping Systems
Lesson 3:	Management Issues and Electronic Records
Lesson 4:	Establishing an Electronic Records Programme: Programme Level Issues
Lesson 5:	The Components of an Electronic Data and Records Management Programme
Lesson 6:	What to Do Next?

AIMS AND OBJECTIVES

Aims

This module has five primary aims. These are to

1. introduce the basic concepts associated with electronic records and record-keeping systems

2. present practical approaches and solutions that can be used to preserve and manage access to electronic records

3. consider the technological, legislative and organisational factors that will determine the ongoing success of an electronic records management programme

4. discuss the strategies that organisations should consider adopting as they begin to establish electronic records management programmes

5. explain where to go for more information on electronic records management.

Objectives

When you have completed this module, you will be able to

1. understand the basic concepts of electronic records and record-keeping systems

2. understand and apply practical actions to control and protect electronic records

3. understand the various technological, legislative and organisational factors involved with electronic records management

4. identify key strategies that could be used in the development of an electronic records management programme

5. know where to go for more information.

METHOD OF STUDY AND ASSESSMENT

The module of six lessons should occupy about 85 hours of your time. You should plan to spend about

15 hours on Lesson 1

15 hours on Lesson 2

15 hours on Lesson 3

15 hours on Lesson 4

15 hours on Lesson 5

10 hours on Lesson 6.

This includes time spent doing the reading and considering the study questions.

At the end of each lesson there is a summary of the major points. Sources for additional information are provided in Lesson 6.

Throughout each lesson, activities have been included to help you think about the information provided. Each activity is a 'self-assessed' project; there is no 'right' or 'wrong' answer. Rather, the activity is designed to encourage you to explore the ideas presented and relate them to the environment in which you are studying or working. If you are studying these modules independently and are not part of a records or archives management organisation, you should try to complete the activities with a hypothetical situation if possible. If the activity suggests writing something, you should keep this brief and to the point; this is not a marked or graded exercise and you should only spend as much time on the activity as you feel necessary to understand the information being taught. At the end of each lesson are comments on the activities that will help you assess your work.

Following the summary at the end of each lesson are a number of self-study questions. Note that these self-study questions are designed to help you review the material in this module. They are not intended to be graded or marked exercises. You should complete as many of the questions as you feel will help you to understand the concepts presented. External assessments, such as assignments or exams, will be included separately when this module becomes part of a graded educational programme.

WHAT RESOURCES WILL YOU NEED?

This module assumes that you have access to a records office, records centre, archival institution or computing bureau or that you have some involvement with the management of records, particularly electronic records. The various activities may ask you to draw on your own experiences and compare those with the information provided in the lessons. If you do not have access to such facilities, you may wish to discuss this module with friends or colleagues who work with electronic records so that you can discuss principles and concepts with them and compare your understanding with theirs.

Case Studies

The following case studies may be useful additions to this module.

Case Study:

8: Pitt Kuan Wah, Singapore, 'Preserving Electronic Records at the National Archives of Singapore: A Balancing Archival Act and a Shared Responsibility'

11: Greg O'Shea, Australia, 'The Transition to Electronic Government: the Challenge for Records Management'

LESSON 1

ELECTRONIC RECORDS: BASIC CONCEPTS

This lesson examines some basic concepts central to understanding the nature of electronic records and record-keeping systems. It begins with a broad overview of the effect of information technology on record keeping and describes how mainframe computing, personal computing and networks have affected records management over the past few decades.

THE EFFECT OF INFORMATION TECHNOLOGY ON RECORD KEEPING

Until the early 1980s, most data processing was done on mainframe computers. With the advent of the personal computer, or 'PC', computer technology and applications advanced rapidly. Today, many organisations are creating electronic records through the use of office automation tools such as word processing, spreadsheets, electronic mail and database management software, all running on personal computers.

> ***Data** (pl.):* The representation of information in a formalised manner suitable for communication, interpretation and processing, generally by a computer system. *Note:* the term 'raw data' refers to unprocessed information.

Because of the rapid spread of information technology, some experts have been predicting that the 'paperless office' will soon become commonplace and that advanced information systems will provide instantaneous access to information through computers, telecommunications and optical disk systems. In reality, few automated systems have eliminated the use of 'hard copy' documents (that is, documents printed on paper from a computer application), and in many cases the use of computers has actually accelerated the creation of paper records.

The contents and functions of electronic and paper records are usually closely related. Data may be extracted from a database to produce summary reports on paper; printouts of reports may be produced as a database is updated; and word-processed correspondence stored on a diskette may also exist in an agency's paper files. As a result, paper and electronic records management must be closely co-ordinated. A comprehensive records management programme must focus first on analysis of the information in records and then on the medium on which the information is stored.

Traditionally, the form of the record and the medium on which it is produced were inseparable. Records were managed by controlling the physical record. The custody of this record was passed progressively from the originator to the records manager and finally to the archivist. The creating agency has tended to be responsible for organising, maintaining and using current records. Records managers may have been involved in facilitating this process but often they only become involved at the point that records were scheduled for destruction or transfer to a records centre. Archivists often participated in retention decisions, but their real concern was with the records identified for permanent preservation and research use.

In an electronic environment, it is necessary to treat content and medium separately. Records managers must participate in the early planning and design stages of computerised systems or risk losing control of electronic records, either because the records will not be kept in the first place or because they will be irretrievable or unreadable if they are kept. These changes are forcing records and archives professionals to re-examine their traditional roles and to reconsider their approach to the creation, management and use of records. Many professionals now recognise the need to manage electronic records throughout their life cycle, following a continuum of care.

However, the changing attitude to records management is not confined to the management of electronic records. The new working environment is also causing records professionals to rethink their approach to paper records. Records and archives staff must become increasingly involved with the process of records creation, use and maintenance; they cannot wait for creators to finish using current records and pass them along for storage and preservation because the paper records and the electronic records are usually part of a single system.

Records professionals recognise that paper and electronic records need to managed as part of a continuum of care.

If records are to survive and be useful in supporting the functions of governments and preserving a cultural record of the past, the concept of passive reception will have to change to one of active involvement at the point of creation.

Records professionals will have to be equipped with the skills required to contribute effectively to an electronic working environment. Records management will require greater discipline and greater creativity than in the past.

Activity 1

Before reading further, write down as many reasons as you can think of for records managers to participate in the management of electronic records from their point of creation through to their destruction or transfer to an archival facility.

TECHNOLOGICAL TRENDS

The use of information and communications technology is transforming the way organisations work. The introduction of computers can achieve efficiency savings and add value to the conduct of government or business. This places new demands on records professionals to change the way they carry out records management responsibilities.

Computers generate large volumes of paper records that can be managed using the techniques described in other training modules in this series. However, governments are increasingly choosing to not only *create* records electronically, but also to *store*, *retrieve* and *use* them in computerised form for long periods. The management of electronic records presents new and complex challenges to the record keeper, and this is already beginning to revolutionise the way records professionals approach their work.

Electronic records management provides the catalyst for records managers and archivists to become involved in the design of information technology systems to ensure that records are controlled from the beginning of the records life cycle. Controls must be applied from the outset if the records are to be protected as reliable sources of information over time. Moreover, because the control of electronic records is dependent upon technology, records professionals must become more aware of how different technologies work and how they affect records and record keeping.

Electronic records must be controlled from the point of creation.

From the first mainframe computers in the 1940s and 1950s to the introduction of the personal computer (PC) in the 1980s and networked computers in the 1990s, the evolution of information technology has been dramatic. It is important, however, to focus on the changing nature of the applications supported by the technology rather than the technology itself.

Application: A set of related tasks supporting a work activity for which all or some of the tasks have been automated through the use of computer technology.

Applications support a range of functions from managing financial and human resources, to processing applications for licenses, to preparing reports and correspondence. Records are created and used by applications. To understand changes in records, it is necessary to understand the changes taking place in the design of these applications.

There are three major trends in information technology development and in the applications available to create and manage data and records: mainframe computing, personal computers and networking. Records professionals may experience examples of one, two or all three of these in the agencies in which they work. The main issues involved with these three trends are summarised here.

> *For a detailed discussion of how each of these technologies actually operates, see* Understanding Computers: An Overview for Records and Archives Staff.

Mainframe Computing

The earliest mainframe computers were introduced into large private firms and some government organisations during the 1940s and 1950s. They were used to automate tasks involving numerical calculations (such as accounting, taxation or statistics). Data were entered into the computer system and then processed in batches.

> ***Batch:*** A group of jobs, data, or software programs treated as a unit for computer processing.

'Batch processing' refers to the computer processing in groups, or batches, of data accumulated in advance, or over a period of time, without the user being able to make changes during the processing. The output of batch processing was aggregated data that could be used in summaries, bills, accounts and other business documents, as well as in reports and in analysis of scientific research.

Mainframe computers were expensive to acquire and operate. They required complex software that was developed for each new type of application. Most organisations set up separate computing departments and hired specialised systems analysts, programmers and computer operators to run and maintain operations. These specialists decided which hardware and software would be used, which applications lent themselves to automation and how the systems should be designed.

During the 1960s, computer manufacturers introduced the concept of 'time-sharing', allowing several users to access the computer simultaneously. Time-sharing gave rise to an early form of computer networking and remote access and stimulated the development of new kinds of software. New software, together with declining costs for running and storage, made it possible for organisations to automate more complex tasks and applications (such as managing law enforcement information, natural resources information, regulatory licensing and so on). However, the design of the systems and the operation of the computers remained a specialised technical area

distant from users.

Throughout the 1970s and 1980s the impact of mainframe-based applications on records management was not apparent. Most computer centres established 'tape libraries' and handled the storage, disposal and recycling of machine-readable media. For records managers, the most obvious impact of early automation was a rapid increase in printed output from computer systems, which added to the growing volume of paper records. The prevailing view of electronic records at this time was that they were special media records. They were primarily valuable because of their informational content while records that were needed as evidence of actions and decisions were printed on to paper and stored in established filing systems.

During this period, the experience of archivists was restricted almost exclusively to the appraisal, acquisition and preservation of computer files containing the results of social science research (such as opinion polls and census data). Some large databases were also appraised and acquired, but archivists were primarily concerned with data files. The initial machine-readable archives programmes in the National Archives of the United States and Canada, the only two archival institutions in the world to support such programmes during this period, were modelled on data libraries.

The bulk of the world's data is stored on mainframe computers.

By the 1990s, as personal computing and networking became more common, many information technologists were predicting the demise of mainframes. However, mainframes continue to be used to support important applications for organisations across a wide range of industries. Despite the fact that they represent a smaller percentage of the global market for information technology, the bulk of the world's data is still stored on mainframes.

Activity 2

Write a brief memorandum answering the following questions.

Does your organisation currently make use of, or has it ever made use of, a mainframe computer? What business activity does it support? What department is responsible for operating and maintaining it? How is input into the system? What happens to the inputs? What are the outputs form the system? What happens to the outputs? Are there backup-up procedures for the information contained in the mainframe, if so, what are these procedures? Who is responsible for maintaining backups and where are they maintained?

Personal Computing

In 1981, IBM ('International Business Machines') introduced personal computers (PCs) to the consumer market. This brought about revolutionary changes in the way organisations and individuals carried out work. By the mid-1980s, PCs came equipped with 'user-friendly' software for word processing, database applications, spreadsheets and graphic design.

User friendly: Computer software or hardware that is simple to set up, run and use.

The introduction of the PC has several implications for the creation, management and control of electronic records. Unlike mainframes, which are administered by central data processing departments, PCs are controlled by individual users. The individual or group that owns a PC can decide when and how to use it and can control the information stored on it. PCs have made computing affordable and accessible to a much larger user population.

The personal computer is the most widely used technological tool in the work environment.

Throughout the world, the PC (and the more portable laptop computer) have become the most widely recognisable and most widely used technological tool in the work environment. However, as the reliance on PCs increases, organisations are beginning to realise the difficulties in finding and retrieving information stored on them and of continuing to access this information over time. Problems include

- lack of standards and rules for managing information stored on PCs
- inadequate back-up procedures
- vulnerability of the storage media
- incompatibility of some software applications.

The problems of locating and retrieving information have increased as PCs are linked together by networks.

Activity 3

Write a brief memorandum answering the following questions.

Does your organisation use personal computers? What software applications are used and for what purposes? Are there procedures for backing-up files? How are back-up diskettes labelled and stored? Is the information stored on a diskette anywhere, if so, how?

Network Computing

One of the most significant advances in computing began in the mid-1980s with the integration of telecommunications and computing to form computer networks.

Network technology allows organisations to connect a number of PCs into a local area network (LAN) to enable groups to share software applications and file storage space and to transport documents and messages electronically.

> ***Local area network:*** A computer network located within a relatively limited area such as a building, agency or university campus. Also known as a LAN.
>
> ***Computer network:*** A grouping of computers and peripherals connected together by telecommunications links to enable a group of users to share and exchange information.

By the late 1980s, wide-scale adoption of telecommunications standards, such as TCP/IP, made it possible to link hundreds of thousands of LANs and PCs into regional and global networks. The best known global network is the Internet, which, as of 1998, was estimated to have over 100 million users in over 110 countries.

> ***Internet:*** A collection of local, regional and national computer networks that are linked together to exchange data and distribute processing tasks.
>
> ***Standard:*** A definition, format or specification that has been approved by a recognised standards organisation or is accepted as a de facto standard by an industry.
>
> ***Transmission Control Protocol/Internet Protocol (TCP/IP):*** The de facto standard used by the Internet for transmitting data over networks.

The integration of computing and telecommunications into networks has important implications for how records are created, stored and used. Networks combine the autonomy of a PC with some of the central controls of a mainframe. They make it technically feasible to process and communicate all of the information needed to conduct business activities in modern organisations.

> *See* Understanding Computers: An Overview for Records and Archives Staff *for a more in-depth discussion of network capabilities, distributed computing and client-server architecture.*

In a networked environment, records can be located in centralised databases, in shared network filing space and on the hard drive of an individual's PC. The ability to keep information in several places makes it more difficult to control the creation, revision, distribution and deletion of records. Where systems allow individuals to share electronic records and data, the provenance, or origin of creation, of these materials becomes more complex since several different administrative units may contribute to

the creation of a document.

It is also possible for several different individuals to use the information at once. Increasingly, people prefer to receive information in electronic form, and printed versions become convenience copies. This trend has led to the growing acceptance of electronic records as evidence in a court of law. As a result, organisations must manage their records in a much more disciplined manner than they have in the past.

Activity 4

Does your organisation have any computer networks? Who has access to the network? What software applications are available to its users? What records are stored in shared filing space on the network and how easy is it to retrieve them (that is, how are they organised)? Do any or all of the computers have an Internet connection? Who is responsible for maintaining the network? Are there backing-up procedures for the information stored on the network, if so, what are these procedures? Who is responsible for maintaining backups and where are they maintained?

Computerisation has innate consequences for the way we create and keep records; manually as well as electronically. Having recognised these consequences, the remainder of this lesson aims to provide a basic introduction to the concepts of electronic records and electronic record-keeping systems.

WHAT ARE ELECTRONIC RECORDS?

Within the offices of government, and similarly in the private sector, records are created and used to document actions, confirm decisions, identify rights and responsibilities and communicate information.

All records can be defined as documents, regardless of form or medium, created or received, maintained and used by an agency, organisation (public or private) or individual in pursuance of legal obligations or in the transaction of business, of which they themselves form a part or provide evidence. Records are time bound and cannot be altered in any way without creating a new record.

An electronic record can be manipulated, transmitted or processed by a computer.

An electronic record is a record that can be manipulated, transmitted or processed by a computer. It is

- written on magnetic or optical medium (including magnetic tapes, cassettes, CD-ROMs, hard disks and diskettes)
- recorded in binary code
- accessed using computer software and hardware
- easily manipulated (that is, updated, deleted and so on).

Binary code: A system of encoding data that uses binary digits, 0 and 1.

For more information on binary code, see *Understanding Computers: An Overview for Records and Archives Staff*.

Although it is easy to manipulate electronic records, it is critical to recognise that every time a record is updated or manipulated in any way the result becomes a new record.

Electronic records and data are not the same thing. Data comprises raw unformatted information. It is easily manipulated, updated, edited, copied and reused. Data lacks context and structure and is therefore meaningless on its own. Records, on the other hand, derive meaning from their context and structure as well as their content.

It is important to understand, however, that records may be derived from data and data may be derived from records. They complement one another. For example, unaggregated data may be consolidated and structured to produce a report. Aggregated information contained in a report may be extracted and input into a database where it is held as unaggregated data until such time that it is compiled into a new report. The qualities of data ands records are illustrated in Figure 1 below.

DATA	***RECORDS***
• raw unformatted information • easily manipulated, updated, edited, copied and reused • lacks context, content and structure	• structured information • 'permanently' recorded on a medium (but the medium is not the record) • has context and structure as well as content

Figure 1: Data versus Records

Students should note that in the field of information management and data processing, a 'record' is defined as a grouping of inter-related data elements forming the basic unit of a computer file. This concept is entirely different from the record-keeping concept of an electronic record and the two should not be confused. To clarify, the two definitions are shown below.

> ***Record (1):*** A document regardless of form or medium created, received, maintained and used by an organisation (public or private) or an individual in pursuance of legal obligations or in the transaction of business, of which it forms a part or provides evidence.
>
> ***Record (2):*** A complete set of information in a database; records are composed of fields, each of which contains one item of information. *Note:* the term database record is used in this study programme as database record, to distinguish it from record (1).

Traditionally, records have been physical objects. They were recorded on a medium (usually paper) by means of symbols (letters, numbers, figures and so on) that people could access, or read, directly. Electronic records are recorded on a medium such as a magnetic tape or a disk, but their status as records is not dependent upon that medium; in effect they are 'permanently' recorded on the medium, but the medium is not the record. Electronic records must be viewed as logical rather than physical entities because they cannot be read directly without the aid of computer software and hardware to interpret the codes used to represent letters, numbers, figures and so on. As logical entities, electronic records have three attributes: content, context and structure, which can be explained as follows.

- *Content* is what the record says.
- *Structure* relates to both the appearance and arrangement of the content (for example, the layout, fonts, page and paragraph breaks, tables, graphs, charts and so on) and the relationship of the record to other related records in the system (ie the links). This includes structural information about the application software used to create the record's content and information about the system (the platform, hardware and so on) that manages the links between records.
- *Context* is the background information that helps explain the meaning of the document. This includes two types of information. Firstly, there is information that identifies the particular document, such as the title, author and date of creation. Secondly, there is information about the creator and the purpose of creation, for instance, the nature of the business function or activity, the creating agency and unit concerned.

Activity 5

Based on the example shown in the figure, identify the content, structure and context of a document (paper or electronic) you have received recently.

EXAMPLE: Content, Structure and Context of an Electronic Record	
RECORD	Electronic circular advising office staff of new procurement procedures (an amendment to the departmental procurement procedures manual) -- distributed electronically to all department staff through a departmental LAN.
Content	The content explains the need for new procedures, relates them to the section of the procedures manual being amended, explains when they will come into effect and outlines the new procedures in detail.
Structure	*Content Structure* (internal: appearance and arrangement): standard circular format created using a word processing template; ASCII character set; English (United Kingdom) language; contains imbedded graphic image files created in standard tiff format. *System Structure* (external: application, system and links): created using Microsoft Word 97 running on a Microsoft Windows 98 operating system on an IBM compatible PC with a Pentium II processor; the circular file is stored in a networked Windows NT server sub-directory dedicated to circulars within the parent directory containing the procurement procedures manual.
Context	The circular was created by the Departmental Accounting Clerk, according to established procedures for amending procurement rules. Authorised and distributed by the Departmental Accounting Officer responsible for procurement, it was distributed to 35 departmental staff on 5 February 1998 at 11:15 am.

Figure 2: Content, Context and Structure of an Electronic Record

FORMATS FOR ELECTRONIC RECORDS

Electronic records can be created in a range of different formats. The simplest and perhaps most common form are data sets contained in databases (these are sometimes referred to as data files). Otherwise, the majority of electronic records are still simple text-based records or relatively uncomplicated spreadsheets. However, as software applications become more advanced, the documents created will become more sophisticated. Broadly speaking, electronic record format types include the following.

- *Data sets:* These are groups of related electronic records organised and treated as a unit. Data sets are created, managed and used in the context of a database. For example, a data set could contain annual census information for a region.
- *Text-based documents:* These are primarily basic word-processed documents, with words only and few or no graphic images. However, it is already common for a single word-processed document to include embedded elements created by other software applications. For instance a spreadsheet from Microsoft Excel could be imported into a report being created using Microsoft Word. In addition, the word-processed report may include a chart created using Microsoft PowerPoint.
- *Multi-dimensional documents:* Some forms of electronic record can be represented in more than one way on the screen and on the printed page. A spreadsheet can be represented as a set of figures and formulae or as the result of the calculations. Both representations are part of the record, although it may not always be necessary to retain both of them. Similarly, a presentation may consist of a set of prepared slides and notes displayed and used in different ways.
- *Multi-media documents:* Such documents are composed of a number of different elements, which interact together to display their full meaning. They include graphical, moving image, sound and text documents, which may appear differently at different times in response to variations in user interaction.

There is an increasing trend for documents to include elements in several media. For instance, documents may be composed of separate reusable components that can be stored in different parts of a network, brought together as a 'virtual' document and presented in different forms for different uses. Moreover, note and voice annotations can be added to text-based documents; digital sound and video can be added to presentations; 3-D modelling and simulation can be added to analytical documents.

Activity 6

Find an example of a data set, text-based document, multi-dimensional document and multi-media document created by your organisation. (Note: it may not be possible to locate an example of each type.) What software application was used to create each one? What business function does it support? Why was this type of format considered most appropriate for the purpose?

SUMMARY

This lesson has explored the main technological trends that have led to the creation of electronic records, including mainframes, personal computers and networks. It has explained that electronic records are fundamentally the same as other kinds of records but they have special characteristics because of the medium in which they are created and stored. All records have content, context and structure, but with electronic records these attributes have to be analysed separately. The lesson described the main electronic record format types.

STUDY QUESTIONS

1. What are the main differences between 'traditional' paper records and electronic records?

2. Why do records professionals need to become involved in records from the point of creation?

3. What are the four main uses of computers for record keeping in government?

4. What is 'batch processing'?

5. What was the initial impact of records generated by mainframe computers for archivists?

6. What are the main problems for accessing information over time associated with the spread of the use of PCs?

7. What are the differences between a mainframe computers, PCs and network computing?

8. Define the term 'electronic record'.

9. What is the difference between records and data?

10. What are the three attributes that every electronic record possesses?

11. Name four main electronic record format types.

ACTIVITIES: COMMENTS

Activities 1-6

All the activities in this module are designed to help you examine your institution's existing electronic records management issues in relation to the suggestions and recommendations offered here. You are encouraged to examine your findings for each activity and compare them with the information provided throughout this module.

LESSON 2

ELECTRONIC RECORD-KEEPING SYSTEMS

Electronic records do not exist in isolation. They are created by organisations and individuals for specific purposes. To be readily accessible to others, electronic records need to be captured in record-keeping systems.

One of the most significant problems facing organisations that create and use electronic information is that electronic systems are seldom designed to keep records. They do not capture the structural and contextual information, or *metadata*, that describes how the record was created, how it is arranged (its form), who created it and what business function and transaction led to its creation. This creates two main problems. First is a risk that, without information about the record's or data's structure, it may be difficult if not impossible to retrieve it in the future if the software and hardware used to create it becomes obsolete. Second, without context, the record is meaningless.

This lesson explains how records managers and archivists are exploring how to use metadata and standards to ensure that electronic records can be migrated on to new systems without losing the information needed to understand them.

METADATA

More often, the need for records lasts longer than the need for the system that created them. Metadata is an important element in any records and archives programme where the object is to preserve the authenticity and integrity of the data and to retain the context with which to analyse the actual records.

Metadata is data about data.

Metadata is a relatively new notion for the archival profession. Interest in metadata stems from the realisation that electronic records do not contain enough contextual information to enable future users to fully understand the record. Metadata is an attempt to capture this information in a systematic and structured manner that can be stored in electronic format and easily migrated with the record over time.

The concept of metadata is an area that is still in the development stage and a standard for metadata has yet to emerge. Indeed little of a practical nature has been implemented although there is a significant research effort being carried out world-wide. Nonetheless, this notion has attracted a great deal of interest and is regarded by the international archival community as a promising development. The records professional will need to monitor future developments in this area.

What is 'metadata'? Metadata is data about data; it is an 'abstraction' of the data.

> ***Metadata:*** The information about a record that explains the technical and administrative processes used to create, manipulate, use and store that record.

Metadata is essential in transforming raw data into records because it provides the means to make sense of the data. Metadata is the background information that describes how and when and by whom a particular set of data or a record was created, collected or received and how it is formatted. Especially when data is computerised, it can be impossible to understand its essential details without appropriate background information.

Consider for a moment the following set of data:

100965 020359 031265 300989 060297

How much can you safely deduce from this information? It is fair to say that the answer is 'absolutely nothing.' The numbers listed could be the population of towns, estimates tied to budget line items or a series of phone numbers. It could even represent vehicle licence plate numbers. The only way to assign any meaning to the data is by linking the content to its structure and context, and when we speak of 'structure' and 'context' we are implying the presence of metadata.

The term 'metadata' emerged out of the information management community many years ago. Yet if we think of the term in its broadest form, then records managers and archivists are metadata experts. In essence, metadata is simply a new term for pulling together information electronically that was available all along in a paper environment. For example, index cards, file covers, file registers, the headers and footers of paper documents all contain metadata and have computerised equivalents that fulfil a similar function.

'Record-keeping metadata' is only one of many types of metadata, all of which have different uses. Others may include 'systems operating metadata', 'data management metadata' and 'access/location and retrieval metadata'.

Record-keeping metadata serves many important purposes, including

- identifying records
- authenticating records
- administering terms and conditions of access and disposal
- tracking and documenting the use(s) of records

- enabling access/location, retrieval and delivery for authorised users
- restricting unauthorised use
- capturing in a fixed way the structural and contextual information needed to preserve the record's meaning.

Metadata can be organised into several levels, ranging from a simple listing of basic information about available data, to detailed documentation about an individual data set or a record. Metadata may be used to support the creation of an inventory of an agency's data holdings. It helps that potential users to make informed decisions about whether the data or record is appropriate for the intended use. Metadata also provides a means of ensuring that the data and record holdings of an organisation are well documented and that agencies are not vulnerable to losing vital knowledge about their data when key employees retire, leave or transfer within the organisation.

Activity 7

List three reasons why you believe metadata is important for record keeping.

Given the abundance of metadata a computer system can create, it is important to think about how metadata can best be used for keeping electronic records over time. Some of the categories of record-keeping metadata that could be useful are 'terms and conditions metadata', 'structural metadata', 'contextual metadata', 'content and use metadata'. (All information technology (IT) standards referred to in the example are explained more fully at the end of this lesson.)

Metadata can include 'terms and conditions metadata', 'structural metadata', 'contextual metadata' and 'content and use metadata'.

Terms and conditions metadata identifies restrictions imposed on access and use and requirements for disposal. Examples are

- access conditions and/or restrictions: textual information supplied by the creator defining permission to access the records according to staff position
- use conditions and/or restrictions: textual information supplied by the creator defining permission to use the records according to staff position
- disposal requirements: information, probably in the form of records schedules which describe the conditions under which a record (in whole or in part) may be removed from the system.

Structural metadata consists of information about the design of the data or record. It defines the logical constructs that make up the record. For example, consider the hierarchical relationships between the title of a report, section headings, subsection

headings and so on. If the structural information about the design of the report is lost, the logical flow of ideas in the report could be destroyed, the table of contents and index to the report would be incorrect, thus making information difficult to locate. Some examples of structural metadata include the following.

- *File identification* makes it possible to identify the individual file(s) that comprise a record. This allows the system to bring together all of the parts of the record to form the whole. For example: the text file 'report.doc' is the actual word processed report, but this file contains a graphic image ('image.gif') that is stored in a database of clip art and a spreadsheet (spreadsheet.xls) that is stored in the system's sub-directory for financial information. Each file has a file name that identifies it and a file location for where it is stored. This information should be recorded in the structural metadata.
- *File encoding* identifies the codes used to put an individual file into code including: modality (eg text, numeric, graphic, sound, video, etc); data encoding standards (ASCII, EBCDIC); method of compression (JPEG, MPEG); method of encryption (the algorithms used to encrypt the record's content).
- *File rendering* identifies how the record was created so that it can be reconstituted. This includes information about software application dependencies, operating system dependencies, hardware dependencies and standard(s) used (SGML, Postscript, TIFF).
- *Content structure* defines the structure of the record's content including the definition of the data set, the data dictionary, data delimiters or labels, authority files containing the values of the codes used for the data, version identifiers, series identifiers and so on. A data dictionary is a file that defines the basic organisation of a database. It contains a list of all files in the database, the number of records in each file and the names and types of each field. A delimiter, or label, is a punctuation character or group of characters that separate two names or two pieces of data, or marks the beginning or end of a programming construct. Delimiters are used in almost every computer application. For example, the backslash (/) in a file's pathname is a delimiter that separates directories and filenames (C:/MyDocuments/Reports/report.doc). Other common delimiters include the comma (,), semicolon (;) and braces ({}).
- *Source* identifies the origin of the record or the relevant circumstances that led to the capture of the data, including the computer system in which the data or record was created and instruments used to capture the data (sound recording, location recording and so on, including the manufacturer, model number or other information about the instrument).

