3. Institutional Strategies

Outline

Intended primary audience

Both senior administrators and operational managers within institutions. Also existing or potential third-party service providers.

Assumed level of knowledge of digital preservation

Intermediate (basic understanding of the issues, some practical experience).

Purpose

- To form the basis for further development of policies and strategies appropriate to individual institutions.
- To provide existing examples of good practice which might serve as models.

This chapter outlines a number of strategies which have been used successfully by institutions in developing approaches to digital preservation. Each section discusses the approach, its potential advantages and disadvantages, and then provides exemplars of the approach together with further reading on the topic. Strategies such as these will form a core component of corporate policy development to address digital preservation. Sound policy development combined with effective working practices and procedures (see **Organisational Activities**) has been essential to effective digital preservation programmes.

3.1 Collaboration

There are compelling reasons and, in some cases, political pressure, to engage in greater collaboration within and between organisations in order effectively to confront and overcome the challenges of digital preservation.The range of skills required to do this demands flexibility within organisational structures to facilitate working in multi-disciplinary teams.There is a significant overlap in the digital preservation issues being faced by all organisations and across all sectors so it makes sense to capitalise on the potential benefits of pooling expertise and experience.

Internal collaboration

The usual assumption is that collaboration is external. However, most libraries and archives are managing a combination of paper-based and digital resources for the foreseeable future and will need to structure their organisation to manage the disparate needs of the two.The blurring of boundaries which digital technology produces means that sections and departments which are structurally distinct, will now need to co-operate in order to integrate the preservation and management of digital materials with other materials.

Such co-operation may well prove impossible unless there are mechanisms put in place to facilitate it. At the strategic level, a cross disciplinary committee charged with developing and overseeing objectives is one means of ensuring that the involvement of all relevant sections can be brought together (**DLM Forum 1997**). At the operational level, consideration will need to be given to defining what specific tasks are required and where those responsibilities logically lie. Setting up of working groups to investigate specific issues is one means of blending the range of skills required (**Lee 1999**).

Advantages

- Makes good use of available skills and expertise.
- Promotes team working.
- Recognises the diversity of skills required for the digital environment in general and digital preservation in particular.
- Is much more likely to yield a good outcome in the longer term.

Disadvantages

- May be frustrating and time consuming in the short term.
- Communication may be difficult initially.
- Senior management may be unwilling to risk perceived lack of control.
- Staff may feel uncomfortable with new ways of working.
- Organisational structures may not be sufficiently flexible to facilitate effective collaboration between different sections. See also **Outreach**.

External collaboration

External collaboration can include formal agreements between two or more organisations and informal arrangements between colleagues working in different institutions and possibly also across different sectors. See also **Outreach**.

Formal agreements can range from collaborative agreements for simply sharing information to accomplishing a specific task (for example working groups), or agreeing on specific allocation of archiving responsibilities. Clearly, the more complex the nature of the agreement, and the more differences there are between participating organisations in terms of their business needs, the more difficult it is likely to be to achieve, though the longer term benefits may also be greater.

Advantages

- Organisational commitment and authority.
- Clear allocation of responsibility.

- Clearly identified gains.

- Enhanced understanding of complex issues.

- Economies of scale - the sum being greater than the parts.

- Greater practical benefit from pooled resources and expertise.

- Greater political and economic clout.

- Improved prospects for future mutually beneficial collaboration.

Disadvantages

- Difficulty of establishing unambiguous agreements able to be accepted by all parties.

- Time taken to establish them.

- Difficulties of communicating across different professional and organisational frameworks.

- Potential bureaucratic barriers.

Informal arrangements have always played an important role in maintaining current awareness among colleagues in similar disciplines. Digital technology provides an increased imperative to share experience and information in an emerging discipline as well as a simpler and more rapid means to contact colleagues known to be working in areas of interest.

Advantages

- Specific to individuals and their personal development and interest.

- Speed and ease of communication.

- Efficient transfer of information.

Disadvantages

- Potential to side-step wider organisational perspective.

- May miss the potential for wider dissemination of knowledge unless there are organisational mechanisms in place to facilitate sharing of knowledge.

See Exemplars and Further Reading

3.2 Outreach

Promotional activities are becoming an increasingly important aspect of the business of cultural institutions in general. In terms of digital preservation, there are compelling reasons to engage in an active awareness-raising campaign and programme of outreach activities:

- Preservation is heavily dependent on data creators, funders, and other stakeholders and their actions early in the lifecycle.

DigitalPreservationCoalition

- Outreach is cost-effective if it reduces or eliminates the need for retrospective construction of documentation, rights clearance, file reformatting to a technology neutral format, and other resource intensive interventions by archiving institutions.

- Both the increasing importance of digital information and the need to retain significant digital resources over time need to be actively promoted.

- Awareness raising of the challenges associated with ensuring digital preservation is needed.

- Awareness raising of the resource implications is needed.

- Roles and responsibilities need to be established.

- The overall understanding of the many and varied issues needs to be improved.

- The prospects for effective collaboration based on shared understanding of the issues will be improved.

There is a basic conundrum in attempting to communicate about digital preservation issues.While the overall approach to digital preservation is based on common sense and sound business practices, the subtleties and interdependencies of many of the issues makes it difficult to convey them. Added to this is the current work environment of information overload in which staff have neither the time nor the inclination to undertake research into current trends and master highly technical material.

The combination of these factors makes the danger of misunderstandings far greater in the digital environment. An effective outreach strategy can do much to minimise this danger. As with **Collaboration**, a high initial investment of resources is likely to yield considerable long-term benefits.The web provides both the incentive and a useful means to promote outreach activities and a number of organisations have made good use of it to disseminate information on digital preservation.

See **Exemplars and Further Reading**

3.3 Third Party Services

Outsourcing specific tasks or services is by no means a new phenomenon. Libraries and archives have contracted out some of their operations for decades.This is an area in which lessons learned from outsourcing in other media can be of value. For example, preservation microfilming has frequently been outsourced and valuable (and sometimes painful) experience has been gained as a result. A major learning experience from preservation microfilming which is directly applicable to the digital environment is the critical importance of having sufficient knowledge of the technology to be able to prepare effective specifications. Earlier microfilming tended to be of poor quality, reinforcing user resistance to it. In recent years, the increased practical experience of the preservation microfilming

community has led to the adoption of appropriate standards developed in partnership between the preservation community and the micrographics industry, as well as greatly improved contracts with bureaux.These developments have yielded major benefits for the preservation of the original materials, for users of microfilmed material, and for the cost-effective deployment of scarce preservation resources.The lessons from preservation microfilming were often learned through a process of trial and error but can now serve as an effective reminder to transfer them to the digital environment.

Cost will clearly be a key consideration when deciding whether or not to contract out digital preservation but there are also other factors to consider and the advantages and disadvantages of each will need to be balanced against the overall mission of the institution. For example, legal provisions due to privacy or confidentiality may influence whether outsourcing is appropriate or not. It should also be emphasised that the extent to which the potential advantages of using third party services can be maximised and the potential disadvantages minimised will be heavily dependent on dedicating staff resources to the following:

- Establishing clear and realistic requirements;
- Maintaining good communication between the contractor and the institution;
- Undertaking quality assurance checks;
- Developing and monitoring the contract.

These costs will need to be added to the overall contract costs when calculating the cost benefit of using third party services for digital preservation, bearing in mind that most of these costs will be or should be incurred even if preservation is not outsourced.

