DIGITAL PRESERVATION POLICIES

STUDY

Part 1: Final Report October 2008

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Note: Part 2 of this report containing Appendices 1-6 is published as a separate document.

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2. EXECUTIVE SUMMARY

A major business driver in all universities and colleges over the past decade has been harnessing digital content and electronic services and the undoubted benefits in terms of flexibility and increased productivity they can bring. The priority in recent years has been on developing e-strategies and infrastructure to underpin electronic access and services and to deliver those benefits. However any long-term access and future benefit may be heavily dependent on digital preservation strategies being in place and underpinned by relevant policy and procedures. This should now be an increasing area of focus in our institutions.

This JISC funded study aims to provide an outline model for digital preservation policies and to analyse the role that digital preservation can play in supporting and delivering key strategies for Higher and Further Education Institutions. Although focussing on the UK Higher and Further Education sectors, the study draws widely on policy and implementations from other sectors and countries and will be of interest to those wishing to develop policy and justify investment in digital preservation within a wide range of institutions.

We have created two tools in this study: 1) a model/framework for digital preservation policy and implementation clauses based on examination of existing digital preservation policies; 2) a series of mappings of digital preservation links to other key institutional strategies in UK universities and colleges. Our aim has been to help institutions and their staff develop appropriate digital preservation policies and clauses set in the context of broader institutional strategies.

There are a number of ways in which development of digital preservation policies and procedures could be further developed in UK universities and colleges. We have made therefore two recommendations to JISC and other funders for future work:

Recommendation1: Funders should utilise this study to evaluate and encourage best practice in terms of institutional preservation policies and procedures and their development in their funded programmes and evaluations.

Recommendation 2: JISC should consider assisted take-up by funding case studies on how the generic digital preservation policy in this study might apply in practice to specific activities, digital content or units within HEIs, for example institutional repositories.

3. INTRODUCTION

3.1. BACKGROUND

This report is the result of a call by the JISC, issued in January 2008, for a study that would assist UK higher and further education institutions to formulate policies relating to the preservation of their digital assets. The contract was awarded to Charles Beagrie Limited, and the work was carried out between April and September 2008.

A recent synthesis of the UK Joint Information Systems Committee's digital preservation and records management programme had noted that 'the costs and benefits of developing a coherent, managed and sustainable approach to institutional preservation of digital assets remain unexplored'(Pennock 2008). Across many sectors the development of institutional preservation policies is currently sporadic and digital preservation issues are rarely considered in key strategic plans. The lack of preservation policies and as a result the lack of consideration of digital preservation issues in other institutional strategies is seen as a major stumbling block and has prompted the commissioning of this study.

3.2. AIMS AND OBJECTIVES

This principal aim of this study is to help institutions in the UK Higher and Further Education sector understand, develop and implement relevant digital preservation policies.

Institutions may have a range of central and devolved functions and departments that will need to consider digital preservation in some form. The study is therefore ensuring that it promotes approaches to policy and guidance which will underpin and inform the activities of a wide range of relevant functions and stakeholders within institutions.

The research that has been undertaken in the course of this study references existing institutional policies and also seeks to include information from outside of the UK HE/FE sector where appropriate. It does not have resources to develop recommendations for all areas from scratch but has referenced and build upon other work, case studies, and tools and services and seeks to identify and position its recommendations to complement existing resources.

Our objective therefore has been to produce a practical guide for developing an institutional digital preservation policy. It contains strategic policy advice supported by further reading

sections which select and provide brief descriptions of key existing resources to assist implementation using specific strategies and tools.

We understand the very different types of institutional needs that need to be supported by the study. We are therefore including guidance on how to tailor a policy for the needs of a specific institution or function. This combined with a modular approach should allow selection and tailoring for a wide range of individual needs.

Finally but perhaps most importantly, we have recognised developing an institutional preservation policy will only be worthwhile if it is linked to core institutional business drivers and strategies: it cannot be effective in splendid isolation. We have therefore devoted significant effort to mapping other core university strategies including research, teaching and learning, information, libraries, and record management. These mappings and the methodology for them appear in the appendices (Part 2 of this report), and are also briefly discussed in Chapter 8.

4. METHODOLOGY

The principal methodology for the study was desk research which focussed on gathering available examples of:

- preservation policies including guidance on policy frameworks;

- case studies, technical strategies and resources available from JISC 04/04 programme, the Digital Curation Centre, The National Archives (TNA), the Digital Preservation Coalition, and other sources which may assist institutions in implementing preservation policies;

- a sample of online key institutional policies for research, teaching and learning, information, and UK library and records management from a cross-section of different institutions for our mapping analysis and developing relevant policy links and recommendations;

- other digital preservation literature and resources relevant to this study including JISC records management guidance available from JISC Infonet, and tools such as Drambora (Digital Repository Audit Method Based on Risk-Assessment) and the RLG/NARA Trusted Repository checklist.

In the first phase of the project desk research was used to identify existing digital preservation policies and policy guidance and compare the principal components. The outline model high-level policy and implementation framework we have created in Chapter 7 is based on some of the principal themes from a variety of existing digital preservation policies identified and analysed in the desk research. Some key strands are shared in almost all the policies examined: preservation objectives; mission statement; contextual links; financial support; staffing; intellectual property issues.

Policy level components were then examined in more detail and direction added on how to structure these high level policy statements and how the principle clauses can tie into other key organisational strategies.

The implementation level includes technical guidance, containing information about metadata and auditing as well as references to distributed archiving and standards such as the Open Archival Information System (OAIS) Reference Model (CCSDS 2002).

Particular policies/documents of note for our study have been from: the UK Data Archive (Woollard 2008); the former Arts and Humanities Data Service (James 2004); the JISC/NPO Beagrie-Greenstein strategic framework for creating and preserving digital resources (Beagrie and Greenstein 2001); the Interuniversity Consortium for Political and Social Research (McGovern 2007); the Canadian Heritage Information Network (Canadian Heritage Information Network 2004); University of Columbia (Columbia University 2006); and the Cedars Guide to Collection Management (The Cedars Project 2002). While the research focussed on policies from Higher and Further Education, the British Library (British Library 2006) and the UK National Archives (Brown 2003a, 2003b, 2003c, 2003d) also have the relevant technical and administrative strategies. Another paper of particular note is the Preserv digital preservation survey report (Hitchcock et al 2007b).

While the JISC 04/04 digital preservation programme projects (Pennock 2008) were varied in their outcomes, many of the results were able to be synthesised and drawn into the study. Tools are hard to review as it is not yet fully examined how they are received or used within the community. We have thus had to be selective as to what tools are pointed to in the study. With regard to standards and guidelines, RLG/NARA's Trustworthy Repositories Audit & Certification: Criteria and Checklist (TRAC) (RLG/NARA 2007) is very comprehensive and is often cited, along with the OAIS reference model (CCSDS 2002) as a key standard.

Function-specific areas were looked at such as: e-journals, IRs, organisational electronic records, digitised images, and research data. There is certainly a commonality between different communities and the similar materials they are preserving, for example policies tend to be clearer and more focussed if homogenous sets of materials are the target contents of a repository. However, clear parallels can be drawn between a different range of policies, and on the whole they don't differ hugely between these functional areas.

Finally, desk research was also used to identify and select a range of other core strategies from UK universities and analysed for links to digital preservation (see Part 2 of the report for further details of the methodology used).

5. WHAT IS DIGITAL PRESERVATION?

Information growth and the increasing shift to digital forms of storage and communication have made access to digital information and e-strategies central to effective delivery of modern services. In contrast to printed materials, digital information will not survive and remain accessible by accident: it requires ongoing active management. The extent to which this active management differs radically from activities in the paper environment is something that is only now beginning to be understood.

Digital preservation is the process of active management by which we ensure that a digital object will be accessible in the future. The time span is potentially very short and given rapid change in technology and systems this will impact on us directly; and potentially vast given that we have no idea to what point others will wish to continue accessing our 21st century digital output. When they do, it is possible that much of the technical infrastructure we use to create and read our data may be unavailable.

While we are rapidly creating so much digital data in our every day communications, we shouldn't lose sight of the fact that the medium is inherently fragile, dependent on a range of technical processes for us to understand it. A combination of specific software programmes and physical hardware is crucial to read any digital file, and this range of requirements has to be preserved as a whole in order to access the information. Technology develops quickly, but we run the risk of forgetting to preserve vital bits of information or software as we struggle to keep up with these changes. In other words, preserving vital digital files today will ensure us access to it in the future.