Contextual metadata identifies the provenance of the record (such as the person or system responsible for creating it) and provides data that supports its use as evidence of a transaction. Examples of contextual metadata include the following.

- *Transaction information* identifies information about the transaction documented by the record including the person or system responsible for initiating the transaction, the time of the initiation, the recipient and time of receipt, the type of transaction (its functional context), linked prior transactions that are part of the

same business activity; action requested about subsequent related transactions.

- *Responsibility information* identifies the organisation, unit and/or individual responsible for the transaction including references to the source authorising the transaction, responsibility for the system and systems procedures.
- *Content metadata* contains the actual data that documents the transaction

Use metadata documents any significant uses of the record following its creation. Typically it identifies how the data was used (that is viewed, copied, edited, filed, indexed, classified, sent) and when and by whom these actions were carried out. This type of metadata could be gleaned from the system's audit trail, which is the record showing who has accessed the system and what operations were performed in a given period of time.

> ***Audit trail:*** In computer environments, a record showing who has accessed a computer system and what operations he or she has performed during a given period of time.

Audit trails are useful both for maintaining security and for recovering lost transactions. Most accounting systems and database management systems include an audit trail component. In addition, there are separate audit trail software products that enable network administrators to monitor use of network resources.

Activity 8

What are the different types of metadata and what purpose(s) do they serve? Using a letter created by your organisation, identify the metadata elements that pertain to it.

Collecting Metadata

The first step in building up metadata is to inventory and evaluate the data and records that currently exist, along with any related metadata. If there is critical missing metadata, the process of collecting and building it up begin.

It is also important to plan for the ongoing collection of metadata that documents any new data that is being considered. It is far easier to collect accurate and detailed metadata at the time the data is being input than afterward. A plan can also be made to maintain the metadata so that it reflects changes made to the data over time.

Metadata can be collected automatically or gathered systematically.

Metadata can be either captured by the system automatically or gathered systematically through the use of computer forms, templates and utility programs.

Systems-generated Metadata

Archives and records management programmes should be encouraged to use the self-documenting (or metadata generating) capabilities of electronic record-keeping systems both to reduce their manual description backlogs and to help guarantee the authenticity and integrity of electronic records over time.

Computerised systems can be programmed automatically to extract some information and record it. For example, as explained above, a data dictionary is a file that defines the basic organisation of a database. Most systems keep the data dictionary hidden from users to prevent them from accidentally destroying its contents. Data dictionaries do not contain any actual data from the database, nor do they manage it. However, without a data dictionary a database management system cannot access data from the database. Structural and contextual metadata needed to identify data can be gathered automatically by the system from the data dictionary.

Forms-based Metadata Gathering

Computerised forms can help guide the user throughout the documentation process. They may consist of fill-in boxes or pick lists. Some forms may indicate what information is optional and what is mandatory. If the forms are built into the framework of the system, it may be easy to recycle portions of the metadata for different uses. Forms can be used to collect contextual and some structural metadata needed to describe the record.

An example of a form is the 'properties' option in Microsoft Word which asks for information on the document such as: title, subject, author, manager, company, category and key words. This option can also provide statistics on when a document was created, modified, accessed and printed; how many words are contained in the document; and the file's size, type and location.

Computer Application Templates and Style Sheets

A template defines the layout of a document. It can store boilerplate text, custom toolbars, macros and so on. Templates aid in structuring information in such a way that everyone in the organisation or unit creates documents according to a predetermined format. For example, templates are useful for creating commonly used document types such as faxes, memos and reports. See the example of a fax template created in Microsoft Word that follows. The template includes instructions for entering information. In spreadsheets and database applications a template is a blank form that show which data files exist, their locations and length.

Styles define the appearance of various text elements of a document, such as headings, captions and body text. It specifies such parameters as font size, bold, italics, justification an so on. Templates and styles are not metadata capturing tools per se. However, where predetermined templates and styles are used, they can help the system to glean automatically structural and in some cases contextual metadata information.

[Click here **and type return address and phone and fax numbers]**

Organisation Name

Fax

To:	[Click **here** and type name]	From:	[Click **here** and type name]
Fax:	[Click **here** and type fax number]	Pages:	[Click **here** and type # of pages]
Phone:	[Click **here** and type phone number	Date:	September 7, 1999
Re:	[Click **here** and type subject of fax]	CC:	[Click **here** and type name]

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

● **Comments: [Click here and type comments]**

Figure 3: Example of a Template

Utility Programs

A utility program is a computer program that performs a very specific task, usually related to managing system resources. For example, an operating system contains a number of utilities for managing disk drives, printers and other devices. Utilities differ from applications mostly in terms of size, complexity and function. For example, word processors, spreadsheets and database applications are considered applications because they are large programs that perform a variety of functions not directly related to managing computer resources. Utility programs may be of particular use in capturing structural and contextual metadata.

As stated earlier, metadata is still being developed as a concept, and the records profession is in the process of working through its precise meaning. Records professionals should work with systems developers to examine a number of metadata models in order to determine what metadata is required to meet their organisation's needs.

Activity 9

In your own words, describe the different methods for capturing metadata. Does your organisation use templates or styles? If so, for what purpose do they use them?

THE LIFE CYCLE OF ELECTRONIC RECORDS

The life cycle of electronic records is longer than the life cycle of the systems used to create them.

Computer systems become obsolete so rapidly that it is unrealistic for these systems to remain usable for the length of time that the organisation will need the records that are created by them. This fact is a characteristic that distinguishes electronic records from paper records. Electronic records have to be migrated on to new systems in such a way that they can still read and understood while maintaining their integrity and authenticity. This is presents significant technical challenges, which will be discussed below.

Although the technical challenges in managing electronic records are formidable, the management issues are arguably even more important. Electronic records cannot survive without active strategic intervention to migrate the records onto new systems. This process is expensive and requires the implementation of policies and procedures that affect the working practices of the entire organisation.

Changes requiring this level of resources and support cannot be achieved without senior management approval. For example, the adoption of technical standards to facilitate the future migration of electronic records involves a short-term penalty to the organisation because it limits the choice of computer applications that may be used. It is a management decision to forego the short-term operational benefit of having a wider choice of computer software in favour of the long-term organisational benefit of being to access essential records in the future.

Balancing these opposing needs is a management decision. To be successful, an electronic records management programme must be treated as a management issue and have high-level support. Recognising this point is the first step toward ensuring effective management is possible.

Planning for electronic record-keeping systems often stops once the system is implemented. This is usually because system's developers do not consider the fact that the record's life cycle often extends long past the anticipated obsolescence of computer equipment. In short, the systems do not address record-keeping needs comprehensively, and this can result in serious problems, including the following:

- poor system performance because of accumulation of unneeded data which should have been subject to disposal requirements
- use of outdated information in decision-making
- compromised systems security and data integrity because of uncontrolled or improper deletion of records or data
- inability to perform necessary audits or management reviews.

Ideally, the life cycle of electronic records should be planned and reflected in the design of systems that support the work of the organisation. Planning should include

- determining at what point a transaction creates a record
- defining the structural and contextual attributes of the record that the system should capture
- determining the rules for how records should be captured when performing a transaction
- identifying relevant laws, regulations, policies and standards
- incorporating the record-keeping requirements identified in laws, regulations, policies and standards, including records disposal requirements
- identifying security features that need to be included, such as the ability to restrict access to systems functions and records to appropriate staff
- ensuring that appropriate audit trails are created that will reflect accurately the history of the record's creation and use
- controlling hard copies of system inputs and outputs for entering, updating and deleting data and producing reports and so on
- determining whether any of the records may have value for purposes not directly related to their current business function

- assigning responsibility for ensuring that records are generated and captured.

Activity 10

What are the consequences for records when systems become obsolete? What are the technical issues? What are the management issues? Are there old computer disks and/or tapes in your office? If so, can you still read them? If not, why not?

THE IMPORTANCE OF STANDARDS

Standards play a key role in the management of electronic records. Until recently, most computerised systems did not contain records of long-term archival value. While there was data in these systems, the material did not need to preserve any of its structure or context. However, increasingly, computerised systems are replacing paper as the record-keeping systems of choice by many organisations. As a result, it is critical that the information technology standards being applied today are adequate to ensure the long-term preservation and use of the information contained in the systems.

Standardisation is critical to managing electronic records effectively.

Standardisation plays a critical role in avoiding costs associated with changing technologies. Records professionals need to encourage awareness of the importance of relying on recognised IT standards as a preventive measure against the potentially devastating effects of hardware and software incompatibility, coupled with the rapid obsolescence of technology.

A standard is a definition or format that has been approved by a recognised standards organisation or is accepted as a *de facto* standard by the industry. One example is the Windows NT Operating System. Among other things, standards exist for programming languages, operating systems, data formats and communications protocols.

Machines that communicate in a stream of ones and zeros need conventions that arrange, classify and interpret such bits in a consistent fashion. For the most part, every digital device has the ability to do this so that images appear as intended and letters appear correctly and not as unreadable characters. However, problems often occur when one machine needs to work with another or with software meant for another. There may also be problems when information must be migrated to a new system, through a software upgrade or to another storage medium.

Migration: The transfer of data in electronic form from one hardware or software configuration or generation to another.

The information from one source must be framed so it can be understood at the other end. In order to do this, one of three things must happen.

1. Both machines must use the same formal, standard way to interpret bits.

2. One machine must agree to use the other's standard.

3. A translator must sit between the two to convert otherwise incompatible messages.

Failing this, information passed between machines may be indecipherable. Standards are a tool that makes communication comprehensible by assigning precise meanings to bits and bytes. To be useful, the standards must be consistent and unambiguous.

Records professionals will encounter IT systems standards as a result of

- defining specifications for an automated system that will operate within their own repository
- participating in the design of organisational systems
- trying to establish links with external networks in order to communicate or exchange data.

Regardless of the circumstances in which they encounter them, records professionals needs to have a basic understanding of these standards.

There is a need to identify and accept nationally or internationally recognised standards for different types of electronic record formats to enable the transfer of records from one system to another. These standards should facilitate the record's preservation and its presentation.

However, there are several constraints that may limit the formats used. There is a need to

- minimise the risk of becoming locked into proprietary formats and applications

Proprietary: A computer format that is privately owned and controlled (such as the Kodak photo CD, which is owned by the Kodak Corporation).

Open: A computer format that is not owned by a company and so is freely available to use and to mix and match with other products.

- limit the number of formats in order to minimise the number of migration paths to be managed (see Lesson 2 for a discussion of migration strategies)
- select transfer formats that require minimal enhancement to an organisation's normal IT applications

- keep the degree of intervention in the day-to-day running of an organisation's IT infrastructure to a minimum
- select formats that will not preclude additions or changes in the future as different approaches become available.

Often, records programmes do not have the authority to require the use of standard-compliant formats, and the organisation concerned tends not to consider the need for migration and long-term preservation when selecting software. However, information systems developers and IT staff do recognise that standards are central to information even within the confines of a single organisation.

Records and archives managers need to collaborate with IT professionals and information officers to set standards.

Records and archives managers need to collaborate with IT professionals and information officers to set standards that ensure compatibility and leave the various departments and agencies to make their own choices about hardware, software and data that will comply with these instructions. It is important to evaluate carefully and limit the number of choices of standards because too many choices means no choice at all, just chaos.

From the record-keeping perspective, one way of doing this is to list the acceptable standards for each type of file, as shown in the figure below.

Designating acceptable standards for data and document formats will enable the records programme to plan for the transfer, maintenance and migration of data and records for which they will be responsible over time. There are many more standards to consider than those included in the example above. The table shown in Figure 5 at the end of this lesson provides an initial reference to a wider variety of standards that any government should take into account. However, this list is not comprehensive, and the table provides an overview only.

The problem for the records profession is that, at present, there are a variety of standards, which in some cases are in competition with each other (see Figure 5 below). National archives around the world are having to make decisions about which standards to adopt based on the technical performance of the standards and an assessment of which standards are likely to be supported by the world at large. These decisions are highly technical and are usually made jointly with relevant information technology experts from the government's national computing centre. It is too early to say which standards will prove to me the most durable and widely used and this explains which at present different archival institutions have adopted different standards. Records professionals need to keep abreast with their colleagues' experiences in other institutions.

There is a danger that records professionals will be overwhelmed by the sheer number of standards that have real or potential impact on their work. Moreover, most standards were developed outside of the records profession, which means that records and archives managers are working in unknown and technically challenging territory.

However, standards apply to every process during which information about records, repositories, staff or users is captured, processed or retrieved. Consequently, if records managers and archivists are to fulfil their statutory responsibilities in the future, it is essential that members of the profession should become better acquainted with the wide range of standards available.

Records professionals need to become knowledgeable about their colleagues' experiences with electronic records and with new findings in information management and information technology.

Activity 11

Why are the use of information technology standards important for electronic record keeping? What are the advantages of using information technology standards? What, if any, information technology standards does your organisation adhere to? Who in your organisation is responsible for determining which standards are used? Who should you work with to determine the appropriate information technology standards for record keeping in your organisation?

Using the table of standards for storage media, identify which storage media are used by your organisation. Identify the relevant international standard for those used?

Using the table of standards for archival description/information retrieval, which, if any, of these standards does your archival programme use? What is the reason for using this particular standard?

Type of Data	Recommended Standard	Comments
Character sets	ISO/IEC 8859-1 (ISO = International Standards Organisation)	For western European countries another possibility is Unicode (ISO/IEC 10646) if other character sets are needed.
Structured text	SGML	
Bitmap graphics	JPEG	
Faxes	ITU-T Group 3 (ITU = International Telecommunications Union)	
Vector graphics	CGM	
Audio and video	MPEG II	
CAD/CAM	STEP	
Accounting/invoice	EDIFACT	
Other database files	Flat file, comma separator	No standard database format exists. The flat file allows long-term preservation if the structure of the database is well documented.
Encrypted file programs	RSA (source or PC compatible version)	No standard exists for compiled programs. The Java byte code, which is platform independent may help for long-term preservation of Java applications.
Media for long-term preservation	DVD	While DVD is rather new, it should be widely used in the near future. Its large capacity and ease of use may help in making the DVD the media for archives. Several organisations have made their own choice for the media. It is recommended to select one medium or a very small set to facilitate future use.

Figure 4: Table of Standards for Different Types of Data

Reproduced from DLM-Forum on Electronic Records, *Guidelines on Best Practices for Using Electronic Information: How to Deal with Machine-readable Data and Electronic Documents*. Updated and enlarged edition. (Luxembourg: Office for Official Publications of the European Communities, 1997).

Name	International standard or profile	European standard or profile	Other specification	Description
Storage Media				
½ inch tape cartridge	ISO 8462-1			Half-inch tapes come also in the form of 9-track reels. The tapes themselves are relatively cheap but they require expensive tape drives.
3 ½ inch floppy disk	ISO/IEC 9529-1 ISO/IEC 9529-2	EN 29529-1 EN 29529-2		Have a storage capacity of from 400K to 1.4MB of data. The most common sizes for PC are 720K (double-density) and 1.44 (high-density). Macintoshes support disks of 400K, 800K and 1.2MB.
CD-ROM	ISO 9660 ISO 10149			Short for *Compact Disc Read-Only-Memory*. A type of optical disk capable of storing large amounts of data – up to 1GB, although the most common size is 650MB. A single CD-ROM has the storage capacity of 700 floppy disks.
DAT cartridge				Acronym for *Digital Audio Tape*, a type of magnetic tape that uses a scheme called helical scan to record data. A DAT cartridge is slightly larger than a credit card in width and height and contains a magnetic tape that can hold from 2 to 24 gigabytes of data. It can support data transfer rates of about 2 MBps. Like other types of tapes, DATs are sequential-access.
DVD	Under preparation			Short for *Digital Versatile Disk* or *Digital Video Disk*, a new type of CD-ROM that holds a minimum of 4.7GB, enough for a full-length movie. Many experts believe that DVD disks, called DVD-ROMs, will eventually replace CD-ROMs, as well as VHS video cassettes and laser disks. The DVD specification supports disks with capacities from 4.7 GB to 17GB and access rates of 600 KBps to 1.3 MBps. They are backward-compatible with CD-ROMs.

Figure 5: Table of Selected Information Technology Standards of Relevance to Record Keeping

Name	International standard or profile	European standard or profile	Other specification	Description
Storage Media				
WORM	There is no single standard for WORM disks, which means that they can only be read by the same type of drive that wrote them.			Short for *Write Once Read Many*, an optical disk technology that allows you to write data onto a disk just once. After that, the data is permanent and can be read any number of times
Photo CD	Proprietary standard patented by Eastman Kodak Company			Photo CD was introduced by Kodak as a means of storing high quality digital colour images, captured from continuous-tone film, as a digital signal on a CD-ROM disc.
Bit-mapped graphics[1] and vector graphics[2]				
CAD graphics				Acronym for *Computer-Aided Design*. It enables engineers and architects to design everything from furniture to aeroplanes.
CGM graphics	ISO/IEC 8632: 1992			Abbreviation for *Computer Graphics Metafile*, a file format designed by several standards organisations and formally ratified by ANSI.[3] It is designed to be the standard vector graphics file format and is supported by a wide variety of software and hardware products.

Figure 5: Table of Selected Information Technology Standards of Relevance to Record Keeping (cont.)

[1] Bit-mapped graphics refers to hardware and software that represent graphic images as bit maps. Bit maps are a representation, consisting of rows and columns of dots, of a graphics image in computer memory. They are often known as *raster* graphics.

[2] Vector graphics (or object-oriented graphics) are images that are represented as mathematical formulas that define all the shapes in the image. They are more flexible than bit-mapped graphics because they look the same even when you scale them to different sizes, whereas bit-mapped images become ragged when you shrink or enlarge them.

[3] Acronym for the American National Standards Institute. Founded in 1918, ANSI is a voluntary organisation composed of over 1,300 members that creates standards for the computer industry.

Name	International standard or profile	European standard or profile	Other specification	Description
Bit-mapped graphics and vector graphics (continued)				
GIF graphics	CompuServe Inc provides royalty-free limited-use licence to users.			Stands for *Graphics Interchange Format*, a bit-mapped graphics file format used by the World Wide Web, CompuServe and many on-line bulletin boards. It includes data compression, making it especially effective for scanned photos
GKS	ISO/IEC 7942			Short for Graphical Kernel System. GKS is a machine, language, operating system and device-independent specification of a set of services for displaying and interacting with 2-dimensional pictures.
Group III fax	ITU-T group III			A universal protocol defined by the CCITT[4] for sending fax documents across telephone lines.
Group IV fax	ITU-T group IV			A protocol for sending fax documents over ISDN networks.
JPEG graphics	ISO/IEC 10918 ISO/IEC DIS 14495-1			Short for Joint Photographic Experts Group. Although it can reduce graphics files to about 5% of their normal size, some detail is lost in the compression

Figure 5: Table of Selected Information Technology Standards of Relevance to Record Keeping (cont.)

[4] Now known at ITU.

Name	International standard or profile	European standard or profile	Other specification	Description
Bit-mapped graphics and vector graphics (continued)				
MPEG-1 video	ISO/IEC 11172:1993			Short for *Moving Picture Experts Group* – a working group of ISO. MPEG is part of a family of digital video compression standards and file formats. The most common implementations of the MPEG-1 standard provide video resolution of 352-by-240 at 30 frames per second (fps). This produces video quality slightly below the quality of conventional VCR videos.
MPEG-2 video	ISO/IEC 13818: 1995			MPEG-2 offers resolutions of 720x480 and 1280x720 at 60 fps, with full CD-quality audio. This is sufficient or all the major TV standards, including NTSC and even GDTV. It is used by DVD-ROMs. MPEG-2 can compress a 2 hour video into a few gigabytes.
MPEG-4 video	ISO/IEC DIS 14496-1 (Draft)			High-compression version of MPEG-2.
TIFF graphics	Proprietary format developed by Aldus Corporation (now owned by Adobe) and Microsoft.			Acronym for *Tagged Image File Format*, one of the most widely supported file formats for storing bit-mapped images on PCs. Files in TIFF format often end with a .tif extension.

Figure 5: Table of Selected Information Technology Standards of Relevance to Record Keeping (cont.)

Name	International standard or profile	European standard or profile	Other specification	Description
Character Sets[5]				
ASCII			ANSI X3.4-1968	The basic ASCII character set that uses 7 bits for each character giving it a total of 128 unique symbols (the numbers 0 through 127 to represent all English characters as well as special control characters).
EBCDIC	Proprietary standard developed by IBM			Abbreviation of *Extended Binary-Coded Decimal Interchange Code*. EBCDID is an IBM code for representing characters as numbers. Although it is widely used on large IBM computers, most other computers (including PCs and Macintoshes) use ASCII
Extended ASCII	ISO/IEC 8859-1			Extended ASCII uses 8 bits which gives it an additional 128 characters. The extra characters represent characters from foreign languages and special symbols for drawing pictures.
ISO 7-bit	ISO/IEC 646			The international version of ASCII.
ISO 8-bit	ISO/IEC 4873	BS 6006		International 8-bit code for information interchange.
ISO Latin 1	ISO/IEC 8859-1			A standard character set developed by the ISO. It is a superset of the ASCII character set. Both the HTTP and HTML protocols used on the World Wide Web are based on ISO Latin-1. This means that to represent non-ASCII characters on a Web page, you need to use the corresponding ISO Latin-1 code.

Figure 5: Table of Selected Information Technology Standards of Relevance to Record Keeping (cont.)

5 A character set is a defined list of characters recognised by the computer hardware and software.

Name	International standard or profile	European standard or profile	Other specification	Description
Character Sets (continued)				
Unicode	A subset of ISO 10646			A standard for representing characters as integers. Unlike ASCII, which uses 8 bits for each character, Unicode uses 16 bits, which means that it can represent more than 65,000 unique characters. This is necessary for languages such as Greek, Chinese and Japanese. Many analysts believe that as the software industry becomes increasingly global, Unicode will eventually supplant ASCII as the standard character coding format.
Structured Text/Document Interchange Standards				
DSSSL	ISO/IEC 10179: 1996			Abbreviation for *Document Style Semantics and Specification Language*. It is the language used to associate formatting rules with the elements of a structured document encoded using SGML (ie in a fully standardised environment a structured document coded in SGML would have its formatting specifications written in DSSSL)
FTP			IETF RFC 542; RFC 2389; RFC 2428	Abbreviation for *File Transfer Protocol*, the protocol used on the Internet for sending files.
HTML	ISO/IEC FCD 15445 (ISO HTML)		RFC 1866 (HTML 2.0)	Short for *HyperText Markup Language*, the authoring language used to create documents on the World Wide Web. HTML is similar to SGML, although it is not a strict subset.

Figure 5: Table of Selected Information Technology Standards of Relevance to Record Keeping (cont.)

Name	International standard or profile	European standard or profile	Other specification	Description
Structured Text/Document Interchange Standards (continued)				
HTTP			IETF RFC 1945 / 2616 / 2109 / 2295 / 2617	Short for *HyperText Transfer Protocol*, the underlying protocol used by the World Wide Web. HTTP defines how messages are formatted and transmitted, and what actions Web servers and browsers should take in response to various commands.
HyTime	ISO/IEC 10744: 1997			Abbreviation for *Hypermedia/Time-based Structuring Language*. HyTime is an SGML application that provides facilities for describing the relationships between different types of data. It provides standardised methods for describing hypertext links, time scheduling, even synchronisation and projection in multimedia and hypermedia documents.
ODA/ODIF	ISO 8613 FOD 26	EN 41509 EN 41515		Acronym for *Open Document Architecture and Interchange Format*. It is the interchange standard for business documents. ODA defines an architecture that describes typical business documents in terms of their content and two hierarchical structures: a logical structure and a layout structure. Documents can be interchanged in formatted form (using the layout structure only), in processable form (using the logical structure only) or in formatted-processable form (by interchanging both formats). Both formatting and structural information can be composed of two sets of information: generic data and document specific instructions.
PDF	Proprietary standard developed by Adobe Systems Inc.			Abbreviation for *Portable Document Format*. It allows pre-formatted pages to be interchanged over a network. Key features in PDF are a set of hotlinks, thumbnail icons of pages, chapter outlines and page annotations.

Figure 5: Table of Selected Information Technology Standards of Relevance to Record Keeping (cont.)

Name	International standard or profile	European standard or profile	Other specification	Description
Structured Text/Document Interchange Standards (continued)				
PostScript	Proprietary standard developed by Adobe Systems Inc.			PostScript is a general-purpose programming language with powerful built-in graphics. It is also a page-description language that includes programming features and can act as an interactive system for controlling displays and printers.
RTF	Proprietary standard developed by Microsoft Corporation			Abbreviation for *Rich Text Format*. The RTF specification details the ASCII representation required for most of the low-level functions supported by Microsoft's Word word-processing package. It was originally developed to allow Microsoft Word files to be interchanged between different platforms and has now become one of the most commonly supported interchange formats between proprietary word-processing systems.
SDIF	ISO/IEC 9069			
SGML	ISO/IEC 8879: 1986	EN 28879		Abbreviation of *Standard Generalised Markup Language*, a system for organising and tagging elements of a document. It does not specify any particular formatting; rather, it specifies the rules for tagging elements. These tags can then be interpreted to format elements in different ways. SGML is used widely to manage large documents that are subject to frequent revisions and need to be printed in different formats.

Figure 5: Table of Selected Information Technology Standards of Relevance to Record Keeping (cont.)

Name	International standard or profile	European standard or profile	Other specification	Description
Structured Text/Document Interchange Standards (continued)				
SPDL	ISO/IEC 10180: 1995			Abbreviation for *Standard Page Description Language*. SPDL has its origins in the desire to provide a complete set of standard interchange languages for all stages of the traditional publishing process. SGML provides the language used in interchange at the authoring and editorial stages. DSSSL provides the language for specifying to the typesetter (formatter) how the document is to be composed and presented. SPDL provides the language that enables the style and layout decisions of the formatter to be realised on a variety of imaging surfaces (screen, paper, film, etc).
Standard DTD	ISO/IEC 12083			Short for *Document Type Definition*, a type of file associated with SGML and XML documents that defines how the markup tags should be interpreted by the application presenting the document.
TCP/IP			IETF RFC 791 / 793 / 1883	Abbreviation for *Transmission Control Protocol/Internet Protocol*. TCP/IP is intended for use as a highly reliable host-to-host protocol between host in packet-switched computer communication networks, and in interconnected system of such networks.
TEI	Sponsored by the Association for Computers and the Humanities			Short for *Text Encoding Initiative*. A major international initiative within the academic community to provide a standard set of SGML tag definitions that can be used to represent all kinds of electronic information.

Figure 5: Table of Selected Information Technology Standards of Relevance to Record Keeping (cont.)

Name	International standard or profile	European standard or profile	Other specification	Description
Structured Text/Document Interchange Standards (continued)				
UN/EDIFACT	ISO/IEC 9735: 1998	EN 29735		Short for *United Nations Electronic Data Interchange for Administration, Commerce and Transport*. UN/EDIFACT is a set of internationally agreed standards, directories and guidelines for electronic interchange of structured data between computerised information systems.
XML			In draft with W3C and IETF	Short for *eXtensible Markup Language*, a new specification being developed by the W3C. XML is a pared-down version of SGML, designed especially for Web documents. Whether XML eventually supplants HTML as the standard Web formatting specification depends a lot on whether it is supported by future Web browsers. XML supports links that point to multiple documents, as opposed to HTML links, which can reference just one destination each.
Archival Description/Information Retrieval				
EAD	Maintained in the Network Development and MARC Standards Office of the Library of Congress in partnership with the Society of American Archivists			Short for *Encoded Archival Description*. These standards define principles and criteria for designing, developing, and maintaining an encoding scheme for archive and library finding aids. The standard accommodates registers and inventories of any length describing the full range of archival holdings, including textual and electronic documents, visual materials and sound recordings.

Figure 5: Table of Selected Information Technology Standards of Relevance to Record Keeping (cont.)

Name	International standard or profile	European standard or profile	Other specification	Description
Archival Description/Information Retrieval				
ISAAR			International Council on Archives (ICA)	Short for *International Standard Archival Authority Record* for Corporate Bodies, Persons and Families. ISAAR provides general rules for the establishment of archival authority records that describe the corporate bodies, persons and families that may be named as creators in descriptions of archival documents.
ISAD (G)			ICA	Abbreviation for *International Standard Archival Description*. ISAD is intended to be broadly applicable to descriptions of archives regardless of the nature or extent of the unit of description.
Z39.58			ANSI/NISO Z39.508-1992	This standard specifies the vocabulary, syntax and operational meaning of 19 basic command terms for use with on-line interactive information retrieval systems. It is intended to simplify the use of on-line information retrieval systems by presenting a single, uniform command language.
Database Query				
SQL	ISO/IEC 9075			Abbreviation of *Structured Query Language*. It is a standardised query language[6] for requesting information from a database.

