Public Record Office & British Standards Institute
IDT/1/4 (Committee in Formation)

ROUGH DRAFT TECHNICAL REPORT (version 0.4)

A Mechanism for the Perpetual Preservation of Electronic Records of Value.

For UK Submission

Foreword

ISO (the International Organisation for Standardisation) is a world-wide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through local ISO technical committees. Each member body interested in a subject for which a technical committee has been established has a right to be represented on that committee. International organisations, governments and non- governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardisation.

This Draft Standard was prepared by a PRO Working Group in anticipation of the formation of BSi Committee IDT/1/4: A Mechanism for the Perpetual Preservation of Electronic Records of Value.

KEY GOALS and DEFINITIONS

For the purposes of this Technical Report, the Euro-Forum definition of 'record' has been used:

"a specific piece of information produced or received in the initiation, conduct, or deletion of an institutional or individual activity and that compromises sufficient content, context and structure to provide evidence of an activity"

The goals of IDT/1/4 are:

"to ensure that current and recently created electronic documents are available for future legal or historical research"

and

"to make the adoption of new methods based on technology as straightforward as possible for departments, with the maximum benefit to Government or commercial organisations"

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Introduction

The production and storage of documents on computer systems has become common practice. It is therefore inevitable that these stored documents will increasingly be used in their electronic form as a basis for business transactions, and will be produced, transmitted and stored in significant numbers.

There has been much discussion about the value of documents stored on document management systems when required as evidence for a considerable time. It is crucial that a discipline is commonly agreed so that the value of these documents as historical evidence can be maximised. Instead, a Technical Report has been developed which will evolve as the technology and electronic commercial practices mature.

This Technical Report sets out the constructs of an essentially non-technical approach to storing document Electronically. It seeks to define an interpretation of likely best practice that will meet the objectives at the least cost for supplier and consumer alike.

This Technical Report covers issues such as preparation, implementation, initial loading, and the procedures for the use of the system. It pays particular attention to setting up authorised procedures and subsequently the

The Technical Report is divided into 'n' sections, each of which contains details of processes and procedures that need to be put in place to ensure conformance with this Technical Report.

1. Structuring of the Information
2. Defining "Worthy of Preservation"
3. Selection of the Information worthy of preservation
4. The Approach to Document Bundling
5. Bundling Technologies
6. Delivery of the Bundles to a national or commercial archive
7. "Arrayment" of the Bundles at a national or commercial archive
8. Obsolescence in the 'Primary Storage' technical systems
9. Audit Trails
10. Distribution of Bundles to a future user

Scope

This Technical Report describes the use of electronic document management systems to store documents, where the issues of long term preservation, authenticity, context, and visual presentation of the information contained in these stored documents is important.

This Technical Report covers any type of 'data file' produced or controlled by a document management system. Data files may potentially contain text, Image, CAD data, moving and still video images, and audio, or any combination of these or similar data types.

Data files may be created by the system , or may be imported into it. This Technical Report covers all such data files, either created and/or imported directly or through a network system, from the time at which the system assumes complete control of the data file. Such networks may be local or wide area, or specifically Internet/Intranet mechanisms.

This Technical Report provides a conceptual-technical approach to the storage of documents in self-contained electronic bundles. This Technical Report *clearly does not specify* the technical content of the Bundles of documents or the type of storage media used by a national or commercial archive. However, as media types are presently divided between WORM and non-WORM technology, specific controls recommended for each type. This is to cope with technical obsolescence in the 'Primary Storage' technology envisaged for a national or commercial archive.

While this Technical Report covers all aspects of document management that impinge upon the issue of legal admissibility of digitised images, it also covers aspects that may affect the use of the documents in some future legal or, government and historical research context. Such aspects include the control of the documents, and the transfer mechanism that is inextricably linked to the automatic 'Arrayment' of the 'Bundled' documents on the 'Primary Storage' system.

This Technical Report is intended for:

- Systems Integrators whose equipment provides facilities to meet the requirements of end users
- End users who wish to ensure that their own stored electronic documents may be kept long term for legal, commercial or to meet the requirements of any national, international, or state Public Record retention purposes.

Golden Principles

Unusually for any form of Standard, technical or otherwise, IDT/1/4 deals with matters in perpetuity. Commercial organisations may well be considering periods in excess of one hundred years. Governments will be considering preservation in perpetuity - forever!