Solutions for digital preservation are being developed and effective preservation tools and archives are being built. Teams of research professionals are working hard to solve the challenges of ensuring access to complex digital data such as multimedia, and a whole field is devoted to the development and understanding of the role of the institutional repository as well as developing relevant auditing procedures, some aspects of which closely look at policy procedures, for example DRAMBORA (DRAMBORA 2008).

Digital preservation solutions are undoubtedly partly technical, and the tools being created will enhance digital longevity, but these solutions are also equally dependent on organisational issues. It is important to remember that digital preservation relies on the interaction between the digital preservation environment and wider organisational objectives and procedural issues. These could be financial and staffing issues, collection management, legal obligations, auditing requirements, and other strategies and policies. In this respect, recognition by organisational divisions that digital data is important and key to the successful running of an organisation is crucial.

6. APPLYING AND TAILORING THIS STUDY TO YOUR INSTITUTION

6.1. INTRODUCTION

This study is not intended to outline detailed strategies for digital preservation, but more to provide pointers for creating a high level policy. It should be tailored to your own organisational needs. It is not prescriptive, but aims to support preservation planning which is in itself dependant on other organisational activities.

The study consists of two principle parts: in the main report (Part 1), a model and outline framework for a digital preservation policy (see Chapter 7) is presented; this is followed in Part 2 by separate appendices on how digital preservation policy and activities map over onto some of the principle institutional strategies in UK universities such as teaching, learning and research.

The model policy and framework and accompanying guidance in Chapter 7 are largely based on key existing digital preservation policies and resources, and will thus give an overview of how other organisations have authored and organised their digital preservation policies. Plenty of examples and case studies are included and an annotated bibliography accompanies each section to provide further opportunities for you to select relevant examples and guidance.

Part 2 of the study presents a series of appendices with aggregated strategies and policies for key areas such as research, learning and teaching, information, libraries, and records management from a selection of UK universities. This also has suggestions for digital preservation policy and activity links into these key strategies and policies. Each individual institution's strategies and policies will be distinct. However it is hoped that the aggregated strategies will provide a framework for you to be able to identify comparable business drivers and processes within your own institution and the potential benefits and contextual links for your own digital preservation policy.

6.2. HOW TO GET STARTED

If you are embarking or thinking of embarking on creating a digital preservation policy for your organisation, then it is worthwhile taking into account a number of considerations:

Connect to your business drivers: One of the most important considerations is to look at the needs of your organisation and how this will affect your policy. A policy may be hard to start to implement, but once the organisation can recognise that such a policy will filter all the way through and move across into other policies it may become a clearer exercise. The digital preservation policy should be integrated into business drivers, activities and functions e.g. regulatory compliance, staff development, applied technology, academic excellence. Try to map these to digital preservation benefits. For more detailed examples see Part 2 of this report and the appendices for mapping organisational strategies into digital preservation policy and activities.

Analyse Your Existing Strategies and Policies: An initial task is to try to identify what exists in your organisation in terms of high level policies and schedules, for example policies on financial, staffing or risk assessment. Highlight relevant policies and clauses. Be aware of any other detailed workflow documents within other divisions. Once you have identified them, the mappings in this study will help highlight how digital preservation can tie into even very high level policy clauses. As you will see from Chapter 8 and the appendices in Part 2, many high level strategic organisational policies have relevance within a digital preservation policy.

Phasing: It can be a daunting task to embark on creating a digital preservation policy for an organisation. Policy and procedures do not change overnight and often implementation will need to be phased and built in incremental steps.

A good starting point is the development of a high-level policy. Consider carefully the five high level clauses of the Policy section of the model policy in Chapter 7: Principle Statement, Contextual Links, Preservation Objectives, Procedural Accountability, Identification of Content.

Developing detailed procedures for the implementation of the policy can then follow from this. The implementation clauses are more technically detailed: Financial and Staff

accountability, Intellectual Property issues, Distributed Services, Metadata, Standards compliance, Re-formatting of object, Implementation, Storage and Media strategy, Review and Certification, Auditing and Risk Assessment, Stakeholders involved, Glossary.

Raise Awareness: Perhaps promote a risk analysis document that highlights the importance of the digital preservation policy. Ensure that people are aware that digital preservation is a means to provide access to data. For example, the University of Glasgow's eSpida project guides preservation policy makers with a calculated approach to promoting and giving value to digital assets (University of Glasgow 2007).

Survey Colleagues: It would be worth carrying out a survey within the organisation to assess knowledge of digital preservation and views about its impact. Review whether this policy will be incorporated into policy for existing divisions or will be a separate policy on its own. In addition, appreciate the challenges of incorporating a policy into an already existing system.

Review Support: Consider whether you have sufficient resources within the organisation for digital preservation and support from senior management. Consider the limitations within the organisation, whether you have the current staffing expertise needed to carry out relevant tasks. It is also worth considering that policies need to be signed-off by senior management. Consider carefully the resources and support that you need and the organisational workflow needed to approve and introduce the policy.

Scope: Creating a digital preservation policy also means thinking carefully about the type of digital data to be collected and preserved. Think carefully about what are the dependencies and linkages between your preservation and collection development policies; the mission, preservation capacities and expertise of your organisation; and scope your preservation policy and implementation plans accordingly.

Technology: Do you already have existing systems e.g. for records management or digital asset management? Does it have any digital preservation features built in, or would it be possible to alter it to incorporate some features as part of your implementation process? Note, the digital preservation policy should be technology independent. It should not be tied into the dependencies that a purchased system might require as this system might cease to exist or change. However consideration of existing systems and planned purchases will be significant when developing implementation of the policy and its application.

Digital life cycle: The digital life cycle of an object is an important consideration in digital preservation. Take for example a higher education institution; a digital object will be created in one academic department, some information about the object will reside in another department, details about the author might be stored somewhere in the records management unit, the object will be used by a number of students and employees, and a copy of the object might be sent to the library or archive for preservation, the personnel of which might or might not be passed on some contextual information about the digital file. That object has a long and complicated life history, most of it unknown to the person who has to archive it, most probably when it is at the end of its life history. If however the concept of the life-cycle continuum is taken into account so that the relevant information has been recorded along the way, and it is recognised that all divisions, departments, or sections of an organisation are responsible for this particular object then its long term longevity and prospects for re-use are substantially enhanced. For a recent study and an overview of these lifecycle stages, see the Digital Curation Centre's recent study on the lifecycle of digital materials (Higgins 2007).

7. A MODEL FOR INSTITUTIONAL DIGITAL PRESERVATION POLICIES

7.1. INTRODUCTION

The model has been divided into two sections, Policy and Implementation. The policy clauses are set at a much higher level and, while less technically detailed, highlight some key points of consideration needed at the beginning of a digital preservation policy. The more technical implementation level also constitutes a major part of this model policy and should either form a significant part of your digital preservation policy and/or be part of separate detailed procedures and guidance which are developed to accompany it.

Please note that this outline policy is intended to provide a model framework and guidance. A selective approach can therefore be taken when creating your own policy drawing from both the policy and implementation clauses to meet the needs of your particular institution.

The model is first presented in summary tables for "policy" (section 7.2) and "implementation" (section 7.3) respectively. This is then followed by more detailed notes, case studies, and exemplars for individual clauses and issues within them. Clauses are numbered for cross-referencing between the summary tables and detailed notes. Finally a summary table and an annotated bibliography are provided in sections 7.4 and 7.5: this gives pointers to policies and guidance for more specific types of institution and functions.

7.2. THE MODEL DIGITAL PRESERVATION POLICY: POLICY CLAUSES

Summary Table of Policy Clauses		
	Clause	Description
7.2.1	Principle Statement	Address how the digital preservation policy can serve the needs of the organisation and the benefits it will bring.
7.2.2	Contextual Links	Highlight how this policy integrates into the organisation and how it relates to other high level strategies and policies.

7.2.3	Preservation Objectives	Information about the preservation objectives and how they will be supported.
7.2.4	Identification of Content	Outline what the policy's overall scope is in terms of content and its relationship to collection development aims.
7.2.5	Procedural Accountability	Identify high level responsibilities for the policy and provide recognition of the most important obligations faced in preserving key institutional resources.
7.2.6	Guidance and Implementation	Guidance and implementation clauses on how to implement the preservation policy and/or identification of where additional guidance and procedures are available in separate documentation or from staff. The clauses and issues in section 7.3 (Implementation) can be used as required either to insert here and/or provide the framework for separate documentation.
7.2.7	Glossary	List of definitions, if required.
7.2.8	Version Control	History and bibliographic details of the version. Add date of the policy, and its intended duration and review process.