Figure 5: Table of Selected Information Technology Standards of Relevance to Record Keeping (cont.)

[6] A query language is a specialised language for requesting information from a database. For example, the query (SELECT ALL WHERE age > 30 AND name = "Smith") requests all records in which the Name-field is "Smith" and the Age field has a value greater than 30.

Name	International standard or profile	European standard or profile	Other specification	Description
Database Query (continued)				
ISAM				Abbreviation for *Indexed Sequential Access Method*, a method for managing how a computer accesses records and files stored on a hard disk. While storing data sequentially[7], ISAM provides direct access to specific records through an index.
Encryption[8] Algorithms[9]				
DAS	ISO 8273			
DES			ANSI X.3.92	Short for *Data Encryption Standard*, a popular symmetric-key encryption method developed in 1975 and standardised by ANSI in 1981 . It uses a 56-bit key[10] and is illegal to export Out of the US or Canada is BXA (US Bureau of Export Administration) requirements are not met.

Figure 5: Table of Selected Information Technology Standards of Relevance to Record Keeping (cont.)

[7] Sequential access refers to reading or writing data records in sequential order, that is, one record after the other. To read record 10, you would first need to read records 1 through 9. This differs from random access in which you can read and write records in any order.

[8] Encryption is the translation of data into a secret code. To read an encrypted file, you must have access to a secret key or password that enables you to decrypt it. Unencrypted data is called plain text; encrypted data is referred to as cipher text. There are two types of encryption: asymmetric (public-key encryption) and symmetric. Public-key cryptology utilises two keys – a public key to encrypt messages and a private key decrypt them. Public-key encryption can be distributed in a non-secure way and the private key is never transmitted. Symmetric-key cryptography is an encryption system in which the sender and receiver of a message share a single, common key that is used to encrypt and decrypt the message. The drawback is that the two parties must somehow exchange the key in a secure way.

[9] An algorithm is a formula or set of steps for solving a particular problem. To be an algorithm, a set of rules must be unambiguous and have a clear stopping point. Algorithms are used every day. For example, a recipe for baking a cake is an algorithm. Most computer programs consist of algorithms.

[10] A password or table needed to decipher encoded data.

Name	International standard or profile	European standard or profile	Other specification	Description
Encryption Algorithms (continued)				
DSS/DSA			US Dept. of Commerce & NIST FIPS PUB 186	Short for *Digital Signature Standard/Digital Signature Algorithm*. It is used to generate a digital signature. Digital signatures are used to detect unauthorised modifications to data and to authenticate the identify of the signatory.
PKCS	ISO/IEC 11770-1: 1996			Abbreviation for *Public Key Cryptography Standards*. PKCS includes both algorithm-specific and algorithm-independent implementation standards.
RSA	RSA has become the de facto standard[11] for industrial-strength encryption, especially for data sent over the Internet.			RSA is a public-key encryption technology developed by RSA Data Security, Inc. The acronym standards for Rivest, Shamir and Adelman, the inventors of the technique. The RSA algorithm is based on the fact that there is no efficient way to factor very large numbers. Deducing an RSA key requires an extraordinary amount of computer processing power and time.

Figure 5: Table of Selected Information Technology Standards of Relevance to Record Keeping (cont.)

[11] A de facto standard is a format, language or protocol that has become a standard not because it has been approved by a standards organisation but because it is widely used and recognised by the industry as being standard.

SUMMARY

This lesson has explored the main technological trends that have led to the creation of electronic records, including mainframes, personal computers and networks. It has also examined the main characteristics of electronic records, the differences between data and records and considered the various record format types.

It has included a chart outlining various national and international standards of interest to record keepers managing electronic records.

STUDY QUESTIONS

1. What is ‘metadata’?

2. Name five types of metadata.

3. Suggest two ways of collecting metadata.

4. Why is electronic records management a management issue?

5. What is a standard?

6. In what circumstances is it likely that records professionals encounter IT systems standards?

7. What are the main constraints that may limit the standards for electronic record formats?

ACTIVITIES: COMMENTS

Activities 7- 11

All the activities in this module are designed to help you examine your institution's existing electronic records management issues in relation to the suggestions and recommendations offered here. You are encouraged to examine your findings for each activity and compare them with the information provided throughout this module.

LESSON 3

MANAGEMENT ISSUES AND ELECTRONIC RECORDS

Many people within an organisation or government have a stake in the protection of records, whether paper based or electronic. The support of these stakeholders is critical to establishing a credible electronic records programme. Their participation can help to ensure that the requirements for managing electronic records are met throughout the organisation and that important public records are not lost. Above all, these stakeholders can help to ensure that the electronic records programme is endorsed across the organisation or government, that sufficient resources are made available to support the programme and that ongoing support is provided to ensure the sustainability of the programme through time.

The need to keep electronic records for long periods makes it necessary for record-keeping requirements to be addressed at the planning and design stage of systems development, that is, before the records are created. However, more often than not record keepers are not informed of the development of new systems. There is a need to raise the profile of records management within the organisation to ensure that the records perspective is taken into consideration when new systems are designed. Records and archives professionals need to understand the management issues involved with electronic records management so that they may alert senior managers to the importance of incorporating record keeping in electronic records systems.

The lesson begins by examining some of the key management issues that that records managers and archivists need to address and need to articulate when communicating with managers about electronic records issues. It goes on to consider the main stakeholders that need to be monitored and then describes the key issue sin establishing an institutional framework for electronic records management.

MANAGEMENT ISSUES

Record keeping is becoming more complex.

Computerisation makes the nature of record keeping more complex than in a paper-based environment. Many automated records systems contain information in a variety of formats saved on different storage media. This may lead to problems in accessing information electronically over time. Certain critical issues must be understood before an organisation moves from paper-based records to records in an electronic system.

- Electronic records may be needed for longer than the expected life of the systems that created them; it is dangerous to rely solely on electronic information unless there is a fully developed electronic records management capacity.
- Managing information electronically is not just a technology issue; it is also a policy issue, a business issue and a training issue.
- Reliable information, not technology, is essential to accountability.
- Collaboration between all the stakeholders is essential for the successful implementation of an integrated system.
- There is a significant difference between using a computer to produce paper records more efficiently and relying upon the computer to keep the official record electronically.
- The storage media is fragile and changes with time.
- It is essential to capture enough contextual and structural information to ensure that the record can be understood when retrieved in future.
- Changes in technology mean that records generated on computers ten years ago may not be accessible today. Records must be migrated through time and through technological changes, but there are significant costs involved with such processes.
- It is essential to assign responsibility for managing the integrity of electronic records.

The long-term accessibility of an electronic record is dependent upon technology that has yet to be invented and is therefore unknown. There is, therefore, an element of uncertainty and risk in the creation and use of electronic records.

Automating Processes versus the Electronic Office

Many organisations will choose to computerise business functions because of the significant efficiency gains automation can bring. Senior managers need to understand that there is an important difference between (1) using computers to automate a process, keeping the resulting records of the transactions as paper printouts, and (2) keeping the records only in electronic formats. The distinction may appear trivial, but the long-term risks involved in keeping electronic records are high and the costs are still uncertain.

Relying on electronic records may be a high-risk strategy.

Using electronic records to document decisions or transactions needed for long-term use is a high-risk strategy. There are significant difficulties in protecting the availability of electronically generated information. Typically, problems arise in the following areas.

- Maintaining records: Electronic records are dependent upon the computer environment in which they were created.
- Managing access to and use of records: even though many current systems have password controls and audit trails, these controls are widely circumvented.
- Version control: computer records can be easily altered or amended and the changes may not be readily apparent.

Several key factors affect the management of electronic records over time. These factors include the following.

High Costs

When records must be kept for ten years or longer, the problems of technological obsolescence are likely to become acute. Creating and maintaining an electronic records programme is expensive compared to an equivalent programme for a paper system. Although electronic records require much less storage space than paper records, these savings are outweighed by other considerations. In virtually every other aspect, the cost of keeping electronic records is higher because they require dedicated computer equipment, stringent environmental controls and expensive specialist IT staff. Moreover, because no one knows what technology future computers may use, it is not possible to predict the costs or difficulties of computer systems.

Need to Protect Evidence

Managers must ensure that the organisation document activities adequately and that records are available for legal and audit purposes.

The principles relating to audit evidence do not change because an audit is being carried out in a computer environment. Computer records in the form of data on magnetic disks or optical disks must still provide the auditor with audit assurance.

There are few precedents for the admissibility of computer records in a court of law. Where computer evidence has been submitted in legal cases, the courts have taken into account expert evidence on the effectiveness of the IT control environment before assessing the reliability of the computer data.

Records of computerised transactions or electronic images of documents may be inadmissible as legal evidence unless controls can be shown to be so strong as to remove reasonable doubt about the authenticity and integrity of the data. Some of these controls are recorded on paper. It is therefore essential that both the electronic records and the paper records that document the control environment are each managed properly.

The Contribution of Electronic Records Management to Electronic Government

'Electronic government' is a new trend. Many governments around the world are developing systems to conduct the main business of government electronically, with the evidence of transactions stored and retrieved on computers. The aim of electronic government is to move to a paperless environment, with the only record being the electronic record.

> *Electronic records in an electronic government must be managed in a structured and comprehensive manner.*

If electronic records in an electronic government are not managed in a structured and comprehensive manner, the organisation is exposed to risk, including

- the uncontrolled accumulation of records, documents and data
- the inadvertent destruction of records, documents and data
- the unauthorised tampering with records and documents
- the absence of systems documentation and metadata.

These risks can lead to serious consequences for the electronic government, including

- an increased risk of wholesale, unsystematic and possibly illegal destruction of records
- the loss of valuable records and archives
- the increased risk of security breaches
- the unauthorised alteration or deletion of records (loss of evidence)
- public embarrassment, for example if the government were unable to produce a key record in court because it was maintained using obsolete technology
- unnecessary delays or breakdowns in the business process
- a lack of public accountability
- system paralysis or, at the very least, difficulties in accessing information
- additional costs associated with the purchase of additional computer storage.

An electronic records management programme will minimise these risks and therefore should be an integral component in a government's strategy for an electronic government.

Activity 12

Every organisation has different management priorities. What is the impact of electronic records on your organisation? List the issues in order of priority. Can you think of any other relevant management issues that have not been discussed in the lesson? What are the areas of risk associated with electronic records in your organisation?

STAKEHOLDERS

Stakeholder: Any person, group or other organisation that has a claim on an organisation's attention, resources or output or is affected by that output.

Stakeholders have an interest in the establishment and maintenance of polices, systems and practices for the effective management of electronic records. Some may also have responsibility for designing and implementing all or some of the policies, systems and practices themselves.

The support of stakeholders is critical to establishing a credible electronic records programme.

Within the government, three types of organisations have a major interest in the management of electronic records: the archival institution, government ministries or departments and the external auditor (sometimes called the supreme auditor or auditor general). Other offices and individuals also have a stake in the effective management of electronic records. Below is a description of many of the stakeholders involved with electronic records.

For more information on stakeholders, see Analysing Business Systems.

The Public

The public can be directly affected by the computerisation of government or business services.

The public has an interest in electronic records, especially when the computerisation of services affects them directly. For example, the computerisation of health services affects all members of the public. Members of the public expect that their medical records are accurate, readily available when needed and handled as confidential records.

In many countries, legislation to protect the creation and use of data (sometimes called data protection acts) arises from the public's concern over the use or misuse of computerised records about individual citizens. The management of electronic records has the potential to be a sensitive public issue. Generally, members of the public are concerned that they should be able to

- have confidence that government records containing personal information are protected from unauthorised access or disclosure and inadvertent loss or destruction
- exercise rights of access to information in government records
- have proof, through records, that their rights and privileges are being respected
- trust the information they obtain from government records in terms of its accuracy, integrity and relevance
- have confidence that historically significant records will be preserved for public use in the archival institution.

Elected Officials

Elected officials rely on records to help them monitor activities and know what actions to take.

Elected officials have a stake in the management of electronic records on behalf of the public. They rely on government records to

- monitor the extent to which government is able to account for its decisions and its programme activities and services
- monitor and act upon the views of constituents regarding the quality of government programmes and services and the extent to which citizens' rights have been protected.

If they are to fulfil their responsibilities, elected representatives need to consider the management of electronic records while scrutinising new legislation and participating in committees overseeing or reviewing programmes and activities.

Government Agencies

Most government ministries or departments are in the 'information business'. In other words, many of their programmes and services involve the creation, exchange and dissemination of information, a growing proportion of which is being created in electronic form. Ministries have a vested interest in ensuring that the records containing such information are accurate and complete and are retained properly for as long as they are required.

Government agencies increasingly rely on electronic records for day-to-day operations.

Individual government ministries need records to

- make decisions about the delivery of services to the public
- provide evidence of decisions made or activities carried out in order to account to the public and to elected officials
- ensure the continuity and integrity of government.

Government departments also have a responsibility to protect to the collective memory of society. The records they create demonstrate citizens' rights and entitlements, explain how people were governed and contribute to a sense of national identity. When those records are in electronic form, there is a danger they may be lost, and the government has a responsibility to take action to preserve them.

The heads of agencies and their senior managers are responsible for ensuring the effective management of all records, including those in electronic form. At a broad level, they carry out their responsibilities for electronic records by

- assigning responsibility within their agencies to manage all electronic and other records as part of a planned process
- ensuring that all staff are aware of their responsibilities for documenting their activities and protecting the resulting records
- integrating the management of electronic records with other records and information resources management programmes
- incorporating electronic records management objectives, responsibilities and authorities into general agency operations.

Normally, senior managers should expect to receive technical advice from the records and archives institution on how to discharge these responsibilities. At a more specific level, managers must ensure that their staff understand the relationship between their

records work and the work of the archival institution. Staff must also understand the importance of an efficient and effective electronic records programme.

The National Archives

The National Archives (or other archival institution in other jurisdictions) has a responsibility to act on behalf of society to ensure the preservation and continued accessibility of the collective memory of the nation. This responsibility should extend to the protection of all public records, irrespective of medium. The National Archives may also support government ministries in the management of the records they require for programme delivery and accountability.

Electronic records have forced archival institutions to become involved in the design of record systems, rather than waiting until the conclusion of the records life cycle before appraising and acquiring archival records, as they did in the past. The interests of the National Archives and the interests of records-creating organisations should normally be addressed simultaneously throughout the conception, creation and maintenance stages of the records life cycle.

> *The archival institution acts on behalf of society to preserve and make available all records, including electronic records.*

Archival institutions carry out these responsibilities by

- advising government and others on public record issues and related policy matters
- facilitating the establishment of policies, procedures, systems, standards and practices designed to assist records creators to create and retain authentic, reliable records that can be preserved over time
- becoming involved in the entire records life cycle (conception, creation, maintenance) to ensure the creation and retention of records that are authentic, reliable and preservable
- managing the processes for appraising records, identifying those with archival value and ensuring their intellectual control through time
- establishing preservation and access procedures to ensure that archives remain available, accessible and understandable.

The Records Manager

Records managers (sometimes known as departmental records officers) are the authoritative points of contact in the ministry or department for records management, including electronic records management. In some countries, records managers form part of a records cadre administered by the National Archives. In other countries, records managers are under the line management of their ministries but receive

guidance from the National Archives.

Records managers are responsible for the day-to-day care of ministry or department records.

Records managers understand the record-keeping requirements of their own ministry and know how to incorporate these requirements into a framework of policies, standards, systems, practices and services within the ministry. They also provide an important link between the ministry and the archival institution. They carry out this role by

- establishing policies and procedures that address records management requirements
- designing, implementing and maintaining a records management programme that accounts for electronic records
- defining record-keeping requirements for electronic records creation, capture, preservation and access
- raising awareness among ministry staff of their responsibilities for proper record keeping
- developing and maintaining up-to-date documentation about all electronic records, in order to ensure their continued accessibility and comprehensibility
- working with the National Archives to establish standards and time frames for the retention of electronic records
- implementing disposal schedules as developed in conjunction with the National Archives
- implementing methods to protect security-classified, sensitive and proprietary records stored and used electronically.

The Civil Servant

Civil servants are the records creators, and they are ultimately accountable for ensuring that records of their activities are created and captured.

Civil servants are accountable for ensuring their activities are documented.

Civil servants carry out this role by

- ensuring that evidence of their activities (including the decision-making process) are captured and maintained as records by adhering to guidelines and procedures

- advising records managers and archivists of the nature of their work and the resulting records, in order to help inform decisions regarding the value of the records.

The Information Technology Manager

Information technology managers and their staff are responsible for designing, implementing and maintaining systems that should conform to requirements for the creation, capture and maintenance of records.

They are the experts within the ministry who can advise on how technology can be used to support record-keeping requirements.

> *Information technology managers are responsible for designing, implementing and maintaining systems.*

Information technology managers should carry out this role by

- incorporating record-keeping policies, practices and requirements into information systems policies and practices
- ensuring the continuing physical management of records according to disposal schedules
- managing the migration of electronic records through changes in software, hardware and storage media
- establishing, with the records manager, standards, procedures and controls for managing electronic records
- implementing standards, procedures and controls on the exchange or sharing of information between departments across a network
- notifying records managers when new systems, or enhancements to existing systems, are planned, especially where these affect electronic records
- advising records managers on a regular basis of new technological solutions concerning the preservation of and continued access to electronic records
- ensuring the effective retention and disposal of electronic records, including their transfer to an archival institution, in accordance with approved standards and procedures.

The Manager of Legal Services

Legal services staff can provide advice to senior management, records managers and others across the ministry on the record-keeping implications of various laws and policies. Their legal opinions will help to sanction proposed records management

policies as these might relate to the provisions of various laws. For instance, while the records manager would be responsible for developing records retention standards, the legal services staff would be responsible for confirming the relationship of these standards to relevant laws.

> *Legal services staff advise on the record-keeping implications of various laws and policies.*

Legal services staff can carry out this role by

- working with records managers to develop legal opinions on the implications of various laws and policies on records management
- incorporating record-keeping considerations (as provided by records managers) into laws and policies relevant to the conduct of the agency's programmes and services
- confirming the disposal strategy for records in both electronic and paper form
- providing advice on legal issues related to records preservation and access.

The Internal Auditor

The role of internal auditors can vary enormously from one country to another. Increasingly, internal auditors are taking an active role in ensuring that departments adhere to internal standards of best practice. In this context, the role of an internal audit should be to ensure that standards and practices for the management of electronic records are being observed across the organisation and that the objectives of the electronic record-keeping programme are being achieved.

> *An internal auditor seeks to ensure that departments adhere to internal standards of best practice.*

The contribution of auditors is twofold. On the one hand, they can measure compliance with electronic record-keeping standards. On the other hand, they can measure the effectiveness of the electronic records programme itself. They can achieve this by

- ensuring compliance with applicable government-wide and ministry-specific record-keeping policies, procedures and standards
- reviewing electronic records systems periodically to ensure that they comply with established agency procedures, standards and policies
- conducting reviews of the state of record keeping across the ministry in order to assist decision makers with plans to implement or revise record-keeping policies,

systems and practices.

The Security Officer

Security officers can play an important role in ensuring that electronic records are protected from unwarranted access and destruction. By setting security standards and measuring compliance, they also help to ensure that sensitive or confidential electronic records are protected.

Security officers set and maintain security standards.

They should carry out this role, in co-operation with the records manager, by

- incorporating record-keeping considerations into the policies, standards and practices governing the security and integrity of information systems
- conducting reviews of the security of information systems in relation to record-keeping standards
- advising records managers on recent developments in the security field that could affect the management of electronic records, especially those that are security classified
- working with records managers and IT managers to develop emergency plans that protect electronic records
- incorporating record-keeping considerations into security awareness programmes.

The External Auditor

External auditors (also known as the Auditor General in governments influenced by British administrative systems) should be concerned to ensure that records produced by electronic information systems provide reliable audit evidence which they can use when forming an opinion about the state of government finances or when conducting value-for-money audits.

The principles relating to audit evidence do not change because an audit is being carried out in a computer environment. External auditors need to be concerned that computer records still provide the auditor with quality information.

External auditors want to ensure that electronic records provide quality information.

Where computer evidence has been submitted in legal cases, the courts have taken into account expert evidence on the effectiveness of the IT control environment before

assessing the reliability of the computer data. Computerised transactions or images of documents may be inadmissible as legal evidence unless controls can be shown to be so strong that the authenticity and integrity of the data is not questioned.

External auditors are particularly concerned to ensure that these controls are adequate and that procedures for disaster recovery and backup are credible.

Manufacturers of Computer Software

Some software vendors are so influential in determining what computer applications are readily available that they may be considered de facto stakeholders. The records and archives profession must work to articulate the need for computer software that is capable of preserving electronic records and making them accessible for as long as they are needed.

Some software vendors can strongly influence the nature and availability of computer applications.

Activity 13

Who are the stakeholders that have in interest in your organisation's electronic records? What is their interest? Why do you need to understand the different stakeholders perspectives?

ESTABLISHING AN INSTITUTIONAL FRAMEWORK

The needs and concerns of the stakeholders drive government policy on electronic records, but policy cannot be put into effect without a framework. The framework can be visualised as a pyramid with policy at the apex and training, services and support at the base, as shown in Figure 6 below. The policy cannot succeed without all the other elements that support each other and form a coherent whole.

Figure 6: Framework for Records Management

Source: State Records Authority of New South Wales, 'The Recordkeeping Regime', Government Recordkeeping Manual, 1999.

Policy

A policy is a plan or course of action designed to influence and determine decisions, actions and other matters; it is a guiding principle or procedure. Policy is the core direction chosen by an organisation. The policy chosen will determine changes to legislation, which in turn will determine standards, codes of practice and so on.

The government's policy for the management of electronic records should be formulated by the National Archives in consultation with the main stakeholders. The policy should take into account other government policies. For example, if the government has decided to automate the administration of particular services for reasons of efficiency, this decision will inevitably lead to the creation of large volumes of electronic records. The policy for managing electronic records must support rather than oppose these objectives.

There is no set form that an electronic records policy must follow. Every government or organisation must establish its own policies based on its own needs and activities. However, the following statements (taken from the Archives Authority of New South Wales) provide an example of the useful core principles that guide decisions and actions regarding electronic records management.

- Agencies' electronic records are official records.
- Electronic record keeping should comply with recognised best practice.
- Electronic record-keeping functions should be built into business processes and tools.
- Business conducted by electronic means should be adequately documented to meet identified record-keeping requirements.
- Electronic records should be maintained in electronic form.
- Electronic records should be maintained in reliable record-keeping systems.
- Electronic records should be managed effectively as part of a comprehensive records management programme.
- Maintaining and providing access to electronic records over time is a shared responsibility.

In order to establish effective electronic records policies, several questions need to be answered.

- What is the proper role of the archival institution?
- Should the archival institution be involved in all aspects of the records life cycle or only at the end?
- How will the archival institution afford any higher costs?

The government's policy for the management of electronic records should be formulated by the National Archives in consultation with the main stakeholders.

Custodial versus Non-custodial Models

These questions have sparked a debate between proponents of two different models of the role of the archival institution in the management of electronic records: the custodial and non-custodial models.

The custodial model states that the primary role of the archival institution should continue to be to provide safe custody of records of permanent or continuing value. The non-custodial model proposes that the archival institution does not actually need to have custody of archival records to fulfil its mandate.

In the world of electronic records, the physical location of the record is much less important than it is in a paper-based environment. The public can be granted access to the electronic record via a dedicated network or the Internet. Thus it has been proposed by proponents of the non-custodial model that the archival institution should concentrate on setting the rules. It should oversee policies about how creating agencies design and administer electronic record-keeping systems and it should produce finding aids that make the records accessible to researchers and other members of the public.

Both the custodial and the non-custodial approaches have their advantages and disadvantages, as summarised in the figure below.

The role of the archival institution as a custodian and its role as the body that sets the rules for managing government records need not be mutually exclusive. An archival institution can perform both roles to a greater or lesser extent, and many institutions around the world already undertake both tasks. The main issue is where the emphasis should lie when managing electronic records.

In the custodial model states, the primary role of the archival institution is provide safe custody of records of permanent or continuing value. In the non-custodial model, the archival institution does not need to have custody of archival records to fulfil its mandate.

Activity 14

Examine this discussion of custodial versus non-custodial management of electronic records. Which model do you think would work best in your organisation? Why?

Custodial Model

Advantages

There is a proven and rich archival methodology.

The archival institution is fully in control of the records.

Archivists have expertise in the management of the record; this expertise is not replicated elsewhere in government.

Disadvantages

The archival institution has neither the budget nor the information technology expertise to maintain electronic records over time for the whole government.

Archivists need to be involved in the design stage of electronic records systems. This is done more efficiently by setting rules and standards than by becoming involved in every computerisation project in government.

Non-custodial Model

Advantages

The high costs of maintaining and accessing records of enduring value are spread across government. It may be easier to cover the costs of electronic records management in departmental budgets.

The archival institution is able to devote its resources to key areas such as developing standards and providing advice on the design of new systems.

Disadvantages

The archivist surrenders 'hands on' control of the records.

The originating agencies may not be interested in maintaining records after they cease to be of administrative use.

The originating agencies often do not want to take on a role that they were happy to leave in the hands of the archival institution.

Most agencies are seeking funds to carry out their primary objectives and they may be unwilling to devote scarce resources to secondary objectives, however desirable. For example, the primary business of the Ministry of Education is education, not keeping records for posterity.

Even where public records legislation puts the onus on originating departments to preserve records of historical value, governments may be reluctant to prosecute even persistent and flagrant offenders. In the past, archival institutions have tended to rely on persuasion rather than coercion.

Agencies may not have the expertise to preserve records permanently.

Figure 7: Custodial versus Non-custodial Model

Legislation

Legislation describes the institution's powers and duties.

Most National Archives are established by legislation. Other archival institutions abide by similar policies or directives. In order to protect electronic records, archival legislation may need to be amended to

- broaden the definition of official records to include electronic records
- empower the National Archives to set rules for electronic records management
- empower the National Archives to create a specialised electronic records management unit and define its powers and responsibilities
- require creating agencies to allocate resources to maintain electronic records of permanent value (this point is important for implementing a non-custodial policy).

The legislation may either need to take into account, or require changes in, other legislation that affect the creation and management of records in the public sector. The list of legislation that may be affected can be lengthy; it may include

- freedom of information legislation
- data protection legislation
- privacy legislation
- finance and audit legislation.

The general issue of legal admissibility of electronic records will also have to be taken into account, including rules of evidence. The National Archives will have to work closely with government lawyers.

Activity 15

Does the National Archives Act in your country define a record? Does the definition take into consideration electronic records? What other types of legislation in your country could be affected by electronic records?

Standards

As noted earlier in this module, standards are measurable rules that can be subject to auditing or review. Technical standards are particularly important because they provide the key to migrating electronic records into new media and environments.

Standards are measurable rules.

Although the National Archives or other archival institution cannot expect to set technical standards for computerised systems unilaterally, the institution needs to be able to contribute to the process. It will therefore need to develop and maintain a knowledge of which technical standards best meet the requirement to preserve and maintain access to electronic records over time.

The International Standards Organisation is developing a standard for records management that is likely to be of particular value in future. The standard will articulate the main principles of records management and provide an objective point of reference to those designing, implementing or managing record-keeping systems. Such a standard will be of use to those working with systems designers on new IT systems.

For more information on the International Standards Organisation, see Lesson 6.

Codes of Best Practice

Unlike standards, codes of best practice are not mandatory. They act as a benchmark against which an organisation can measure its practices and systems. Codes of best practice are not normally subject to a formal audit regime, but failure to comply with them would leave an agency open to criticism.

Guidelines and Manuals

Guidelines and manuals provide guidance in support of the standards and codes of best practice. An archival institution will normally develop a range of guidelines and manuals in partnership with the audit office, IT managers, security officers and others. For example, guidelines might cover the management of electronic records on the individual staff member's 'desk top' or personal computer. Such guidelines might include explanations of how best to create records, manage directories and files and use records efficiently (see Appendix 1). However, such guidance addresses primarily a management issue. Records staff should contribute to developing them, but ultimately it is the responsibility of the department or agency's managers to decide which working practices are appropriate.

Training, Services and Support

Archival institutions need to provide further guidance and assistance to agencies and their staff on practical application. This should include regular training courses and customised training services as well as consulting services to solve particular

problems in the agencies themselves.

Publicity/Outreach

Even a well-designed records management programme will have no effect if no one knows about it. The archival institution must utilise all available means to publicise the electronic records management policy and the framework of legislation, standards, codes of best practice, guidelines and manuals, training and support. For example, the archival institution could publicise good records management practice on posters, articles in staff magazines, workshops and even articles in the press or interviews on television or radio.

Standards, codes, guidelines, training programmes and publicity mechanisms are all part of a successful institutional framework.

Activity 16

Based on your reading of this module, write down all the risks you think an organisation might face when electronic records are created and used.