Figure 2

Issues and Potential Advantages and Disadvantages of Using Third Party Services in Digital
Preservation Activities

Issue	Potential advantage of using 3rd party services	Potential disadvantage of using 3rd party services
Limited practical experience in preserving complex digital objects over time	• Avoids the need to develop costly infrastructure (particularly important for small institutions) • Allows the institution to focus on other aspects of service provision • Provides specialist skills and experience which may not be available within the institution • If there are economies of scale, outsourcing may well be cost effective • Allows action to be taken in the short to medium term, pending development of infrastructure	• Without some practical experience and expertise, it will be difficult to develop and monitor effective contracts • Without practical experience it will also be difficult effectively to communicate the requirements of the organisation (or to assess whether they are technically feasible or not) • Danger of either not developing or losing skills base • There is no established bench marking. It is still too new an area • Risk of business failure • Until the market increases there may be an over-dependence on one contractor • Unless there are adequate exit strategies, may be locked into an outsourcing contract longer than intended

Issue	Potential advantage of using 3rd party services	Potential disadvantage of using 3rd party services
Access considerations	• Monitoring usage may be more efficient (assuming the contractor has a demonstrated ability to deliver meaningful usage statistics) • There may be synergies and cost savings in outsourcing access and preservation together	• Difficult to control response times which may be unacceptably low and/or more costly, especially for high-use items
Rights Management	• Avoids what is often a resource intensive activity for the institution	• May significantly increase the cost of the contract and/or complicate negotiations with rights holders
Security	• Contract can guarantee security arrangements required by the institution	• Lack of control, especially for sensitive material
Quality control	• A watertight contract will build in stringent quality control requirements	• Risk of loss or distortion may still be unacceptably high for highly significant and/or sensitive material

See **Exemplars and Further Reading**

3.4 Rights Management

As outlined in **Legal Issues**, it is important that copyright and any other intellectual property rights in digital resources to be preserved are clearly identified and access conditions agreed with the depositor and/or rights holders. If the legal ownership of these rights is unclear or excessively fragmented it may be impossible to preserve the materials, or for any users to access them. Rights management should therefore be addressed as part of collection development and accession procedures and be built in to institutional strategies for preservation.The degree of control or scope for negotiation institutions will have over rights will vary but in most cases institutional strategies in this area will help guide operational procedures. It will also be a crucial component of any preservation metadata (see **Metadata and Documentation**) and access arrangements (see **Access**).

Negotiating rights

As the volume of electronic materials grows and the complexity of rights and number of rights holders in electronic media continues to expand, ad hoc negotiation between preservation agencies and depositors and between rights holders themselves becomes more onerous and less efficient.

Development of model letters for staff clearing rights, model deposit agreements, and model licences and clauses covering preservation related activities help to streamline and simplify such negotiations. Institutions should seek assistance from a legal advisor in drafting such models and providing guidance for staff on implementation or permissible variations in negotiations with rights holders.

A number of institutions have developed models which can be adopted or adapted for specific institutions and requirements.The procedures outlined below are a synthesis of sound practices now being promulgated.

Recommended procedures

- Use a legal advisor to guide your rights management policy and develop documents.

- Develop model letters for rights clearance, model deposit agreements, model licences and clauses for preservation activities.

- If you are licensing material from third parties ensure they have addressed future access to subscribed material in the licence and have robust procedures to support this.

- Prepare reasoned arguments and explanations for your preservation activities. Remember awareness of preservation issues may be low and external stakeholders such as rights holders will need to be convinced of the need and persuaded that their interests will be safeguarded.

- Keep detailed records of rights negotiations.

- Treat licences and rights correspondence as key institutional records to be retained in fireproof and secure environments.

- Make a schedule clearly identifying a list of materials deposited and covered by the licence.This will ensure that all that is believed to have been sent by the depositor has been received and may form the basis of an acknowledgement of receipt.

Summary of issues for licences and deposit agreements

The following provides a brief checklist and summary of legal issues listed in **Legal** which may need to be considered in relation to licences for preservation or deposit agreements for digital materials. Requirements will differ between institutions, sectors and countries and the list should be adapted to individual requirements.This list does not constitute legal advice and you must seek legal counsel for your specific circumstances.

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IPR and digital preservation

A clause should be drafted to cover the following:

- Permissions needed for content.

- Permissions needed for associated software.

- Permissions needed for copying for the purposes of preservation.

- Permissions needed for future migration of content to new formats for the purposes of preservation.

- Permissions needed for emulation for the purposes of preservation.

- Permissions in respect of copyright protection mechanisms.

Access

- Permissions and conditions in respect of access to the material.

Statutory and contractual issues

- Statutory permissions and legal deposit obligations in respect of electronic materials.

- Grant and contractual obligations in respect of electronic materials.

- Conditions, rights and appropriate interests of authors, publishers and other funders.

- Confidential information and protection of the confidentiality of individuals and institutions.

- Protecting the integrity and reputation of data creators or other stakeholders.

Investment by the preservation agency

- IPR in any value added by the preservation agency.

- Withdrawal clauses (and associated fees).

See **Exemplars and Further Reading**

3.5 Staff Training and Development

"It isn't simply a case of sending people on courses. There needs to be a fundamental shift."
Case Study Interviewee

Carefully designed staff training and continuous professional development can play a key role in successfully making the transition from the traditional model of libraries and archives to the digital or hybrid model. Ensuring all staff have adequate IT skills is only a part of the preparation required for equipping staff to maximise the potential of digital technology. A useful starting point for any organisation is to conduct a skills audit tailored to the needs of

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the specific institution.The following section is intended to prompt thought and discussion on the various factors which need to be considered before an effective training programme can be developed.

The current work environment is characterised by:

- Rapid and ongoing change.

- Blurring of boundaries within and between institutions.

- Uncertainty in terms of the ability confidently to predict future trends and requirements.

- Less clearly defined and/or changing roles and responsibilities.

- Increased emphasis on collaboration and team work.

- Increased emphasis on accountability.

Senior management are also subject to the same pressures of dealing with what often seems like a moving target and must simultaneously decide on the strategic way forward while ensuring their staff are able to come with them.

As well as threats there are of course huge opportunities and intelligent training and development can do much to minimise the former and unlock the latter. A creative approach to training and development (as opposed to just "sending people on courses") is likely to make a significant difference by:

- Effectively exploiting the technology to improve the overall quality of service.

- Enhancing the individual level of job satisfaction and commitment.

- Improving the strategic outlook for the organisation as a whole.

In terms of digital preservation, there are specific challenges which can be added to the general work environment list above:

- There is little in the way of formal guidance. A certain amount of "learning by doing" is needed, albeit within the context of much important ongoing research and practice in other institutions. Formal and informal co-operation with colleagues working in similar areas is also relevant here.
  (See also **Collaboration**).

- Lack of training courses and professional development covering the full range of competencies, skills and knowledge required for digital preservation. A suite of skills and competencies are needed and it may be necessary either to commission tailor-made training packages and/or utilise off-the-shelf courses which consider individual issues of relevance to digital preservation, e.g. IT skills; copyright; project management; and metadata.

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- Little empirical data on costs.This may need a combination of some educated guesses, based on current research, combined with specially designed workshops facilitated by experienced practitioners.

The success of training and development programmes will be affected by the degree to which various roles and responsibilities mesh.

Roles and responsibilities of the institution

- Developing an Information Strategy which integrates IT training with the overall mission of the institution.

- Identifying, in consultation with key staff, a skills audit, to determine what specific competencies are required to meet organisational objectives.

- Establishing a balance between recruiting specific skills and effectively developing existing talent.

- Providing adequate resources for training and development.

- Ensuring staff have access to appropriate equipment.

- Ensuring access to practical "hands on" training and practice.

- Encouraging networking between colleagues in other institutions.

- Considering strategies such as short-term secondment to an institution which may have more experience in a specific area.

- Involving staff in designing training and development programmes.

- Facilitating effective multi-disciplinary communication.

- Taking a broad view of what constitutes training and development (i.e. combination of formal courses, both generic and tailor-made, informal training within the organisation, skills transfer within the organisation, networking etc.).

Roles and responsibilities of professional associations

- Responsiveness to current training and development needs.