Notes and Guidance

7.2.1 Principle Statement

- This section should align with the organisation's own high level goals or mission statement and provide a starting point and framework for the remainder of the policy.

- Highlight here the role of digital content and collections to be preserved that might be seen as core strengths of the organisation.

- Include an example or key section of the organisation's mission statement or mandate if needed.

- State here any high level synergies or links with other organisations.

- List the commitments of the policy, for example whether it is to ensure long-term preservation, to adhere to current standards, and/or to meet the needs of the customer.

Exemplars and useful references:

Some interesting university library digital preservation examples are from Yale (Yale University 2005) and Columbia (Columbia University 2006) where they state, respectively,

"The Yale University Library, as one of the world's leading research libraries, collects, organizes, preserves, and provides access to and service for a rich and unique record of human thought and creativity."

"The Columbia University Libraries provides Columbia faculty, students, and staff with access to information in all subject areas related to the University's academic mission and its goals. The Libraries embraces its time-honored obligations of collecting, preserving, and providing access to collections"

Both these quotes come from the mission statements within their digital preservation policies, which clearly tie in with the University's aims.

The Principle Statement should set out its overall goals, for example, the UK Data Archive (Woollard 2008) outlines its high level aims in the Purpose section of its policy, "*The UKDA follows a policy of active preservation with the aim of ensuring the authenticity, reliability and logical integrity of all resources entrusted to its care, while providing usable versions for research, teaching or learning, in perpetuity*".

7.2.2. Contextual Links

- The relationship to other institutional strategies and policies and any synergies should be highlighted, for example the policy could be directly linked to the strategies for the Library, Research, Teaching and Learning, Information, or Records Management.

- Depending on where the digital preservation policy sits, link to any other relevant internal division strategies, for example, digitisation, Web, or e-learning strategies.

- Consider how the policy should link to organisational risk management schedules and processes: ideally the policy should help identify and mitigate risks for the organisation.

- Any critical interoperable standards and agreements between repositories that the repository has adopted could be stated, for example the same identifier, metadata, and/or storage standards with other institutions.

- Consider the external context of your organisation and implications for the policy.

Exemplars and useful references:

Appendices 2-6 in Part 2 of this study suggests digital preservation links into other major institutional strategies and policies for research, teaching and learning, information, libraries, and records management.

The National Library of Wales' (Jenkins 2003) policy contains two contextual sections, internal and external which is an interesting and essential approach. The Internal context section contains a 'Relationship with other internal policies and strategies', such as preservation and digitisation strategies, IT, Collections Development, Electronic Records policy and an overview of the types of digital objects that the library holds.

7.2.3 Preservation Objectives

- Why the policy has been created, for example, for long-term research prospects or a statutory obligation to meet archival requirements.

- Statement that the policy will endeavour to deliver a reliable and authentic version to its user community.

- State any high level preservation guarantees and exclusions – storing the bitstream, commitment to keep the original, maintain the user experience.

- State some principle aspects for implementation, for example that digital preservation actions will be carried out in-house, for an indefinite period, or within a certain division.

- Commitment to conduct regular risk assessment, auditing, feedback gathering and upgrading of systems for digital preservation purposes.

- State here any general policies that the digital preservation policy will adhere to, for example, university statutes, legal acts such as the Freedom of Information Act, Data Protection Act.

- Where necessary, identify any commitment to interoperability and the use of open source and/or widely implemented proprietary software with excellent export formats.

Exemplars and useful references:

These objectives are very similar to the principle statement but tie in more with the actual preservation process itself. For example, the National Library of Wales (Jenkins 2003) sets out in its 'Policy' section that it will *"Preserve the original bytestream of digital objects according to collection policy retention decisions"*

The Inter-University Consortium for Political and Social Research (ICPSR) (McGovern 2007) states under 'Administrative Responsibility/Objectives' that it will *"Maintain a comprehensive and responsive digital preservation program that identifies, acquires, verifies, archives, and distributes core social science digital assets"*

In Columbia's 'Statement of Commitment to Lifecycle Management' (Columbia University 2006) it sets out that it is *"committed to preserving the archival version: the fullest, highest-quality available version of the resource, whenever possible; and the descriptive, structural, and administrative metadata associated with it."*

7.2.4 Identification of Content

- List a high level overview of what materials are to be preserved. This could be ordered in a number of ways, such as:

  - Listed simply in order of priority and perceived value.

  - Divided into different resource types – licensed, 3rd party, scholarly materials.

- Ordered by levels of complexity of preservation; simple file formats, born digital, digitised, proprietary formats, multimedia etc.

- Divided into different collection levels; archived, served, linked.

- Once each category is identified, state how long each one is to be preserved and how to access it.

- If necessary, state what is definitely not preserved, for example certain file formats not accepted into the repository, software, hardware.

- What file formats the preservation policy supports

Exemplars and useful references:

The Canadian Heritage Information Network workflow tool (Canadian Heritage Information Network 2004) asks the policy creator *"Does the object fit into the current or planned digital preservation infrastructure of the institution?"* which is an important point to consider when deciding what content to preserve. The policy helps the content manager think about the nature of the digital collections they are preserving and how they fit into the context of the organisation.

Both the National Library of Australia (National Library of Australia, 2002) and State Library of Victoria (State Library of Victoria 2008) concentrate on stating what collections they are including and excluding. The National Library of Australia policy (National Library of Australia 2002) highlights in its 'Broad Directions' section that *"The Library intends to preserve all the digital materials covered by this policy. However, it is likely that the Library will need to allocate priorities for action, based on the relative significance of particular materials and the technical complexity of preserving access to them."* This indicates that it is important for the institution to prioritise and assign levels of preservation importance to certain collections. What is *not* preserved is also an important point to mention in this section, the State Library of Victoria (State Library of Victoria 2008) contains an Exclusion and Inclusions section, which state clearly the content of collections or objects they have decided to preserve, for example "turned digital objects" from the library; and the content which will not be preserved, for example emails generated by staff.

The Cedars project (Cedars 2002) sets out some ways of looking at different levels of collections and prioritising what is important.

The Mandate project lists the assets that the College is preserving (Robertson et al 2006).

7.2.5 Procedural Accountability

- Identify high level divisional responsibilities for the policy.

- Terms of Reference for the policy should be made clear.

- The defined obligations could be legal, or procedural and serve to recognise where the preservation policy stands in relation to other areas of the organisation and how it ties into the overall procedural standards.

- State a commitment to creating transparent and accessible policies and procedures.

Exemplars and useful references:

The following institutions all set out the institutional accountability, how the archive or repository will be audited and that it will strive to retain the readability and technical completeness of objects. UKDA (Woollard 2008), Mandate Project John Wheatley College (Robertson et al 2006), Stirling (University of Stirling 2008), and AHDS (James 2004).

The UKDA (Woollard 2008) claims that it is committed to ensuring *"the reliability and logical integrity of the data collection…some significant properties of a data collection may have to be altered in order to ensure a level of software independence"*

The Mandate project's 'management policies' section (Robertson et al 2006) states *"Another aid to assessing what parts of the current system can be adapted or transformed rather than replaced is to carry out an audit of the current system, checking that everything is as it should be."*

The University of Stirling (University of Stirling 2008) is also clear about its accountability with regard to its institutional archive, *"Items will be deleted from the Repository if there is a legal requirement to do so, or if it is deemed by the University to be in its best interests… In*

the event of University of Stirling Institutional Repository being closed down, the database will be transferred to another appropriate archive. It may not be possible to guarantee the readability of some unusual file formats."

To some degree it can also state the relationship it will have with the depositor and the obligations necessary to receive good data. For example, the AHDS (James 2004) states that *"The exact level of preservation service offered by the AHDS will depend on the technical quality and completeness of the deposited data."*

7.2.6 Guidance and Implementation

- This guidance section should cover the key areas of implementation for the digital preservation policy.

- Once the above general policy headings have been established, it is necessary that the implementation of any digital preservation policy is addressed. There is not a great deal of validity in a digital preservation policy without having in place the procedures to make it work, so we recommend including guidance and implementation here after the high level policy section, and/or pointers to additional documentation, or at the very least a clear implementation plan to develop them and clear interim sources of advice.

- This of course will depend on where your organisation is at in developing its strategy, for example, it may need to be slowly developed and detailed over time, or all that may be required is a section with pointers to relevant strategies and distributed services.