APPENDIX 1

GUIDANCE FOR THE CREATION AND USE OF ELECTRONIC RECORDS

It is important to make the distinction between record keeping and records management. The guidance below follows addresses record-keeping issues. This information is only intended as an introduction. Readers are directed to the resources information in Lesson 6 for references to publications offering more detailed guidance. Several archival institutions around the world, for instance the National Archives of Canada and the State Records Authority of New South Wales, have developed such guides.

If an office plans to maintain records solely in electronic form, without printing paper, it will be essential to establish a formal, office-wide system for creating, filing, labelling and naming electronic records. A formal system will also be advantageous if there is a high turnover of personnel, or if information is shared or routed electronically. In addition, a formal system will facilitate retrieval, help to ensure proper security and protection of the documents. It will even help facilitate retention and disposal.

SAVING DOCUMENTS

To ensure that electronic information is available, understandable and usable, it is necessary to apply a structure to the way it is stored. Organisations can offer guidance on the co-ordinated management of documents in shared directories and files. It is helpful to explain that the structure of the activity can provide a model for the storage structure: for example, the function of land registration may be identified in the name of the electronic file, so that people can link the record to the function it reflects. Suggestions can also be made about the protection and disposal of electronic documents. Often guidelines also include examples of naming conventions for directories, sub-directories and documents.

When developing the standard system, first consider the operating system and its particular constraints. Most operating systems provide for structured names for directories, sub-directories and files. The guidelines draw on examples consistent with a Microsoft Windows 98 environment. The same principles presented can be adapted and applied to other operating environments.

If information is stored on paper, minimal identifying information should be sufficient. For example, it may be enough to record the computer directory and

electronic file name in a line of text that shows up on the printed document: C:/Projects/Land Registration/regions.doc.

> For more information on the concepts of computer operations and the components of computers, see *Understanding Computers: An Overview for Records and Archives Staff.*

STRUCTURING THE DIRECTORY

The first activity should be to structure the directory, including the directory and sub-directory levels. The directory system can be compared to a tree, with directories and sub-directories branching off from the main, or root directory, resulting in a hierarchical structure.

Directories should be structured to suit the needs of the department. They can be structured in many different ways (such as by user names, dates, organisational units, type of document and so on). However, organisations should base the structure on the department's functions, programmes and activities to ensure that the documents are organised according to the way the department, and consequently the employee, works (this approach is discussed in depth later in the guidelines). The controlled vocabulary used by a registry can serve as the basis for naming directories and files.

Documents can then be stored as files under the appropriate directories and sub-directories. Directory names do not need to be repeated in the file names.

The following principles should be kept in mind when designing the structure for electronic directories.

- The structure should be simple and logical.
- The arrangement of the directories should proceed from the general to the specific. In other words from activity to a sub-activity to tasks and sub-tasks. For example, proceed from FINANCIAL MANAGEMENT to ACCOUNTS ADMINISTRATION to PAYMENTS
- Clear and consistent terminology should be used to when naming directories and files. This will permit the originating users as well as others to quickly identify and retrieve documents.

If an organisation chooses to base its directory structures on its programmes and activities, these should follow a hierarchical arrangement. This can be easily adapted to the directory/sub-directory hierarchy. Existing subject file classification systems for managing paper files are often based on this structure. If this is the case, this will provide a good means of linking the paper and electronic parts of systems.

> *For information on controlled vocabularies and file classification systems, see* Organising and Controlling Current Records.

NAMING CONVENTIONS

Departments should set up standard conventions for naming the directories and the files stored under the directories. There are many benefits to establishing conventions for directory and file names.

- Documents can be easily and quickly located in personal or shared workspace, on diskettes, on backup systems or in off-site storage.
- Since adopting naming conventions allows employees to recognise documents that others may have filed, they can be reused, reducing the risk of duplicating someone else's work.
- The file name can be used to distinguish final versions from drafts.

It is best to use standard abbreviations whenever possible.

- The records manager can help identify standard abbreviations already in use in the department.
- The government telephone directory often contain abbreviations for names of departments and agencies.
- The post office often provides abbreviations for regions.
- Department-wide conventions for names of individuals, locations and so on can be developed and disseminated.

A problem arises when users exchange documents on diskettes or by electronic mail. Documents with the same names cannot be stored in the same directory. Therefore, users need to save documents with the same name in separate directories.

DOCUMENT VERSION CONTROLS

The degree to which a particular document can be revised before being filed as a record should be a matter for corporate procedures and user guidance. After a document reaches its final version as a record, editing should be prevented as far as possible.

New and related versions of the record can be created by making and editing a copy, and saving this as a new record. For example, it may be appropriate to retain various version of a document as it passes through draft to finalisation.

The record-keeping system should be capable of linking together versions of the same record, either automatically by the system or through the use of strict naming conventions, to ensure that the latest version is retrieved by a user search. The user should be aware that earlier versions of the record exist in the system.

BACKING-UP

Dependable backup procedures protect electronic documents from loss and corruption. Most networked environments provide for effective backup procedures. Individual hard drives on PCs are not backed up via the regular network backup procedures and must be backed up regularly by users onto diskettes.

DISKETTES

Diskettes may be used to store documents with a very low reference rate or to back up individual hard drives. In addition, they are used to transport documents in the absence of network access.

The directory structure of diskettes should be the same as the directory structure used in other electronic workspace. Since diskettes have limited storage space, separate diskettes may be used for each directory or sub-directory. Alternatively, diskettes can be used to store documents belonging to one user or work group, or documents on the same subject or with the same deletion date. They can then be filed by directory or sub-directory name, user name, organisational unit, subject grouping, deletion date and so on. A printout of the document index could be stored with the diskette for retrieval purposes.

LABELLING DISKETTES, CDS AND TAPES

All electronic media items must be labelled. External labels on diskettes or CD ROM covers should include the name of the originating office, the title of the document and the start and end dates. They should indicate the equipment on which it was produced.

Diskettes should be labelled and filed alphabetically or numerically. When dealing with many diskettes, use colour-coded labels to help identify and retrieve documents quickly. For example, each colour could refer to a different programme, activity, subject, organisational unit, user name and so on.

Labels on a computer magnetic tape cassette should include the volume/serial number, the name of the programme office sponsoring the data and data set name(s). Access restrictions should be indicated on the label when applicable.

Labelling conventions should be kept simple. One effective system is to file like records in the same place (ie on the same labelled floppy or magnetic tape).

CARE AND HANDLING OF MEDIA

Electronic media needs special handling if electronic records are to be preserved for more than a short time. File custodians should know which files are permanent, what is to be done with them and when. This becomes increasingly important if computer files appraised as permanent are being maintained in decentralised locations.

The following are general maintenance suggestions.

- Backup files onto disks often – preferably after every update. Systems administrators should perform periodic system-wide backups. Ideally, backups should be kept off site.
- Do not use diskettes for long-term storage of permanent records. Temporary storage on diskettes is acceptable.
- Keep disk and tape drives clean and give them periodic preventative maintenance.
- Keep diskettes and tapes away from strong electrical or magnetic fields.
- Do not touch the recording surfaces of floppy diskettes; do not break open their outer shell.
- Do not allow unauthorised persons to have access to the computer or to the diskettes or tape files and records. Even people with good intentions can enter commands that will delete files or reformat hard disks.
- Keep food and drink away from storage media as well as equipment.
- Store disks and tapes in a vertical position in a storage container (for example a disk box).
- Store diskettes under normal office conditions, taking care to avoid extreme fluctuations in temperature and humidity if possible.

Data processing facilities storing magnetic tapes containing permanent or unscheduled records need to take account of the following points.

- Store magnetic tapes in a dust-free environment at a constant temperature between 18-20 degrees Celsius and at a constant humidity between 35 and 45 percent.
- Read annually a statistical sample of all permanent and unscheduled data sets stored on magnetic tape to detect any loss of data.
- Periodically rewind tapes at constant tension, at normal tape speed.
- Copy data on the tapes to new or re-certified tapes at least once every ten years or more frequently when necessary to prevent the physical loss of data or technological obsolescence of the medium.

SUMMARY

This lesson has examined the management issues associated with electronic records, including the following realities:

- record keeping is becoming more complex
- automating processes is different from managing an electronic office
- relying on electronic records is a high-risk strategy
- there are high costs associated with electronic records management
- there is a risk of lost audit evidence
- electronic records contribute to the development of electronic government.

This lesson has considered the stakeholders who have an interest in the creation and use of electronic records, and it has then examined the legislative or policy framework required for effective electronic records management programme.

It concluded with an appendix of guidelines for the creation and use of electronic records.

STUDY QUESTIONS

1. List ten issues that must be understood before an organisation moves from a paper-based to an electronic records environment

2. Why might relying on electronic records be a high risk strategy?

3. What is ‘electronic government’?

4. What are the main stakeholders in well managed electronic records?

5. List the layers in a framework for records management.

6. What is the difference between the custodial and non-custodial models for the role of an archival institution?

7. What kinds of legislation may have to be amended to take into account the existence of electronic records?

ACTIVITIES: COMMENTS

Activities 12-16

All the activities in this module are designed to help you examine your institution's existing electronic records management issues in relation to the suggestions and recommendations offered here. You are encouraged to examine your findings for each activity and compare them with the information provided throughout this module.

LESSON 4

ESTABLISHING AN ELECTRONIC RECORDS PROGRAMME: PROGRAMME-LEVEL ISSUES

Once the technical and management issues involved with electronic records management are understood, it is possible to consider the actions involved in establishing an electronic records management programme. The first step is to conduct a needs assessment, which will help the organisation identify what type of electronic records management programme would work best. This needs assessment includes analysis of

- stakeholders
- existing computerised systems and electronic records
- proposed computerisation projects that will generate electronic records
- the capacity of the archival institution to participate in electronic records management, including its facilities, equipment, financial resources and human resources.

The goal should be to determine where the organisation is in terms of becoming a full record-keeping organisation and establish at what point is the organisation on the movement to automation.

Then consideration must be given to evaluating any programmes or initiatives to ensure they function adequately. Finally, the electronic records environment must be examined: is the organisation working in an environment with mainframe-database systems, personal computers, or networked computers?

STAKEHOLDER ANALYSIS

In establishing an electronic records programme, it will be necessary to carry out a stakeholder analysis to:

- identify all individuals, groups and organisations concerned with using or managing electronic records

- identify the potential (strengths, weaknesses, opportunities and threats) which each group has for coping with the problems of electronic records
- identify linkages between the stakeholders (conflicts of interest, co-operative relations, dependencies, opportunities for co-operation in project activities).

This analysis should place the records manager in a strong position to plan the electronic records management programme and to identify potential obstacles that need to be overcome.

Activity 17

Refer back to the stakeholders you listed in Lesson 3 and identify the strengths and weaknesses of each group with regard to the management of electronic records. Can you identify the relationships between these stakeholders?

SURVEY OF COMPUTERISED SYSTEMS AND ELECTRONIC RECORDS

It is important to survey the organisation to identify the electronic record-keeping systems. This helps to determine the scale of the problem, thus providing the basis for justifying specific electronic records strategies.

Surveying the organisation helps to identify electronic record-keeping systems.

The survey should begin by asking the following questions. The subsidiary questions will help refine understanding of answers to the main questions.

What Business Functions Have been Automated?

This is the fundamental question. It will identify where to find computerised systems that may be creating records. If no functions have been automated, then this survey of existing systems can stop here and people can concentrate on identifying proposed systems.

Is the System Producing Records?

If only data is produced, it needs to be managed, but records issues (such as authenticity and so on) are not a primary concern. See lesson 1 for a discussion of data and records.

How Long Do the Records Need to Be Kept?

There is a big difference between the problems to be encountered in keeping records electronically for two or three years or even seven or eight years and keeping them for ten years or longer. The longer the period, the greater the risk that the hardware, software or medium will become obsolete and that the costs of preservation will escalate.

Subsidiary questions include the following.

- What is the system's purpose? The reason records are generated and the nature of the users will have a significant effect on how they should be kept.
- Does it serve different purposes for different users?
- Do the different purposes reflect different needs for retaining data?
- Does the organisation REALLY need to keep the record electronically? One of the ways of reducing the risk of obsolescence, as described in Lesson 3, is to copy the records on to a more stable medium, such as paper. Inevitably, printing records will negate the benefits of having the records in electronic form: records can no longer be manipulated or changed. In some cases, this would not be acceptable to the users, but in others a paper record will meet the needs of the organisation. It may not be technically possible to print out the record. However, whenever printing out is an acceptable solution, this option will be more cost effective and easier.
- What inputs, papers or electronic are needed and how long should they be retained?
- Are they needed for legal or audit purposes?
- What will be done with the reports, either on paper or computer output microfilm (COM), generated by the system?
- How long do the records need to be kept electronically? The uses for records change over time. For instance, the organisation may need to access the record electronically while it is active, but it may be acceptable to put the record or copy it to microfiche during the semi-current or non-current stages of its life.
- How long does information need to be kept online?
- If the agency no longer needs data on line, does it need to retain it off-line? For how long?
- What information about the transaction can the organisation afford to lose? This is a difficult aspect to evaluate. On the one hand, migrating records on to software independent formats such as ASCII text can carry the risk that aspects of the structure and layout of the record will be lost. This will depend upon the nature of the original format and whether appropriate software and necessary formatting standards are available (see Lesson 1). In general, however, migrating electronic records over a number of cycles will probably involve some loss of information. On the other hand, printing records out on to paper or microfilm is also likely to involve loss of information. For example, printing out an electronic mail message

will ensure the preservation of the message as it appears on the computer screen, but it will not preserve details of 'blind' copies, information about which of the recipients opened the message and when, etc. The final decision will need to take into account the relevant legal requirements for keeping records and to be accountable, as well as the business needs of the organisation. These are complex decision that need to be taken on a case by case basis and reviewed at regular intervals.

Activity 18

Choose one computerised system in your organisation and try to answer the following questions:

- What business functions have been automated?
- Is the system producing records?
- How long do the records need to be kept?

INSTITUTIONAL CAPACITY

A capacity assessment should also be carried out to explore the capacity of the national archives and other stakeholders to manage the electronic records effectively in relation to the needs identified. This should take into account the existing budget and human resources and the budget required.

- Do you have the institutional capacity needed to keep records electronically? This is an important factor in deciding what strategy to adopt. If the institution does not have the capacity, this must be communicated openly to senior management. Some of the key questions that should be considered are shown below.
- Do you access to IT specialists?
- Do you have appropriate environmental conditions and controls to store electronic records, eg air conditioning?
- Do you have guaranteed access to a stable electricity supply? If local power supply is unreliable do you have access to an uninterruptible power supply (UPS), surge protectors, generators and so on?
- Do you have staff with sufficient expertise to manage and electronic records programme?
- Do you have the right equipment and technical support?
- Do have an adequate budget?

Activity 19

Attempt to answer the questions about institutional capacity in relation to your organisation.

Budget

As with any records management activity, an electronic records management programme can only be sustained if appropriate funds are available. This is a long-term commitment and therefore it is important that management is aware of the financial implications and that appropriate allocations are made to the recurrent budget.

Adequate and ongoing funds are required to administer an electronic records management programme satisfactorily.

It is difficult to calculate the likely long-term costs of keeping electronic records with any precision. This is because the technology is changing rapidly and so are the costs. This makes any cost/benefit analysis for adopting an electronic record-keeping system problematic. However, here are some of the factors that will need to be taken into account:

- cost of storage
- depreciation of equipment (IT equipment rapidly depreciates in value and needs to be replaced frequently)
- cost of consumables
- environmental conditions
- cost of migration
- cost of computer centre services (if applicable)
- cost of specialised staff.

Although estimates of the long-term costs are difficult to calculate reliably, it should be possible to arrive at a reasonably accurate figure for the short-term costs of a programme. These reflect the cost of establishing the infrastructure for managing electronic records. The short-term costs are likely to be significantly higher than the equivalent cost for paper records. This largely reflects the scarcity (and thus high salaries) of specialised IT staff, as well as the cost of purchasing, maintaining and upgrading computer facilities, software and equipment.

Archives and records programmes will need to learn how to prepare business cases justifying why funding sources should invest in their proposed electronic records programmes. In preparing these it may be useful to seek out partners who would be willing to not only invest a certain amount of the funding but who would also help to

persuade others. Potential partners can be drawn from those ministries that are facing problems managing their electronic records and who are in need of solutions.

Human Resources

The nature of the human resources needed to run an electronic records programme has been much debated by the archival profession ever since it became clear that computers were transforming the way governments are doing business. Although every organisation has its own requirements for electronic records and the field of information technology is constantly changing, a number of broad principles have become clear.

> *Staff need to have good records management skills and a team approach to manage electronic records programmes well.*

First, the main principles and discipline of records management and archives administration apply whatever the medium. Good records management skills are essential.

Second, managing electronic records is a team effort. The skills needed are too diverse for any one individual to master completely. The archival institution needs to build up a team that together has all the skills required. The European Commission's DLM Forum has identified what it calls 'core competencies' (skills, knowledge, abilities and so on) these involve an in-depth understanding of the subjects listed below.

This work on core competencies should not be misunderstood as a kind of curriculum for a training programme. No training program could cover all these different aspects completely. Furthermore, the skills on the list are very demanding and can probably only be reached at a very advanced level. The core competencies for electronic record keeping, as set out below should be seen as a high-level list of qualifications for professional profiles developed by a human resources department as background to individual job descriptions.

These core competencies need to be converted into job descriptions and statements of qualifications that may, in some circumstances, radically change the occupational profiles of those currently employed in the records or archives programme.

A records or archives programme will have to identify, define and even develop special training and education programmes. Also, it will have to establish recruitment plans to hire those who can meet the skill and knowledge requirements regardless of their professional or technical backgrounds.

Where the archives is unable to build up such a team within its own organisation, it should consider bringing in outside expertise to supplement any gaps. This could involve other government bodies, such as the national computing bureau or it could mean contracting for specific services from the private sector or other relevant bodies,

such as university data processing departments.

The key point to take into account is that this group of competencies are the minimum range of skills needed to create a sustainable electronic records programme. Where these are not available the long-term success of the programme will be in question.

How should the team be organised? Increasingly national archives are looking at ways of incorporating the principles of managing electronic records into the mainstream activities of the organisation. This has many advantages, including fostering a consistent treatment of records, whatever the medium and ensuring that all of the staff can make some contribution to this specialist area. In practice however, there is usually also the need for a specialist unit within the national archives to liaise with key partners, to provide a focal point for expertise about technical standards, to manage specialised repository facilities and to carry out specific processing procedures.

Activity 20

Consider the competencies shown in the figure below.

No one person is expected to have all the core competencies listed in this section. Which individuals in your organisation could be brought together to satisfy these requirements? Which competencies could not be easily filled from within your organisation? How would you propose to fill the gaps?

Records Management and Archival Competence

basic concepts and terminology of archival science
record-keeping function/archival function
authenticity
principle of provenance
definition of a record (including a electronic record)
concept of continuing value
records management and record-keeping practices and systems
appraisal
description of electronic records
description standards and practices
contextual information
long-term access to electronic records

Legal Competence

data protection and information technology security
privacy legislation
copyright and intellectual ownership
access and freedom of information
archival law and ethics
legal evidence/juridical aspects of electronic records

Organisational Competence

information management
organisational dynamics and change management
information policy:
- records/information as organisational assets
- resource sharing
- roles and responsibilities
- policy formation

information technology and management in public administrations
business process redesign (BPR) in relation to the use of information technology
interaction between working processes and records/information

Figure 8: Competencies

Methodological Competence
project management
software engineering
cost/benefit analysis
programme planning, development and evaluation
strategies for gaining support and sustaining programmes

Information Technology Competence
basic concepts and terminology of information technology systems
components of information technology systems (eg hardware, software, storage media, standards, telecommunications and networks)
data structures and formats (standards) (eg databases, numeric files, text files, GIS, CAD, spreadsheets, bit-mapped images, compound documents)
long-term preservation of electronic records
preservation hazards
migration strategies
metadata
documentation and metadata standards

Systems Design Competence
information systems architecture
different types and functions of office systems (electronic registry systems, document management systems, workflow systems, groupware systems)
systems analysis and evaluation (business function analysis, conceptual data models, systems development methodologies, flowcharts)

Figure 8: Competencies (cont.)

Facilities

In order to ensure access to electronic records, both the storage media and the technology used to create the electronic record must be stable. Electronic storage media (such as magnetic tape, diskette, CD-ROM or ZIP drives) do not have the longevity of paper records. Environmental conditions can adversely affect the ability to read the information stored on media. High humidity is a particular a danger. General recommendations for magnetic media, including diskettes, is to store records in temperatures between 16-20^{o} Celsius and 45-50 percent relative humidity. Current testing procedures point to an even lower temperature for electronic media for long-term storage.

Electronic records need to be stored in a stable environment.

The basic principle is to keep electronic records in a clean cool, dry environment with no exposure to magnetic or electrical fields (for example keep them away from electrical generators, telephone exchanges and so on). The electronic media should be stored vertically in appropriate containers. For 12-inch magnetic tape, wire shelving designed specifically for this media is available. There are storage containers for 3480 tape cartridge as well. The best way to protect the information is to have a second copy of the electronic record stored off site.

Lower temperatures and humidities will reduce the risk of having binder hydrolysis problems in tape systems (known as 'sticky tape' or tape shedding) and will reduce the rate of corrosion of optical formats. But even more critical to the preservation of electronic records is the absolute necessity to control and if possible avoid fluctuations in temperature and humidity. The expansion and contraction that fluctuations generate in the different components of tape and disk formats can cause their layers to permanently deform, delaminate or fracture. That is why it is so important to use environment-shielding containers when shipping electronic records during seasons of extremes.

For the same reasons, storage and work areas should not have diametrically opposed temperature and humidity conditions. Physical carriers coming from an area with a different environment should be acclimatised, that is allowed to equilibrate to the new environment prior to use. This is especially important to prevent moisture condensation when the material is transferred from a cold environment to a warmer one. As a general rule, but more specifically when we are dealing with magnetic tape formats, the physical carriers should be allowed to acclimatise for at least 24 hours, or one hour of acclimatisation for each degree celsius and each five percent relative humidity difference between two environments prior to use. If the material is in a storage container during acclimatisation, the amount of time should be doubled. Full humidity acclimatisation of a 9-track tape could take as much as eight days.

The area where electronic records are being stored should be clean and should benefit from the best housekeeping programme possible. The ideal type of storage facility is designated as a 'clean room'. It is an area in which airborne contamination is controlled. Clean rooms are generally expensive and are subjected to strict

operational and maintenance rules. Dust-generating material should never be allowed in the storage area, nor should dust be allowed to accumulate. If a 'clean room' cannot be constructed, the storage area, if affordable and feasible, should benefit from a positive pressure relative to adjacent rooms and hallways.

The use of chemicals to clean the storage room and its contents is not recommended. This includes all common housekeeping cleaners. When the floor requires washing, a mild dishwashing detergent can be used sparingly in clean, warm water. However, all traces of water should be removed quickly with a clean dry mop. No stripping, buffing or waxing should be allowed in the storage area. Cleaning of containers and of storage hardware should be done with non-chemically treated clean and static-free wipes. Archival material must be protected with plastic drop-sheets when overhead repair or maintenance work is performed in the area.

The storage area should be as well protected as possible against fire. Full walls and ceiling are recommended (no false ceiling). Where a fire-resistant vault cannot be implemented or where fire-insulated record containers are not within budget, then the storage area should be located far from potential fire hazards like cafeterias or stockrooms containing flammable material or substances. For the best protection, duplicate copies of records should be stored off site. Finally, if electronic records are stored in a basement, the potential for flood damage should be assessed and appropriate preventive measures taken.

If an organisation acquires computer equipment for validating and copying electronic records, it will need enough space for a server, computer monitor and tape drives. The space required could be as small as the space provided to a staff member for a workstation. The environment should also be cool and dry, since people will be handling electronic media. No food, drink or smoking should be permitted, nor should there be any chemicals in the vicinity.

One of the requirements for an electronic records management programme is the planned migration of information.

However, the storage media is only part of the equation. All electronic records are created using technology that is constantly changing. Thus, even if a CD-ROM can last for fifty years, the technology of CD-ROM drive will last, probably at most, ten years. Consequently, one of the requirements for an electronic records management programme will be the planned migration of information off of the current storage medium to a new medium. The new medium will take advantage of the technology in use at the time of migration.

There are several research projects underway around the world that are exploring ways to resolve the problem of having to move electronic information to new technology. Because there are no obvious answers at present, part of any electronic records management programme must include planned migration to new media. Thus, the organisation should determine the answers to the following questions.

- Does the institution have appropriate environmental conditions and controls to store electronic records, such as reliable air conditioning and humidity controls?
- Does the institution have guaranteed access to a stable electricity supply? If the local power supply is unreliable, does the organisation have access to an uninterruptible power supply (UPS), surge protectors, generators and so on?

Equipment

The type of equipment needed to copy or migrate records depends on the type of medium on which the original material was created and the type of medium to be used for present or future storage and access. One of the routines that should be included in the copying process involves performing a comparison between the recorded information on the original media and the information recorded on the copy to ensure no information was lost. Another important feature is the ability to validate the file, by examining the metadata provided by the transferring department. The software for both the copying and validating of the electronic files can be placed on the same computer if there is enough disk space for both programs.

Adequate computer equipment will be required to maintain an effective electronic records management programme.

The hardware used for recording, playback or maintenance of the electronic records should be kept in perfect operating order. Preventive maintenance of the equipment is not a luxury but rather a key factor for trouble-free data recovery. The manufacturer's recommendations and maintenance schedule should be adhered to scrupulously and any repair should be done by qualified technicians. Computer equipment operators should always be properly trained.

Activity 21

Imagine you are setting up an electronic records management programme for your organisation. Assess the existing equipment and facilities in your organisation. What do you have already? What do you require?

MATCHING STRATEGIES TO THE COMPUTING ENVIRONMENT

Deciding to maintain records permanently or for long-term use in electronic formats is a high-risk option. As we have seen, the associated technological problems have not been fully resolved. Moreover, the need to migrate records on to new technological platforms that have not even been invented yet introduces an element of risk that cannot be fully assessed.

> *Deciding to maintain records permanently or for long-term use in electronic formats is a high-risk option.*

At the very least there is a risk that a part or all of the record may be lost. Moreover, the costs of this option over decades are very difficult to assess. For this reason the decision to keep electronic records for long-term use needs to be evaluated carefully.

How does an archives or records programme begin to build the tools and techniques to ensure that electronic records are managed properly? The first step is to understand the environment within which the records are being managed. Three main computing environments exist at varying levels of sophistication across most government organisations. As described in Lesson 1, these are mainframe-computing, personal computing and networks computers.

Within these categories there may be a range of scenarios. An organisation may only be opening two or three centrally controlled financial databases. There may be few personal computers, and none of these may be connected into a network; they may have no access to the internet. On the other hand, some organisations may make more sophisticated use of information technology and may take steps to automate a number of their work processes.

The work process may take a number of different forms ranging from the highly structured processes associated with financial management, taxation, social benefit delivery or regulatory licensing to the less structured processes associated with policy development and the preparation of briefing notes, discussion papers and so on. These organisations may have networked their computers together in order to permit the exchange of documents and electronic messages, and they may have provided full access to the web for most of their employees. They may even be delivering their programmes and services to outside clients (citizens) through the Internet.

Figure 9 below is intended to assist records managers and archivists in evaluating their capacity to manage electronic records created in different environments and to determine the most appropriate strategies.

Guidelines on the management of shared storage space on the network have been developed by the National Archives of Canada (*Managing Shared Directories and Files)* and by the State Records Authority of New South Wales (*Desktop Management – Guidelines for managing electronic documents and directories; Managing the Message - Guidelines on Managing Electronic Messages as Records*). These guidelines elaborate on the approach described above and provide a useful base upon which more detailed strategies for the management of shared storage space on the network can be developed.

For more information on these guidelines, see Lesson 6.

Activity 22

In Lesson 1 you identified the computer environment that defines your organisation. Using the figure shown below, propose a strategy for your organisation.