Taking the normal path of development for any standard, over a five year period a standard can evolve and develop in many ways. In most circumstances, this is the objective of the Committee's work.

This Standard for Bundling and long term preservation is in the reverse situation. The Committee and those who will influence it, must recognise that achieving its very long term stability and consistency is their objective. The Committee recognises this, and has [will] adopted the following principles:

1. that following a rapid development to Version 3 of this Standard over the next two years, Version 3 will become the status quo; and that,

2. the Standard for Bundling seeks to maintain a lowest common denominator, in the most straightforward form, and so will resist influences to introduce higher order functions that impact upon the rendering, transportation, and arrayment of a Bundle. However, facilities to assist the researcher or ultimate user of a Bundle are exempt from this inhibition, provided that they do not detract from the fundamental principles of achieving long term preservation

Therefore, Version 3 of this Standard will be the cross-over from development of Bundling, to the ongoing and very long term perspective of the needs of those preserving electronic documents. Thus the Standard will remain untouched, *unless* the Committee feels that change, enhancement or an update, is essential to maintaining its viability as an operating mechanism - in perpetuity.

Incorporation and Adoption of Other Standards

Whilst it is accepted that other Standards will have considerable impact from time-to-time upon how the goals of this Standard are achieved, the adoption of another related standard as a component of this Standard should not be considered automatic. If another standard has merit in achieving the Goal of preservation in perpetuity, than it may be given as a reference or normative reference.

However, nothing in the Standard should, by implication or otherwise unless explicitly stated in this text, mandate or seek to enforce the adoption any other standard work. The reason for such a statement is to avoid that short term, in the context of this work, influences of 'technological fashion', which might detract from the long term Goal of technological risk reduction to be gained from adopting this Standard text.

Normative references

ISO 2859

IS0 7768

Others to be advised

What is Bundling?

The process of archival storage currently has many steps, from creation, to first reviews, to long term archive of suitable documents. The current processes of selection and review originated form the need to balance what is kept to something manageable by the PRO. Those processes are staff intensive demanding choices today on what may be important tomorrow..

The underlying principle of the ICP is that we have Bundles of electronic documents, scanned images, WP texts, audit logs, meta data, and pure data. On their own these Bundles would be useless to the PRO would need to be able to replicate the applications and versions of file handling. To make these Bundles a self contained entity, two additional pieces of software would be included in each and every Bundle. The first is a navigator or database subset which will enable a researcher to find documents by their index or some other attribute. The second is a viewer which can display those files, print them, or cut out information from that Bundle.

Thus the Bundle is self contained and exists on its own regardless of its originating application or version. To an extent it is independent of hardware platform, as each Bundle would probably run on an Intel/Microsoft, or equivalent platform. The Bundle is based upon which proprietary platform has the greatest longevity and strongest market position. With the weight of numbers currently behind the Intel platform, it is probable that any new technology will emulate or migrate today's operating systems. In the event that they do not, the PRO would commission an emulator that would support the Bundles on that new platform. Thus in the worst case the PRO can ensure continuity by having a single problem to resolve, rather than an operationally complex one.

The Bundle's navigator and viewer would be provided by the original supplier, on a 'free to use and copy' licence. Thus the PRO avoids substantial cost overheads to preserve what already exists. Several companies have supported this principle, and suggest that additional costs will be minimal.

Having Bundled or records the next task is how those Bundles are delivered to the departmental records officer or to the PRO. Taking a pragmatic view, using physical media recreates the same problems as for paper, i.e. someone has to handle it. This is apart from the problems of storage, media life and hardware upgrades to ensure availability. ICP would make the transfer through a Common Carrier who would provide a high security mechanism to move a Bundle from A to B. The PRO receives the Bundle by wire, and then can array the Bundles onto any media type it chooses. Thus the storage requirement is reduced to a single type of , making long term availability for that media more straightforward to plan for. The possibilities for such extremely large scale storage are that departments may chose to use the PRO for its immediate backing up of electronic documents.

Some media are claiming, if only unofficially, a hundred years of life. Storage media with the potential for substantially longer life times is coming into use although there are concerns about proving the 400 year shelf lives possible. To the PRO, beyond a certain point, the actual life achieved is unimportant as if regeneration is required, this is a more straightforward with one large form of media, rather than dealing with millions of CD's or tapes. On the same basis, if it is necessary to migrate to a new media type this task is manageable, which with optical disk devices alone it is not.