- In any case, it is crucial to outline an implementation plan, and what technical steps are being taken for preservation purposes.

Exemplars and useful references:

See section 7.3 for detailed clauses and exemplars.

7.2.7 Glossary

- A short glossary and list of definitions may be useful at the end of the policy, particularly if it is likely to be read by anyone unfamiliar with some of the terms and concepts used.

Exemplars and useful references:

The Mandate Project contains a good exemplar glossary (Robertson et al 2006).

The National Library of Wales also includes an exemplar glossary (Jenkins 2003).

Other policies with good exemplar glossaries are: State Library of Victoria (under 'Definitions') (State Library of Victoria 2008), Edinburgh University Library (Semple 2003), ICPSR (under 'Definitions') (McGovern 2007), UKDA (Woollard 2008).

7.2.8 Version Control

- The policy (and any separate guidance and procedures) should be dated, author identified, and version tracked. Add date of the policy, and its intended duration and review process.

- Where this section sits is optional and can be either at the beginning of the document or at the end.

7.3. THE MODEL DIGITAL PRESERVATION POLICY: IMPLEMENTATION CLAUSES

Summary Table of Implementation Clauses		
	Clause	Description
7.3.1	Financial and Staff Responsibility	This section should be about who is responsible for digital preservation within the organisation. It should also be about financial sustainability and how the policy sits within the organisational financial plan.

7.3.2	Intellectual Property	This clause shows awareness of copyright issues and how the institution plans to recognise and tackle these key issues.
7.3.3	Distributed Services	In some situations it may be more convenient or cost effective to outsource some or all preservation activities.
7.3.4	Standards Compliance	List here what standards the archive is committed to.
7.3.5	Review and Certification	A description of how often a review of the policy is carried out, for example, bi-annually, yearly, biennially.
7.3.6	Auditing and Risk Assessment	Procedures for carrying out standardised auditing and recognition of risks facing the policy.
7.3.7	Stakeholders	Identification of all parties involved in the policy and its implementation procedures.
7.3.8	Preservation Strategies	A guidance table on preservation strategies adopted and technical implementation of the policy.

Notes and Guidance

7.3.1 Financial and staff responsibility

Clarify who is responsible for preservation, for example the digital preservation officer, or someone in a senior management role, how the post/posts are funded and associated business and individual workplans that will implement aspects of the policy.

- Financial and organisational planning for any digital archive should be clearly stated and should include provision for:

  1. Staff training

  2. Technical infrastructure

3. Outsourcing preservation activities

4. Storage and media

5. Changes due to evolving technology

6. Forward workload and costing projections

Exemplars and useful references:

CHIN highlights the importance of assigning relevant staff early on in the digital preservation process (Canadian Heritage Information Network 2004).

Yale library preservation policy contains a clear financial clause and lists a number of different costs applicable (Yale University 2005).

The SOLINET study (Solinet nd) states that the organisation should be aware of who, or what section, is responsible for its digital preservation responsibilities and state them in the policy. This, in addition, to setting out the exact job titles of the people involved in digital preservation activities.

The Planets policy and strategy document (Dappert et al 2008) states that Authority and Responsibility are relevant factors in making digital preservation policies.

DAAT, a JISC funded project, looked into the process of identifying preservation needs and what to retain in the planning stages of digital preservation activities (Pinsent and Ashley 2006).

The eSpida project (University of Glasgow 2007) is a good resource for looking at all business drivers for digital preservation and presenting it within a senior managerial context.

Specific training for digital preservation in the UK include: JISC-funded Digital Preservation Training Programme www.ulcc.ac.uk/dptp; the DCC 101 digital curation course www.dcc.ac.uk; the annual KCL Digital Futures Workshop www.kdcs.kcl.ac.uk/digifutures/ ; and the tools from the METS Training Project www.odl.ox.ac.uk/projects/projects_mets.htm.

7.3.2 Intellectual Property

- Agreements with authors and data owners made clear and recorded. A commitment to keeping the data secure should be stated. Any changes to digital object tracked.

- A registry of object creators and owners should be created, and their details tracked.

- Legal context: Can the digital object be reproduced? Make clear explicit agreements with authors on rights for preservation and reproduction of the object.

- Access issues: Routine access levels should be explained and different levels assigned to different collections or a similar procedure outlined.

- Deposit agreements and methods of depositing, e.g. self archiving, mediated by staff, tightly controlled.

Exemplars and useful references:

The CHIN web resource contains a useful list of points to include when including intellectual property issues in a digital preservation policy (Canadian Heritage Information Network 2004).

The recent report on the impact of copyright on digital preservation provides a clear overview of copyright issues (Besek et al 2008).

7.3.3 Distributed Services

- It is important to recognise that a preservation policy is still essential for the organisation regardless of choices made for how the services are implemented and delivered. Even if distributed service options are used, Digital Preservation Policies will still be necessary for the originating institutions to frame their requirements for service level agreements and licensing with any third-party(ies) providing the preservation services.

- There are two options for how to approach distributed services. Either to use third party services and outsource all, or components, of a preservation service, or to take a collaborative approach partnering with other institutions.

- The repository might use a third party to provide archiving services or work with an open-source software collaboration, e.g. Fedora, or DSpace. This should be made clear in this clause.

- The architecture of the repository might be such that it has a preservation layer separate from the object creation and management procedures.

- Consider: Who are the vendors of software, and do any agreements or contracts exist for building digital preservation features into the software.

Exemplars and useful references:

For a good example on a collaborative preservation approach (currently focused primarily on the acquisition of web sites) see the UK Web Archiving Consortium project (UK Web Archiving Consortium 2008).

For an article on distributed infrastructures, that highlights the importance of trust and control in repositories see (Day 2008).

See also the Sherpa DP (Knight et al 2007) and Preserv projects (Hitchcock et al 2007a) for methodologies on distributed services.

7.3.4 Standards Compliance

- Selection and compliance with agreed file format standards may be a policy aim and there are a number of ways this can be implemented. Some archives list the file formats the archive will accept for transfer to the archive from the depositor; the file formats the archive will employ for archiving once files are ingested; and finally the file formats which can be generated and supplied to users. Other archives may list the file formats they can support and offer assurances on future access and alternatively where future access would need to be on a best efforts basis.

- Consider: Does the organisation promote the use of open source formats and self-supporting file formats?

- Statement of compliance to the OAIS reference model if necessary. Outline how the workflow might map onto the model. This can be a relatively short section, but worth mentioning.

- Use of other standards and guidelines such as RLG / NARA's TRAC framework.

Exemplars and useful references:

Section Five in the TNA Standards paper sets out a list of useful and currently applicable standards to consider in a digital preservation policy (Brown 2008).

See Cornell's digital preservation tutorial web resource for an explanation of some key standards (Cornell University 2007).

ICPSR's preservation policy links to a page of key standards that they comply with (McGovern 2007).

For a good overview of both the OAIS and METS standards see the study by TNA and UKDA (Beedham et al 2005).

For information about standards in use, refer to the DCC DIFFUSE project which is collating a database of preservation and curation related digital standards the final tool will be ordered according to life cycle functions: www.dcc.ac.uk/diffuse.

7.3.5 Review and Certification

- State how often a review of the policy is carried out, for example, bi-annually.

- Outline strategic planning decisions to review the archive, carry out a preservation watch, and an upgrade of IT systems.

- Preservation watch can include a continual monitoring of digital preservation activities elsewhere and altering the policy accordingly to incorporate changes.

- Include a strategy to gather user feedback on the preservation service. Use this feedback in the policy and procedures revision process.

- Participate in a repository certification process if there are plans to grow and improve the service.

- Include a section on how the repository is 'Trustworthy' – i.e. that it is secure, guarantees authenticity of object, and has an exit strategy.

Exemplars and useful references:

There are formal ways of establishing Trust in a repository, for example, the Digital Repository Audit Method Based on Risk Assessment (DRAMBORA), follows a self-audit process for certifying a repository, which also includes looking at the existing policy framework (Cornell 2007, DRAMBORA 2008).

A seminal document to address digital repository certification is the RLG/NARA's Trac document (RLG/NARA 2007).

7.3.6 Auditing and Risk Assessment

- A risk assessment registry should be created.

- Future interoperability of the archive should be stated, and conditions of passing it on to another organisation. Good documentation about the archive is essential.

- Protection of data and security should be stated, what levels of protection are accorded to different collections.

- Ensure clear audit trails are set up.

- File formats should be part of the risk assessment; market penetration of file formats and how much they are used, open/proprietary, stability, dependencies, complexity of format.