- Ability to work with institutions to develop training packages to meet their needs.

Roles and responsibilities of the individual

- Ability to tolerate frequent change.

- Ability to be flexible.

- Ability to work in teams.

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- Ability actively to pursue personal professional development through a range of mechanisms.

- Ability to share skills and expertise.

- Ability to learn new skills.

- Ability to apply new skills.

See **Exemplars and Further Reading**

3.6 Standards and Best Practice Guidelines

Standards

Using file format standards (see **Media and Formats**) and encouraging best practice in data creation and preparation of digital resources for deposit has been a key part of many digital preservation programmes. Combined with collaboration and outreach (see **Collaboration** and **Outreach**) it can be an effective method of addressing some other challenges in digital preservation.

The use and development of reliable standards has long been a cornerstone of the information industry.Their existence facilitates the discovery and sharing of resources. Standards are also relevant to the digital environment and provide the same prospects for resource discovery and interoperability between diverse systems.

There are also specific advantages in terms of digital preservation:

- Standard formats are likely to present fewer problems in migrating from one format to another.

- A relatively small number of standard formats will be much easier to manage in both the short and long term.

- A broad consensus on standards will facilitate and simplify collaboration on digital archiving between institutions and sectors.

While undeniably important, there are also factors which inhibit the use of standards as a digital preservation strategy:

- The pace of change is so rapid that standards which have reached the stage of being formally endorsed - a process which usually takes years - will inevitably lag behind developments and may even be superseded. For example, the DLM Guidelines (**DLM Forum 1997**) divides standards into three levels, de facto, publicly available specifications, and de jure, acknowledging the rapidly changing environment.

- Competitive pressures between suppliers encourage the development of proprietary extensions to, or implementations of, standards, which

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can dilute the advantages of consistency and interoperability for preservation.

- The standards themselves adapt and change to new technological environments, leading to a number of variations of the original standard which may or may not be interoperable long-term even if they are backwards compatible in the short-term.

- Standards can be resource intensive to implement.

- In such a changeable and highly distributed environment, it is impossible to be completely prescriptive.

The above factors mean that standards will need to be seen as part of a suite of preservation strategies rather than the key strategy itself.The digital environment is far less inclined to be constrained by rigid rules of any kind and recent years have witnessed a change of emphasis, from reliance on standards towards establishing common approaches which are sufficiently flexible to adapt to both changing circumstances and individual requirements.

Best practice

The necessity for a more fluid approach has led to increased efforts to establish best practice. Increasingly this is being refined into concepts of "ideal practice","acceptable practice", and "unacceptable practice" to aid implementation.There is still some distance to go before best practice in all aspects of digital preservation can be definitively articulated and in such a rapidly changing environment it may never be categorically established. There are beginning to emerge common approaches based on increasing practical involvement with the many and varied issues. For example, NEDLIB, Cedars, the British Library, and the National Library of Australia have all either adopted the OAIS Reference Model or have taken account of it in their system specifications.There are also increased efforts to define a whole range of acceptable practices, particularly in the creation of digital resources (see also Creating Digital Materials), many of which will significantly assist later digital preservation efforts.This guidance invariably includes, but is not limited to, the use of appropriate standards.

Common elements of good practice in creation include:

- The use of open, non-proprietary data formats.

- Providing metadata in conformance with emerging standards and documentation aimed at facilitating future use and future management of the resource.

- Assigning permanent names to online digital resources.

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See **Exemplars and Further Reading**

3.7 Costs and business modelling

Note: This is a new section and has been prepared by Deborah Woodyard-Robinson [March 17 2006]

> "Delays in taking preservation decisions can (and most often will) result in preservation requirements that are more complex, labour intensive and therefore costly."
>
> - Cedars Guide to Digital Collection Management[1]

Through several recent projects and studies we are now beginning to understand what it costs to manage digital material in the long term. See **Exemplars and Further Reading** Preparing cost models and estimations is an invaluable task. It combines the initial investments with ongoing costs to inform sensible and economical decision making and provides advice on the total resources required to implement digital preservation.

Calculating the cost of digital preservation is a complex task, but perhaps even more challenging is assessing the value of this work and securing the funding to perform it. Key decision makers must be convinced that the value of the digital assets is equal to or greater than the cost of the services to maintain them in order to establish economically sustainable processes and business models.

Costs

There are too many variables for a single model to be applied to developing digital preservation costs, but there are now several tools and case studies available that can be useful for guidance.

Using an established model as a basis can be helpful but be aware of significant differences in collections and material types, organisation mission and the services they provide as all these aspects of an organisation can have significant effects on their costs.

A standard approach to determining costs is to break down the digital life cycle into processes based on workflow or a system model such as the OAIS Reference Model[2]. Each stage or process, called a cost event (for examples see table 1 below), is then evaluated for likely cost sources (for examples see table 2 below). Depending on the purpose of the study a total cost may then be calculated per item, per time period for preservation of all collection material, or per process.

Life cycle management is a sensible tool for allocating costs. Using a structured approach such as this can help identify costs which may not have been considered (e.g. costs of selection, etc) and also reinforces that costs are cyclical and very few are one-off expenses. This is well illustrated by Shenton[3] in the examination of life cycle management of library collections. Stages identified in the life cycle of traditional collections start with selection,

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acquisitions processing, cataloguing and pressmarking and go through to preservation, conservation, storage, retrieval and the de-accession of duplicates. Similarly the digitised material lifecycle was broken down into selection, checking intellectual property rights, conservation check and remedial conservation costs, retrieval and reshelving costs, capture of digitised master, quality assurance of digitised master and production of service copies, metadata creation cost, access cost over time, and storage costs over time. An observation of this study was that a one off cost such as cataloguing may appear to be a large proportion of the initial cost, however over time it may easily become a smaller cost component than a recurring cost in the life cycle such as providing access.

Similarly the LIFE (Life Cycle Information for E-Literature) Project[4] aims to establish individual stages in the born-digital life cycle and examine the cost to provide the full financial commitment of collecting digital materials over the long term. On that basis it also hopes to identify possible cost reductions and potential efficiencies.

It may be helpful to use the OAIS reference model as a guide to enhance and inform the future of the long term digital life cycle. The OAIS discusses many processes that will be needed for long term preservation that may not yet be fully implemented within an organisation.

Table 1: Typical cost events[5]

Activities	Cost Events
System creation and management activities	Creating organisational infrastructure Creating repository architecture Archive administration Repository operation Maintenance Upgrades
Digital material workflow/life cycle activities	Selection, Acquisition, Validation Creation of digital collections, Conversion of deposited material Rights negotiation and management Resource Description, e.g. Cataloguing Metadata and preservation metadata creation Storage Evaluation and revision Disposal/Deaccession

Activities	Cost Events
Specific preservation activities	Technology planning activities such as Technology watch Long-term strategies e.g. migration and emulation
Specific access activities	Access to objects Access to catalogues User support

Table 2: Typical cost sources[6]

Cost Type	Cost Sources
Digital object/data acquisition	Purchase price / licensing cost
Labour	Personnel will include dedicated staff as well as varying proportions of senior management, supervisor, IT staff, curatorial staff etc.
Technology	Hardware Software Level of Requirements (e.g. speed, availability and performance)
Non-Labour operational costs	Facilities and Space (e.g. rent and electricity) Materials and Equipment Communications Insurance Legal costs

Several factors can have a significant influence on the result of these cost events. The relationship of costs and institutional strategies such as **collaboration**, **third party services**, **rights management**, **training** and **standards** are discussed in the previous sections. Other factors include:

Labour

Undoubtedly the greatest cost in the digital material life cycle today is labour. Therefore the ability to automate or batch process digital materials and to participate in collaboration on research and services will reduce the cost of digital preservation most significantly.