Bundling educes the need for conformance to a few principles, and a minimum of technical standards. In learning from the past it would be foolish to believe that the world will easily embrace electronic Bundles without reservation. To make EROS-ICP work, a set of activities would be

undertaken to support the change agents within each community, to deliver their part of redefining the industry.

What is the Process of Achieving Long Term Preservation?

Information is one of the most important assets that any organisation owns. This is particularly true for governmental organisations, where the quantities of information are substantial, come in many different formats, and are eventually open to public scrutiny and challenge.

The process of achieving the long term preservation, or effectively in perpetuity, of electronic documents is fraught with difficulty, particularly when dealing with technological obsolescence. This Standard assumes a sequence of events leading to preservation will be followed, broadly as outlined below.

Stage One:	Origination of the electronic document in the user organisation;
Stage Two:	the appraisal of documents in storage, or the enactment of some pre-determined policy (electronically enforced or otherwise), towards identifying those documents deemed worthy of retention and preservation;
Stage Three:	the rendering of those documents identified in Stage Two, into a Bundle format and structure, with additional identifying index and audit material, as appropriate, which relates a particular Bundle to its source;
Stage Four:	the Arrayment of Bundles within the user organisation, or their transfer by telecommunications means, to a third party storage facility or a national archive;

Stage Five: (for third parties or national archives)	(for user organisations storing their own documents)
the Arrayment of Bundles at the third party or national archive site, including the updating of a master index of Bundles;	
Stage 6: the making available of Bundles to users via some Finding and downloading mechanism.	Stage 6: The making available of Bundles to users via some Finding and downloading mechanism.

Thus, regardless of telecommunications protocols, their efficiency or otherwise, and similarly, regardless of the approach used for Appraisal, documents can be stored in such a manner as to reduce the long term risks associated with technological obsolescence.

This process of preservation is identified with the nomenclature: **R**eceive, **S**tore, **A**ccess (RSA).

Selection

This Standard does not differentiate between approaches to the selection or Appraisal or electronic documents. Such policy matters are the concern of the originating organisation, as is their choice of management mechanism through personal human intervention after the event, or the use of enforced indices at the time of origination.

This Standard mandates that index information in the style and structure of the original user, is included in a Bundle's content. Similarly, any audit, third party comments, and other associated objects or files, are included within a Bundle under the control of the Navigation software within it.

Where electronic records exist in a wholly unstructured environment disposition management will be problematic. If individual documents are appraised in isolation, selection and disposal policies are likely to be flawed as documents will be examined out of context.

Many documents can appear superfluous but when they are aggregated into a meaningful assembly, a very different conclusion would be reached. Additionally, the effort involved in document-by-document review is considerable and it is unlikely to be cost effective. Where unstructured document collections occur the seeking of professional or organisational advice is advised before embarking on a course of action.

Bundling

When viewed by a reader, an electronic document or record should appear in a form as close to the original as possible. When being handled by any user many years into the future, an electronic record or document should be readily accessible, without conversions or translations as far as possible.

Thus the Bundle must be self-contained and exist on its own regardless of its originating application or version. Hardware dependence must be reduced to a single or at most pair, of chosen platforms, upon which a Bundle can be constructed to function.

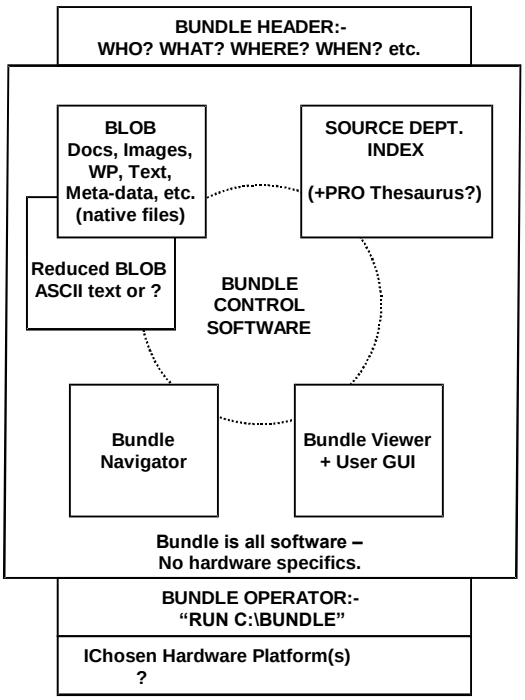
This Bundle Standard will seek to be based upon the proprietary platform or platforms, that has the greatest potential for longevity and is in the strongest market position.