- State an exit strategy for the archive and succession plan in case of a change in organisational/divisional financial status.

- Disaster planning procedures put in place, based on organisation's disaster management strategy.

Exemplars and useful references:

A key report is the Managing Risk strategy from KCL, (King's College London 2006) which examines risk issues within an organisation.

OCLC's policy contains much on risk, including a data format risk assessment and recommends that such an assessment is carried out before objects are entered in to a repository (OCLC 2006).

The British Library's preserving e-journals strategy (McLeod 2007) contains a good section on the technical risks involved.

The DAAT project looks at risk factors in organisational issues, file formats, and physical risks for media (Pinsent 2006).

Drambora is a tool that enables repository managers to self audit their digital repository (DRAMBORA 2008).

The RLG/NARA audit and certification 'TRAC' model provides an emerging standard for auditing repositories (RLG/NARA 2007).

7.3.7 Stakeholders

▪ List of all the departments/sections involved in this strategy.

▪ Consider: Your users/customers, depositors, agencies for out-sourcing.

Exemplars and useful references:

The Cornell University library policy (Cornell University Library 2004) identifies stakeholders based on the OAIS standard.

7.3.8 Preservation Strategies

This section of course depends on the chosen technical preservation strategy. The guidance below is intended to provide a framework you can adapt.

One possibility is to take a life-cycle approach; go through each implementation stage in the following order: selection, conversion, receive, verify, determine significant properties, ingest, metadata, storage, preservation techniques, and access.

Another option for structure is to order it according to OAIS terminology (CCSDS 2002). This should include Preservation Planning, Ingest, Archival Storage, Data Management, Administration, Access, Deletion, and possibly a description of the different archival packages: Archival Information Package, Submission Information Package, and Dissemination Information Package.

The following points should be considered for inclusion (ordered according to the digital life-cycle):

Preservation Approach(es).

- State what type(s) of preservation the archive will adhere to, e.g. bit stream preservation, transformation to an open format, rendering, emulation, keeping the original, recreating the experience, or a combination of the above. Detail the process, e.g. migration every 4 years etc.

Ingest.

- In some digital preservation procedures, the object is reformatted, or 'normalised' to prepare it for entry into the archive in a more neutral format. Ensure that the procedure is well documented.

- State if the source version is also deposited along with the new version.

- Document whether it is legally accountable now that it is a new object.

- A statement about unique ID/naming convention chosen should be included.

- How the object is ingested in to the repository, for example, compressed, zipped, encrypted. State virus check standard. Standards for Export and Access.

Archival storage.

- State whether or not the repository or archive is mirrored off-site?

- What storage media has been chosen and how regularly this is upgraded.

- Consider: When are regular back-ups carried out?

- Decide on creating a Dark Archive or a routinely accessed archive, or both.

Data management.

- Link to the metadata standard if possible, whether it is an in-house standard, or an external one.

- It is important to record a persistent definition of the standard and its version number so that semantic interpretation of the metadata will be possible in the future. Record the application profile in use, which specifies the rules by which the standard is applied.

- Include an outline of the metadata schema in use. The different sections of the schema could be structured in the following order: Descriptive metadata, Structural metadata, Administrative metadata, Preservation metadata.

- How the repository will document the Representation Information, will it rely on an external service to provide it, e.g. Pronom.

- Include a statement of data management i.e. where and how the metadata is stored. For example, the OAIS model recommends Descriptive Information from an Archival Information Package is stored separately in a Data Management function.

- Record how the repository will ensure fixity, authenticity and integrity, for example which message digests are used and how often they are checked.

Administration.

- How the Provenance of the object will be tracked; will any alterations to an item be documented?

- Consider adding a clause about De-selection of items and/or Deletion procedures. Quality Control – will the archive be regularly checked for file readability?

Access.

- Access rights to the archive – link to access level schedule.

- Translation on demand of the digital object to another language if needed, for future purposes.

Exemplars and useful references:

Sherpa DP technical strategy report provides a detailed overall technical strategy with many useful examples and links throughout (Bodhmage and Hedges 2006).

The Paradigm workbook provides some technical how-to's and gives a good workflow overview of the digital preservation process (Paradigm Project & Bodleian Library 2008).

Minnesota's policy includes a good example of preserving different file types (University of Minnesota 2007).

The System Security clause in ICPSR's preservation policy is a good example of how it manages its data systems and carries out regular security checks (McGovern 2007).

See the JScholarship metadata section under the 'managed activities' section. It links to certain metadata standards (John Hopkins Libraries 2008).

See the Preserv report for good examples of linking to metadata schemas relevant to the material they are preserving (Hitchcock et al 2007a).

The Mandate Project contains a good section on metadata requirements (Robertson et al 2006).

METS Awareness Training Project includes detailed information about the metadata standard and how to learn more about it, www.odl.ox.ac.uk/projects/projects_mets.htm

See Minnesota's preservation policy for how it incorporates 'normalisation' into the preservation process (University of Minnesota 2007).

The National Archives has produced a guide for choosing appropriate media (Brown 2003b).

OCLC's policy outlines some robust back up strategies (OCLC 2006).

7.4. SOURCES FOR SPECIFIC TYPES OF FUNCTION AND ORGANISATION

As part of this study, a mapping exercise comparing existing digital preservation policies from and guidance for different types of institutions was also carried out. This can be found in Table 1. This may be helpful in conjunction with the annotated bibliography in Section 7.5 in suggesting other policies and guidance to read and in considering how the generic policy can be tailored to your specific type of institution or function. Functional areas included are libraries, digitisation projects, archives/records management/special collections, teaching and learning, research data, and cultural heritage. Further Education colleges were included in the research, although the scope for digital preservation policies was limited.

The study also looked at cultural heritage data and audiovisual material residing in universities. As such, there were no digital preservation policies located pertaining to this content under the banner of universities per se.

However, attention was also paid to the nature of these collections outside HE and how they are dealt with. One of the main observations was that institutions which create their own digital content, such as in broadcasting, or have projects for digitising paper, images, or audio and video in museums, may fully value their digital content and desire its long-term preservation, but also often have no in-house digital preservation technology or policy.

It appears that a major issue in audiovisual preservation (at least, in the university sector) is the scalability of the institutional repository 'offering' in digital preservation. It may be that audiovisual data will be seen as too large for existing repositories and hence will instead go to a data centre or other third-party service provider. However we believe Digital Preservation Policies are still necessary for the originating institutions to frame their requirements for service level agreements and licensing with any third-party.

Table 1: Mapping Policies and Guidance for Specific Functions		
Area	**Functions**	**Function-specific policies and guidance**
Library	Library digital preservation policies	British Library, Columbia University, Cornell University, University of Minnesota, National Library of Australia, National Library of Wales, OCLC, Solinet, Yale University, Cedars Collection Management Guide
	Institutional Repositories and ePrints	OpenDoar (University of Nottingham), John Hopkins University, University of Glamorgan, University of Stirling, Preserv, SherpaDP, JISC Repository Support Project
	E-journals	BL's e-journal policy, JISC e-journal archiving solutions study
	e-Theses	Ethos Study
Digitisation Projects		TASI
Archives, Records Management, and Special Collections		Inter-Pares, Paradigm, The National Archives, Open University, Yale Fedora Project, King's College London, JISC DAAT
Teaching & Learning		JORUM, Open University, Mandate project
Research Data		AHDS, ICPSR, UKDA, MRC Note the DCC currently are undertaking research

		to assess the range of policies required for digital curation of research data and to identify gaps in current provision. A suite of tools will be developed in response to assist institutions to develop and implement appropriate curation and preservation policies. This will include guidelines on policy creation, FAQ sheets on how to comply with research council data policies, and generic policy templates that can be downloaded and customised. The University of Glasgow will be used as a focused case study to validate the tools and guidance provided.
Cultural Heritage	General	NEDCC
	Museums	Canadian Heritage Information Network [CHIN]
	Film Archives	British Film Institute

7.5. ANNOTATED BIBLIOGRAPHY

Libraries

Library Digital Preservation Policies

British Library (2006) *British Library Digital Preservation Strategy.* Retrieved 20 June 2008 from:
http://www.bl.uk/aboutus/stratpolprog/ccare/introduction/digital/digpresstrat.pdf
A good example of a very high level policy and contains all the relevant clauses needed to tackle such a large amount of heterogeneous materials.