Object types and storage size

The complexity of the material submitted and number of objects acquired generally has more impact on costs than the total storage size. The type and variety of formats accepted into the repository will also affect cost, because for example proprietary formats are likely to be more difficult and expensive to manage in the long term. It may be possible to reduce costs by limiting the formats the repository will accept, or transforming material into a standard common format. This can be done to reduce the number of file types and possibly reducing the storage size. However, it is also necessary to realise that due to storage redundancies required for back up each gigabyte of deposited data requires more than one gigabyte of disk space in repository storage.

Beware of generalising storage sizes for digital file formats. The definition of an "object" must be very specific to make sense of figures. For example an image may be a small low resolution GIF or a large high quality TIFF. When one file size is multiplied by many thousands of objects this can impact storage predictions and costs considerably. Yet the smallest version of an object may not be the most cost effective to preserve if it cannot serve the required purpose, such as in the case of the high quality, substantially larger image.

Repository boundaries

A clear set of guidance documents such as the organisations mission and collection (selection) policies and guidelines will reduce long term cost defining the aim and direction of collections and services for more efficient decision making.

Existence of services that can be shared such as file format registries and technology watch services will reduce long term preservation costs. Availability of software tools for providing automation will also be a key factor particularly for smaller organisations not able to afford to create their own.

Preservation service level

The various levels of preservation service offered by an organisation will also significantly affect cost. Effectively there is a long-term trend for a rapid increase in the quantity of computer storage per unit cost, so the cost of bit preservation over time is declining towards zero. The real costs are in providing staff and access over time (and meeting increasing user expectations of service for this). Therefore a repository only offering bit-level preservation, where the only undertaking is to guarantee storage and delivery of the sequence of bits, will have lower costs than a repository managing full migration paths or emulation solutions.

Timing

Preservation strategies enacted early in the life cycle are likely to be more cost effective than salvage attempts left until technology has already moved on significantly. For example, creating preservation metadata while sources such as the producer are still available is much faster and cheaper than to attempt to divine the appropriate information at a later date. It may also be cheaper for the producer to create such metadata as they are likely to have the information required at hand and find it easier to understand. Similarly solutions to

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technology obsolescence change with time from easily and quickly solvable while the technology is familiar, to the area of a few specialists or a state of digital archaeology requiring significantly more time and expense to restore.

Another aspect of timing in relation to costs is the period of retention. Expect that materials to be preserved indefinitely will be more costly than those for finite retention. The cyclical nature of digital preservation expenses will likely determine that disposal of material not required permanently in a timely manner will provide a cost benefit, providing the disposal event does not cost more to achieve than the continued preservation expenses.

Business models

As described above methods for assessing the costs of managing digital materials in the long term are becoming clearer. Further to this work is the need to prove the benefit or return of this investment in order to secure adequate funding.

Key stakeholders and decision-makers need to be motivated to contribute to the medium to long term preservation of digital materials. These key stakeholders include the producer, the rights holder, the repository and the consumer, who each may or may not be the same entity depending on the organisation. Each stakeholder will have different interests and require different incentives to actively participate in the preservation process.

In examining the business model a clear focus should be on the end purpose of the archiving process which is to serve the consumers or "designated communities" of current and future users.

Organisations such as the British Library are now exploring ways to enumerate the value of their collections and services which had previously appeared to be unquantifiable[7]. These new calculations based on "Contingent Valuation" prove the worth of supporting their operations to their key stakeholders and funding sources.

One reasonably simple method to assess the value of maintaining digital material in an organisation is to present the case if there were inaction and the assets were effectively lost to the community. What would be the cost of replacing them, recreating them or managing to work without them?

The *espida* Project[8] at the University of Glasgow is developing a sustainable business focused model for digital preservation at an FE/HE institution. They have recognised that digital preservation so far has frequently been funded only by short term projects, yet there is an on-going cost for preservation. There is a lack of commitment to sustainable funding. Therefore there is a need to demonstrate the benefit weighed against the costs and risks. There needs to be a demonstrable return on that preservation investment, even if it isn't directly financial in nature.

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    iii. Connaway, Lynn., Lawrence, Stephen (2003) *Comparing Library Resource Allocations for the Paper and Digital Library: An Exploratory Study* D-Lib 9, (12) http://www.dlib.org/dlib/december03/connaway/12connaway.html

    iv. Costs of Digital Preservation, Testbed Digitale Bewaring (Date Created: May 2005) (Netherlands) http://www.digitaleduurzaamheid.nl/bibliotheek/docs/CoDPv1.pdf [PDF]

    v. Arturo Crespo, Hector Garcia-Molina: Cost-Driven Design for Archival Repositories. Joint Conference on Digital Libraries 2001 (JCDL'01); June 24-28, 2001; Roanoke, Virginia, USA. http://www-db.stanford.edu/~crespo/publications/cost.pdf [PDF]

    vi. Rosenthal, D. S. H., Robertson, T., Lipkis, T., Reich, V., Morabito, S. (2005) *Requirements for Digital Preservation Systems: A Bottom-Up Approach* D-Lib 11,(11) http://www.dlib.org/dlib/november05/rosenthal/11rosenthal.html

7. *Measuring Our Value*, Results of an independent economic impact study commissioned by the British Library to measure the Library's direct and indirect value to the UK economy http://www.bl.uk/pdf/measuring.pdf [PDF]

8. The espida Project: http://www.gla.ac.uk/espida/

See **Exemplars and Further Reading**

3.8 Exemplars and Further Reading

Collaboration

Outreach

Third Party Services

Rights Management

Staff Training and Development

Standards and Best Practice Guidelines

Costs and Business Modelling

Collaboration

1. AHDS (Arts and Humanities Data Service)
   http://ahds.ac.uk
   The AHDS is a distributed service consisting of five service providers (Archaeology Data Service; History Data Service; Oxford Text Archive; Performing Arts Data Service;Visual Arts Data Service) and the Executive. The aim of the AHDS is to collect, preserve, and promote re-use of the electronic resources resulting from arts and humanities research.

2. Cedars (CURL Exemplars in Digital Archives)
   http://www.leeds.ac.uk/cedars
   A three-year eLib project which commenced in 1998 and is led by the universities of Oxford, Cambridge, and Leeds on behalf of CURL.The UK Office for Library and Information Networking (UKOLN) is also a partner, with particular emphasis on the development of preservation metadata.The main goal of the project is "to address strategic, methodological and practical issues and provide guidance in best practice for digital preservation".

3. Digital Library Federation. Preservation of electronic scholarly journals.
   http://www.diglib.org/preserve/presjour.htm
   An initiative commenced by the Coalition for Networked Information (CNI) and the Council on Library and Information Resources (CLIR).The objectives are to establish archival repositories; seek publishing partners to populate the archives; develop the necessary licensing apparatus to ensure libraries' interests are accommodated by archiving strategies being adopted by the repositories; and share experience of publishers, libraries, and repositories to mutual advantage. The initiative has also defined minimum criteria for a digital archive repository which is based on the OAIS model but has been recast to reflect the specific needs of libraries and publishers. A draft document has also been prepared which encourages merging digital archives and repositories to document and enclose their practices in particular areas.This is further indication of the progress towards defining operational requirements and preservation responsibilities based on practical experience.

4. National Digital Preservation Coalition
   In 2000 the JISC under the aegis of its Committee for Electronic Information (JCEI) created a new post, the Digital Preservation Focus, in recognition of the increasing strategic importance of digital preservation for the Higher and Further Education communities. A key task was the establishment of a National Digital Preservation Coalition in the UK. Lunched in July 2001 the DPC has rapidly established an alliance of major organisations and programme activities to advance digital preservation.