Environment	Main considerations	Examples of Strategies
Mainframe Computing In this environment the computer is being used as a tool to support a given 'business' application such as processing applications for licenses, processing government payroll information, processing financial accounts, processing environmental resource information, etc. The focus of this environment is on the work process and the rules for undertaking the business process. Accountability for the planning, design, testing, implementation and evaluation of the system has been assigned clearly. The structure of the system may be simple or complex but it is always premised on the fact that there are a series of pre-planned inputs and pre-planned outputs as well as a series of steps in between, all of which are designed to accomplish a pre-defined set of tasks. The design and implementation of the system is also based on a structured methodology.	A number of issues may have an impact on the management of the electronic records generated by these systems: • lack of assigned accountability for the management of electronic records • lack of retention standards (too often, the systems development methodology does not account for the need to set retention standards for the records; as a result records are kept far longer than needed and often occupy expensive storage space as they grow in volume on computer storage tapes; in other cases, the lack of retention standards may result in electronic records being destroyed earlier than they should or at a time which is inconsistent with the disposal timing for the related paper records) • lack of back-up and recovery procedures (systems follow a regular cycle of updating which, in addition to data being loaded onto the system, permits back-ups to be taken of the data in the system; failure to create back-ups and to store these in remote locations places the ministry at risk especially if the system is rendered inoperable as a result of such natural and man-made disasters as storms, power loss, etc) • lack of documentation (user manuals and systems manuals may have been developed but these may be fragmentary and never kept up to date; as a result, the information necessary to understand the records, especially those which are being kept for the long term, may be missing) • lack of standards (unless a strategy is developed to account for changes in the technology or changes in the way data are recorded and used, the system may be rendered inoperable or the costs of conversion to a new version of the technology or a new systems specification may be too great to warrant the continuance of the system).	Archivists and records specialists can provide the answers to these and related questions. Some suggestions are as follows: • Address simple problems first. Examples of simple problems are: poor storage problems for tapes; lack of a procedure for rewinding tapes stored for long periods of time; development of backup and recovery procedures; development of procedures for testing tapes to determine data loss; setting standards for the storage of magnetic tapes, etc. • Gain experience in solving simple problems and advance to slightly higher levels of problems. For instance, solve problems in setting and implementing retention periods, establish consistency between electronic and related paper records; establish disposal procedures (for both data and the media); establish procedures and standards for copying data from old tapes to fresh tapes. Finally, address higher level problems such as those relating to the establishment of standards for the authenticity and reliability of electronic records; incorporate retention periods and the business rules for how records should be managed, into the design of databases and systems; establish migration strategies to address the issue of technology obsolescence Several national archives and a number of private and public sector organisations have had some experience in building record-keeping requirements and strategies into a 'mainframe-database' environment. Please consult Lesson 5 for a list of relevant references and web sites.

Figure 9: Matching Strategies to Environments

Environment	Main considerations	Examples of Strategies
Personal Computing. In this environment personal computers are installed on the desk tops of a selected number of staff to support the work performed by these individuals. The computers are not networked nor are they linked to the internet (although some might have a modem that could provide limited access to e-mail but again on an individual basis). The purpose of the computers is to facilitate the work of individual staff members in preparing documents such as correspondence and reports. Small databases may be established to manage financial information but the main sources for this information are in paper form.	Users of personal computers would benefit from guidance on how they can manage their directories and files. Several Archives around the world (eg National Archives of Canada; State Archives Authority of New South Wales) have developed such guides. This guidance is designed to facilitate retrieval, ensure proper security and protection of the documents and even to facilitate retention and disposal. It is also a way to enhance awareness of the importance of records management in alleviating the records problems users may be facing.	A brief manual drawing on the contents of guides produced by other archives can be a cost-effective way of providing basic support to the users of personal computers. Examples of the advice that can be given are as follows: • how to back-up electronic information stored on hard disks • how to build simple directories and standards for describing the files in the directories • how to protect floppy disks and other media used to store electronic information • how to develop templates for use in creating draft letters and reports, etc. • how to protect electronic information from unwarranted access or deletion (ie through the use of passwords, read-only provisions; etc.) • how to make sure that paper and electronic filing structures and reference match how to protect floppy disks and other media used to store electronic information • how to develop templates for use in creating draft letters and reports, etc. • how to protect electronic information from unwarranted access or deletion (ie through the use of passwords, read-only provisions; etc.) • how to make sure that paper and electronic filing structures and reference match.

Figure 9: Matching Strategies to Environments (cont.)

Environment	Main considerations	Examples of Strategies
Network Computing. In this environment, the network is used to support the work undertaken on personal computers ie preparation of documents) but it may also be used to support the transmission of relatively simple electronic messages (ie not lengthy, no attachments, etc). In this environment, there is no access to the internet.	Records managers and archivists need focus their advice on the management of the electronic information held on the personal computers supported by the network. Documents are likely to continue to be produced and printed onto paper, which means that users will still need basic guidance on how to manage their paper files and their computer directories and files (*see personal computing, above*). In addition, however, they might want to turn their attention to the management of the e-mail messages and the way in which the organisation can ensure that important messages are identified and protected as records.	Given the nature of the environment, it is important that the organisation recognise that e-mail systems such as those commonly found in the marketplace are not record-keeping systems. Unless there are arrangement in place to transfer e-mail messages to a secure central system and to manage them as electronic records, the policy should be to require users to print important electronic mail message to paper and place these in the corporate filing system. In setting this policy, records managers should be prepared to offer generic advice on how electronic messages can be managed even as the important messages are printed to paper. The following guidance may be helpful (adapted from guidance provided by the Archives of Ontario, Canada). • Decide how the e-mails should be saved. Remember that electronic systems are more easily searched than paper files, so important e-mails should electronically if possible. • If the system allows long-term storage of records on paper only, print out copies and store them in an appropriate manual filing system. Ensure that the information identifying senders, receivers and time of transmission is printed and stored together with the e-mails to which they relate. • Do not rely on e-mail system backup tapes preserving the electronic record. Backup tapes are not meant for regular use but rather to meet special circumstances. Make a habit of saving e-mail electronically to folders, including the e-mail messages transmitted. Periodically eliminate unimportant messages. • When there is a change in e-mail software convert saved e-mails to the new system. If the new system doesn't allow this, find out how to save them in a standard format or print and file them.

Figure 9: Matching Strategies to Environments (cont.)

Environment	Main considerations	Examples of Strategies
More sophisticated network. In this environment, electronic messages are more sophisticated (contain more substantial work related content, decisions, etc. as well as attached documents). Users have access to the internet, and, above all, they are sharing documents which are necessary for the conduct of their work. Records are being created which document important decisions, etc. In fact members of a given work group may even be making significant comments on the electronic drafts, rather than on a paper version. The documents may be stored on a file server that is shared by the members of a work group or organisational unit or they may be stored on the disk drives of individual users. Information which is created or collected in electronic work space may consist of documents which need to be used by individual employees, or shared among staff.	In this environment, the focus shifts from the hard disk of the individual user to the shared space used by a given work group on a file server. In this case, records are being created electronically and decisions need to be made concerning whether or not such records should continue to be managed in electronic form and whether or not they should be managed on the file server. This is why it is important to determine what kinds of records are being managed on the file server and, by extension, what kinds of records are currently being managed in the hard disks of individual users that could be better managed if they were stored on the file server. Typically, the network is used by a work group: • to compose documents • to update documents • to copy standard text for inclusion in other documents • to print out documents • to communicate information to and from others • to read documents • to fill in standard forms.	The first step is to determine if the shared space on the file server is adequate for use as a record-keeping system. Is it secure? Will the documents stored on the file server be protected from loss and destruction? Does it respond to core requirements for record-keeping systems, as follows: • placing all records (hard copy and electronic) are placed within common file classification schemes, making complete, timely information much easier to locate • security features are incorporated, including the ability to restrict access to systems • functions and records to appropriate staff • procedures are in place to support prompt, accurate implementation of records retention and disposal plans and schedules • keyword terms have been developed and system are in place to support searches for records • the movement and location of both hard copy and electronic records can be tracked • reports and statistics regarding records use and disposal can be generated If not, then consider establishing polices that are similar to those for the less sophisticated networks (such as print to paper and store in the corporate filing system). If the core requirement are met, then consider a dedicated record-keeping system as described below under highly sophisticated network. Regardless of the approach, archivists and records specialists should be in a position to provide guidance to the users of shared space on how the space should be managed.

Figure 9: Matching Strategies to Environments (cont.)

Environment	Main considerations	Examples of Strategies
Highly sophisticated network computing. In this environment the network is being used to support the automation of complete work processes. Documents are generated, transmitted, reviewed and approved in an automated environment. The file servers are used as sophisticated repositories for a host of information types ranging from documents shared by many people to reference information, to large databases supporting the work of the organisation (and possibly accessed by others outside of the organisation, etc).	This is an environment where the record of decisions and the conduct of work is electronic rather than paper-based. Structured work processes and business rules determine how information flows through the processes and what happens to it along the way. In some organisations, concerns are raised that important records of the business of the organisation may be lost because they are electronic and because they are being stored in high risk locations which could include the shared space on a file server. These may grow to the point that the organisation decides to adopt a more comprehensive solution to the capture and maintenance of the organisation's records (ie one that can address paper as well as electronic records generated in a host of functions and activities across the organisation).	Given the reliance of the organisation on the electronic record, it is not enough to simply introduce a technical solution. Accountability for the records needs to be assigned, policies need to be set, record-keeping rules need to be integrated with the business rules for the various work processes and people need to be trained to establish a record-keeping infrastructure within an electronic environment. In general terms, the a dedicated record-keeping system is needed that is able to support the core requirements described above under more sophisticated network.

Figure 9: Matching Strategies to Environments (cont.)

SUMMARY

This lesson has explored the programme level issues associated with establishing an electronic records management programme. It has emphasised the need to carry out a thorough analysis before designing the programme. The analysis should identify and take into account

- all the stakeholders and their needs
- the computerised systems and records that already exist
- the capacity of the institution to implement a programme including human resources, budget, facilities and equipment.

The next step is to develop a strategy for the programme. This should take into consideration the type of computing environment and match the strategy to the environment.

STUDY QUESTIONS

1. What are the main areas that must be covered by a needs assessment?

2. Why should a capacity assessment be carried out?

3. Why is it unlikely that a single individual will have all the skills needed to manage electronic records?

4. Describe the environmental conditions needed for electronic records?

5. Why should fluctuations in temperature and humidity be avoided?

6. What procedures can be introduced to prevent sharp changes in environmental conditions between storage and work areas?

7. What are the two fundamental questions that an organisation should answer about its facilities?

8. Why is equipment maintenance critical for an electronic records management programme?

9. What are the three main computing environments that currently exist in government organisations?

10. Suggest a strategy for a mainframe computing environment.

ACTIVITIES: COMMENTS

Activities 17-22

All the activities in this module are designed to help you examine your institution's existing electronic records management issues in relation to the suggestions and recommendations offered here. You are encouraged to examine your findings for each activity and compare them with the information provided throughout this module.

LESSON 5

THE COMPONENTS OF AN ELECTRONIC DATA AND RECORDS MANAGEMENT PROGRAMME

The purpose of this lesson is to familiarise students with some basic activities involved in managing electronic information, from the records and archives manager's perspective. It reflects the gradual progression from established methods for managing data sets that has been taking place over several decades to the emergence of modern electronic record-keeping strategies to integrate record-keeping requirements into the design of new systems.

The detailed descriptions of the functions outlined in this lesson have been derived from the following sources: National Archives and Records Administration, Electronic Records Management; *Public Record Office.* Management, Appraisal and Preservation of Electronic Records: Standards for the Management of Government Records; *National Archives of Canada.* C-12 Central Procedures in Electronic Form in CARDD *(draft 5: June 1, 1998); Margaret L Hedstrom.* Archives & Manuscripts: Machine-Readable Records. *Full reference information is provided in Lesson 6.*

Lesson 3 introduced the management perspective by emphasising the issues that determine the strategic direction of the programme. In order for a programme to be successful, it should

- be positioned strategically in government to enable it to act effectively
- take into account how far the organisation has progressed toward automating its functions and the effectiveness and quality of its record-keeping systems and conventional records management programmes
- be based on an appropriate strategy that takes into consideration both where the organisation is at the present time and where it aims to go.

Many organisations are still dealing largely with database materials when managing electronic records.

From a comparatively early period it was recognised that some data sets were of value to the research community and would need to be preserved permanently. As a result, the archival and information technology community has had decades to learn how to preserve data sets and to develop procedures to preserve the integrity of the information they contain.

Most organisations are still dealing largely with database materials, and many key decisions are still being taken on the basis of data sets.

> ***Data set:*** A group of related electronic records that are organised and treated as a unit. The term is often used interchangeably with data file.

For example, the Ministry of Education in Tanzania in the late 1990s used a simple database on FoxPro software stored on a laptop PC to store comprehensive and detailed information about the nation's schools and their teachers. This data was used to make important policy decisions about the funding of primary and secondary schools and the redistribution, retraining and retrenchment of teachers throughout the country. Access to the original database would be of great interest to future social scientists and educational historians. This example illustrates why preserving such data sets should be the concern of archivists.

In contrast, other kinds of electronic records have only recently been recognised as being of permanent value. For example, although electronic mail software has been used in administrative offices since the mid 1980s, it has only been in the last few years that archivists have started accessioning electronic mail files. Prior to this period, such records have either been regarded as too recent to be worth appraising, or it was assumed that the paper version of the document was the 'original' and the electronic file the convenience copy. As a result the profession has come to recognise that it needs to be involved in the creation stage of the records life cycle and, as a consequence, archivists have started paying attention to much more complex kinds of electronic records.

> *Archivists have started considering the care of more complex kinds of electronic records than databases.*

Internationally, the records profession is turning its focus on to issues such as the development of metadata requirements for electronic record-keeping systems. However, much of this thinking has yet to move beyond theory to the development and application of practical guidance on the management of electronic records. Other than the experience with accessioning data sets, there is very little actually being implemented by national archives, except for the acquisition of small word processing files. Very little has been written that can serve as guidance for other archival institutions around the world. Most other writings on the subject are based on theoretical research, the results of which have yet to be applied or tested. Consequently much of this lesson, which is practical in nature, is devoted to the

treatment of data sets. The student should be aware, however, that new approaches are being developed and in time some will prove to be successful and will be incorporated into the canon of recognised best practice.

For example, the lesson describes a procedure for verifying the data and documentation of a data set. The procedure would be essentially the same for the task of verifying a group of text files that include hyper links; the process would still involve verifying that the text could be read, that all the characters were correctly displayed, that the hyper links actually worked and so on. In both cases, the archivist would still have to check that a complete set of any related documentation accompanied the electronic records.

Although the functions that comprise an electronic records management programme may seem complex and difficult to implement, in reality they are within reach. However, for a programme to be successful it must be tied closely to policy, particularly where policy relates to transfer requirements. Lesson 3 includes a discussion on policy formulation, and transfer requirements are addressed later in this lesson.

The lesson assumes that most programmes will manage current and legacy electronic systems.

> ***Current system:*** An information systems application that is actively being used by an organisation.
>
> ***Legacy system:*** An old application that an organisation continues to use, perhaps because the cost of replacement or redesign is high.

The implication of a legacy system is that despite its poor competitiveness and compatibility with modern systems, the organisation has invested considerable time and money in it. (If the legacy software will only run on antiquated hardware, the cost of maintaining it may eventually outweigh the cost of replacing both the hardware and software. An important feature of some new software products is their ability to import data from legacy systems.)

Most records management programmes will care for both current and legacy electronic systems.

The goal of an electronic records programme is to ensure that electronic records are available for as long as they are required for administrative purposes or permanently if they are appraised as archives. Therefore, in addition to covering current and legacy systems, a comprehensive programme should also focus on developing systems for the future.

The need to keep electronic records for long periods makes it necessary for record-keeping requirements to be addressed at the planning and design stage of systems development, that is, before the records are created. Otherwise it may be too late to introduce the necessary safeguards. However, more often than not records

keepers are not informed of the development of new systems. There is a need to raise the profile of records management within the organisation to ensure that the records perspective is taken into consideration when new systems are designed.

> *Record-keeping requirements must be addressed at the planning and design stage of systems development, before the records are created.*

The final section of this lesson relates records management considerations to the appropriate stages of the systems development. Lesson 3 discusses the kinds of issues that records professionals need to raise with senior managers to alert them to the importance of record keeping.

Broadly, the activities required to manage electronic records are very similar to the activities needed to manage paper records. This is an important because, as far as possible, the electronic records programme should complement the existing records management programme for traditional types of records. The management activities discussed in this lesson include

- inventorying
- scheduling
- appraising
- accessioning and processing
- preserving and maintaining
- describing
- providing access.

> *The electronic records programme should complement the existing records management programme for traditional types of records.*

Activity 23

What should be the goal of an electronic records management programme for your organisation? Why?

INVENTORYING

A record-keeping systems inventory is used to identify and locate electronic data and records. Compiling the inventory involves collecting and maintaining information about record-keeping systems in an organisation. This is the first step in the disposal process.

The inventory will provide the basis for developing the programme and improving records management generally. Ideally, it should include information about all of the data and records associated with a system, regardless of physical characteristics.

A complete inventory of an organisation's electronic systems should include the following.

- *Name of the system:* This indicates the commonly used name and acronym of the system.
- *System control number*: Where applicable, this specifies the internal control number assigned to the system for reference, control or cataloguing purposes.
- *Agency programme supported by the system*: This states the agency programme(s) or mission(s) to which the system relates and cites any laws or directives authorising such programmes or missions. It also lists the names, office addresses, telephone numbers and location of the programme personnel who can provide additional information about the programme and the system supporting it.
- *Purpose of the system*: This indicates the reason(s) for the system and the requirement(s) it meets.
- *Data input and sources*: This describes the primary data input sources and the providers of the data to the system.
- *Major output*: This shows the system's main products and the frequency of their preparation.
- *Information content*: This indicates the main subject matter, date coverage, time span, geographic coverage, update cycle and other major characteristics of the system. It also states whether the system keeps superseded information and whether it contains microdata (unaggregated or unsummarised data) or summary data (data summarised from the microdata, also referred to as macrodata).
- *Hardware/software environment*: This indicates the computer system that creates, manages and manipulates this information and the software used.
- *System manager(s)*: This lists the name, office, telephone number and location of the system manager or other system personnel who can provide more information about the system and the programme it supports.
- *Location of documentation needed to read and understand the files*: This records where the code books and file layouts are maintained. It also indicates the office, room number and name of the person having custody of paper documentation. Identifies and locates any documentation that may be held in computerised form

(such as CD-ROMs that accompany software).

- *Restrictions on access and use*: This indicates national security, privacy or other restrictions.
- *Authorised disposal of the information as determined by the records schedules*: This indicates the disposal decision, for example 'permanent.' If there is no schedule the inventory should indicate 'unscheduled' and recommend a disposal date.
- *Disposal authority citation*: This gives the records schedule and item number(s) covering the records contained in this system. It also cites any record schedule(s) and item number(s) authorising disposal of system components, such as input forms, printouts, output reports and so on.
- *Location and volume of any storage media containing identical information*: This records the location of any magnetic tapes or disks containing information identical to that in the system being inventoried. It also indicates the number of tapes and/or disks and their storage capacity.
- *Related systems*: This identifies and shows the location of any systems that relate to the system being inventoried and documents the nature of the relationship (for example, a database on one system may draw information from a database maintained by another system).
- *Identification of the person conducting the inventory*: This gives the person's name, office, telephone number and location.
- *Date prepared*: This gives the date the inventory was prepared.

Records managers and archivists need to examine the data and records in electronic systems. They may not always be allowed or able to examine electronic records directly, and in some cases, they may need assistance from the system's maintenance staff and users. It is critical that they build the relationships necessary to achieve this.

The inventory will provide the basis for developing the programme and improving records management generally.

Activity 24

Choose a current computer system in your organisation and try to inventory its electronic records. Note you may need to obtain permission to do this.

SCHEDULING

After compiling an inventory of electronic systems, the records manager must determine whether the information in any system is covered by disposal instructions in existing general records schedules. For example, accounting records throughout the public service are sometimes managed by means of a general retention schedule. It is critical that these instructions and schedules reflect relevant legislation, particularly with regard to disposal.

The first decision that needs to be made is whether all or part of the records generated by a computerised system should be kept electronically or on paper. The retention schedule should record this decision. Many organisations without the staff capacity or the facilities to preserve electronic records have decided to print hard copies of word processed or electronic mail documents. The success of this approach depends upon a clear understanding by all employees of the obligation to print and file all record material.

In these cases, employees should be encouraged to destroy electronic versions of documents created by computer applications as soon as paper records are filed, unless they need them for updating or reissuing. Success also depends upon the records programme establishing mechanisms for monitoring and measuring compliance with this approach.

If the appraisal decision is to destroy electronic data and records after a certain period, staff must understand what is required to destroy them completely. This is particularly important for restricted documents, especially those that are security classified. In these cases it is necessary to erase the entire disk or tape, in order to ensure that files that have supposedly been deleted cannot be recovered. Where applicable, records managers should consult the organisation's information security officer for additional requirements for destroying security classified electronic data.

It is important that records managers assemble the following facts before they can recommend disposal of electronic records and data.

- What government programmes does the information support?
- What is the authorising law or directive for the programmes?
- What are the functions that the information system performs?
- What are the sources of the data in the system?
- What information is in the system, such as the primary subject matter, time span, geographic coverage, update cycle (the regular process of updating a file) and so on?
- What reports or other outputs does the system produce?

The records manager will also need other information, such as the commonly used name and acronym of the system and citations to any previously approved disposal for any data in the system. Much of this information should be included in the inventory of electronic records.

The information in each automated system should be scheduled comprehensively. The schedule should take into account

- data sets and files included in the system
- paper inputs and outputs
- processing, subset and special format files created and used in the system (a subset is a data set where each element is part of another data set)
- documentation that describes and defines the system and the data in it.

Disposal instructions should be established for each of these components within the context of the overall system. The technical appraisal may have to be deferred until transfer is imminent if the records have long-term archival value but are not scheduled for transfer to an archival facility within three to five years. This is because technology changes so fast that an early technical appraisal might be out of date by the time of transfer. Any changes made to the system should be tracked until that time.

Once the organisation determines how long it needs to retain data in an electronic record-keeping system the records officer should provide specific retention times for each system component. These components include all inputs and outputs as well as relevant systems documentation, regardless of medium. The disposal instructions should be specific enough to provide for different information needs within the organisation. Any special legal requirements (concerning entitlement, for example) should also be reflected in the disposal. The disposal must be co-ordinated with programme offices to ensure that all involved parties know when the information is no longer needed for agency purposes and what will happen to it.

Electronic records must be scheduled for disposal, just as paper records are scheduled.

Activity 25

Choose a current computer system in your organisation (preferably the system you inventoried in the previous activity). What do you need to take into account to schedule it? Where would you get the information?

APPRAISAL

This section concentrates primarily on appraising data sets from statistical, or at best structured, databases because data sets represent the bulk of electronic information that the archival institution is likely to encounter. The appraisal of textual material should follow similar basic principles.

For more information on appraisal, see Building Records Appraisal Systems.

As is the case with paper records, most electronic records do not have sufficient value to warrant permanent preservation as archives. Records that do require continued preservation are those that

- document essential agency functions
- contain important and unique information about people, places, things or events
- provide automated access to other permanent records.

The identification and selection of potentially permanent electronic data and records is a complex process. Appraisal requires a content analysis (an evaluation of the evidential and informational value of the data) and a technical analysis (an evaluation of the usability of the data). The results determine whether and how the records can be transferred from the organisation's system to the archival environment.

Archivists appraise information in computer files using the same general standards used to appraise information in any other medium. They need to consider the value of data and records as evidence, keeping in mind the data's origin and current use and its impact on government programmes and policy.

Generally, only a small percentage, usually less than 5 percent of all electronic records have enduring value. However, electronic information may have greater research utility than similar information stored on paper or microfilm because it can be manipulated.

Once it has been determined that the data or records have enduring value, the next step is to decide whether it should be preserved in an electronic format. The decision often rests on whether it is important to preserve the ability to process the data by computer. For example, computer processing is highly valuable for large collections of data that may be subjected to statistical analysis. When computer processing is not necessary, and especially if funds or staff capacity are scarce, records staff may recommend that records or data be preserved only on paper or microform.

Some records cannot be printed easily, if at all. Multi-dimensional documents may be difficult to print because they can be represented in more than one way on the computer screen and on paper. For example, a spreadsheet can be represented either as a set of base figures and formulae or as the result of the calculations. Both representations are part of the record. Multi-media documents are impossible to print out.

As computer software becomes more sophisticated, users will be able to add note and voice annotations to text-based documents, digital sound and video to presentations and three-dimensional modelling and simulation to analytical documents. Thus only a small part of the record would be kept if it were printed. In the case of data, it would be a futile effort to print out 6,000 responses to a questionnaire.

If the records have continuing value in electronic format it is important to form partnerships with the records creators and systems personnel to consider the best preservation option. Staff may need to perform a technical analysis. The technical analysis considers the organisation of files and data, the medium, and other technical characteristics of the records to determine whether and how the records can be transferred.

The analysis identifies those points in the system life cycle at which records can be extracted for transfer to the archival institution. It also establishes requirements for technical documentation necessary to permit reading and interpreting records transferred to archival custody. The archivist must determine whether the electronic records are dependent upon software or systems that might prevent or impede transfer, preservation or retrieval of the records. Advice should be sought from IT personnel if there is a question of working out the technical issues associated with a complex data file.

As well as appraising electronic records for criteria applicable to all records, archivists must appraise them for other qualities specific to the computer environment.

The following are broad appraisal criteria for electronic records.

The Level of Aggregation

In a paper-based environment, summaries, aggregations and statistical reports are often the preferred format for preserving textual records. This is because they are more readily interpreted and less voluminous than micro-level data. (Micro-level data refers to data at the lowest level of aggregation possible, generally pertaining to each case, event, transaction and so on.) In an electronic environment, the reverse is true; the computer can easily aggregate and summarise micro-level data.

The availability of micro-level data allows researchers to perform analyses that were overlooked or beyond the scope of the analysis performed by the originator or to replicate original research by reanalysing data to assess the validity of the original conclusions. Unaggregated micro-level data (that is, data in its original form before aggregation, summarisation, or masking) has the greatest potential for future secondary analysis. The question is, should micro-level data, summary statistics, or both be preserved?

Format

Records professionals must determine the most desirable format for long-term retention. Often records exist in both electronic and paper form, as input documents and output reports. Input documents contain unedited versions of the raw data and output reports contain summary information at various levels of aggregation. When paper versions are available, it is important to consider how the records are likely to be used. The electronic version is preferable if micro-level data is likely to be used for statistical analysis. A paper version may be preferable if researchers are likely to request summary statistics or to examine only a single case. Some data sets may be used for both statistical analysis and occasional retrieval of a single case, making it advisable to retain both an electronic and a paper version.

Records Linkage

The potential for records to link to other records or data is a significant factor in the appraisal of electronic records. Records linkage refers to the practice of combining data on identical or similar cases from two or more sources, using common identifiers such as name, address, social security number and date of birth or common attributes such as sex, race and age. In a paper-based environment, linkages are possible but time consuming. Electronic records facilitate large-scale linkage of thousands and perhaps millions of cases because of the relative ease of programming the computer to match cases that share identifiers or attributes. Therefore, consideration must be given to the existence of related data files and the exact data elements available for potential records linkage.

Updates

Updating electronic records and data is common practice. The ability to update easily affects the appraisal of the informational value of electronic records. The contents of a database may change from day to day and the database design may determine the nature of the historical record that can be captured for preservation. In appraising records that are updated, it is important to evaluate the design of the system or database to determine what types of records are available to document the activities covered by it.

Restrictions on Access to Personal Information

Maintaining personal information in electronic form has a twofold impact on appraisal. First, many electronic data files and records contain confidential information that documents the current status or recent past of many individuals and organisations. By collecting micro-level data in preference to aggregate statistics and by acquiring records shortly after they are created, data archives tend to hold large volumes of personally identifiable information of a contemporary nature. Some of

these data files can be linked with data from other sources, with the potential to provide researchers with a more comprehensive picture of an individual or organisation than would otherwise be available. Records creators may be reluctant to release confidential records to the archival institution in electronic form because of the possibility of unauthorised access and reproduction. It is critical that restrictions on access also reflect legislation (such as data protection and privacy legislation).

Second, electronic records and data offer greater flexibility in handling restricted information. It is possible to remove names and other personal identifiers from electronic data files and records and to produce public-use or disclosure-free versions of the files. When such techniques are employed, disclosure-free files may permit access to information that would not otherwise be made available. Appraisal should take into account the impact of restrictions on access, especially when the restrictions vary among different versions or formats of the same body of information.

Supplementary Applications

Some data files and records, which lack sufficient detail to merit retention for statistical analysis and research use, have supplementary applications in archival institutions, which can use some electronic records to create indexes to paper and microform records in their holdings or to develop sampling frames for selecting samples of paper records. For example, many voluminous series of case files have automated indexes, called case management systems. These indexes usually contain a limited number of data elements such as case number, name, address, social security number, date of birth, sex, race and a few descriptive elements germane to the application. Such an index may lack sufficient detail to merit retention for research use, but it can be used to generate printed and electronic indexes to the case files. Archivists should consider potential auxiliary applications of electronic records for administrative and reference activities in their organisations.

Documentation

It is important to identify and review technical documentation to determine if it is sufficiently comprehensive and accurate to permit use of the data without relying on individuals who have specialised and extensive knowledge of the system. The documentation itself is a valuable record that should be retained for the life of the system. If the archival institution appraises electronic records as permanently valuable, the documentation must be transferred to archival custody along with the records. In some cases, the documentation may have more long-term value than the data itself. For instance, the data may no longer be required, but it is important to know that it once existed.

A record layout and a codebook are the minimum documentation that must accompany each data set. (A codebook is a guidebook identifying and explaining the codes used in a computer file or database.) The record layout defines the content, size and position of the fields and lists all data elements in each logical record. The

codebook lists the codes used to represent information in the file and defines acceptable codes for each variable. A file without minimum documentation is useless because its contents cannot be interpreted.