The Cedars Project (2002) *Cedars Guide to Collection management*. Retrieved 20 June 2008 from:
http://www.leeds.ac.uk/cedars/guideto/collmanagement/guidetocolman.pdf
Covers a range of issues: the need for policies, selection of materials, acquisition and organisation, assessing significant properties, preservation metadata, storage, de-selection. Highlights the importance of articulating responsibilities.

Columbia University (2006) *Columbia University Libraries: Policy for Preservation of Digital Resources.* Retrieved 20 June 2008 from:

http://www.columbia.edu/cu/lweb/services/preservation/dlpolicy.html

A good, clear and practical policy. Commitment to life-cycle, resource management, and responsibilities outwith the library.

Cornell University Library (2004) *Cornell University Library Digital preservation policy framework.* Retrieved 20 June 2008 from: http://commondepository.library.cornell.edu/cul-dp-framework.pdf

Quite a short, straightforward and high level policy. Low on technical strategy. Has a section on Roles and Responsibilities, Selection criteria.

Cornell University (2007) *Digital preservation management: implementing short-term strategies for Long-term problems.* Retrieved 20 June 2008 from: http://www.icpsr.umich.edu/dpm/dpm-eng/eng_index.html

Contains a walk through of all the important digital preservation steps. Provides many links throughout to standards. Some good exercises and questions at the end of each section. It also provides good legal guidance and would be a vital resource when creating a decision tree.

Jenkins, G (2003) *National Library of Wales, Digital Preservation policy and strategy.* Retrieved 20 June 2008 from:

http://www.llgc.org.uk/fileadmin/documents/pdf/digital_preservation_policy_and_strategy_S.pdf

The policy outlines most of the different preservation activities in the library, but it is not a particularly technical policy. While it is high level it is also comprehensive.

National Library of Australia (NLW) (2002) *NLA Digital preservation policy.* Retrieved 20 June 2008 from: http://www.nla.gov.au/policy/digpres.html

A very high level policy, outlining some key policy areas to be included in any policy, also including a series of implementation steps. Research possibilities section also of use.

OCLC (2006) *OCLC Digital Archive Preservation policy.* Retrieved 20 June 2008 from:

http://www.oclc.org/support/documentation/digitalarchive/preservationpolicy.pdf

A very useful policy, which is fairly technical in its approach. Defines content access environments, and recommends a preservation action plan to deal with changes in technology. Each file format will have its own plan and be risk assessed. Also includes a succession plan.

Solinet (nd) *Solinet Contents of a Digital Preservation Policy.* Retrieved 20 June 2008 from:

http://www.solinet.net/Preservation/Resources%20and%20Publications/Contents%20of%20a%20Digital%20Preservation%20Policy.aspx

A succinct outline of a preservation policy, principally aimed at libraries and information organisations. Contains some good tips within the proposed appendices.

University of Minnesota (2007) *University Digital Conservancy Preservation policy.* Retrieved 20 June 2008 from: http://conservancy.umn.edu/pol-preservation.jsp

A strong technical policy, with emphasis more on technical strategies than organisational policy. Clearly details some preservation support levels for individual file formats.

Yale University (2005) *Yale University Library Digital Preservation policy.* Retrieved 20 June 2008 from: http://www.library.yale.edu/iac/DPC/final1.html

A high level policy covering most aspects of digital preservation. Identification of Content, File Format, Source and Collecting Levels of digital resources to be preserved; Financial; Access; Authenticity

Institutional Repositories and e-prints

Hitchcock, S., Brody, T., Hey, J., and Carr, L. (2007a) *Laying the foundations for Repository Preservation Services* Retrieved 20 June 2008 from:

http://www.jisc.ac.uk/media/documents/programmes/preservation/preserv-final-report1.0.pdf

Funded by the 4/04 programme, this paper describes the Preserv project which set out to investigate the preservation of institutional repositories by looking at distributed services, and how they might support preservation.

Hitchcock, S., Brody, T., Hey, J., and Carr, L. (2007b) *Survey of repository preservation policy and activity.* Retrieved 20 June 2008 from: http://preserv.eprints.org/papers/survey/survey-results.html

This paper studies HE/FE commitment to preservation. It covers depositing patterns, selection and file formats. Contains useful links to other policies, and concludes by saying that more consideration is needed to make overall policies before smaller ad hoc policies about such things as file formats are created.

John Hopkins Libraries (2008) *JScholarship Digital Preservation Policy.* Retrieved 20 June 2008 from: http://www.library.jhu.edu/collections/institutionalrepository/irpreservationpolicy.html

This policy mentions 'preservation guarantees' ; standards; format types accepted; image capture standards; institutional roles and responsibilities.

Knight, G and Anderson, S (2007) *SherpaDP Final Report.* Retrieved 20 June 2008 from: http://www.jisc.ac.uk/whatwedo/programmes/programme_preservation/programme_404/project_sherpa2.aspx

This paper describes the SherpaDP project, including the Preservation Service demonstrator and the use of a disparate collection of tools and services. Gives an overall summary of preservation tools, and the responsibilities of an OAIS-compliant repository.

Repositories Support Project (RSP) (2008) *Repository Policy Briefing Paper.* Retrieved 20 June 2008 from:
http://www.rsp.ac.uk/pubs/briefingpapers-docs/repoadmin-policyv2.pdf
This short paper gives an overview of the important aspects of any repository policy framework, such as licensing agreements. It also highlights the difference between strategic and operational policies.

University of Nottingham (2007) *OPENDOAR Policies Tool.* Retrieved 20 June 2008 from:
http://opendoar.org/tools/en/policies.php#demo
A tool which provides repository administrators with pre-made policies for metadata; data; content; submission and preservation.

University of Stirling (2008) *STORRE: Online Research Repository Policy.* University of Stirling. Retrieved 20 August 2008 from: http://www.is.stir.ac.uk/research/repository/eprint-policy.php
A good case study of how a short digital preservation policy is built into a wider repository policy. A clear and succinct policy which places emphasis on directions for deleting or altering digital items.

University of Glamorgan (2008) *University of Glamorgan Online Research Repository Policy.* Retrieved 20 June 2008 from: http://dspace1.isd.glam.ac.uk/dspace/docs/UoG-Repository-Policy.doc
This institutional repository contains a clause for digital preservation, the DSpace software providing bit-stream preservation.

e-journals

Beagrie, N., Chruszcz, J., Jones, M., and Morrow, T (2008). *A Comparative Study of e-Journal Archiving Solutions* (Joint Information Systems Committee).http://www.jisc-collections.ac.uk/media/documents/jisc_collections/reports/e_journals_archiving_%20solutions_report_final_080518.pdf
This study analyses the key issues and service options for e-journal archiving. It is designed to inform institutional policies and investment in e-journal archiving solutions.

McLeod, R (2007) *Preservation Plan for ejournals.* Retrieved 20 June 2008 from:
http://www.bl.uk/aboutus/stratpolprog/ccare/introduction/digital/digpresejournal.pdf
A detailed technical preservation policy for e-journals, and includes a useful technical plan.

e_Theses

Key Perspectives Ltd and UCL Library Services (2006) *Evaluation of options for a UK Electronic Thesis Service.* Retrieved 20 June 2008 from:

http://www.keyperspectives.co.uk/openaccessarchive/reports/EThOS%20Report%20-%20final%20published%20version.pdf

This paper touches on the preservation aspects of preserving function-specific resources, e-Theses and what solutions might be available.

Digitisation

Technical Advisory Service for Images (2007) *Establishing a Digital Preservation strategy.* Retrieved 20 June 2008 from: http://www.tasi.ac.uk/advice/delivering/digpres2.html

A high level policy, with not much technical or implementation detail, but certainly useful for any organisation involved in digitisation.

Archives and Special Collections

Brown, A (2008) *The National Archives Digital Continuity project - Standards and Requirements for Digital Continuity in the UK Govt.* Retrieved 22 June 2008 from:

http://www.nationalarchives.gov.uk/services/publications/standards-for-digital-continuity.pdf

Sets out standards used in the digital preservation process, based on de facto standards. Follows life-cycle approach. Covers: Confidentiality; Availability; Authenticity [integrity, reliability, usability]. Lists a number of important standards and a compliance checklist.

Interpares (nd) *Strategy Task Force Report.* Retrieved 20 June 2008 from:

http://www.interpares.org/book/interpares_book_g_part4.pdf

Aims to provide a framework for the articulation of policies. States a number of principles and criteria that a policy should contain. Includes a useful footnote that clarifies difference between policy, strategy.