5. National Library of Canada. Consultation on Online Publications
   http://www.collectionscanada.ca/8/7/index-e.html
   An initiative of the National Library of Canada aimed at bringing together key experts from various sectors of the Canadian publishing community with NLC staff to discuss Canadian online publishing issues.This is another example of the leadership role being taken by national libraries to confront the issues associated with electronic publishing and develop strategies to deal with them.While this initiative is seen as preliminary, the NLC "considers it to be the start of a process towards a strategy that meets common objectives".
   Update 26 September 2007
   This document has been archived with a note that ".. information may be out of date and some functionality lost."
   Archived location

http://epe.lac-bac.gc.ca/100/206/301/lac-bac/consultation_online_publications-ef/8/7/index-e.html

6. NEDLIB (Networked European Deposit Library)
   http://www.kb.nl/nedlib
   This project has twelve partners consisting of deposit libraries, archives, and IT developers.Three publishers are also contributing to the project, which runs from January 1998 to December 2000. As well as collaboration between the partners, the NEDLIB website and discussion list, NEDLIB-INT actively encourages communication with others working on the same things.
   The three aims of NEDLIB are:

   1. To develop a common architectural framework and basic tools for building deposit systems for electronic publications;

   2. To address the issue of long-term preservation;

   3. To build a demonstrator system, with tools and software, covering all functional aspects of a deposit system for electronic publications (DSEP).

7. PANDORA (Preserving and Accessing Networked Documentary Resources of Australia)
   http://pandora.nla.gov.au
   The PANDORA project began as a National Library of Australia initiative. Once the proof-of-concept archive was established, the NLA sought other deposit libraries as partners to join them in preserving Australian online documentary heritage.This involves state libraries, the other deposit institutions which, with the NLA, have a mandate to collect and preserve Australian non-digital documentary heritage.

8. RLG-DLF 1999 Task Force on Policy and Practice for Long-Term Retention of Digital Materials.
   http://www.rlg.org/preserv/digrlgdlf99.html
   An example of collaboration between two membership organisations, Research Libraries Group (RLG) and Digital Library Federation (DLF) which have both made digital preservation a key priority for action and attention.This Task Force was formed in response to a 1998 survey of digital preservation needs and requirements in RLG member institutions.

9. RLG/OCLC
   http://www.rlg.org/pr/pr2000-oclc.html
   Once again RLG is in partnership with another organisation, in this case, Online Computer Library Center (OCLC). RLG and OCLC are two organisations that have done much separately to progress digital preservation issues but now feel it is timely to explore how they can co-operate to create infrastructures for digital archiving.The first steps towards this wider aim are collaboration on two working documents, one on characteristics of reliable archiving services and another on preservation metadata.

Update 03 October 2007
RLG has merged with OCLC http://www.oclc.org/

10. Reference Model for an Open Archival Information System (OAIS)Draft Recommendation for Space Data System Standard. May 1999.
    http://www.ccsds.org/documents/650x0b1.pdf
    The Consultative Committee for Space Data Systems (CCSDS) has been asked by the International Standards Organisation (ISO) to co-ordinate the development of standards to support the long-term preservation of digital information obtained from observations of the terrestrial and space environments.The OAIS Reference Model is the first of this co-ordination effort to reach draft standard and is being used, or at least adapted by an increasing number of organisations.Though initially intended for a fairly specific application, it is intended to be used in a wide range of archiving organisations.This is a good example of both the advantages (consensus; increased consistency; utilising wide ranging expertise and experience) and disadvantages (time to reach widespread consensus; time delay before it becomes an official standard; necessity to adapt the model to specific needs) of international collaboration.
    Update 27 January 2006
    The draft OAIS recommendation is no longer available, the full specification (2002) can be found at: http://public.ccsds.org/publications/archive/650x0b1.pdf
    See also **Standards and Best Practice Guidelines**.

11. JISC/Publishers' Association Working Group and Joint Working Parties.
    http://www.jisc.ac.uk/index.cfm?name=wg_pals_home
    Initially set up with a fairly broad mandate to discuss issues of mutual concern between libraries and publishers, the enhanced mutual understanding between these two groups has been of great benefit in helping to foster co-operation and collaboration in digital preservation as well as other issues. A number of joint working groups have subsequently been established, including one on the development of model licences and another on long-term retention of digital publications. Model licences based on the initial JISC/PA model licence have been developed to ease the administrative burden imposed by multiple terms and conditions.The latter are being adapted by the Cedars project to deal with digital preservation issues.

12. Working Together:A Workshop for Archivists, Records Managers and Information Technologists. Sponsored by the Coalition for Networked Information (CNI) and Committee on Institutional Co-operation (CIC), 18-19 November 1999.
    http://www.cni.org/projects/working.together/wt9911/
    This is the second workshop in an innovative mechanism for overcoming communication barriers between different professional groups.The purpose of the workshop is "to promote the inclusion of archival and records management issues in systems development projects, create incentives for supporting electronic records management concerns, remove organizational barriers that prevent archivists from implementing electronic records programs, and educate archivists and information technologists about their shared responsibilities and interests in preservation of and

access to electronic records.Through collaboration among information professionals, we hope to realize these goals."

13. Bernbom, G, Lippincott, J. and Eaton, F. (1999).'Working Together: New Collaborations Among Information Professionals.' Cause/Effect 22 (2). http://www.educause.edu/ir/library/html/cem/cem99/cem9922.html

14. Berthon, H. and Webb, C. (2000).'The Moving Frontier: Archiving, Preservation and Tomorrow's Digital Heritage.' Paper presented at VALA 2000 - 10th VALA Biennial Conference and Exhibition, Melbourne,Victoria, 16-18 February 2000. http://www.nla.gov.au/nla/staffpaper/hberthon2.html

15. Dempsey, L. (1999).'Scientific, Industrial, and Cultural Heritage: a shared approach.' Ariadne 22, December. http://www.ariadne.ac.uk/issue22/dempsey

16. Digital Archiving: Bringing Issues and Stakeholders Together. An Interactive workshop sponsored by ICSTI and ICSU Press. UNESCO House, Paris, 30-31 January 2000. http://www.icsti.org/2000workshop/index.html
    Update 23 May 2008
    URL no longer available - link disabled

17. McGovern,T.J. and Samuels, H.W. (1997).'Our Institutional Memory at Risk: Collaborators to the Rescue.' CAUSE/EFFECT 20 (3). http://www.educause.edu/ir/library/html/cem/cem97/cem9735.html
    van der Werf-Davelaar,T. (1999).'Long-term Preservation of Electronic Publications; the NEDLIB Project'. D-Lib Magazine 5 (9). http://www.dlib.org/dlib/september99/vanderwerf/09vanderwerf.html

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Search Other Resources

Search Archives of Digital Preservation Jiscmail list
http://www.jiscmail.ac.uk/cgi-bin/wa.exe?S1=digital-preservation

Search Preserving Access to Digital Information (PADI) Gateway
 http://www.nla.gov.au/padi/search.html

Outreach

The following are a few examples of outreach activities and are indicative of the wide range of mechanisms which can be used in this context:

1. Feeney, M. (ed). (1999). Digitising Culture: maximising the nation's investment. The National Preservation Office, London.
   Also available online at: http://www.bl.uk/npo/
   The JISC/NPO Digital Archiving Working Group commissioned this publication as a means of making the series of commissioned reports on various aspects of digital preservation more readily accessible to a larger audience.

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The Handbook was first compiled by Neil Beagrie and Maggie Jones and is now maintained and updated by the DPC.