Having Bundles of records the next task is how those Bundles are stored or delivered to a third party or a national archive. Using physical media recreates the same problems as for paper, i.e. someone has to handle it. This is apart from the problems of storage, media life and hardware upgrades to ensure availability. Bundling expects that the most efficient telecommunications transfer mechanism will be chosen, through

a Common Carrier who would ensure that the necessary security mechanisms were provided.

A storage facility receives a Bundle by telecommunications, to then Array the Bundles onto any media it chooses. Thus the storage requirement is reduced to a single type of media, making long term availability of that media more straightforward to plan for.

A pictorial presentation of the conceptual structure of a Bundle is shown below:



Components of a Bundle:

Binary Large OBbject: A file of any format, proprietary or otherwise, that represents the original electronic document, spreadsheet, motion video, or otherwise; and, its audit, control and other such management information. This container of the electronic originals may contain multiple versions of file formats, that relate to the original document. Thus, although the files have been rendered in a proprietary format that meets the accuracy of representation requirements from a Bundle, alternative versions of those files may be provided in ASCII text format, PDF or other file formats as agreed between the originator and the long terms storage facility.

This multiple format approach enables more advanced search facilities, or migration tools to be applied to the content of a Bundle, without impinging on the fundamental need for reliable preservation. Such multiple formats also assist in the reduction of risks, in the even that no hardware platform or platforms predominate in the future, and the migration of the content of Bundles becomes essential to maintaining their long term integrity.

Navigator: A software mechanism within the Bundle, that enables the user of a Bundle to access its content, and to load the appropriate index materials.

Viewer: A file viewer, browser, or terminal emulator provided by the supplier of the document originator's system, that is encapsulated and self-contained within the Bundle, such that the Binary Large Objects, can as a minimum at least be displayed on the chosen hardware platform workstation.

Bundle Header: This is the external marking for the Bundle, visible to the Arrayment systems and their associated index mechanisms. This is identifies the source and likely content of a Bundle, such that it can be automatically Arrayed and entered on the master index on the long term storage system.

The content of this Bundle Header, is by agreement between the originator and the long terms storage facility or national archive. If the long term storage facility or national archive has its own corporate master index for all documents, paper electronic or otherwise, the Bundle Header should represent that corporate master index such that electronic documents are not lost in context to their paper counterparts during the inevitable period of transition from one format to another.

It is likely that the content of a Bundle may deviate, in whole or in part, from its identifying Header for purely electronic or reasons of subject interpretation. Both originator and the long term storage facility must provide some quality assurance mechanism, and agree policy, on how to reduce the impact of such deviations.

Source Index: This is the index and control information for the content of specifically that Bundle alone, and represents the original user's view of how they would index and work with such documents. This index material would be agreed within a commercial organisations own environment, or for governmental operations, in conjunction with its own policy unit, in the context of a national archive's published or agreed guidance.

Transfer

Bundles are expected to be passed from the user or originator's system, to some long term storage facility. Within an organisation, it would be expected that such a transfer would be through some local area or wide area network.

If the storage facility is remote at some third party's premises or at a national archive, then the preferred method of transfer would be telecommunications based, to enable Arrayment to happen automatically. If, physical media are chosen, then it would be preferred that upon receipt of that media by the third party, it is copied onto the single form of media chosen for the Arrayment and subsequent retrieval systems.

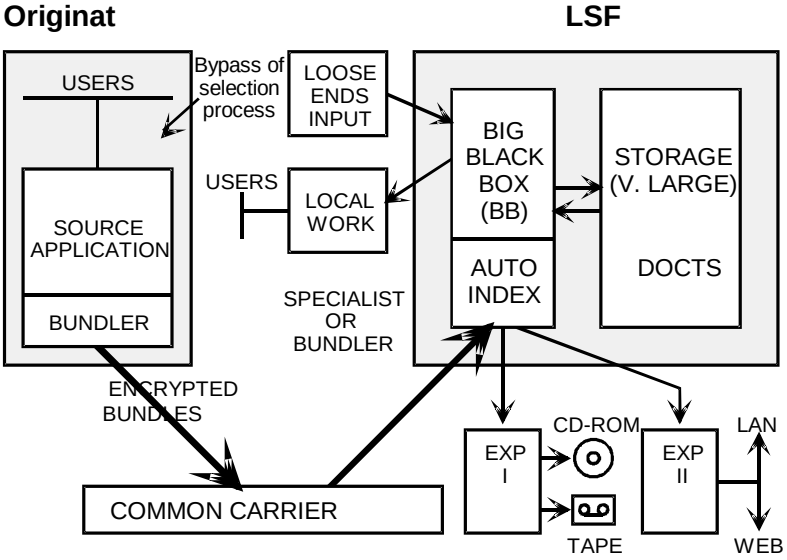
Arrayment

This is the process associated with a specific function within a long term storage facility or a national archive, that ultimately preserves the electronic records or documents.