Considerably more documentation is needed for complex data sets. For example, when a sample has been taken, documentation should include narrative and technical descriptions of the sampling techniques and sample size. If interviews were used, the interviewers' instructions and techniques should be documented. A data set should not be retained if reasonable efforts to locate and assemble documentation fail to produce a record layout, codebook and other essential explanatory materials.

Readability

Physical deterioration of storage media may render a data file or record unusable. During the appraisal process, the archivist must evaluate the physical quality of the storage medium on which the data is stored. This is accomplished by placing the tape on a tape drive and instructing the computer to read the file or by testing data on other storage media with the appropriate input device. Problems with reading tapes are most likely to occur when data has been kept in inactive storage for several years, but many initial 'read' problems can be resolved by cleaning the magnetic medium. Many data processing centres have staff who handle cleaning and other methods of recovering data from deteriorating tape. When the data is read, it is desirable to obtain a printout (sometimes referred to as a 'dump') of a few records in each data file. This shows whether or not the record layout matches the data and may alert the archivist to unanticipated technical problems.

Software Dependence

The need for special software to access a data file or record and retrieve information from it is a major obstacle to its transfer, processing and distribution. Some software-dependent data sets or records are unusable if transferred to the archival institution without companion software. Others might be transferred if the data is reorganised into a format that does not require special software.

Some software packages are designed with special utility programmes to create software-independent output files. In appraising software-dependent files, the archivist must consider the costs associated with reformatting the data or acquiring the necessary software. An additional problem is the potential reduction of the utility of the data through reformatting. In some cases, software requirements may prevent the archival institution from acquiring a data set. Reformatting data files into a software-independent form or acquiring the software needed to access the data greatly increases the cost of accessioning a data set.

Hardware Dependence

Hardware-dependent files are files that can only be accessed using particular hardware. Because the computer industry is constantly changing, such hardware is likely to become rare or obsolete. Most hardware-dependent files must be reformatted for preservation and dissemination. Generally, hardware-dependent files that cannot be rewritten in a standard format on magnetic tape are considered unacceptable for archival preservation.

Costs

Several factors affect the costs of accessioning, processing and preserving electronic files (that is, records). The fixed costs associated with every file include:

- the cost of archival quality magnetic tape for data storage
- the small amount of computer processing time needed to create a master file and a security backup file
- staff time to prepare documentation
- the long term costs for regular maintenance procedures to preserve the tape.

There may be additional costs associated with accessioning and processing files. If the original file structure is complex or if the data is hardware or software dependent, technical assistance and additional computer time are needed to reformat the data. Considerable staff time may be required to locate, compile and rewrite documentation that is incorrect or inadequate.

Recovery procedures to salvage data from deteriorating storage media are also expensive. Therefore, in estimating the costs of preparing a file (record) for research use, the archivist must consider the complexity of the original file structure, the adequacy of available documentation and the degree of deterioration of the storage medium. These processing costs are largely independent of the size of the file.

In assessing costs, the archivist should also consider some of the potential advantages of keeping electronic records. Compared with paper, magnetic tape is a very compact storage medium. If the records require little processing and have adequate documentation, they are an economical alternative to paper for storing large volumes of information. At the same time, even a small data set can be expensive to process and preserve if it requires extensive reformatting and has poor documentation.

The example shown in Figure 10 below outlines costs identified by the US National Archives and Records Administration (NARA) in 1998.

There are no universally applicable appraisal criteria, and guidelines cannot substitute fully for the general knowledge, training and experience that each archivist brings to the appraisal process. Appraisal guidelines for electronic records are still in the formative stage.

It is also important to recognise that the enormous variety of information in computer files makes it impossible to compile a definitive list of electronic records of potentially permanent value. However, the following list highlights typical categories of electronic records that should be considered for retention:

- electronic records that replace records scheduled as permanent in another medium
- automated indexes to permanent records
- unique and important scientific and technical data resulting from observations of natural events or phenomena or from controlled laboratory or field experiments
- management data that have government-wide coverage or significance
- socio-economic data on such topics as trade, education, health or behaviour
- natural resources data related to land, water, minerals or wildlife
- data that document military operations
- political or judicial data related to such topics as elections, special investigations or court proceedings
- cartographic data used to map the earth's surface or other planetary bodies
- national security and international relations data that document such activities as strategic or foreign policy assessments or international negotiations.

Processing cost:	US $25 per year per magnetic tape reel
Storage cost:	US $10 per cubic foot of storage space
Total cost:	US $160 per cubic foot of magnetic tape [6 reels = 1 cubic foot; processing = US $150 (6x25); storage = US $10]
Paper comparison:	The information stored on 6 reels (1 cubic foot) of magnetic tape = 360 cubic feet of paper. If storage costs are US $10 per cubic foot then it costs US $3600 per year to store 360 cubic feet of paper, which is the equivalent to 6 reels of magnetic tape equalling 1 cubic foot at US $120 per year.

Figure 10: Cost of Processing Electronic Records

The following checklist may serve as a useful starting point for the appraisal of electronic records.

Appraisal Checklist for Electronic Records			
CONSIDERATION	**YES**	**NO**	**MAYBE**
Does the data file have: • legal value? • evidential value? • informational value?			
Does the data file have: • immediate research value? • long-term research value?			
Does the data file contain original micro-level data?			
Is the file likely to be used for: • statistical analysis? • retrieval of single cases?			
Is the data file in danger of deterioration or destruction in its present location?			
Do similar records exist elsewhere? Are they: paper ☐ microform ☐ (please check)			
Will the other records be preserved?			
Do related records contain information not included in the data field?			
Does the data file contain information not included in related records?			
Are related records more appropriate for preservation? • regarding the cost of preservation? • regarding arrangement?			
Are there restrictions on use: • of paper records? • of electronic records?			
TECHNICAL CONSIDERATIONS			
Can the data file be read?			
Is the documentation complete?			
Is special hardware required?			
Is special software required?			
Approximate volume of paper records:			
Approximate number of electronic records:			
Logical records length (the size of the computerised file as opposed to the tape itself):			

Figure 11: Appraisal Checklist for Electronic Records

Adapted from: Margaret L Hedstrom. *Archives & Manuscripts: Machine-Readable Records.* (Chicago, IL: Society of American Archivists, 1984), p. 43. Reprinted by permission of the Society of American Archivists.

Activity 26

What are the principles for appraising electronic records? Are they different from paper records. If so why?

Choose a current computer system in your organisation (preferably the system you inventoried in the previous activity). For that system, complete the appraisal checklist form to the best of your ability.

DISPOSAL

If electronic records are proposed for permanent retention, the disposal instructions should identify precisely which files will be transferred to the archives and specify a time frame for the transfer. For example, if data is collected periodically, with separate data sets created for each period, the disposal instructions should stipulate appropriate file breaks, which delineate the data sets, and specify when each data set should be transferred to the archival institution. (A file break refers to the appropriate point within a large data set, that is a group of related electronic records that are organised and treated as a unit, for splitting it.

Consider the following example, taken from: US National Archives and Records Administration (NARA), Office of Records Administration. *Managing Electronic Records*. Instructional Guide Series (Washington, DC: NARA, 1990), page 22.

Disposal: Create annually a new master file to record applications received after the end of the prior year. Close master file for prior year after verification of final decision on all applications recorded in the file. Transfer master file for prior year to the archival institution three months after it is closed.

(A master file [may also be called a main file] is a relatively long-lived computer file containing an organised and consistent set of complete and accurate data. It is usually updated periodically.)

For an ongoing system, where the administrative needs of the agency prevent the use of such periodic file breaks, routine system update procedures could be used to trigger the transfer of data to the archival institution according to disposal instructions. Appropriate benchmarks and explicit instructions should be established to measure the success of such procedures.

Consider the following example taken from US NARA, *Managing Electronic Records, pages* 22-23.

Disposal: At end of fiscal year, copy records that have had no activity to history file and delete from master file. Transfer a copy of the annual history file to the archival institution immediately after it is created.

Copy records from history file to current master file for any case where new transactions occur after the case record was migrated to the history file. Destroy agency copy of history file when one year old.

(History files are electronic files copied from inactive master files for long-term or permanent retention.)

ACCESSIONING AND PROCESSING

Once the decision is made to acquire an electronic data file or record, several processing steps are required to produce a master and security backup copy. These steps require access to a computer. Moreover, all processing should be carefully documented and the documentation should be kept as part of the record.

At present, magnetic tape cartridges (specifically 3490 magnetic tapes) tend to be the preferred medium for storage after transfer. There are other storage media (such as diskettes, magnetic cartridges, CD-ROMs and so on), but in practice most archival institutions are still using tape. Various organisations are continuing to test alternatives and it is important to stay abreast of new developments.

The goals of processing electronic records are

- to ensure that the records appraised as permanent are the records that are being transferred
- to ensure that there are no transportability problems with the records that would prevent them from being processed and made available. (Transportability is the ability to move records from the system on which they were created to the system used by the archival institution and then to users of the records.)
- to ensure that the documentation that has been compiled during processing is sufficient to allow the records to be read, used and understood.

The amount of processing necessary to prepare a data file and documentation depends on the complexity of the data and the standards in place at each repository. In general, the procedures required to process data sets are more rigorous than to process simpler kinds of electronic records such as word-processed files.

Records professionals generally agree that there are a set of basic steps necessary to process electronic data files (records). These basic steps are listed below and described in detail in subsequent sections.

They involve

- arranging for the transfer of the data file (record) from the original custodian to the records facility
- verifying the data and documentation
- resolving errors.

Electronic records should be processed as soon as possible once the archival institution receives the files. Options for processing include

- in-house: establish an internal processing programme either with existing funds or supplementary external funding
- contractual: contract with a service provider (such as time sharing arrangements with a computer centre) that can support the preservation programme
- consortium: form a consortium with other organisations to share the costs of processing
- external: establish a monitoring programme when long-term access will not be directly managed by the archival institution
- combination: a mix of the types may be required to meet the needs of the records creators or to address a wide variety of electronic record types.

If the option to contract external services is selected, the computer centre selected must recognise that it may be expected to perform a variety of services that are unique to archival preservation. The following factors also need to be considered.

- *Tape processing capability*: The computer centre must be able to process tapes created at other computer centres, transfer data to new magnetic tape, convert the data to a standard archival format and provide printouts needed for verification. Computer centres with industry standard hardware and a wide range of software packages are best able to handle and reformat tapes.
- *Hardware compatibility*: Consideration must be given to the compatibility between the type of hardware available at the computer centre and the type used by the creating department.
- *Availability of external support*: The availability of consultants, analysts and programmers is important for archivists who need technical assistance with reformatting data files.
- *Data security*: Good data security is essential for repositories that plan to preserve confidential information in electronic form.
- *Cost*: While cost is a concern, a records programme is likely to incur most of its costs for programming services rather than for actual computer use.

> *All processing should be carefully documented and the documentation should be kept as part of the record.*

Arranging for Transfer

It is important to define appropriate transfer requirements for electronic records. Ultimately responsibility for the long-term preservation of electronic records of permanent value should fall within the statutory remit of the records and archives institution. However, this can be achieved by transferring custody to the archival institution or by designating other agencies as places of deposit.

The advantages and disadvantages of custodial and non-custodial strategies are discussed in Lesson 3.

Formats

Which formats are acceptable for transfer and which are not? The archival institution should specify what formats are acceptable for transfer. Records professionals must make decisions about access and preservation formats for all types of records (for example, deciding to microfilm or digitise paper records and so on).

It is easy to confuse access and preservation formats when dealing with electronic records as both formats will be in electronic form. This will require careful consideration of the different types of electronic files (such as word-processed documents, database files, spreadsheets and so on). In short, an archival institution can choose to

- accept a wide variety of file formats and then convert the files into the accepted archival preservation formats

or

- require the records creators to provide the electronic files for transfer in specified preservation formats.

If the original custodian of the records cannot provide the data file in a standard format, additional processing may be required to convert it to an acceptable format for preservation and distribution. Often reformatting involves only simple processing routines such as removing labels from labelled tapes, changing the recording density or converting the character code. In some cases, however, the records staff member may need technical assistance to convert a data set to a standard format.

The best way to determine the appropriate preservation format for electronic files is to

- understand the legal environment (the legal admissibility of electronic records, the status of electronic records in the accepted definition of a record in the environment and so on)

and

- experiment with what happens when files are converted to various preservation formats.

The archival institution should specify what formats are acceptable for transfer.

Documentation

What kind of documentation is expected or required? Records managers should maintain the documentation needed to plan, develop, operate and use machine-readable records and automated systems. This documentation should explain the arrangement, contents and coding of information in a machine-readable file. Two common elements of documentation are described below.

- A diagram or list of record layout/file layout/file description/data dictionary: This document records the contents of the electronic records by describing each item of information in each field (such as the length, type and position of each field and the relationship between files).
- A codebook: This provides an explanation of the codes used to represent information in abbreviated form.

Documentation is not standard and cannot be universally defined. Good documentation should allow the user to read, understand and use the electronic records it describes. For example, users of electronic records need to know how the information in the records was collected, entered and processed. Assembling this documentation should be a regular records management routine.

Documentation at the time of transfer must be adequate not only for the immediate use of the records but also for use over time. The documentation required for reference use can be quite minimal when the records are current and the software in which it was created is widely available. The documentation for long-term preservation should be much more extensive, and there is much to be said for gathering all the information available.

If the records programme receives and must accept electronic files that are not well documented, the transferring department should complete a transfer form. This will help in collecting precise technical specifications, including the following.

- Record length.
- Exact record count. There should be an exact count of the number of electronic records in a file.
- Character code. This code represents alphanumeric data in binary form.
- Block size. A block is a section of recorded information on a magnetic tape or disk, separated from other blocks by a small area of non-recorded tape or disk, often called the inter-record gap or IRG. One block may contain many electronic records or one electronic record may extend over several blocks, depending on size, hardware used and the programmer's decision.
- Type of label. A label is an identifier that provides information about a file, magnetic tape or direct access device. There are two types of labels: external labels identify the physical medium and are used to locate magnetic tapes, diskettes, etc. Internal labels are written in computerised form at the beginning and/or end of a file or volume and provide information that identifies the file(s) or records stored on the device.

- Number of tracks. A track is one of seven or nine parallel rows of bits along the length of a magnetic tape or one of a series of concentric circles on a magnetic disk or diskette where data are recorded.
- Density. This is the number of bits recorded in a single linear track on a magnetic tape or disk, notated in bits per inch [bpi], characters per inch [cpi] or frames per inch [fpi].
- Parity. This is the means of verifying recorded data and detecting errors using binary calculation as a means of identifying data loss.
- File structure. This file structure is the way in which a particular file is organised. A file has a rectangular file structure if it contains data on only one observation or unit of analysis. The file structure is hierarchical if each electronic record contains data on more than one unit of analysis.
- Hardware used.

A transmittal form is useful for gathering this information, obtaining the necessary authorisations for the release of electronic data/records and keeping records of the transfer. The following is an example of a data file transfer/electronic records form.

Records managers should maintain the documentation needed to plan, develop, operate and use machine-readable records and automated systems.

DATA FILE TRANSFER/ELECTRONIC RECORDS

1. *Complete one form for each file on tape.*
2. *Distribute the copies of this form as denoted below.*
3. *Blank forms are available from the National Archives.*

Agency:	Records Disposal Authorisation/Schedule Number:
Division:	File Name (Series Title):
Transferred by:	System Name:
Phone Number:	Dates or Years of Records:
Transfer Date:	Transfer Approved By:

This file is written on tape number(s) (external label):

This file was computer generated on:	Date file was created:

File is number _____ of _____ files on this reel of tape.

Number of electronic records: _____

Length of longest electronic record is _____ characters.

Number of blocks: _____

Blocking factor is _____ electronic records per block.

Block size is _____ characters.

Number of characters in last block is _____.

MODE	TRACK	PARITY	DENSITY	LABEL
BCD	7	Even	556	None
EBCDIC	9	Odd	800	IBM
ASCII			1600	ANSI
FIELDATA			6250	Other
Other				

Comments:

Copy to: 1) National Archives; 2) Data Processing/Operations; 3) User/Custodian of Records; 4) Records Officer

Figure 12: Example of Data File Transfer/Electronic Records Form

Adapted from Hedstrom. *Archives & Manuscripts: Machine-Readable Records,* p. 47.

CUSTODIAL RESPONSIBILITIES

What will the original custodian agree to do or provide when the records are transferred? At the time of transfer to archival custody, the original custodian of the data/records, for instance the Ministry of Agriculture should be encouraged to take the following actions. The records manager will need to follow up on whether these things have been done. If not, the records staff should make provision for doing so.

- Make a duplicate copy of the record or data at the time if transfer. This serves as a back up in the event of loss or physical damage to the master copy during processing. If diskettes are received, they should be virus checked and a security copy should be made prior to performing any processing.
- Compare the record or data with the documentation supplied.
- Identify and document errors in the documentation.
- Consult the supplier of the electronic records or data in the event of difficulty in identifying codes or if there are errors and inconsistencies in the records or data.
- Document the physical files, indicating any difficulties encountered.

Access

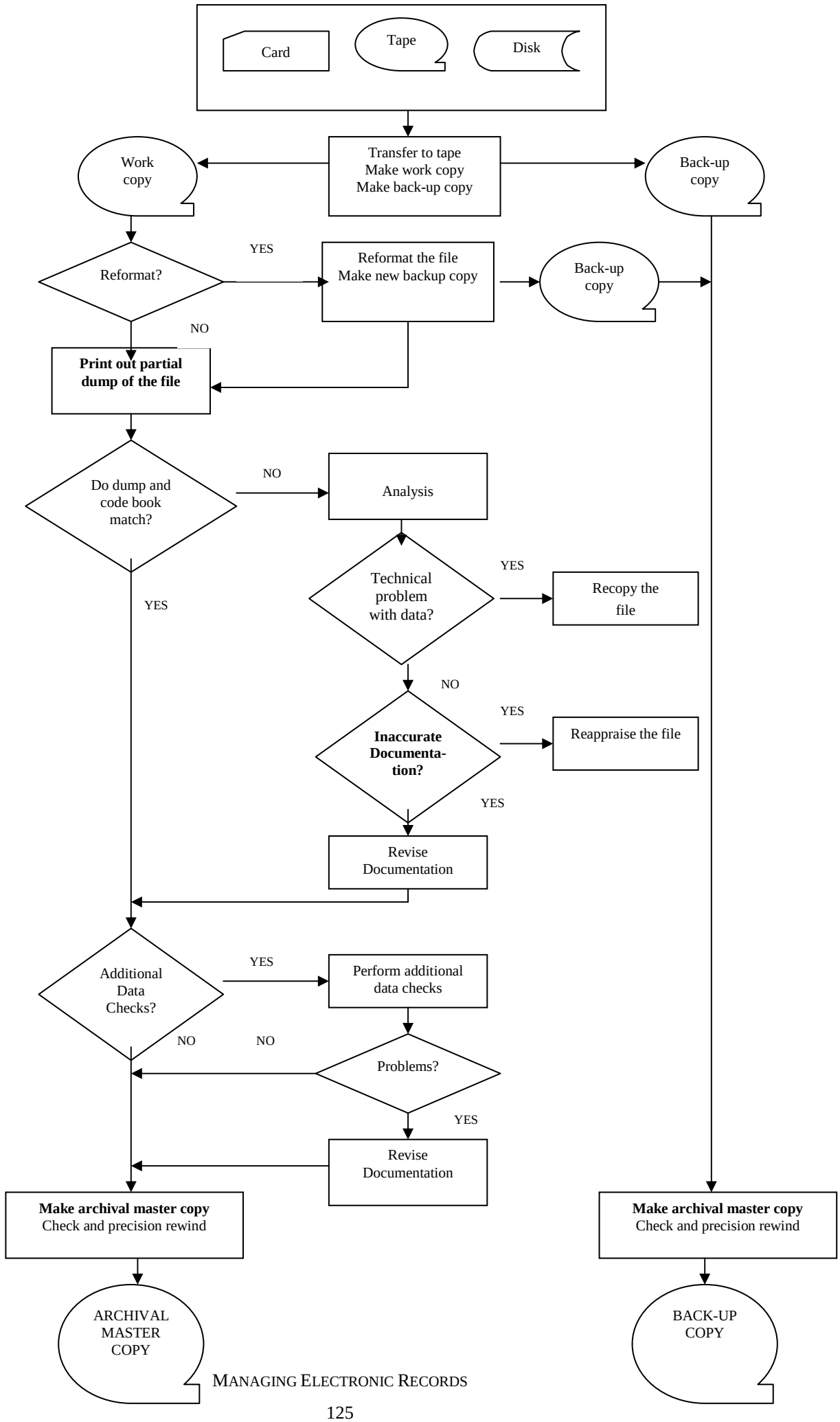
Who will have access to the records and how? Access to the records should be determined in consultation with the creating department. The same rules on accessing traditional paper-based records should apply to electronic records.

In order for electronic records to be used by researchers, they need to be readable, understandable and meaningful. Reference use can, therefore, be a good test of the preservation and processing of the electronic files. Users often identify problems or questions about the records (such as missing codes or files that can then be explained in the documentation). If electronic records do not have access restrictions but cannot be made available to users, then processing has failed.

What will happen if the records transferred are not readable, meaningful and usable? Restoring files from damaged media can be difficult and costly. Bad files or media can often be recovered if the cost can be justified. To avoid this, precautions should be taken to minimise the risk of receiving unreadable or meaningless electronic records. These include

- ensuring that accompanying documentation actually matches records
- verifying that all documentation is available (for example, documentation that only contains even-numbered pages may be missing half the pages)
- checking that the records are indeed saved on the storage media and are readable.

Figure 13 below summarises the steps involved in preparing an electronic data file for long-term retention. This figure has been adapted from Hedstrom. *Archives and Manuscripts: Machine-Readable Records*, pp. 48-49.


Card
Tape
Disk
Transfer to tape
Make work copy
Make back-up copy
Work copy
Back-up copy
Reformat?
YES
Reformat the file
Make new backup copy
Back-up copy
NO
Print out partial dump of the file
Do dump and code book match?
NO
Analysis
YES
Technical problem with data?
YES
Recopy the file
NO
Inaccurate Documenta-tion?
YES
Reappraise the file
YES
Revise Documentation
Additional Data Checks?
YES
Perform additional data checks
NO
NO
Problems?
YES
Revise Documentation
Make archival master copy
Check and precision rewind
Make archival master copy
Check and precision rewind
ARCHIVAL MASTER COPY
BACK-UP COPY

Verifying the Data and Documentation

Another action that must be taken when electronic records are transferred to archival custody is to verify that the data and documentation are intact and valid. The discussion on the verification of the data and documentation that follows pertains primarily to processing data sets. The process may be similar for other types of electronic information with some exceptions, such as Geographic Information Systems (GIS).

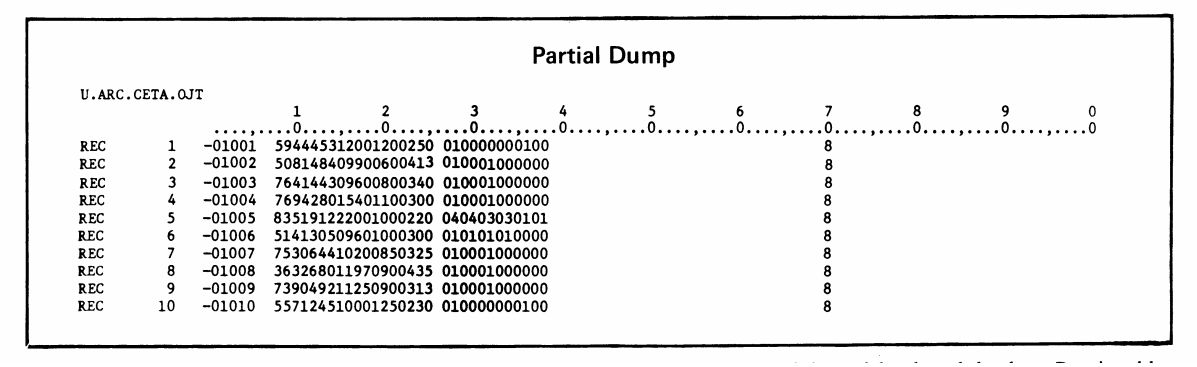
The validation process generates a report that lists, in summary or detailed form, problems that have been identified. During the verification process, the records manager and/or archivist should obtain a record count (that is, an exact count of the number of electronic records in a file). Most computer operating systems provide a record count when the tape is read. To ensure that the file is complete, the record count for the archival copy should be compared with the number of electronic records reported by the original custodian.

The records centre should obtain a printout, called a partial dump, of selected records from the data file. It is common practice to print out the first ten and last ten electronic records in the file. The exact number of records will vary depending upon the complexity of the file. The records centre must verify that the codebook, is accurate and complete and that each data element is located in the correct position. Staff must compare the dump with the file layout and codebook. Each field on the printout is marked off, and its contents are compared with the acceptable values as indicated by the codebook. See Figure 14 for an illustration of a codebook and a partial dump.

Verification procedures can uncover two types of problems.

1. They may reveal inaccuracies in the record layout or codebook. Ongoing records systems are subject to frequent changes and revisions that are not always indicated on the record layout. A new data element may be added to a file (such as when an organisation's information requirements change). Codes are revised or expanded as data processing proceeds, but these changes are not always noted in the codebook. To resolve errors or address omissions from the documentation, the records staff should discuss the problems with the original custodian and revise the documentation accordingly.

2. They may reveal errors in the data itself. A visual examination of the dump will reveal obvious errors that occurred when the data was transferred. As in the following example, the appearance of large numbers of blanks or unusual characters, where letters or numbers should be, is an indication that the data was copied incorrectly. This type of error occurs if the original custodian provides the wrong technical specifications with the tape or if the data is copied incorrectly. Usually, staff can rectify such errors by recopying the file with the correct technical specifications.



Partial Dump

U.ARC.CETA.OJT

```
                    1         2         3         4         5         6         7         8         9         0
          ....,....0....,....0....,....0....,....0....,....0....,....0....,....0....,....0....,....0....,....0
REC     1   -01001  594445312001200250 010000000100                                 8
REC     2   -01002  508148409900600413 010001000000                                 8
REC     3   -01003  764144309600800340 010001000000                                 8
REC     4   -01004  769428015401100300 010001000000                                 8
REC     5   -01005  835191222001000220 040403030101                                 8
REC     6   -01006  514130509601000300 010101010000                                 8
REC     7   -01007  753064410200850325 010001000000                                 8
REC     8   -01008  363268011970900435 010001000000                                 8
REC     9   -01009  739049211250900313 010001000000                                 8
REC    10   -01010  557124510001250230 010000000100                                 8
```

Figure 14: Codebook and Partial Dump of a Data File

Adapted from Hedstrom. *Archives & Manuscripts: Machine-Readable Records*, pp. 51.

When validation is required, some form of validation statement should be drawn up to document this stage of processing. Figure 15 is an example of a validation statement.

Resolving Errors

Resolving errors requires the records programme to collect additional information from the original custodian. It is also necessary to refer to any source documents. As a general rule, records repositories do not correct errors in the data by altering the content of a file. Changing the content of a file can reduce its evidential value, especially if decisions were made on the basis of erroneous data. Rather than altering the data in a file, the records staff notes errors and inconsistencies in the documentation.

Each repository should develop its own policies regarding error detection and correction based on the type of record involved, the availability of resources to improve the quality of the data and the type of patrons the repository serves. Any known errors in the data must be noted in the documentation and users should be informed of any steps taken by a repository to alter the contents of a file. If significant inconsistencies or large numbers of errors are uncovered, the records manager and/or archivist will need to re-evaluate the administrative and research value of the file. Figure 16 illustrates a printout showing errors in the tape copy procedure.

Electronic Records Section, National Archives

10 September 1998

J. Doe

NA-98-251

VALIDATION STATEMENT

When the National Archives acquired custody of this file, the processing procedures called for a manual comparison of the documentation with printed portion of the records in each file. This manual comparison is referred to as a 'preliminary assessment' or 'validation'. The number of records that were compared varied from file to file. However, as a general rule the comparison involved less than ten records and was limited to only the first and last records in each data set. This is a statement of the results of the preliminary assessment or validation.

Title: accounting transaction records, 1-20 August 1997
Logical record length: 40
Number of data sets: 1

No discrepancies between the documentation and a sample dump of the new data were noted during manual validation.