Digital Preservation Coalition
November 2008
Website: www.dpconline.org
Email: info@dpconline.org

2. National Library of Canada. Consultation on Online Publications. January 31 2000.
   http://www.collectionscanada.ca/8/7/index-e.html
   A Consultation on Online Publications was hosted by the National Library of Canada in January 2000 with the purpose of identifying and addressing issues with respect to acquisition, preservation and provision of access to online publications.
   Update 26 September 2007
   This document has been archived with a note that ".. information may be out of date and some functionality lost."
   Archived location
   http://epe.lac-bac.gc.ca/100/206/301/lac-bac/consultation_online_publications-ef/8/7/index-e.html

3. Arts and Humanities Data Service (AHDS) website. Managing Digital Collections.
   http://www.ahds.ac.uk/about/publications/index.htm
   The AHDS invests significant effort in a range of publications and training activities designed to raise awareness of digital preservation issues and provide practical advice to data creators and potential future depositors.

4. Preserving Access to Digital Information (PADI) website.
   http://www.nla.gov.au/padi

5. Public Record Office. EROS (Electronic Records in Office Systems) programme.
   http://www.pro.gov.uk/recordsmanagement/eros
   Update 26 November 2004
   The EROS project has now ended. This redirected page contains links to relevant guidance: http://www.nationalarchives.gov.uk/recordsmanagement/

   The Public Record Office promotes information about its EROS programme via its website and also has a dedicated staff team specifically for outreach activities to government departments.

6. Into the Future: On the Preservation of Knowledge in the Electronic Age
   http://www.clir.org/pubs/film/film.html
   The Council for Library and Information Resources (CLIR) and the American Council of Learned Societies produced a film on the subject of digital preservation, Into the Future: On the Preservation of Knowledge on the Electronic Age, as well as an accompanying discussion guide and a compendium of other resources.The purpose was to inform a variety of communities about issues of preservation in the electronic age, to articulate what might be at stake for society, and to point to ways that individuals and groups can work together to find solutions to the challenges posed.

Search Other Resources

Search Archives of Digital Preservation Jiscmail list
http://www.jiscmail.ac.uk/cgi-bin/wa.exe?S1=digital-preservation

Search Preserving Access to Digital Information (PADI) Gateway
 http://www.nla.gov.au/padi/search.html

Third Party Services

Digital reformatting

1. RLG tools for beginning digital reformatting projects (1998)
   http://www.rlg.org/preserv/RLGtools.html
   Includes Worksheet for Estimating Digital Reformatting Costs; RLG Guidelines for Creating a Proposal for Digital Imaging; RLG Model Request for Information (RFI); RLG Model Request for Proposal (RFP).

2. Higher Education Digitisation Service (HEDS).
   http://heds.herts.ac.uk
   HEDS provides a host of information on their website and also undertake consultancy services for digitisation projects.

Data recovery

3. Ross, Seamus and Gow, Ann. (1999). Digital Archaeology: Rescuing Neglected and Damaged Data Resources.
   http://www.hatii.arts.gla.ac.uk/research/BrLibrary/rosgowrt.pdf Appendix 3 refers to a list of Data Recovery companies

Tendering for digital storage systems

4. National Library of Australia. Digital Services Project. Request for Tender - Digital Collection Management System.
   http://www.nla.gov.au/dsp/rft
   The NLA does not propose this as a model but it is very instructive to any other organisation contemplating developing the infrastructure for managing and preserving digital collections.The Draft Contract at Attachment 1 clearly includes elements specific to Australian Government requirements but also includes many generic elements applicable to similar organisations in any country.

Search Other Resources

Search Archives of Digital Preservation Jiscmail list
http://www.jiscmail.ac.uk/cgi-bin/wa.exe?S1=digital-preservation

Search Preserving Access to Digital Information (PADI) Gateway
 http://www.nla.gov.au/padi/search.html

Rights Management

1. Arts and Humanities Data Service. Rights Management Framework.
   http://www.ahds.ac.uk/depositing/index.htm
   A rights management framework for the AHDS which incorporates model agreements
   for depositors and users to access data.

2. Beagrie, N. and Greenstein, D. (1998). Managing Digital Collections:AHDS Policies,
   Standards and Practices. Consultation draft.Version 1. 15 December 1998.
   http://www.ahds.ac.uk/about/publications/index.htm

   A handbook of AHDS policies, standards and practices including procedures for the
   administration of the rights management framework.

3. Book Industry Communication,The Rights Decision Tree, Sally Morris and the Rights
   Metadata Working Party.
   http://www.bic.org.uk/rightree.rtf
   Update 29 September 2008
   No longer available online

   A model decision tree developed for publishers to administer permissions. Although not
   encompassing digital preservation, it provides a useful guide to the concerns of and
   procedures followed by publishers.

4. Essex Data Archive, Guide to Depositing Data.
   http://www.data-archive.ac.uk/depositingData/introduction.asp
   A guide and forms for depositors with the Essex Data Archive.This includes a pro
   forma licence agreement.
   Update 14 June 2005
   The Guide to Depositing Data has now been moved onto the Economic and Social Data
   Service web site, please use the following link to access the relevant sections:
   http://www.data-archive.ac.uk/aboutdata/create.asp
   Update 12 December 2006
   New location
   http://www.esds.ac.uk/aandp/create/depintro.asp

5. National Library of Australia.Voluntary Deposit Scheme for Physical Format Electronic
   Publications.
   http://www.nla.gov.au/policy/vdelec.html
   A guide to the Voluntary Deposit Scheme for Physical Format Electronic Publications
   in Australia.This includes a pro forma deposit deed.
   Update 27 January 2006
   This page has actually been removed from the site and the information will be
   incorporated into the following page: http://www.nla.gov.au/policy/cdrom.html - Use
   of Australian CD-ROMs & Other Electronic Materials Acquired by Deposit

6. Seville, C. and Weinberger, E. Intellectual Property Rights lessons from the CEDARS project for digital preservation. Eighth draft, 1 June 2000 http://www.leeds.ac.uk/cedars/contentpub.htm A draft guide being developed by the CEDARS project.

7. LIBLICENSE. Licensing Digital Information. A Resource for Librarians. http://www.library.yale.edu/~llicense/index.shtml or UK mirror site: http://mirrored.ukoln.ac.uk/lib-license/index.shtml Web pages and discussion lists to assist librarians in negotiating licence agreements. Includes many model licences and publishers' agreements.

8. AHDS and TASI, Copyright FAQ. http://www.tasi.ac.uk/advice/managing/copyright_faq.html

9. Bide, M. et al. (1999). Digital Preservation: an introduction to standards issues surrounding the deposit of non-print publications. http://www.bic.org.uk/digpres.doc **Update 29 September 2008** Link no longer valid - new location: http://www.bic.org.uk/files/pdfs/digpres.pdf

10. Koelman, K. J. et al. (1998). Copyright Aspects of the Preservation of Electronic Publications. Instituut voor Informatierecht Report 7. http://www.ivir.nl/Publicaties/koelman/KBeng2.doc

11. Lyons, P. (ed). (1998).The JISC/TLTP Copyright Guidelines. (ISBN 1 900508 41 9) http://www.ukoln.ac.uk/services/elib/papers/other

12. PADI Website. Rights Management. http://www.nla.gov.au/padi/topics/28.html

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Search Other Resources

Search Archives of Digital Preservation Jiscmail list
http://www.jiscmail.ac.uk/cgi-bin/wa.exe?S1=digital-preservation

Search Preserving Access to Digital Information (PADI) Gateway
http://www.nla.gov.au/padi/search.html

Staff Training and Development

1. Arts and Humanities Data Service. User Support and Training page. http://ahds.ac.uk/users.htm

2. Edwards, C. (1997). 'Change and Uncertainty in Academic Libraries.' Ariadne, Issue 11. http://www.ariadne.ac.uk/issue11/main

3. Garrod, P. (1998).'Skip (Skills for new Information Professionals).' Ariadne, Issue 16.
   http://www.ariadne.ac.uk/issue16/skip/intro.html

4. Jefcoate, G. (1997).'Training for a national library website: the experience of the British
   Library.' Gabriel workshop, session V - Human Resources and Training.
   http://www.bl.uk/gabriel/about_gabriel/workshops/contents/1997/ses5-gj.htm
   Update 14 June 2005
   Gabriel has ceased as a project and this page is no longer available.