King's College London (2006) *Managing Risk: a Model Business Preservation Strategy for Corporate Digital Assets.* Retrieved 20 June 2008 from:

http://www.jisc.ac.uk/media/documents/programmes/preservation/kings_final_report2.pdf

A valuable case study for HE organisations as it thoroughly investigates and highlights institutional assets via a survey. The findings are not a surprise; data loss, misunderstanding of digital record management, legal exposure, duplication of data. Contains very useful appendices.

Paradigm Project & Bodleian Library (2008) *Paradigm: Workbook on digital private papers.* Oxford, UK: Paradigm Project, Bodleian Library. Retrieved 20 June 2008 from:

http://www.paradigm.ac.uk/workbook/index.html

This workbook provides a thorough walk through of all the digital preservation issues associated with digital personal papers in archives and special collections, and can also guide one through all the main considerations of a digital preservation policy.

Mansfield, S (2006) *Open University - Reviewing records for permanent preservation.* Retrieved 20 June 2008 from: http://www.open.ac.uk/records/pics/d65485.pdf

A records management policy, containing some reference to digital preservation.

Pinsent, E and Ashley, K (2006).   *Digital Asset Assessment Tool (DAAT) Project.* Retrieved 20 June 2008 from:

http://www.jisc.ac.uk/media/documents/programmes/preservation/daat_final_report_2006.pdf

Outlines what such a tool should contain, when automating digital preservation. Highlights the importance of doing a PAS [Preservation Assessment Survey] created by the NPO. Gap analysis study is also of use.

Yale University Library (2006) *Fedora and the preservation of University Records.* Retrieved 20 June 2008 from: http://dca.tufts.edu/features/nhprc/index.html

A practical outline of an institutional repository dealing with preservation. Contains some useful appendices and background information to the project.

Teaching and Learning

Stevenson, J (2006) *Jorum preservation watch report*. Retrieved 20 June 2008 from:
http://www.jorum.ac.uk/docs/pdf/Jorum_Preservation_Watch_Report.pdf

While this is not a preservation policy per se, it provides an interesting case study of the issues of preserving very function specific and complex materials, i.e. learning objects for a national HE/FE repository established by JISC.

Robertson, R. J., Green, C., Dunsire, G., and Kearny, K. (2006) *Managing Digital Assets in Tertiary Education Toolkit (Mandate)* Version 2.2 Retrieved 20 June 2008 from:
http://www.jwheatley.ac.uk/mandate/Toolkit/docs/mandatetk.pdf

Digital preservation policy forms part of this digital asset strategy. This report includes a case study, and tackles major issues such as OAIS and metadata mappings. It is also interesting to see the how a Further Education college tackles its preservation requirements, and how it is integrating its preservation strategy into college policy.

Robertson, R.J (2006) "Digital preservation in the Tertiary education sector: management implications" Library Review 55 (3) Retrieved 10 September 2008 from: http://eprints.cdlr.strath.ac.uk/1840/01/RobertsonLR55_3.pdf

This paper examines digital preservation in further education and draws the conclusion that it is not the full responsibility of FE to tackle this area, as it might be in higher education. The author suggests that collaborative co-ordination with national memory institutions could be a solution for FE preservation activities.

Research Data

James, H (2004) AHDS *Collections Preservation Policy.* Retrieved 20 June 2008 from: http://www.ahds.ac.uk/documents/colls-policy-preservation-v1.pdf

This comprehensive policy details some technical processes, as well as levels of preservation used by the Arts and Humanities Data Service (AHDS). It aims to preserve a heterogeneous set of materials. The policy also includes some useful appendices.

McGovern, N (2007) *ICPSR Digital preservation policy framework.* Retrieved 20 June 2008 from: http://www.icpsr.umich.edu/DP/policies/dpp-framework.html

A very solid policy. Links out to a large number of policies within the organisation, which makes it comprehensive. ICPSR stands for inter-university consortium for political and social research. Links to many other procedures in the organisation.

Medical Research Council (2008) *MRC Policy on Data Sharing and Preservation.* Retrieved 20 June 2008 from:

http://www.mrc.ac.uk/PolicyGuidance/EthicsAndGovernance/DataSharing/PolicyonDataSharingandPreservation/index.htm

This short policy advises data science creators to make 'provisions' for preservation at the beginning of the life cycle and praises the merits of data curation.

Woollard, M (2008) *UK Data Archive Preservation policy* Retrieved 17 June from: http://www.data-archive.ac.uk/news/publications/UKDAPreservationPolicy0308.pdf

An informative case-study giving a thorough walkthrough of a policy, at both high and implementation levels. Follows OAIS methodology. Updated, reviewed and audited regularly.

Cultural Heritage

Bishoff, E and Rhodes, E (2007) *Planning for digital preservation: A self-assessment tool.* Retrieved 19 June 2008 from:

http://nedcc.org/resources/digital/downloads/DigitalPreservationSelfAssessmentfinal.pdf

A useful outline of what cultural and memory institutions should remember to include in a policy.

Canadian Heritage Information Network (2004) *Digital preservation for Museums: Recommendations: A possible checklist for creating preservation policy.* Retrieved 20 June 2008 from:
http://www.chin.gc.ca/English/Digital_Content/Preservation_Recommendations/index.html
This includes action recommendations as well as a more detailed checklist which includes: Organisational policies; media; formats; metadata; IR.

Clareson, T (2005) *NEDCC Survey and Colloquium Explore digital preservation policies and practices.* Retrieved 20 June 2008 from:
http://www.nedcc.org/resources/digital/surveyexplorearticletc.pdf
This document presents the results of an e-mail survey to collate readiness of cultural heritage. Recommendations include training; putting together internal guidelines; onsite assessments needed.

Kalas, A (2008). *Moving Images should never stop moving: digital preservation of film*. British Film Institute – Internal document
This report gives an overview of digital preservation in film making and how the industry is approaching the issue, changing tack in film production and realising some digital preservation solutions such as migration and the pioneering 'digital separations' solution. The BFI's approach is to back up on servers, tapes and DVDs. In some cases, film production standards are still accessible from 20 years ago.

8. MAPPING TO KEY INSTITUTIONAL STRATEGIES

8.1. AIMS AND METHODOLOGY

In addition to digital preservation policies, this study examined over 50 other important strategy documents from a wide range of universities in order to establish the principal themes and ideas embedded in them; identify any digital preservation links to these principal themes and ideas; and articulate ways in which a digital preservation policy and associated activities can contribute to the wider mission and strategies of universities.

This work is presented in full in appendices 1-6 and briefly summarised below. The appendices are as follows:

Appendix 1: Methodology for Institutional Strategy Mappings

Appendix 2: Research Strategies

Appendix 3: Teaching and Learning Strategies

Appendix 4: Information Strategies

Appendix 5: Library Strategies

Appendix 6: Record Management Policies

The overall aim was to provide a series of aggregated documents for common strategies such as research, teaching and learning, information, libraries, and records management, which would be relevant to a broad spectrum of UK universities. In particular our aim was that these documents could be used to promote development of digital preservation policies within institutions by:

- providing an advocacy tool;

- identifying organisational drivers and benefits for key sections of the policy;

- suggesting the broader organisation context in which the policy should fit and other key strategies and policies which should be linked to and/or reference it.

It is recognised that the needs and strategies of individual universities will vary. However it is hoped that the approach taken will provide content and ideas that can be selected and adapted for a wide range of individual institutions.

8.2. UNIVERSITY RESEARCH STRATEGIES (APPENDIX 2)

The research strategy is one of the core strategies of many UK universities. Although most will be at institutional level, it is not uncommon to have a research strategy for individual departments and faculties in teaching-led universities and in more research intensive universities. Typically, research and the teaching and learning, together with a strategy for "third-stream" activities such as knowledge transfer and engagement with industry and public sector, provide the key framework for the missions of UK universities.

As might be expected given the range of institutions covered, the strategies examined were varied in approach and detail so that it was difficult both to condense their key points into only a few categories and to compare them. However, in broad terms the teaching universities were surprisingly similar to those leading in research.

The principal shared research strategy aims, were to:

- Maximise staff and research excellence;

- Provide a high level of administrative support;

- Recognise and promote the link between teaching and research;

- Increase income and financial sustainability.

Strategy aims that either only applied to teaching-led universities, or were particularly emphasised were noted. Teaching-led universities tended to:

- Include more peripheral aims such as attracting a diverse student body;

- Place greater emphasis on interdisciplinary and collaborative work, including the involvement of external organisations. It may be that established research-led universities do not need to explicitly state this, whilst teaching universities may see them as an excellent way to raise the research profile;

- Explicitly aim to disseminate research, again presumably to raise the institutions' research profiles;

- Offer more staff support for research.