The choices as to the supporting technology are for the long term storage facility or national archive to make.

Arrayment should follow the conceptual structure shown pictorially below, bearing in mind that such Very Very Large Scale Storage (VVLSS) are unlikely to be suited to classical database or relational database technologies and approaches.

Arrayment Infrastructure v0.2



Conceptual Layout of Arrayment Systems 1

Retrieval

The final user of a Bundle will do so by seeking a particular Bundle or Bundles from the Bundle Header information on the Arrayment Master Index. Once that Bundle has been copied down to the final users workstation of the chosen hardware platform type, the final user will have access to a Bundle's internal index material which represents how it was originated and used within the originating organisation.

This Standard *mandates* that such retrievals are *copies from*, the Arrayment System to the final users workstation, and that amendments and alterations cannot be returned to the Arrayment system. This is for reasons of ensuring legal admissibility and document integrity in perpetuity.

Technical Architecture

The technical architecture cannot be defined for this first draft of the standard, as it subject to ongoing work and technical evaluation.

It is anticipated that in the formative years of the adoption of this Standard, that a number of hardware platforms will be chosen. It is expected that these choices of hardware platform will converge over time to a single platform as and when the technology becomes available, or dominant, and it is appropriate so to do.

It will be the final user's responsibility to ensure that they copy down Bundles to an appropriate workstation upon which it will run and be usable.

The table below presents the first sets of hardware and operating system(s) for Bundles, to be considered for the Standard*. As such it is provisional.*

Standard Reference	Hardware Device	Operating System
1.	Intel Microprocessor 686 family	Mirosoft Corporation Windows 95 - Service Pack II
2.	Intel Microprocessor 686 family	Mirosoft Corporation Windows NT Version 4.0
3.	Motorola 6800 family for Workstations	Unix Version 5.1
4.		

Representation of Information

This Standard seeks to preserve not just the textual content of a document or record, it seeks to preserve context with other documents from the same source or sources, as well as the 'look & feel' of the documents when in original use.

It is not acceptable, to reduce an original electronic document or record to a format which has lessor abilities to present the content of the original. This is for two reasons:

1. legality, many legal jurisdictions now accept that the electronic document 'as created', is classed as the original, and the reduction of that original to some lesser form that no longer adequately presents that original as seen by the originator or recipient may reduce its probative value in court;

2. researchers and final users may derive much useful knowledge upon our working practices and cultural attitudes, from how our technology looked and worked, as from the content of the electronic records themselves.

This Standard therefore, seeks to preserve 'look & feel' unless there are significant mitigating circumstances apart from cost or operational expediency.

Policy Document

The Committee defining how Bundling should operate at an organisational level through this Standard, appreciates that there is considerable scope for agreement and choice to suit local circumstance. To ensure that those involved comprehend what is being provided and undertaken, a Policy Document should be produced, creating a policy towards:

- document lifecycles
- selection of Documents 'Worthy of Long term preservation'
- the implementation of key standards that precursor long term preservation, such as BS7768 or PD008/9
- any legal or governmental advice to be sought and acted upon
- Master Index Content
- telecommunications protocols and security matters
- originating index and audit content
- user authorisation, affirmations, signatures (digital or otherwise), and verification practices (in Rendering a Bundle for storage or during its subsequent display to the final user, digital signatures must be verifiable as per the original)
- creation and origination practices
- working retention periods for any paper derivatives of electronic materials
- user Access
- revisions of documents and revision histories
- transfer of Worthy documents to a long term archive constructed for that purposes
- the local erasure of electronic documents transferred to an archive or long term storage facility

Legal Responsibilities

An organisation must be aware of the value of information that it stores, and executes its responsibility to preserve document long term under the principle of ensuring a *Duty of Care.*

To fulfil this objective, the organisation must:

- Be aware of legislation and regulatory bodies pertinent to its industry
- Establish a chain of accountability and assign responsibility for activities involving electronic document management at all levels
- Keep abreast of developments by keeping in contact with the appropriate bodies and organisations

An organisation must have appropriate levels of security for managing its information agreed and documented.