5. Public Record Office. (1999). Human Resources in Records Management. Kew: Public
   Record Office.
   http://www.nationalarchives.gov.uk/recordsmanagement/advice/pdf/best_human_resour
   ces.pdf
   Update 03 November 2006
   Link broken. New location
   http://www.nationalarchives.gov.uk/documents/best_human_resources.pdf

6. Ross, S., Moss, M. and Richmond, L. (1998).'Planning and Designing a Programme of
   Digital Preservation Studies'. In Electronic Access:Archives in the New Millenium.
   Kew: Public Record Office. pp102-110.

7. SKIP (Skills for New Information Professionals) Project. Final Report. 1998.
   http://www.ukoln.ac.uk/services/elib/papers/other/skip/finalpt2.html

8. Wettengel, M. (1998).'Core Competencies for Electronic Record Keeping'. In Electronic
   Access:Archives in the New Millenium. Kew: Public Record Office. pp.96-101.

Search Other Resources

Search Archives of Digital Preservation Jiscmail list
http://www.jiscmail.ac.uk/cgi-bin/wa.exe?S1=digital-preservation

Search Preserving Access to Digital Information (PADI) Gateway
 http://www.nla.gov.au/padi/search.html

Standards and Best Practice Guidelines

1. Arts and Humanities Data Service. Guides to Good Practice.
   http://www.ahds.ac.uk/creating/guides/index.htm

2. Beagrie, N. and Greenstein, D. (1998). Managing Digital Collections:AHDS Policies,
   Standards and Practices. Consultation draft.Version 1. 15 December 1998.
   http://www.ahds.ac.uk/about/publications/index.htm

3. DLM Forum. (1997). Guidelines on Best Practice for Using Electronic Information.
   http://europa.eu.int/ISPO/dlm/documents/gdlines.pdf
   Update 19 March 2008

No longer available - information at
http://ec.europa.eu/archives/ISPO/dlm/

4. Gatenby, P. (2000).'Digital Archiving - Developing Policy and Best Practice Guidelines at the National Library of Australia.' Paper presented at an interactive Workshop on Digital Archiving sponsored by ICSTI and ICSU Press, 30-31 January 2000. UNESCO House, Paris
http://www.icsti.org/2000workshop/gatenby.html
Update 23 May 2008
URL no longer available - link disabled

5. NOF-digitise Technical Standards and Guidelines.Version One; June 2000.
http://www.peoplesnetwork.gov.uk/content/technical.asp
Update 27 January 2006
This link no longer active. Version One and later versions available at:
http://www.mla.gov.uk/webdav/harmonise?Page/@id=73&Document/@id=18612&Section[@stateId_eq_left_hand_root]/@id=4332

6. Reference Model for an Open Archival Information System (OAIS) Draft Recommendation for Space Data Systems (CCSDS), CCSDS 650.0-R-1, May 1999.
http://www.ccsds.org/documents/650x0b1.pdf
Update 27 January 2006
The draft OAIS recommendation is no longer available, the full specification (2002) can be found at: http://public.ccsds.org/publications/archive/650x0b1.pdf

It is also instructive to look at responses to the draft OAIS model from the perspective of deposit libraries which have reviewed or implemented it. See, for example the National Library of Australia's response at: http://www.nla.gov.au/wgroups/oais
NEDLIB contribution to the review of OAIS is at:
http://www.kb.nl/coop/nedlib/results/OAISreviewbyNEDLIB.html
Update 11 August 2006
New location http://nedlib.kb.nl/results/OAISreviewbyNEDLIB.html

7. PADI Website. Data Documentation & Standards.
http://www.nla.gov.au/padi/topics/29.html

8. Public Record Office. (1999). Management,Appraisal and Preservation of Electronic Records.Volume 1, Principles & Volume 2, Procedures.
http://www.nationalarchives.gov.uk/electronicrecords/advice/guidelines.htm

9. Public Record Office Victoria (Australia). (2000). Standard for the Management of Electronic Records in the Victorian Government.Version 1.0,April 2000. (PROS 99/007). http://www.prov.vic.gov.au/vers/standards/pros9907/99-7toc.htm
Update 26 November 2004
Version 2 now available: Management of Electronic Records PROS 99/007 (Version 2)
http://www.prov.vic.gov.au/vers/standard/version2.htm

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http://www.jiscmail.ac.uk/cgi-bin/wa.exe?S1=digital-preservation

Search Preserving Access to Digital Information (PADI) Gateway
 http://www.nla.gov.au/padi/search.html

Costs and Business Modelling

These sources are quite different from the costs referred to in section 4 which indicate the cost of creating digital surrogates. The costs here relate to the development of life cycle costing and maintaining digital materials in the long term.

Costs and models

1. LIFE : Life Cycle Information for E-Literature*
   http://www.ucl.ac.uk/ls/lifeproject/
   This project has been launched to examine key stages of digital library material life cycles which will then be costed to show the financial commitment required to maintain the materials in the long term. It is being conducted by the University College London (UCL) Library Services and the British Library is funded by the Joint Information Systems Committee (JISC). The project is expected to present findings in early 2006.

2. Rusbridge, Chris. (2006). Excuse Me : Some Digital Preservation Fallacies. Ariadne 46 Jan. 2006
   http://www.ariadne.ac.uk/issue46/rusbridge/
   Rusbridge makes the point that all preservation is expensive and there is a logical argument to suggest that digital preservation will be cheaper than preservation of print materials. His conclusion emphasises that repositories need to make conscious and responsible decisions when allocating resources for digital preservation actions.

3. Lavoie, Brian F. (2003) Incentives to Preserve Digital Material: Roles, Scenarios and Economic Decision-Making
   http://www.oclc.org/research/projects/digipres/incentives-dp.pdf
   "Economics is, fundamentally, about incentives, so a study of the economics of digital preservation should begin with an examination of the incentives to preserve." This concept is key in this paper which convincingly argues the case for influencing the key economic decision-makers to see the case for preservation in order to sustain funding for digital collections.

4. espida *
   http://www.gla.ac.uk/espida/index.shtml
   This project of the University of Glasgow is developing a sustainable business focussed model for digital preservation at an HE/FE institution. The project agrees very much with the intention of Lavoie in the previous article that the key to sustained funding for digital preservation lies in creating an incentive in the mind of the key stakeholders by proving the value of the investment in digital preservation. They are developing an

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approach based on an economic model, the model scorecard approach. The final results are expected in September 2006.

Currall, J., Johnson, C., McKinney, P., (2005) 'The Organ Grinder and the Monkey. Making a business case for sustainable digital preservation', Paper given at EU DLM Forum Conference 5-7 October 2005 Budapest, Hungary.
http://www.gla.ac.uk/espida/documents/dlm%20forum%202005.pdf
A paper discussing the reasoning behind the espida project.

5. Chapman, S. (2003) Counting the Costs of Digital Preservation: Is Repository Storage Affordable? Journal of Digital Information 4, (2), 208-214
    http://jodi.ecs.soton.ac.uk/Articles/v04/i02/Chapman/chapman-final.pdf
    This is a very interesting discussion of the costs of digital versus analog storage, however it is discussed in isolation from any other issues so the results should not be taken out of context.
    Update 10 August 2007
    No longer available online.

6. Marley, S., Moore, M., Clark, B. (2003) Building a Cost-Effective Remote data Storage Capabilities for NASA´s EOSDIS. Paper presented at the Twentieth IEEE/Eleventh NASA Goddard Conference on Mass Storage Systems & Technologies April 7-10, San Diego
    http://storageconference.org/2003/papers/04-Marley-Building%20.pdf
    This article contains a detailed discussion of a data system cost model and cost sources. They reach the conclusion that staffing is the major cost factor involved and facilities costs will remain insignificant at only 5-10% of total cost of ownership.