Figure 15: Example of a Validation Statement

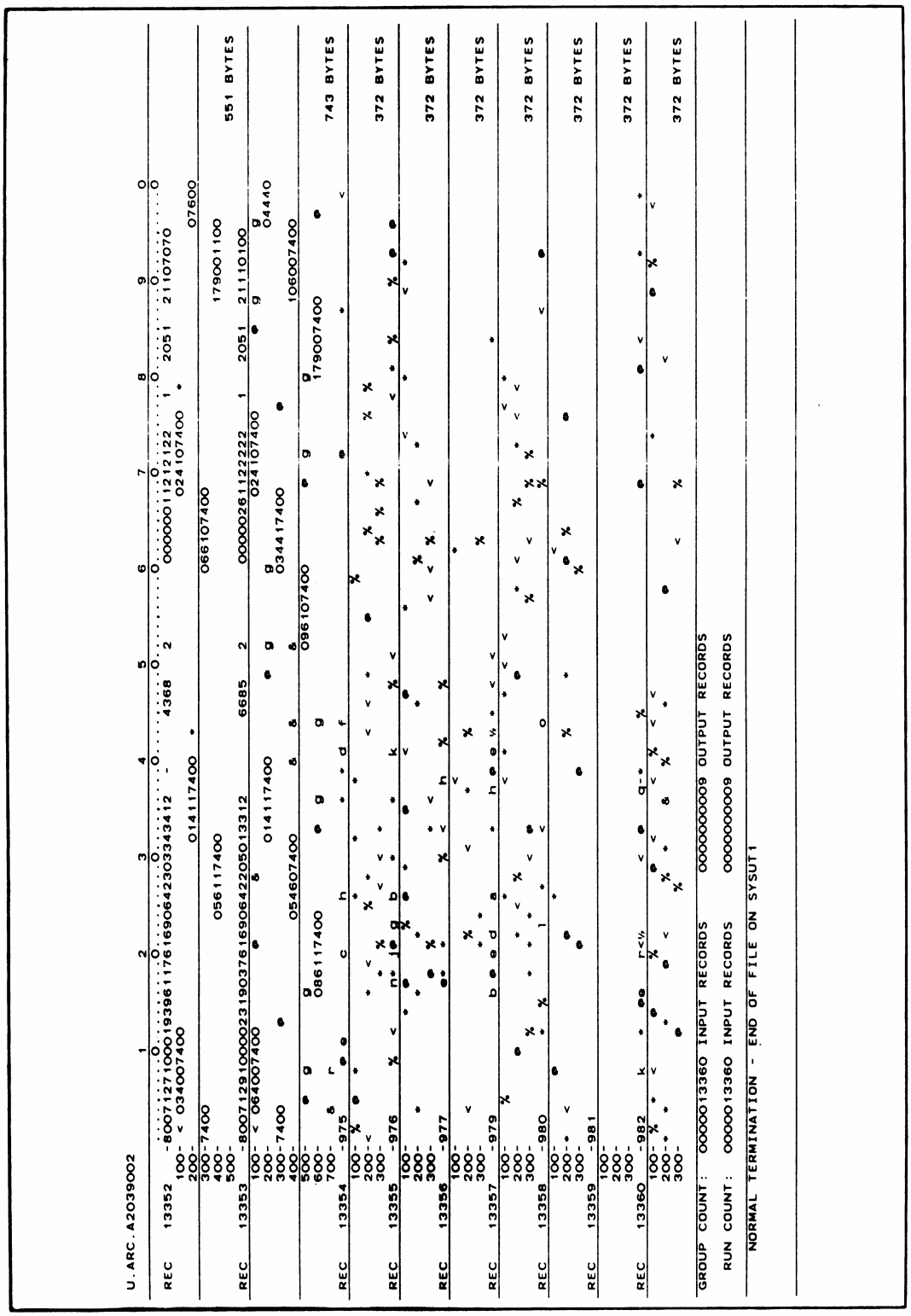


Figure 16: A Printout Showing Errors

Adapted from Hedstrom. *Archives & Manuscripts: Machine-Readable Records*, pp. 52.

Once processing is completed, a master copy and security back-up copy of the data file should be created. These copies are different from those made at the time of transfer. Both copies should be recorded on high-quality new magnetic tape that has been tested and certified as error-free at a given density by the manufacturer. Transfer to new tape allows the archival institution to monitor the quality, age, and maintenance of the storage medium. It is an acceptable and economical practice to use the entire length of a tape by storing as many files as possible on a single reel.

Prior to storage, the master and security copies should be checked for write parity errors and rewound under constant tension. The security copy should be stored off-site to permit recovery of the data in the event of damage to the facility housing the master copy.

Once processing is completed, a master copy and security back-up copy of the data file should be created.

Activity 27

Summarise the steps for accessioning and processing electronic records. Highlight the key considerations.

What are some of the problems that one might encounter and what steps does one need to take to avoid them or reduce the risks?

PRESERVING ELECTRONIC RECORDS

Magnetic tape is not a permanent archival storage medium.

Magnetic tape is not a permanent archival storage medium. Under optimal conditions, tape cannot be expected to last more than twelve to twenty years. Until a more stable and economical storage medium is developed, data files have to be transferred to new tape periodically. However, problems associated with tape deterioration are reduced and tape life is increased if tapes are stored under proper environmental conditions and subjected to regular maintenance routines, including:

- storing magnetic tapes in a dust-free environment at a constant temperature between 16-20 degrees Celsius and at a constant humidity between 35-45 percent
- reading an annual statistical sample of all permanent and unscheduled data sets stored on magnetic tape to detect any loss of data

- rewinding tapes periodically at normal tape speed to ensure constant tension
- copying data on the tapes to new or re-certified tapes at lease once every ten years or more frequently when necessary to prevent the physical loss of data or technological obsolescence of the medium.

A regular maintenance routine also enhances the longevity of the tape and usually makes it possible to detect tape deterioration before extensive damage to the data occurs. Once a year a sampling of tapes should be examined for physical evidence of being wound too tightly; protruding layers of tape; broken reels, hubs or canisters; surface contamination; physical creases or scratches on the tape; or other signs of deterioration including tears, mould, and so on. Many tape problems can be remedied by cleaning the tape and rewinding it under constant tension.

Once every one to two years, a small sample of the tapes in storage should be placed on a tape drive and tested to see if there are any problems in reading the contents of the tape or 'read errors' (the previous section on verification procedures discusses methods for detecting and resolving such read errors). If testing reveals read errors, additional tapes should be tested. Remedial actions of cleaning and rewinding under constant tension should be taken to correct any errors, but if these recovery procedures fail, the data should be transferred to new tape.

All tapes in storage should be cleaned and rewound under constant tension every one to two years regardless of their physical appearance or evidence of read errors. All data files should be transferred to new tape every twelve to twenty years, or more frequently depending upon the stability of the storage conditions, the regularity of maintenance procedures and the results of periodic tests of the tape. It is essential to keep precise records of the manufacturer, purchase date, creation date and dates when maintenance procedures and tests were performed for preservation purposes.

Long-term access cannot be assured if the data are stored in a format that is dependent on outmoded computing equipment. Therefore the threat of technological obsolescence is an ongoing concern for electronic records programmes. As older storage formats and recording techniques are replaced with new technological innovations, the archives has an obligation to convert its holding to a format that is compatible with current technological requirements.

Activity 28

Describe how you would develop and maintain a regular maintenance programme for the care of electronic records in your organisation.

MIGRATION STRATEGIES

When new hardware and software are introduced into an organisation, digital materials must be migrated to the new system in order to retain the ability to retrieve, display and make use of the information in them. Remember the definition included earlier in this module.

> ***Migration:*** The transfer of data in electronic form from one hardware or software configuration or generation to another.

Ideally, migration should be carried out without any loss of information. However, loss of some information may be inevitable because of the incompatibilities between the original system and the new system.

Some of the more common options for migrating digital information and their advantages and disadvantages are outlined in the Figure 17 below. This figure offers an overview of these options and may provide useful reference information.

Rather than choosing a single approach to migration, repositories should select appropriate migration options that take into account the need to protect the integrity of records and retain as much of the utility as possible.

Certain formats of records are better suited for specific migration strategies. The adoption of internationally recognised data and document standards is another important factor, as discussed earlier in Lesson 2. When the software application generates data and documents in a proprietary format, it may be necessary to preserve the entire system in order to access the information. This includes the application itself, the IT platform and the documentation.

(A platform is the underlying hardware or software for a system. For example, the platform might be an Intel 80486 processor running DOS Version 6.0. The platform could also be UNIX machines on an Ethernet network. The platform defines a standard around which a system can be developed. Once the platform has been defined, software developers can produce appropriate software and managers can purchase appropriate hardware and applications. The term is often used as a synonym for operating system.)

It may even be necessary to retain the services of the staff with the know-how to use the application and the platform. For example, the platform might be an Intel 80486 processor running DOS Version 6.0. The platform could also be UNIX machines on an Ethernet network. The platform defines the standard around which a system can be developed. Once the platform has been defined, the appropriate software and hardware can be selected.

The cost of such a solution should be carefully weighed against the intrinsic value of the information. Converting data and documents to standard formats is a solution that ensures greater durability. However this may impose limitations on the organisation regarding the software they can use.

Loss of information and loss of functionality are frequent consequences of migration. In order to reduce loss, a migration programme should involve

- establishing formal policies for migration to substantiate why specific options for migration were chosen and how they were used
- assigning responsibility for migration to a unit or person
- assessing the impact of migration strategies on the integrity and utility of records (including testing the approach on a sample of records)
- establishing and implementing an appropriate quality control procedure for migration (the method chosen may vary)
- documenting migration procedures and actions by preparing thorough and complete documentation of any measures taken to convert records to new formats (documentation should include the organisation's migration policy, the reasons for selecting a specific migration option, the results of any tests or evaluations of the impact of the methods used, the specific methods used and any known changes to the records that resulted from conversion or reformatting).

Repositories should select appropriate migration options that take into account the need to protect the integrity of records and retain as much of the utility as possible.

Activity 29

Write a brief description of what migration strategy would best suit your organisation and why.

Migration Strategy	Advantages	Disadvantages
1. ***Transfer to paper or microfilm:*** this is the oldest method of migration and has been used effectively for textual documents that may be retrieved and read, but that will not be altered and reused.	• from a legal and a technological point of view, the methods for demonstrating the authenticity of printed or microfilmed documents are well established. • alterations to records are more difficult and are relatively easy to detect • transfer to film or paper eliminates the problems of software obsolescence	• much of the functionality for both rapid retrieval and reuse is lost • this method does not work well for many formats of material because of the limited options for manipulation, linkage and presentation Hybrid solutions can mitigate some of these disadvantages: retain computerised indexes to records to ease retrieval scan to reconvert printed materials to digital form, etc.
2. ***Store records in a 'software-independent' format***: this strategy involves transferring electronic records to a simple 'software independent' format prior to storage. It has been used extensively with numeric data files and with some textual materials (eg text files stored in ASCII)	• the need for special software for retrieval and reuse of the records is limited • once records are formatted in software-independent form, simple copying is all that is needed during subsequent migrations	• special programs may need to be written to transfer the records into a software independent format if the original system does not have the ability to 'export' files in a neutral format (Exporting means to format data in such a way that it can be used by another application.) • information and functionality may be lost in conversion • cannot be used with many complex file formats (multi-media records, hyper-text).

Figure 17: Migration Strategies

Derived from Margaret Hedstrom. *DRAFT Section of a Report on Migration Strategies Prepared for the Experts Committee on Software Obsolescence and Migration.* Fermo, Italy (April 1996).

Migration Strategy	Advantages	Disadvantages
3. ***Retain records in their native software environment***: one option is to retain electronic records for as long as possible in the hardware and software system that was used to create them. This may be the only strategy available for preserving records in very specialised formats that cannot be accessed without the original software. [This strategy is closely related to 7 as it assumes the software will be available].	• eliminates the need to reformat records • retains all of the functionality of retrieval, display and manipulation	• requires long-term maintenance of hardware and software that may become obsolete (if the records are retained by the originator, a business decision would be made to migrate them to a new system if ongoing access is required; if the records have been transferred to an archives, the archives will have to migrate them to a new systems before their native environment becomes obsolete)
4. ***Migrate records to a system that is compliant with opens systems standards***: this strategy is an alternative to storing electronic records in a software independent form. Instead it converts them to a format that complies with widely used international standards (ie open standards).	• even through widely adopted standards are subject to change, they are not likely to change as often as proprietary software	• the initial expense of conversion from proprietary to standard formats (ideally, organisations should create records in standard formats that support their export to other systems) • conversion can result in the loss of information and/or initial functionality (the impact of conversion must be evaluated and tested in advance and the conversion process must be carefully documented) • many so-called 'open standards' have evolved into variant versions used by particular software manufacturers that may not be compatible

Figure 17: Migration Strategies (cont.)

Migration Strategy	Advantages	Disadvantages
5. ***Store records in more than one format***: this can reduce the uncertainty of software obsolescence and increase the options for future migration (eg textual documents may be kept in two different word processing formats). This may be a sensible approach if no open standards exist and where several software products are competing for market share. Many systems today provide the capability to export documents in two or more formats so that special conversion is not needed.	• the organisation has an alternative format should one of the software packages become obsolete • retains both functionality and integrity of records when a single format cannot support both functions (eg electronic records stored as both bit-mapped image files and as scanned text in ASCII code. The bit-mapped images provide a physical reproduction of the original document, but the bit-mapped image cannot be searched; the scanned ASCII text may not have sufficient structure and contextual information to stand alone as a reliable record, but can be used for access and retrieval. (The term bit-mapped refers to hardware and software that represent graphic images as bit maps. Bit maps are a representation, consisting of rows and columns of dots, of a graphics image in computer memory. They are often known as *raster* graphics.)	• increases the cost of storage and maintenance

Figure 17: Migration Strategies (cont.)

Migration Strategy	Advantages	Disadvantages
6. ***Create surrogates for the original records***: if the software dependencies are so extensive that the records cannot be migrated to different systems it may be necessary to create a 'surrogate' of the original record. Surrogates are documents that represent the original but that do not reproduce its original structure or content (eg summaries or abstracts of documents might serve as surrogates for textual records). This strategy may be necessary when access, retrieval or display of records require maintenance of executable software. This strategy should only be used when other options have been considered and found too expensive to not be feasible from a technology standpoint.	• if surrogates are created in software-independent formats or in formats that comply with open system standards, the complexity and cost of future migration will be reduced	• unless the process is carefully controlled and fully documented, the integrity of the records will be lost • surrogates rarely retain the functionality and utility of the original documents and often result in loss of content as well • the authenticity and legal admissibility of the record is open to challenge
7. ***Save the software needed for access and retrieval*** [This strategy is closely related to 3].	• as an interim measure, it could provide repositories with an option of retrieving obsolete document for some years into the future	• the technical complexity of preserving software; most software is written to work only with specific hardware. As a result, saving software also implies saving the hardware needed to run it.

Figure 17: Migration Strategies (cont.)

Migration Strategy	Advantages	Disadvantages
8. ***Develop software emulators***: an alternative to preserving software is the development of new programmes that can 'emulate' (ie replicate) the functionality of obsolete software. If this strategy is used, it is critical to have access to documentation of the original software system that explains the precise software requirements needed to open and retrieve a document and these must be written in a software-independent form.	• does not require access to the same hardware and/or software used originally for the initial application	• special programs have to be written to emulate the obsolete software • can be an expensive and complicated undertaking; repositories considering this approach will need access to highly competent software designers and programmers • not fully tested • copyright issues have not been resolved

Figure 17: Migration Strategies (cont.)

DESCRIBING AND DOCUMENTING

The next step in an electronic records programme is to establish processes for describing the electronic records and documenting the contents of electronic files.

Adequate documentation makes it easier to use electronic records. In this sense, it is an important supplement to the regular descriptive finding aid produced by the archivist or records manager. Documentation improves the quality of interpretation and provides a means of disseminating information about a file to potential users. It also reduces the need for reference staff to answer many specific questions about the file.

> *Documentation is an important supplement to the regular descriptive finding aid.*

In these respects, documentation of electronic records fulfils the same function as registers and inventories of archival records in more conventional formats. Thorough description of electronic records is essential because the records are unusable without adequate documentation and the technical characteristics require an item-level description of each data element. Each archival institution must also maintain records needed for in-house administrative and maintenance functions for electronic records. Such in-house records as accession and processing records, tape maintenance logs and records of usage are not part of the user's guide.

While there are few commonly accepted standards for adequate documentation, data archivists generally agree on what constitutes minimal documentation. Essential documentation must include a description of the file's identity, contents and organisation. Normally this information is conveyed through a finding aid (that is, a user's guide or documentation package) consisting minimally of a title page, abstract, codebook and printouts of selected records from the file.

Archival repositories may choose to describe and catalogue electronic records according to the agreed descriptive standard (eg ISAD(G), MARC AMC, RAD, MAD, or in-house descriptive and cataloguing conventions).

> *It is not unusual for electronic records to be described in two or more formats, to suit traditional archival practice and electronic records requirements.*

For more information on description, see Managing Archives.

PROVIDING ACCESS

The final step in an electronic records programme is the development of reference services and provisions for user access to the records. Possible services range from simply making the data and related documentation available to providing programming assistance and statistical consultation. Each repository must develop its own policies regarding the extent of user services. These policies should be based on

- existing practices for other types of records in the repository
- the needs and skills of the clientele
- the availability of technical and computational assistance to researchers and staff.

Each repository has a minimum obligation to provide physical access to electronic records along with adequate documentation. Normally, physical access is arranged by creating a user copy of the desired data file which the researcher takes to a computing centre for additional processing and analysis. Physical access to the archival master copy should not be granted under any circumstances because of the potential hazard of damage to or alteration of the data.

The repository should offer users some choice of technical specifications governing the exact physical format of the data file to assure maximum compatibility with other computer systems (choices may even include a printed facsimile). Every repository should be capable of providing these basic services to ensure equal access to all patrons regardless of their technical skills or access to computing facilities. The provision of physical access through user copies or printed transcriptions relieves the archival institution of the burden of providing elaborate technical support.

More elaborate user services are desirable and may be necessary to meet the needs and expectations of the researchers. Some users request extracts from a file rather than a copy of the entire file. Others are interested in the data pertaining to only one case or a few cases and wish to search through a data file for the relevant records. If possible, the archival institution should develop the capacity to provide data files or extracts that meet precise user specifications.

Policies governing access to confidential information can pose an acute problem for many data archives because of the tendency to collect relatively recent, micro-level data, some of which may have been collected with assurances of confidentiality. A variety of practical techniques exist to mask the identity of individual cases in an electronic data file (record).

The most common technique is to create public-use or disclosure-free versions. Computer technology makes it possible to delete personal identifiers (names, addresses and so on) from a file prior to its release. However, the removal of personal identifiers does not always provide adequate protection against disclosure of individual identities. Statistical (or deductive) disclosure can occur when a case has a unique characteristic or a combination of attributes that permits its identification solely on the basis of its outstanding features (such as an income in excess of a certain amount). The risk of statistical disclosure may require additional processing of the

data set prior to its release.

Repositories should not release public-use versions of restricted records without the approval of the original custodian and review by statistical experts. Any techniques used to mask disclosure of individual names should be fully documented in the user's guide. The repository should always maintain a complete version of the original data for use in the event that access restrictions are modified or removed.

The acquisition of electronic records often requires expanded reference services. The user's guide is the basic reference tool for data files and, if adequate, contains enough information to enable researchers to access and analyse each data file.

Each repository should actively promote the use of its electronic records by publicising its holding as widely as possible. Many users come from the social sciences, economics, business, education and the natural sciences. Many are unaware of the services offered by traditional archival institutions. In order to reach these groups, holdings should be publicised through wide dissemination of abstracts, published guides to electronic records, special subject guides and inclusion of electronic records in general repository guides.

Archival repositories have a minimum obligation to provide physical access to electronic records along with adequate documentation.

Activity 30

What specific considerations would you take into account when considering an access policy for electronic records in your own archival institution?

DEVELOPING SYSTEMS FOR THE FUTURE

As organisations develop new systems, the requirements for creating, capturing, preserving and making available electronic records should be incorporated from the very beginning, at the planning and design stage.

For example, systems designers and records professionals should incorporate retention scheduling into the design of new systems. Ideally, the system should be programmed to identify archival records based on rules defined by the archivist. Even the specifications for transferring the records to the control of the archival institution according to predefined retention periods should be incorporated into the procedures and technical specifications of the system. However, this ideal is not yet a reality.

Record-keeping requirements will only be systematically built into systems design when records managers are involved at the front end of the systems design life cycle. These record-keeping requirements are statements in statutes, regulations or directives that provide general and specific guidance on particular records to be created and maintained by the department. Since each department is legally obliged to create and maintain adequate and proper documentation of its organisation, functions and activities, departmental record-keeping requirements should be issued for all activities at all levels and for all media and should distinguish records from non-record materials for departmental purposes.

In reality, attempts to incorporate record-keeping requirements successfully are still in the development stage. Nonetheless, if records professionals are to ever ensure that systems developers consider record-keeping requirements, it is important that they understand the broad stages involved with the development of computer systems. This understanding will enable them to recognise where record-keeping requirements need to be factored into the process; thus they can participate effectively in systems design and ensure that records needs are addressed.

The relationship between the various stages in computer systems development and record-keeping considerations is illustrated in Figure 18 below.

As organisations develop new systems, the requirements for creating, capturing, preserving and making available electronic records should be incorporated from the very beginning, at the planning and design stage.

Activity 31

Write a brief description of what role you believe records managers could play at each stage of the development of computer systems. What role would the archivist have?

Integrating Common Record-keeping Considerations into Computer Systems Development		
Stages of Systems Development and Activities	**Common Record-keeping Problems**	**Records Management Solutions**
PLANNING & ORGANISATION (SYSTEMS ANALYSIS) • identifying organisational information need(s) • analysing organisational need systems analysis includes: sources of data, outputs, internal and external constraints, controls and control points, interviews, questionnaires, observation, systems documentation, document findings. • conducting benefits analysis • conducting preliminary feasibility study	• stakeholders don't understand that the system will create, maintain and use records • essential records policies and management practices are not reflective of organisation needs • lack of proven methodologies that incorporating record keeping into the development of information systems	• inventory and analyse existing systems to define the current situation and identify objectives to be met • identify records schedules relevant to the function that will be supported by the system • identify relevant legislation and organisational best practice that requires the existence of records
DEFINING REQUIREMENTS • defining system requirements. This includes analysing: stability of the environment, complexity of the environment, user experience, analyst experience. • developing a framework for studying decision making • documenting user requirements	• electronic records functionality is not identified as part of systems design – there is little understanding that the need for records exceeds the life of the system • little recognition is given to the need for records to support legal and evidentiary needs	• identify and define record-keeping requirements as found in relevant legislation, regulations, etc (refer to records schedules). There will be requirements for creating records at the business process level, records maintenance and accessibility requirements at the record level and systems reliability requirements at the system level. • define data and document standards that will support migration

Figure 18: Integrating Common Record-keeping Considerations into Computer Systems Development

Integrating Common Record-keeping Considerations into Computer Systems Development		
Stages of Systems Development and Activities	**Common Record-keeping Problems**	**Records Management Solutions**
CONCEPTUAL DESIGNING • designing the system (ie modelling) • specifying software/hardware requirements • specifying audit, control and security requirements • designing the system's architecture • refining design specification • integrating and testing software • integrating and testing the system within the organisational framework • identifying critical issues	• record-keeping requirements are not integrated into the conceptual design of systems • systems designers do not realise the need to integrate diverse documentation into records • shortcuts often lead to the loss of context	• review/evaluate applicability and understandability of record-keeping requirements • include long-term preservation issues in testing
SYSTEMS ACQUISITION • selecting application software ('off-the-shelf', modifiable or tailored) • selecting a vendor • selecting hardware • issuing requests for proposals/requests for information • financing systems acquisition • analysing financial alternatives	• hardware vendors and commercial software manufacturers are not generally aware of the need for structural and contextual information in order to keep records electronically • When analysing financial implications, loss of records is not considered	• ensure that record-keeping requirements are factored into the proposals/requests for information that are sent to vendors • encourage the use of agreed internationally recognised information technology standards

Figure 18: Integrating Common Record-keeping Considerations into Computer Systems Development (cont.)

Integrating Common Record-keeping Considerations into Computer Systems Development		
Stages of Systems Development and Activities	**Common Record-keeping Problems**	**Records Management Solutions**
PHYSICAL DESIGNING • evaluating design alternatives • preparing design specifications including: communications configurations, storage medium and structure, input mode and frequency, output mode and frequency, processing operations • preparing conceptual systems design report • designing layouts • developing and writing programmes developing computer procedures • designing controls • developing the logical and physical model • designing document and systems flow charts • designing data flow diagram • developing work measurement & analysis • developing prototype	• record-keeping requirements are not included in the design of systems • often the document and systems flow charts and the data flow diagram do not have the necessary long-term view that a record-keeping perspective adds • record-keeping controls are not factored into the controls of the system, as are audit and security controls	• ensure that systems designers understand what exactly the record-keeping requirements are and why they are necessary. Describe the relationship between record keeping, auditing and security controls.

Figure 18: Integrating Common Record-keeping Considerations into Computer Systems Development (cont.)

Integrating Common Record-keeping Considerations into Computer Systems Development		
Stages of Systems Development and Activities	**Common Record-keeping Problems**	**Records Management Solutions**
IMPLEMENTING & CONVERSION TO NEW SYSTEM • installing the system • testing the system • training users to use the system • writing systems documentation	• opportunities are often missed to train users to name and store records appropriately when implementing a new system • important data and/or records may be lost when legacy systems are imported into new systems	• develop computer desktop management guidelines for creating, naming, storing, etc records on the new system • ensure that IT staff are aware of the problems of importing records and/or data into new systems; discuss migration options; sample imported data and/or records to check whether they have been converted successfully
OPERATION & ADMINISTRATION • running and maintaining system (routine) • trouble-shooting problems as they arise • repairing and maintaining as needed • upgrading when necessary • practicing/testing disaster plan • backing-up system • training employees who join the organisation after the system has been implemented	• important data and/or records may be lost when systems are upgraded • the long-term preservation needs of electronic records are often not considered when deciding how best to back-up systems • most organisations do not create a culture of record keeping that is passed on to new employees	• ensure that IT staff are aware of the potential risks to records as a result of upgrading systems so that realistic precautions can be considered • make sure that back-ups are done in accordance with standards agreed with the national archives/national records centre • educate all new employees to use the computer desktop management guidelines

Figure 18: Integrating Common Record-keeping Considerations into Computer Systems Development (cont.)

Integrating Common Record-keeping Considerations into Computer Systems Development		
Stages of Systems Development and Activities	**Common Record-keeping Problems**	**Records Management Solutions**
REVIEWING & EVALUATING • carrying out a post-implementation review and analysis of the system	• there is little understanding of the nature and extent of planning required to include records management functionality in new information systems • organisations are not aware of the cost implications for adding record-keeping controls after the system is put in place	• measure the systems performance against the record-keeping requirements identified • monitor corrective actions

Figure 18: Integrating Common Record-keeping Considerations into Computer Systems Development (cont.)

SUMMARY

This lesson explored the main components that comprise an electronic data and records management programme. Broadly the programme can be divided into two parts. The first responsibility is to manage the electronic records that already exist in the organisation, including:

- inventorying electronic data/records
- scheduling
- appraising for permanent preservation
- disposal
- accessioning and processing
- preserving electronic records
- providing access and reference to electronic records.

The second task is to develop systems for the future. This involves integrating record-keeping requirements into systems design.

STUDY QUESTIONS

1. Why have many archives started their electronic records programmes by addressing the problem of data sets?

2. Why is it much harder to deal with other kinds of electronic record?

3. What is the difference between a legacy system and a current system?

4. What should be the goal of an electronic records management programme?

5. List seven activities required by an electronic records management programme?

6. What is the purpose of record keeping systems inventory?

7. Should records from a system be scheduled piecemeal or comprehensively?

8. What standards should be used for appraising electronic records?

9. What considerations should be taken into account when deciding whether to print out electronic records?

10. What kinds of records need to be kept in electronic format?

11. List eleven appraisal criteria for electronic records.

12. What are the factors that should be taken into account when estimating the cost of keeping an electronic record?

13. Suggest six types of records that could be considered for permanent preservation.

14. What are the three goals for processing electronic records?

15. Suggest five options for processing electronic files.

16. Is it the role of the archival institution to specify formats for records that it is prepared to accept transfer?

17. What technical information should be gathered systematically when a record is transferred to the archives?

18. What are the two types of problem that verification procedures must be designed to uncover?

19. What should a migration programme include to reduce the risk of losing information or functionality?

20. What is the minimum reference service that an archive should provide?

21. What techniques are available for dealing with files containing confidential information?

22. How well developed is the strategy for involving records professionals in the design of computer systems?

23. Name the eight stages of computer systems development.

24. What could a records manager contribute to systems acquisition?

25. Why is it necessary to co-ordinate electronic and paper based systems?

26. What are the two main options for ensuring that there is a strategy for keeping the complete record?

ACTIVITIES: COMMENTS

Activities 23-31

All the activities in this module are designed to help you examine your institution's existing electronic records management issues in relation to the suggestions and recommendations offered here. You are encouraged to examine your findings for each activity and compare them with the information provided throughout this module.

LESSON 6

WHAT TO DO NEXT?

This module has provided an introduction to the strategies that records and archives programmes can adopt to begin building an electronic records programme. It has explained the concept of an electronic record and discussed some of the qualities of electronic records. It has also identified the stakeholders and those responsible for the establishment of such a programme and discussed the management issues involved with preserving electronic records adequately. It has described a model electronic records programme and provided information about the issues that need to be considered in establishing the programme. It has also discussed issues involved with the management of electronic records.