Seeking Advice

The implications of installing an electronic document management system to store documents that have legal significance are far reaching. Such systems are becoming common, with various codes established by organisations involved with these systems.

It is essential to consult with interested third parties at the planning stage and before the system is installed.

Consultations should take place on the following topics:

- Legal Issues (Civil Law and/or Company Law - Contracts & Disputes)
- Government Bodies
- Special Regulations

Each organisation will have to determine the levels to which these consultations will be made.

- International Law
- Community
- Organisation
- Individual
- National Law
- Industry Sector
- Department

Consultation with the following organisations or individuals is considered advisory and recommended:

- Executive Legal Advisors
- Internal and external Auditors
- Government Bodies
- Industry Regulators
- International Authorities

Operational Procedures

This section deals with the operating procedures a user should implement . These procedures should be documented in a user manual, as required under a Policy Document describer earlier in this Standard, and as similarly required by other related electronic document management standards.

The Committee accepts that operational procedures for the origination of document and records, should remain outside of the scope of this Standard. It is assumed that the originator's system meets those other standards requirements, and that are in good order when being Rendered for storage and preservation.

Document Types

This Standard makes no assumptions as to what will form the content of a Bundle. It is likely that Bundles will be used for a multiplicity of other purposes ranging its primary role as long term preservation mechanism, to becoming a generic transportation mechanism. The format and structure of electronic documents is expected to continue to evolve as rapidly as the underlying technology itself.

This would encompass meta-data, other information such as flight and satellite telemetry, real-time processing, product or construction loading and design data, and information from other computer systems that may be required to be kept for extended periods.

For each type, its validity and accuracy needs to be validated during the Rendering of files into Bundles. Using checks of the origin of the data files, and conformance to the specific procedures, Bundles can be constructed so as to ensure a final user can access those materials and data many years hence.

Indexing

Indexing is a vital part of the process of storing documents, so should index details be lost, then any related documents may also be lost. Indexing should preferably be an automatic presentation of the originator's policy and index structure, at the point of creation of a document.

Procedures for indexing documents should be described in the originator's user manual, and should include methods for checking the accuracy of the index records created. This Standard anticipates that checks and controls will be put in place from origination, through selection, Rendering and Arrayment.

A copy of the index file stored in a Bundle, should include as the documents to which it refers. It may be appropriate on a periodic basis, as part of the agreed policy towards Bundling, to construct a Bundle which contains a single or unified duplicate of the originator's whole index structure at the point in time. If so provided, Bundles delivered after that point in time , should refer back to that previous Bundle and its relevance to those later Bundled documents.

Quality Control

Quality Control procedures should be used periodically to check that the system performance remains stable, and that Bundles are being Rendered as expected. Check frequencies will vary depending on a system's usage, its design, and the agreed policy

The maximum period for any Quality Assurance check for any Rendering process is one business cycle, for at lease 1% of documents rendered. Larger volumes of materials will require grater frequency of checking, which should in turn be related to the expectation of deterioration or performance of the systems and people making index interpretations.

Transfer Procedures

Transfer procedures for Bundles are essentially the responsibility of the originator and the long terms storage facility.

If the transmission of the data file to the storage system is made using a file transfer program, then the transmission system should be designed in such a way to ensure that transmitted files and received files are unaltered by the transmission system. Upon successful receipt of the file the storage system should treat the file as if it had been created within the originator's system.

- Private or public switched telephone network systems should be used only with care, to ensure that the data file being transferred is unaltered by the transmission processes. The following controls could be used to assist this checking process.

- A message identification system should be used to provide mutual non-repudiation. The scheme chosen should include a message identifier and a transmission date and time stamp. Any message identification file should be stored on the System in association with its data file. The message identification system should include a confirmation and/or an echo back, which should be used to confirm to the sender that correct receipt of the data file had occurred;

- Transferred Bundles should be Encrypted using at least three level DES standard algorithms;

- Third party electronic notary techniques should be employed to ensure accurate transfer and integrity of storage;

- This confirmation should include a message identifier and confirmation of receipt date and time stamp;

- Once received by the System, the data file should be treated as if it had been created within the System;

- File encryption systems will enhance the security and authenticity aspects of the File Transmission System. The intended role and use of file encryption systems must be agreed between sender and recipient prior to any transmission being initiated

Document Retention

Document retention procedures are a matter for originator, and the their advisors. This Standard mandates that in any Retention Schedules used by the organisation as a whole, that an appropriate reference is made to the preservation processes required for documents, and any class or other identifier information that goes with them.