7. Schonfeld, R., King, D.W., Okerson, A., Fenton, E. G., (2004) Library Periodicals Expenses: Comparison of Non-Subscription Costs of Print and Electronic Formats on a Life-Cycle Basis, D-Lib Magazine Jan. 2004
    http://www.dlib.org/dlib/january04/schonfeld/01schonfeld.html
    This article analyses some of the costs in the life cycle of digital periodicals in 11 academic libraries.

8. Connaway, L., Lawrence, S. (2003) Comparing Library Resource Allocations for the Paper and Digital Library: An Exploratory Study D-Lib 9, (12)
    http://www.dlib.org/dlib/december03/connaway/12connaway.html
    This is an interesting discussion of cost sources in research libraries, the main aim however was to compare the costs of managing traditional and digital library materials.

9. Deegan, M., Tanner, S.(2003) Exploring Charging Models for Digital Cultural Heritage. In: Ariadne 14 Jan 2003
    http://www.ariadne.ac.uk/issue34/tanner/
    While not directly about digital preservation , this article does discuss some interesting aspects of costs of the digital life cycle of photographic services in cultural heritage institutions.

10. Kol, N., Oltmans, E. (2005) Comparison Between Migration and Emulation in Terms of Costs. RLG DigiNews (15 Apr 2005)*
http://www.rlg.org/en/page.php?Page_ID=20571#article0
This article compares projections for the total life cycle costs when implementing emulation or migration as a preservation strategy, and gives examples from the National Library of the Netherlands digital repository.

11. Ashley, K. (1999).'Digital Archive Costs: Facts and Fallacies.' DLM Forum '99
http://europa.eu.int/ISPO/dlm/fulltext/full_ashl_en.htm
Update 19 March 2008
No longer available - information at
http://ec.europa.eu/archives/ISPO/dlm/
Two extremes of models are explored from the "basic safety deposit" model, in which data are deposited, but not expected to be accessed other than by the depositor, to a more comprehensive service. The latter is assumed to be the most common model and nine potential service elements are identified to provide assistance to archives in evaluating their major cost influences. There is also an indication of what factors will increase costs. In general, the simpler it is to acquire material (for example, one large file v many small ones, a restricted number of file formats v no control over deposited material, etc.), the easier it will be to reduce costs. The experience of the University of London Computing Centre is that staff account for 70% of total costs and the next greatest cost is capital and maintenance costs for hardware and software associated with access (as opposed to data preservation).

* These and other projects and findings are also included in the report from the DCC/DPC Workshop on Cost Models, held at the British Library on 26 July 2005. The report and links to the presentations are available from:
 http://www.dpconline.org/graphics/events/050726workshop.html

Tools

General

12. CEDARS Guide to Digital Collection Management, Section 5. Costs: Processes and People pp.19-21
http://www.leeds.ac.uk/cedars/guideto/collmanagement/

13. ERPANET (2003) Cost Orientation Tool
http://www.erpanet.org/www/products/tools/ERPANETCostingTool.pdf
This tool provides a general discussion of the cost factors and need to develop costs and **benefits for digital preservation efforts.**
Update 27 November 2006
Link broken. New location
http://www.erpanet.org/guidance/docs/ERPANETCostingTool.pdf

14. Hendley, T. (1998). Comparison of Methods and Costs of Digital Preservation. British Library Research and Innovation Report 109. London: the British Library.

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http://www.ukoln.ac.uk/services/elib/papers/tavistock/hendley/hendley.html
One of seven JISC/NPO commissioned reports which investigated various aspects of
digital preservation. The terms of reference for this report were:

1. To draw up a matrix of data types and categories of digital resources.

2. To draw up a decision model for assessing the agreed categories of digital
resources to determine the most appropriate method of long-term preservation.

3. To draw up a cost model for comparing the costs of the preferred methods of
preservation for each category of digital resource.
Chapter 5 describes a cost model using the seven modules proposed by Beagrie
and Greenstein (data creation; data selection and evaluation; data management;
resource disclosure; data use; data preservation; rights management).These are first
analysed to identify generic cost elements and then applied in more detail to four
categories of digital resources (data sets; structured texts; office documents; visual
images).

15. Office of Government Commerce (2004) Life Cycle Costing.Office of Government
Commerce Successful Delivery toolkit:
http://www.ogc.gov.uk/sdtoolkit/deliveryteam/briefings/businesschange/PDFs/lifecycle
costing.pdf
A brief, generic but useful description of life cycle costing.

Records

16. Testbed Digitale Bewaring (2005) Costs of Digital Preservation
http://www.digitaleduurzaamheid.nl/bibliotheek/docs/CoDPv1.pdf
This paper presents a tool for assessing digital preservation costs for archived records.
The digital material lifecycle is comparable to the "records continuum" discussed here.
The cost model developed by this project is discussed in detail. The cost model is used
to evaluate and compare costs of various preservation strategies and several record
types, such as email, text, spreadsheets and databases.

17. Sanett, S. (2003) Cost to Preserve Authentic Electronic Records in Perpetuity:
Comparing Costs Across Cost Models and Cost Frameworks In: RLG DigiNews (Date
Created: 15 Aug 2003) http://www.rlg.org/legacy/preserv/diginews/diginews7-
4.html#feature2
This article suggests a method of comparing various cost models and frameworks to
obtain the most appropriate for a specific purpose and enable selection of the most
appropriate preservation strategy.

E-prints

18. James, H., Ruusalepp, R., Anderson, S., Pinfield, S. (2003) Feasibility and
Requirements Study on Preservation of E-Prints.Report Commissioned by the Joint
Information Systems Committee, pp.41-44
http://www.jisc.ac.uk/uploaded_documents/e-prints_report_final.pdf

Chapter 9 is dedicated to Cost Models for Preserving E-Prints as they currently exist and suggests they are one of the simplest and least expensive types of digital archives to develop and manage because E-Prints are still generally simple by nature. It discusses cost events and states the most significant cost elements in E-Print Archives are: negotiating rights, managing proprietary formats and creating additional metadata.

Data sets

19. Griffin, V.L., Fontaine, K.S., Hunolt, G., Torrealba, D (2002) Cost estimation tool set for NASA's strategic evolution of ESE data systems. Paper presented at the CNES Symposium "Ensuring Long-Term Preservation and Adding Value to Scientific and Technical Data"; November 5-7, 2002.
http://sads.cnes.fr:8010/pvdst/DATA/5-8_griffin.pdf
This paper discusses a complex tool developed at NASA for estimating the cost of proposed data systems. The tool is based on "costing by analogy" which implements a method of comparing the proposed system to other similar past systems and is likely to be relevant to similarly large data archives.

Repository design

20. Crespo, A., Garcia-Molina, H. (2001) Cost-Driven Design for Archival Repositories. Presented at the Joint Conference on Digital Libraries 2001 (JCDL'01); June 24-28, 2001; Roanoke, Virginia, USA.
http://www-db.stanford.edu/~crespo/publications/cost.pdf
This paper presents a method of modelling possible archival repository design to assess which will be the best configuration for reliability and cost factors.

References

1. DLM Forum. (1997). Guidelines on the Best Practices for Using Electronic Information. p. 20 regards the setting up of a multidisciplinary team to define and monitor a global strategy as best practice.
http://europa.eu.int/ISPO/dlm/documents/gdlines.pdf
Update 19 March 2008
No longer available - information at
http://ec.europa.eu/archives/ISPO/dlm/

2. Lee, S. (1999). Scoping the Future of the University of Oxford's Digital Library Collections: Final Report. p.30. Recommends establishing working parties on metadata and delivery systems.
http://www.bodley.ox.ac.uk/scoping/report.html