ESTABLISHING PRIORITIES FOR ACTION

The principles and practices outlined in this module are fundamental to the effective management of electronic records. They provide a sound theoretical and practical grounding in the processes of establishing or improving electronic records management systems. But in considering improvements to systems in your own organisation, what should be done first? Each situation will differ. Given the fact that many of the practices for electronic records management are still in their infancy, the most important objective for the archives is to put into place the foundations that will allow an electronic records management programme to be effective as an when technical solutions emerge. Try the activity below then consider the suggestions offered.

Activity 32

Based on the work you have done for this module, what priorities would you establish for establishing or improving an electronic records management programme? What would you do first? What next? Why?

Priority 1: Establish a Plan

The first step is to establish a plan of action that can receive senior management support. Thus the aspects of particular concern to senior management are emphasised in the discussion below. Consider the following options as some suggestions for the steps that should follow to empower the national archives to play an effective role in electronic records management. Some of the activities outlined may overlap and may be able to take place simultaneously.

Priority 2: Assign Responsibility for Record Keeping

Assign responsibility to develop and implement a government-wide programme for the management of all records created, received, maintained, used or stored on electronic media.

Priority 3: Revise Legislation

Public records legislation is designed to ensure that records with ongoing value are destroyed and archives are preserved permanently. Officials may be under the impression that this legislation only applies to paper records; they may even fail to understand that electronic records are indeed records. Officials need to understand that the failure to manage electronic records has major implications for accountability and for efficiency.

Moreover, some of the government's electronic records are of archival significance and form part of the written record of the past. These records enhance social consciousness and provide a sense of identity and context. Management needs to understand why archives are so important and recognise the organisation's obligation to future generations under public records legislation. Even in the private sector, internal policies and regulations can be amended to recognise the importance of records and ensure the protection of electronic records.

Priority 4: Identify Existing and Planned Systems

To be credible to senior management, the records manager needs to know the scale of the electronic records management problem in his or her organisation. Implement a survey of existing systems as described in Lesson 4. This will provide the basic facts and figures that will allow you to decide whether the priority needs to lie with ensuring the preservation of existing electronic records, or with the design of future systems.

Priority 5: Assign Adequate Resources

The advantages of relying on electronic records should be set against a realistic appraisal of the resources the organisation can afford to spend on an electronic records management programme. Resources will be needed for the purchase and maintenance of appropriate hardware and software and to ensure there are sufficient numbers of trained personnel to build, support and maintain the electronic records system.

Priority 6: Co-ordinate Systems

It is essential to co-ordinate computerised systems with associated paper-based systems. Many organisations make the incorrect assumption that computerised systems, especially systems for storing scanned images of documents, will make paper systems unnecessary. Such an assumption is not only incorrect but dangerous, for it may lead to the destruction of critical paper records without adequate safeguards for the protection of electronic records. In most countries in the world, there will continue to be a need to maintain a mixed paper and electronic system for the foreseeable future, for several reasons.

- It will likely be too expensive to transfer all government information on to a computerised system.
- Documents received from members of the public or other organisations may be in paper form.
- There are significant difficulties in protecting the reliability and availability of electronic records over time, as discussed earlier in this module.
- Power supplies may be unreliable whereas paper systems are usable regardless of the availability of electricity or other sources of power.
- The original documents may be required in paper form for legal reasons. In many countries, evidence laws do not recognise the legal validity of electronic information even if its security can be guaranteed. Often, for example, the original record carries the authorising signature, which is essential to proving the authenticity of the record.
- Corruption and fraud in electronic records systems may be difficult to detect because few people will have the technical skills to understand fully how the system operates.
- Particularly in rural areas, there may be difficulty finding trained staff and local suppliers who can support software and hardware requirements.
- It may be difficult to finance the maintenance and upgrading of computers or the replacement of obsolete or broken equipment.
- Appropriate storage facilities and equipment may not be available. For instance, computers and computer-generated information require temperature and humidity controlled environments, and secure back-up storage facilities must be available.

Priority 7: Develop Strategies

Computer technology is continually changing. Organisations must develop strategies for preserving and providing access to electronic records over time so that all relevant information can be easily retrieved. Only in this way will policy makers and managers have access to the 'complete picture' before making a decision. Essentially there are two options for keeping electronic records: store them electronically or print them out. The emerging international recommendation is that records generated electronically should be preserved and accessed electronically. However, the organisation must evaluate the costs involved, the local capacity to store and maintain electronic records safely and the risks involved. If there are doubts in any of these areas, the prudent option is to print the records to paper and file them, so far as this is possible. The catch phrase is 'when in doubt, print it out.'

In some cases it will be impossible to print out the electronic record to paper. For example, it would be impossible to print out a multi-media document that included electronic links to a video clip or a voice mail message. Thus, printing electronic records to paper and keeping them on paper files is likely to be a transitional or short-term tactic. Governments need to ensure that the systems can provide access to records for as long as they are needed for administrative and other purposes.

Priority 8: Contribute to the Design of Systems

In general, the decision to automate parts of a particular administrative function will be taken by management, with technical advice from information technologists. However, records managers within the records and archives institution should contribute to the design of the new system by giving advice on records systems requirements. These requirements are as follows.

- The information in the existing record-keeping system must be sufficiently reliable that it can be moved to an integrated system safely.
- Provisions must be in place to support ongoing maintenance of the system, including service contracts, staff and appropriate allocations in the recurrent budget.
- Well-organised, accurate and easily accessible source data must be available.
- There needs to be a reliable power supply to ensure the continuous running of the system and reduce data loss cause by power surges.
- Appropriate back-up and storage procedures and facilities must be available.
- The electronic and paper records should be stored in appropriate environmental and physically secure conditions.
- Appropriate standards need to be employed to facilitate the migration of records in the future.
- All records created by the system should be scheduled for appropriate disposal

- There must be appropriate management structures to support the operation of the system.
- Legislation must be in place to support legal admissibility of electronic information if there is no parallel paper system.
- There needs to be an effective training programme for users and custodians of records.

Priority 9: Provide Training

Ensure that adequate training is provided for users on record-keeping requirements, the distinction between public records and non-record materials, procedures for designating records, and moving or copying records for inclusion in a record-keeping system.

GETTING HELP

Many institutions, particularly in countries with limited resources, have little access to resources for electronic records work. However, there are places you can go to get more information or to obtain assistance. Following are names and addresses of agencies that could be contacted for assistance.

See the Additional Resources *document for information on other organisations and associations involved with records and archives management generally.*

Professional Associations and Organisations

American Society for Information Science (ASIS)

8720 Georgia Avenue, Suite 501
Silver Spring, MD
20910, US
Tel: +1 301 495 0900
Fax: +1 301495 0810
Email: asis@asis.org
Web site: http://www.asis.org/

ASIS brings together diverse streams of knowledge, focusing what might be disparate approaches into novel solutions to common problems. ASIS bridges the gaps not only between disciplines but also between the research that drives and the practices that sustain new developments. ASIS counts among its membership some 4,000

information specialists from such fields as computer science, linguistics, management, librarianship, engineering, law, medicine, chemistry and education; individuals who share a common interest in improving the ways society stores, retrieves, analyses, manages, archives and disseminates information.

Association for Information and Image Management (AIIM)

1100 Wayne Ave., Suite 1100
Silver Spring, MD 20910-5603 US
Tel (toll free in US): +1 888 839 3165
Tel: +1 301 587 8202
Fax: +1 301 587 2711

or

2 Crown Walk
Winchester Hampshire
SO23 8BB UK
Phone: +44 1962 868333
Fax: +44 1962 868111
Website: www.aiim.org

The Association for Information and Image Management was organised to bring together the users and providers of document and information management technologies, such as document management, knowledge management, workflow and imaging. This organisation has a mail order bookstore that offers publications, standards and tools that apply to every facet of Records Management from hard copy filing to electronic imaging.

The Association for Information Management (ASLIB)

Staple Hall
Stone House Court
London EC3A 7PB UK
Tel: +44 0 20 7903 0000
Fax: +44 0 20 7903 0011
Email: membership@aslib.co.uk
Website: http://www.aslib.co.uk/aslib/

Founded in 1924, ASLIB is a corporate membership organisation with over 2,000 members in some seventy countries. ASLIB actively promotes best practice in the management of information resources, represents its members and lobbies on all aspects of the management of and legislation concerning information at local, national and international levels.

Association of Records Managers and Administrators (ARMA International)

4200 Somerset Dr., Suite 215
Prairie Village, KS
66208-0540 US
Tel: +1 800 422-2762 / +1 913 341 3808
Fax: +1 913 341 3742

Email: hq@arma.org
Website: http://www.arma.org/

The Association of Record Managers and Administrators (ARMA International) is a not-for-profit association of over 10,000 information professionals in the United states, Canada and over 30 other nations. Among other positions, ARMA International members are employed as records and information managers, Managing Information Systems and Automated Data Processing professionals, imaging specialists, archivists, hospital administrators, legal administrators, librarians and educators.

The ARMA website also includes links to other professional associations involved with record keeping and includes an extensive 'bookstore' with a wide range of advice and information, from introductory to expert. Prices for publications vary and there are significant discounts for ARMA members. The bookshop lists are accessible at http://commerce.shreve.net/armahqstorem/

International Council on Archives (ICA)

60, rue des Francs-Bourgeois
75003 Paris, France
Tel: +33 0 1 40 27 63 06
Fax: +33 0 1 42 72 20 65
Email: 100640@compuserve.com
Website: http://www.archives.ca/ICA/

The ICA is the professional organisation for the world archival community, dedicated to the preservation, development and use of the world's archival heritage. The International Council on Archives brings together national archival institutions, professional associations of archivists, regional, local and other archival facilities and individual archivists. The ICA has more than 1,450 members in 170 countries and territories. It is a non-governmental organisation, and it works in close co-operation with inter-governmental organisations like UNESCO and the Council of Europe. It also maintains close links with other non-governmental organisations.

ICA's wide-ranging international activities include

- a general programme of publications and conferences
- a development programme, promoting co-operation within and between regional branches
- a European programme promoting archival co-operation in Europe
- a professional programme carried out by the sections and committees
- a series of special projects, many in conjunction with UNESCO and other international organisations.

The ICA has a full-time Secretariat of five people, based in the Paris headquarters, which undertakes the general administration of the organisation. The professional output of the ICA comes from its network of members and contacts throughout the world who give their time and their professional expertise on a voluntary basis. The ICA publishes a number of valuable works including *Janus, Archivum* and the *ICA*

Bulletin as well as proceedings of various conferences and a regularly updated *ICA Directory*. The ICA includes regional branches, sections, committees and project groups involved with a range of records and archives issues. These various groups are listed below.

The International Council on Archives is the professional, international, non-governmental organisation representing the interests of archives and archivists worldwide. Is aims are to promote the preservation, development and use of the world's archival heritage. The ICA brings together national archival administrations, professional associations of archivists, regional, local and other archives and individual archivists.

REGIONAL BRANCHES

- ALA: Asociacion latinoamericana de archivos
- ARBICA: Arab Regional Branch
- CARBICA: Caribbean Regional Branch
- CENARBICA: Regional Branch for Central Africa
- EASTICA: East Asian Regional Branch
- ESARBICA: Eastern and Southern Africa Regional Branch
- PARBICA: Pacific Regional Branch
- SARBICA: Southeast Asian Regional Branch
- SWARBICA: South and West Asian Regional Branch
- WARBICA: West African Regional Branch

SECTIONS

- ICA/SAE: Section for Archival Education and Training
- ICA/SBL: Section of Business and Labour Archives
- ICA/SIO: Section of Archivists of International Organizations
- ICA/SKR: Section of Archives of Churches and Religious Denominations
- ICA/SMA: Section of Municipal Archives
- ICA/SML: Provisional Section on Military Archives
- ICA/SPA: Section of Professional Archival Associations
- ICA/SPP: Section of Archives of Parliaments and Political Parties
- ICA/SUV: Section of University and Research Institution Archives

Instructors in records and archives management are specifically directed to information about the ICA Section on Archival Education and Training (ICA/SAE). This ICA/SAE is involved in records and archives education and training around the world; it hosts a website that includes a bibliography of readings used by teachers of

records and archives management courses. The website developers plan to host databases with lists of educators, educational programmes, research and publication projects. For information on the ICA/SAE, see http://www.gslis.utexas.edu/~issa/.

COMMITTEES

- Committee on Archival Buildings and Equipment
- Committee on Descriptive Standards
- Committee on Electronic and Other Current Records
- Committee on Information Technology
- Committee on Archival Legal Matters
- Committee on Preservation of Archival Materials
- Committee on Sigillography

PROJECT GROUPS

- Project Group on Terminology
- Project Group on Architectural Records
- Project Group on Audio-Visual Records
- Project Group on Protection of Archives in the Event of Armed Conflict or Other Disasters
- Project Group on Literature and Art Archives.

Information Systems Audit and Control Association (ISACA)

3701 Algonquin Road, Suite 1010
Rolling Meadows, Illinois
60008, US
Tel: +1 847 253 1545
Fax: +1 847 253 1443
Email: chap/coord@isaca.org
Website: http://www.isaca.org/

The ISACA is concerned with IT governance, control and assurance. ISACA does that by providing value through various services such as research, standards, information, education, certification and professional advocacy. The association helps information systems audit, control and security professionals focus not only on IT, IT risks and security issues, but also on the relationship between IT and the business, business processes and business risks. Local chapters have been established in the following regions: Africa and Europe; Asia; North America; Oceania; and South and Central America.

International Federation for Information and Documentation (FID)

FID Secretariat

PO Box 90402 - 2509 LK
The Hague
The Netherlands
Tel.: +31 70 314 0671
Fax: +31 70 314 0667
Email: fid@python.konbib.nl
Website: http://fid.conicyt.cl:8000/

Since 1895 FID Members, representing organisations and individuals in over 90 nations, have promoted best management practice of information as the critical resource for all society.

International Organization for Standardization (ISO)

Case postale 56
CH-1211 Geneva 20, Switzerland
Tel: +41 22 749 01 11
Fax: +44 22 733 34

Website: http://www.iso.ch

The International Standards Organization (ISO) is a worldwide federation of national standards bodies from some 130 countries, one from each country. The ISO promotes the development of standardisation in order to help facilitate the international exchange of goods and services as well as to help develop cooperation in intellectual, scientific, economic and technical activities.

The ISO has established many standards that affect records and archives work, particularly with regard to quality of microfilm, photographic equipment, paper quality and so on. ISO standards are identified by the term 'ISO' and a number, such as ISO 9000, the standard for quality management and quality assurance, or the ISO 14000 series of standards for environmental management.

Of particular note is ISO/TC46/SC11: Information and Documentation: Archives and Records Management, which is drawing up an international standard for records management. Details of SC11 secretariat should be in ISO literature at www.iso.ch.

International Records Management Trust (IRMT)

12 John Street
London WC1N 2EB, UK
Tel: +44 20 7831 4101
Fax: +44 20 7831 7404
Email: info@irmt.org
Website: http://www.irmt.org

The Trust was established in 1989 in order to support developing country requirements for managing official government records. As technology began to have a rapidly escalating impact on the way records were created, used and stored, it became clear that there was a pressing need for innovative and strategic solutions. The Trust was established to support this need. As a charity dedicated to education, research and practical technical assistance, it set out to undertake a range of project work. Projects evolved and grew in three areas, as summarised below:

- ***Country Projects*** were introduced to support local officials and professionals in managing official records. This includes defining legal and regulatory frameworks; developing organisational structures, including strengthening the national archives' capacity to regulate the continuum of records management functions and developing and introducing new systems and procedures for managing records and developing professional capacity.
- ***Education Projects*** were conceived as a vehicle for introducing greater awareness of the importance of records and for developing educational modules and materials which could be shared between English speaking countries. It was intended that where desirable, these materials could be adapted to meet the requirements of developing countries with different administrative traditions. The aim in all cases was to ensure that the material was in line with global theory and best practice but relevant to local realities where there were severe constraints on funding and a limited technical and institutional infrastructure.
- ***Research Projects*** were introduced to study the requirements for well-managed records in key areas, such as financial and personnel management, particularly in an environment of rapid technological change. The Trust's research projects have focused on real problems and the practical solutions required to solve them.

The range and complexity of Trust's programme areas and project work has expanded in parallel with the growth and spread of technological applications and with global development concerns, such as good governance, accountability, human rights, economic reform, transparency and accountability and cultural heritage for sustainable development. Its work has demonstrated repeatedly that neither technology nor global development agendas can be successfully addressed in the absence of effective control of official records. The Trust is therefore committed to providing an expanded level of services and support for developing countries as they make the transition to the electronic age.

ARCHIVAL INSTITUTIONS

Many national and state or provincial archives in the metropolitan English-speaking countries have excellent leaflets and publications that can be adapted to smaller or different contexts. Many of the institutions also provide useful information on their websites. This list only highlights some key institutions; note that many of their websites include links to other national or state repositories and related agencies.

Archives of Ontario

77 Grenville Street, Unit 300
Toronto, ON
M5S 1B3 Canada
Tel: +1 416 327 1600
Fax: +1 416 327 1999

Email: reference@archives.gov.on.ca
http://www.gov.on.ca/MCZCR/archives/english/index.html

The Archives of Ontario is active in the management of electronic records.

Library of Congress

110 First Street, SE
Washington, DC
20540, US
Tel: +1 202 426 5213
Email: lcweb@loc.gov
Website: http://lcweb.loc.gov

The Library of Congress is involved with extensive research into the management and preservation of records and archives. Much information is available online and publications can be ordered.

National Archives of Australia

PO Box 34
Dickson
Canberra, A.C.T. 2602 Australia
Fax: +61 6 257 7564
Website: http://www.naa.gov.au

The National Archives of Australia offers a number of publications free. The NAA also participates in international activities and makes many of its resources available on its website.

National Archives of Canada

395 Wellington Street
Ottawa, ON
K1A 0N3, Canada
Tel: +1 613 996 7430 (Library)
Fax: +1 613 995 6274 (Library)
Website: http://www.archives.ca

The National Archives of Canada is an active partner in international archival projects, including hosting the International Council on Archives website and participating in a range of ICA activities. The National Archives' website includes valuable information about policies and procedures, examples of on-line research tools and finding aids and information about exhibitions and publications.

National Archives and Records Administration (NARA)

700 Pennsylvania Avenue, NW
Washington, DC
20408, US
Fax: +1 202 208 5248
Website: http://www.nara.gov/

The National Archives and Records Administration is an independent federal agency

of the United States government, responsible for preserving the nation's history and managing its federal records. NARA has a wide range of publications available; the website provides details. People can also view NARA's general disposal schedules online through the website.

The New York State Archives and Records Administration

New York State Education Department
Cultural Education Center
Albany, NY
12230 US
Tel: +1 518 474 6926
Email: sarainfo@mail.nysed.gov
http://www.sara.nysed.gov/

The New York State Archives and Records Administration is active in the management of electronic records and has produced a range of valuable publications.

Public Record Office (PRO)

Kew, Richmond
Surrey TW9 4DU, UK
Tel: +44 208 876 3444
Fax: +44 208 878 8905
Website: http://www.pro.gov/uk

The Public Record Office in the United Kingdom seeks to ensure that public records are preserved for present and future access and to raise awareness of the importance of caring for records and archives.

State Records Authority of New South Wales

Level 3, 66 Harrington Street
The Rocks
Sydney, NSW 2000
Australia
Tel: +61 2 9237 0200
Fax: +61 2 9237 0142
Email: srecords@records.nsw.gov.au
Website: http://www.records.nsw.gov.au

The State Records Authority of New South Wales was previously known as the Archives Authority of New South Wales. The State Records' website offers valuable information on record keeping, including on-line finding aids to holdings, updates on programmes and services, and online versions of various publications including the *Government Recordkeeping Manual.*

Activity 33

Find out if your institution has any information about any of the agencies listed above. Does your organisation receive publications, participate in conferences or meetings or otherwise work with any of these groups?

In your opinion, which groups should your institution consider communicating with first, if any, and what would you expect to achieve by doing so? How would you go about building a productive relationship?

ADDITIONAL RESOURCES

There are many publications available about electronic records management. This bibliography includes key works that might be of value, particularly in your institution's resource centre or library. Some are more easily obtained than others, and some more up-to-date than others. Core publications are identified with an asterisk (*).

> *Core publications are also identified in the* Additional Resources *document; refer to that document for information on more general publications on records and archives management.*

Archives Authority of New South Wales. *Steering into the Future*. Available electronically at http://www.records.nsw.gov.au/publications/steering.htm.

Archives of Ontario. *Fact Sheet #7: Electronic Records: What About E-Mail?*. Available electronically at

http://www.gov.on.ca/MCZCR/archives/english/rimdocs/rim7.htm.

Barata, Kimberly. 'The Impact of Information Technology Standards on Recordkeeping Systems Development: Implications for Records Professionals.' *Computer Standards & Interfaces* 19 (1998): 51-64.

Beagrie, Neil and Daniel Greenstein. *A Strategic Policy Framework for Creating and Preserving Digital Collections.* 1998. Available electronically at http://ahds.ac.uk/manage/framework.htm.

Bearman, David and Margaret Hedstrom. 'Reinventing Archives for Electronic Records: Alternative Service Delivery Options.' In Margaret Hedstrom, ed. *Electronic Records Management Program Strategies*. Pittsburgh, PA: Archives and Museum Informatics, 1993, pp. 82-98.

Bearman, David and RH Lytle. 'The Power of the Principle of Provenance.' *Archivaria* 21 (1985-86): 14-27.

Bearman, David. *Archival Methods (1989) and Archival Strategies (1995),* Pittsburgh: Archives and Museums Informatics. *Archival Strategies* is also published in *American Archivist* 58, 4 (Fall 1995): 380-413.

* Bearman, David. *Electronic Evidence*. Pittsburgh, PA: Archives and Museum Informatics, 1994.

Cain, Piers. 'Data Warehouses as Producers of Archival Records.' *Journal of the Society of Archivists* 16, 2 (1995): 167-171.

Cook, Terry. 'Easy to Byte, Harder to Chew: The Second Generation of Electronic Records Archives.' *Archivaria* 33 (1991-92): 202-216.

Cook, Terry. 'Electronic Records, Paper Minds: The Revolution in Information Management and Archives in the Post-Custodial and Post-Modernist Era,' *Archives and Manuscripts* 22 (November 1994): 300-328.

Cox, Richard J. 'The Record: Is It Evolving?' *Records & Retrieval Report* 10 (March 1994): 1-16.

Dawes, Sharon S, Theresa A Pardo, Darryl E Green, Claire R McInerney, David R Connelly, Ann DiCaterino. *Tying a Sensible Knot: A Practical Guide to State-Local Information Systems*. Best Practices in State-Local Information Systems Project IIS-1 (Albany, NY: Center for Technology in Government, June 1997). Available electronically at http://www.ctg.albany.edu/projects/lg/lgmn.html.

Dawes, Sharon S, Theresa A Pardo, David R Connelly, Darryl F Green and Claire R McInerney. *Partners in State-Local Information Systems: Lessons from the Field*. (Albany, NY: Center for Technology in Government, 1997). Available electronically at http://www.ctg.albany.edu/resources/pdfrpwp/iisfnlrp.pdf.

DLM Forum on Electronic Records. *Guidelines on Best Practices for Using Electronic Information*. Available electronically at

http://www.dlmforum.eu.org/documents/guidelines.html

Dollar, Charles M. *Electronic Records Management and Archives in International Organizations: A RAMP Study with Guidelines.* (RAMP Study PGI-86/WS/12). Paris, FR: UNESCO, 1986.

Dollar, Charles M. *Authentic Electronic Records: Strategies for Long-term Access.* Chicago, IL: Cohasset Associates, 1999.

Dollar, Charles. 'Selecting Storage Media for Long-Term Access to Digital Records,' *Information Management Journal* (July 1999): 36-43.

Duff, Wendy. 'Ensuring the Preservation of Reliable Evidence: A Research Project Funded by the NHPRC.' *Archivaria* 42 (Fall 1996): 28-45.

Durance, Cynthia J, ed. *Management of Recorded Information: Converging Disciplines.* München, Germany, KG Saur, 1990.

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Web-based Information

Activities undertaken by the following institutions, as well as information on specific conferences or projects related to electronic records, are described on the websites identified below.

Research Institutions

MONASH UNIVERSITY, SCHOOL OF INFORMATION MANAGEMENT AND SYSTEMS

http://dlar.fcit.monash.edu.au/

SYRACUSE UNIVERSITY, SCHOOL OF INFORMATION STUDIES

http://istweb.syr.edu/~mcclure/

UNIVERSITY OF BRITISH COLUMBIA, SCHOOL OF LIBRARY, ARCHIVAL AND INFORMATION STUDIES

http://www.slais.ubc.ca/

UNIVERSITY OF PITTSBURGH, SCHOOL OF INFORMATION SCIENCES

http://www2.sis.pitt.edu/

UNIVERSITY OF TORONTO, FACULTY OF INFORMATION STUDIES

http://www.fis.utoronto.ca

Conferences

DLM FORUM ON ELECTRONIC RECORDS (EUROPE), 1996, 1997

http://www2.echo.lu/dlm/en/home.html

ELECTRONIC RECORDS CONFERENCE, UNIVERSITY OF MICHIGAN, 1996

http://www.si.umich.edu/e-recs/

PLAYING FOR KEEPS, CANBERRA, 1995

http://www.naa.gov.au/govserv/techpub/keeps/contents.html

THE OFFICIAL VERSION - A NATIONAL SUMMIT ON LEGAL INFORMATION IN DIGITAL FORM, TORONTO, 1997

http://www.callacbd.ca

WORKING MEETING ON ELECTRONIC RECORDS, UNIVERSITY OF PITTSBURGH, 1997

http://www.sis.pitt.edu/~cerar/er-mtg97.html

Projects

DIGITAL LONGEVITY PROJECT (NETHERLANDS)

http://www.archief.nl/digilong/

DUBLIN CORE METADATA INITIATIVE

http://purl.oclc.org/dc/

FEDERAL TASK FORCE ON DIGITIZATION (CANADA)

http://www.nrc.ca/dtf-gtn/

FAST TRACK GUIDANCE DEVELOPMENT PROJECT (US NATIONAL ARCHIVES AND RECORDS ADMINISTRATION)

http://www.nara.gov/records/fasttrak/fthome.html

INDIANA UNIVERSITY--ELECTRONIC RECORDS PROJECT

http://www.indiana.edu/~libarche/index.html

INFORMATION MANAGEMENT FORUM (CANADIAN FEDERAL GOVERNMENT)

http://www.imforumgi.gc.ca/menu_e.html

INTERPARES

http://www.interpares.org/forums/researchers/

KNOWLEDGE MANAGEMENT CONSORTIUM

http://www.km.org/

RECORDS CONTINUUM RESEARCH GROUP (MONASH UNIVERSITY)

http://www.sims.monash.edu.au/rcrg/

UNIVERSITY OF BRITISH COLUMBIA, THE PRESERVATION OF THE INTEGRITY OF ELECTRONIC RECORDS

http://www.slais.ubc.ca/users/duranti/intro.htm

THE UNIVERSITY OF PITTSBURGH, FUNCTIONAL REQUIREMENTS FOR EVIDENCE IN RECORD KEEPING

http://www.lis.pitt.edu/~nhprc/

WORKFLOW MANAGEMENT COALITION

http://www.aiai.ed.ac.uk/project/wfmc/

Activity 34

Check your institution's library or resource centre. What books or other resources do you have about electronic records management? Are any of the publications listed above available in your institution? If so, examine two or three of them and assess their currency and value to your institution. If not, identify two or three publications you think would be most useful to help develop or expand your library. Devise a plan outlining how you could realistically obtain copies of these.

SUMMARY

This lesson has provided an overview of the entire module, *Managing Electronic Records.* This lesson has then discussed how to establish priorities for put into place the foundations for an electronic records management programme. These include:

Priority 1: establish a plan

Priority 2: assign responsibility for record keeping

Priority 3: revise legislation

Priority 4: identify existing and planned systems

Priority 5: assign adequate resources

Priority 6: co-ordinate systems

Priority 7: develop strategies

Priority 8: contribute to the design of systems

Priority 9: provide training

The lesson then outlined ways to find out more information or get help with records issues. The lesson concluded with a discussion of valuable information resources relevant to electronic records management.

STUDY QUESTIONS

- In your own words, explain the reason why the priorities proposed in this lesson are offered in the order they are in.
- Indicate two of the organisations listed in this lesson that you would choose to contact first and explain why.
- Indicate two of the publications listed in this lesson that you would choose to purchase first and explain why.

ACTIVITIES: COMMENTS

Activity 32

Every institution will find itself at a different stage of development in terms of electronic records management. Similarly, every person will have a different level of knowledge of electronic issues. It is important to undertake policy and planning activities, and to ensure adequate resources are available, before committing to ongoing electronic records management activities.

Activity 33

If resources are limited, it is wise to communicate with international organisations first, as they often obtain and filter information from national or regional associations. Thus valuable information is passed on to your organisation through the international group, which can save resources for all. It is also advisable to focus on records and archives management information before obtaining specialised publications or information.

Activity 34

As mentioned in relation to the earlier activity, it is important to begin with general information and ensure you have a good resource library of introductory and overview publications before developing a more specialised library.