Overall there are a significant number of digital preservation links identified for most areas within the aggregated research strategies.

8.3. UNIVERSITY TEACHING AND LEARNING STRATEGIES (APPENDIX 3)

The teaching and learning strategy is one of the core strategies of UK universities. Typically, together with strategies research and "third-stream" activities such as knowledge transfer and engagement with industry and public sector, it provides the key framework for the missions of UK universities. The main themes of the learning and teaching strategies of the various universities selected for this study concerned:

- The skills, knowledge and experience of the students;

- The use of e-learning;

- The fostering of excellence through staff development and effective leadership;

- Equality awareness.

Strategies tend to emphasise the development of a wide range of skills. In addition to those related to specific disciplines, others included intellectual, generic, and social skills. Teaching and learning aims that promote the employability of students are also common.

There is also an emphasis on students developing research skills, and for teaching to be informed by research.

There is a universal commitment to working with and developing new technologies, including virtual learning environments, e-learning programmes and resources such as access to datasets using powerful search tools and services supported by Library and Learning Resources. Many institutions wish to establish e-learning as an integral part of teaching and learning activities.

Strategies also concern the development and refinement of teaching methods, staff development and the general promoting of the institution through the excellence of its teaching programmes. Some institutions mention developing an effective and enabling educational leadership and management structure in order to facilitate this.

Equality awareness and opportunity are also common themes as are, related to this, aims emphasising the need to attract international students as well as those from diverse domestic backgrounds.

A wide range of digital preservation links to many of these themes is suggested in the aggregated strategies. In particular digital preservation supports continuing access and underpins new e-services and associated efficiency gains; makes historic material available for learning and teaching; and provides support for digital study and research skills.

8.4. UNIVERSITY INFORMATION STRATEGIES (APPENDIX 4)

Information strategies have been described as "a set of principles defining our attitudes towards information and the processes by which it is acquired, manipulated and stored"(UCL 2002). As such they tend to be a framework for a series of more specialised policies covering specific types of information or information systems within the university.

The aggregated strategies are derived from a selection of existing university information strategies. For this study probably the most interesting observations from the comparison are that:

- Close links exist with other strategies and policies in the institution including library strategies (see appendix 5) and records management policies (see appendix 6). Links may also exist with ICT policies which have greater emphasis on systems and procedures rather than the information and content;

- **Information strategies have a strong emphasis on access and sharing of information: digital preservation supports this by promoting continuing access and sharing over time;**

- **Information strategies often cover web strategies and there are digital preservation links from this to web-archiving and persistent identifiers and resolver services.**

8.5. UNIVERSITY LIBRARY STRATEGIES (APPENDIX 5)

Libraries play a major role in the universities of the UK and the older universities have been central to the preservation of some of its most important collections. Preservation and long-term stewardship of institutional collections are therefore roles that are commonly associated with the Library and increasingly apply across both traditional and electronic materials. Many

librarians have also been active in developing and supporting the emerging field of digital preservation.

The aggregated policies below are derived from a selection of existing university library strategies. When the individual strategies were compared there were a wide degree of variation between them particularly in terms of depth and breadth of coverage. In several cases explicit links were provided to separate library e-strategies (not aggregated but referenced below).

For this study probably the most interesting observations from the comparison are that:

- Libraries frame their strategies within the university in terms of support for the key institutional strategies and business activities of research, and teaching and learning. Much can be gained therefore from examining the aggregated research, and teaching and learning strategies in appendix 2 and appendix 3 respectively and their digital preservation links. These often cascade or suggest appropriate digital preservation links to the library strategies;

- Libraries are often not only responsible for the book and journal collections but also for the archives and special collections of the institution. There are potential links therefore for archives and special collections in libraries to records management (see Appendix 6 Records Management for exploration of Records Management policies and digital preservation);

- Digital preservation links to library strategies therefore can be extensive and be critical to activities such as digitisation, e-journal services, institutional repositories, and special collections within the library.

8.6. UNIVERSITY RECORDS MANAGEMENT POLICIES (APPENDIX 6)

Records management can encompass a wide range of corporate records within universities, from research data and documentation, teaching and student records, to "grey literature" such as prospectuses and annual reports.

Records management in universities normally covers the first stages of the records lifecycle when records are in active or semi-active use and includes procedures for reviewing

subsequent further retention, destruction, or selection for permanent archiving. Normally only a very small percentage of records from early in the lifecycle are likely to be selected for permanent preservation and the responsibility for these permanent records will be passed to another entity such as an Archive or the University Library. A "digital preservation policy" is therefore most likely to be developed by the Archive or University Library and closely linked to or subsumed within its existing policies.

The aggregated policies below are derived both from a published model policy by PRO/JISC and a selection of existing university policies. When the individual policies were compared it was interesting to note the differences and commonalities and degree of variation between them. The PRO/JISC model policy is very high-level and the real-life policies tended to include much more implementation detail (covered by the sub-headings below of record quality, management, security, training, and audit). The PRO/JISC model includes referencing other relevant existing policies and the following high level commitments to selection for permanent preservation:

> "A small percentage of the university's records will be selected for permanent preservation as part of the institution's archives, for historical research and as an enduring record of the conduct of business." (PRO 2003).

For this study probably the most interesting observations from the comparison are that:

- Most policies implicitly cover records in any medium but it is still relatively rare for this to be stated explicitly;

- References to specific challenges for electronic records are still rare in individual policies;

- **Relationships to other relevant existing policies and strategies are rarely stated and there is still scope to develop links with digital preservation and related strategies such as those for Information/ICT or Archive and Library Services;**

- **There are significant potential synergies between digital preservation and electronic records management: firstly the early management in the lifecycle of electronic records is critical for the small percentage that will be selected for permanent digital**

preservation; and secondly the technical challenges of changing systems and formats (a core area of digital preservation expertise) affects a much broader spectrum of electronic records with longer retention periods. Both areas therefore can have shared interests.

9. CONCLUSIONS AND RECOMMENDATIONS

Our work to date reinforces our initial view that for institutions digital preservation must be seen as "a means to an end" rather than an end in itself: any digital preservation policy must be framed in terms of the key business drivers and strategies of the institution.

A major business driver in all universities over the past decade has been harnessing digital content and electronic services and the undoubted benefits in terms of flexibility and increased productivity they can bring. The priority in recent years has been on developing e-strategies and infrastructure to underpin electronic access and services and to deliver those benefits.

However, any long-term access and future benefit may be heavily dependent on digital preservation strategies being in place and underpinned by relevant policy and procedures. This should now be an increasing area of focus in our institutions.

It can be a daunting task to embark on creating a digital preservation policy for an organisation. Policy and procedures do not change overnight and implementation will need to be phased and built in incremental steps.

Digital preservation is still regarded as relatively new and unfamiliar and while there are now many technical tools available, strategic and procedural policies are being created and implemented only in a few organisations. As a result there are only a handful of examples to follow when defining a digital preservation policy.

However, most of these examples have been developed and refined over many years. There are enough established policies to examine and common aspects that the policies share, to provide a solid foundation for others to build upon.

We have created two tools in this study: a model for digital preservation policy and implementation clauses based on examination of existing digital preservation policies; and a series of mappings of digital preservation links to other key institutional strategies in UK universities. Our aim has been to help institutions and their staffs develop appropriate digital preservation policies and clauses set in the context of broader institutional strategies.

Although the work for this study is self-contained and complete there are a number of ways in which development of digital preservation policies and procedures could be further developed in UK universities.

A major driver for new policy development can come from funders and grant guidelines and conditions. JISC itself requires preservation to be addressed in proposals for relevant programmes such as digitisation. Funders are therefore in a position to evaluate and encourage best practice in terms of institutional preservation policies and procedures and their development.

We also note that "institutional digital preservation policies" may in practice need to be developed by parts of the organisation that have the most pressing need and/or expertise. Policy at an institutional level may be inappropriate or constrained by timescales for policy review and approval. It could be helpful therefore to review and publish case studies on how the generic policy might apply in practice to specific activities, digital content or units within HEIs for example institutional repositories.

We therefore have two recommendations to JISC and other funders:

Recommendation1: Funders should utilise this study to evaluate and encourage best practice in terms of institutional preservation policies and procedures and their development in their funded programmes and evaluations.

Recommendation 2: JISC should consider assisted take-up by funding case studies on how the generic digital preservation policy in this study might apply in practice to specific activities, digital content or units within HEIs, for example institutional repositories.

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