This requirement is to ensure clearly and firmly that the erasure of electronic documents in any form or media, before Rendering and preservation can be brought into effect, may be a serious breach of a person's terms of employment. For Civil Servants in the United Kingdom, such responsibility is mandated by law, and the consequences of such an action, accidental or deliberate could lead to prosecution.

Technical Obsolescence

Coping with the technological obsolescence of equipment associated with Bundling, is a matter of good practice in a wider context of IT systems usage.

Assuming that the Bundling approach has been followed, technological obsolescence will be reduced to one form of chosen hardware platform, and one form of storage media.

Work on the formulation of a suitable approach to dealing with technological obsolescence continues.

Security and Protection

Bundling systems must includes security controls appropriate to operational requirements. For example, user access controls should be provided, or appropriate BSi and ISO procedures adopted.

To control access to the various levels of the system (e.g. management, selection and rendering, transfers, retrievals), a secure password controlled access system should be implemented.

Data file transfers, such as moving Bundles from one place or device to another should be controlled by the application software. It should not be possible to move documents or change index data without an entry in the audit trail.

All information about the status of documents, maintenance and Quality Control logs and audit trails should be kept in a secure manner, and be available for inspection by authorised external personnel (such as auditors) who have little or no familiarity with the particular system.

Use of Bureau Services for Transfers

Many organisations will wish to send documents to a bureau that specialises in Bundle Rendering and possibly long term storage. Processing may include additional indexing of documents and the transfer of data files to a storage location. Management practices typical for other EDM and image processing applications should be adhered to wherever possible.

Bundle Licensing and Ownership

To achieve the goals for Bundling, the supplier of the originating edm system, must include a tool for the rendering of Bundles. Such Rendered Bundles may well include proprietary software and applications that would incur ongoing support and charges for usage.

This Standard expects that Bundles, once Rendered will be free and unencumbered by additional charges and fees in any form. This is to avoid copyright and intellectual ownership conflicts with the originator or the long term storage facility, or national archive.

Commercial organisations may chose to negotiate such free from further charges, as part of the acquisition of a Rendering tool.

Governmental organisations, potentially under the guidance of their national archive or advisors. At a national level, an appropriate government bodiy or national archive may seek to introduce a standard contractual term for all suppliers of edm technology and ongoing systems support. This ensures that all new procurements or extensions of existing edm systems and technology will be on an equal and equitable basis for all suppliers and user organisations.

Control and Audit Logs

The provision for a log of what Bundles where rendered, when and with what content. Must be kept on the originator's system. Periodically, as agreed between originator and the long terms storage facility or national archive, under the Policy Document, that log must be sent to the storage facility for the purposes a QA checking and confirming operational integrity of the whole chain of systems and people processes involved with the origination, use and Bundling of electronic documents.

A description of the processes involved in Rendering Bundles to long term storage should be included in the Policy Document.

At the time of Rendering to the Bundle, it should contain at least:

- A record in the Bundle the date and time and the location of the data file
- Verification that the Bundles data files have been written completely, including a check balance.
- Track errors or content divergences
- Produce audit trails of the above processes for itself
- Confirm that the various indexing mechanisms have correctly identified the new documents

Appropriate additional manual procedures should be implemented where if necessary to support these processes.

Environmental Considerations

Environmental aspects of Bundling and rendering are considered to be part of good working practice for the particular technology employed. As such they are beyond the scope of the Standard.

Document Deletion or Expungement

Once a Bundle of documents has been Rendered for transfer to a long term storage facility or a national archive, it may only be deleted and reconstructed afresh. However, the logs and audit trails the represent the Rendering process. Must not be altered or show anything other than a Bundle was created, its stated content, and why it was deleted and who authorised such a deletion.

Once a Bundle has been transferred for Long terms storage or to a national archive it may not be erased under any circumstances. If the Bundle is found to be erroneous or a duplicate, its index reference on the Arrayment system may be hidden from public view, not erased