

## **Aberystwyth University**

### *Business case for shared digital preservation provision*

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## 1. EXECUTIVE SUMMARY

If immediate steps are not taken to ensure long-term access to digital material in Wales, vast quantities of information of enormous cultural, economic and political significance will be irretrievably lost.

This report considers the strategic options for the delivery of digital preservation, the actions which need to be taken and the benefits that will be delivered. It then sets out a roadmap which makes recommendations for priority actions.

By its nature digital preservation involves a multitude of technical issues, however this report focuses on the strategic requirements for delivering digital preservation solutions, rather than focusing on technical detail. The imperatives for digital preservation are also dealt with only briefly, as the issue is now widely recognised and accepted as a key challenge for information management.

The report then breaks down the delivery of digital preservation into a series of objectives. These are largely based on the OAIS Functional Model which is widely used as a reference framework throughout the report. These are to:

- Ensure that appropriate digital material from all sources can be collected
- Facilitate the deposit of digital material, and the creation of appropriate metadata
- Ensure the provision of secure and trusted storage for digital material
- Sustain appropriate administration at places of deposit
- Support the preservation planning process
- Ensure cost effective management of the digital material
- Facilitate continued and straightforward access to digital material by users
- Ensure a robust framework is developed and maintained for all digital preservation activities which all ARCW partners are able to adopt

The report also recognises that any recommendations have to be realistic about the feasibility of their delivery. It assumes that no national organisation will deliver digital preservation for everyone and that little, if any, additional funding will be available from most institutions. However, it

does assume that through resource prioritisation some staff time will be made available for development work, training and preservation activities.

High level options for the delivery of the objectives are then considered. These reach the perhaps obvious conclusion that the only realistic way forward is for collaborative action, but discount the idea of establishing a jointly funded body to carry out these functions as unfeasible. Instead it is recommended that a consortium approach is adopted with shared methodologies and a baseline of skills which is further supplemented by a distributed specialisations in a “community of the willing.”

Each of the project objectives is then looked at in greater detail to determine the activities involved and the benefits that will accrue. In order to provide a more familiar frame of reference, each activity is compared with activities which might take place with traditional forms of archives.

Finally the report looks at a roadmap for delivering these objectives. This is based on a pragmatic view of what can be achieved, and the urgency of the need to take actions to deal with material which is now being deposited in archives.

It starts with an initiation stage where project controls and resources are looked at. It then prioritises actions which will help to meet the ingest requirements and immediate preservation needs of digital deposits. It then recommends a series of phases for further implementation.

## **2. PLANNING FOR DIGITAL CONTINUITY IN WELSH ARCHIVE SERVICES**

2.1 The twenty-first century has become a digital age. It is increasingly rare for people at work, or at home, to print their documents, photographs and communications onto paper. It is also increasingly hard for this digital age to be truly reflected on paper, as digital resources become more complex, with multiple links and multiple views.

2.2 The fast pace of software and hardware development and the fragility of digital media means that preserving digital objects is not simple. In order to continue preserving Wales’ archival heritage, it is vital that archive services start to find ways to preserve digital material.

2.3 This fragility and rapid rate of change means that the preservation of digital material has to be considered at an early stage for both long-term preservation for cultural reasons and short-term business continuity, research, and economic and legal requirements.

- 2.4 ARCW's strategic priorities for 2008-2010 include "enlarging and enhancing archive collections in Wales" and "preserving, maintaining and providing access for electronic records". It aims to do this by "investigating collaborative partnerships within and outside Wales".
- 2.5 As a consequence the ARCW Digital Preservation Group was set up in 2009 to make recommendations on the most economically effective method of undertaking digital preservation in archive services in Wales and to look in particular at how they might work collaboratively to do this.
- 2.6 A great deal of international work has been carried out regarding digital preservation and the activities required to ensure success. The following report will use the Functional Modal, defined by the *Open Archival Information System Reference Model (OAIS)*<sup>1</sup>, and its sister standard *Producer-Archive Interface Methodology Abstract Standard (PAIMAS)*<sup>2</sup> to provide the structural breakdown of preservation activities required, and the terminology to describe them.<sup>3</sup> a glossary of terms and abbreviations can be seen in Appendix 1, while a summary of the OAIS Functional Model is attached as Appendix 2.

### **3. PROJECT OBJECTIVES AND CONSTRAINTS**

- 3.1 High level objectives for digital continuity in archive services in Wales have been identified in line with the ARCW strategic priorities, the *OAIS Functional Model*, and accepted best practice. These will inform the assessment of the business options available, and ensure that all aspects of digital preservation are considered.

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<sup>1</sup> ISO 14721:2003, *Space Data and Information Transfer Systems -- Open Archival Information System (OAIS) -- Reference Model*.

<sup>2</sup> ISO 20652:2006, *Space Data and Information Transfer Systems -- Producer- Archive Interface -- Methodology Abstract Standard*.

<sup>3</sup> These international standards, originally developed by the *Consultative Committee on Space Data Systems* for use in the space industry, have been widely adopted across the digital preservation community to define the processes involved.

### 3.2 The identified objectives are:

- **Objective 1** - to ensure that appropriate digital material from all sources can be collected
- **Objective 2** - to facilitate the deposit of digital material, and the creation of appropriate metadata to ensure on-going management
- **Objective 3** - to ensure the provision of secure and trusted storage for digital material
- **Objective 4** - to sustain appropriate administration at places of deposit
- **Objective 5** - to support the preservation planning process
- **Objective 6** - to ensure effective management of the digital material
- **Objective 7** - to facilitate continued and straightforward access to digital material by users
- **Objective 8** - to ensure a robust framework is developed and maintained for all digital preservation activities which all ARCW partners are able to adopt

### 3.3 This report assumes the following constraints:

1. Digital preservation will not be delivered on behalf of organisations by any national institutions or large organisations acting independently
2. Extremely limited resources will be available to fund digital preservation. Many organisations will be unable to provide any significant funding to activities. However, it is assumed that through the prioritisation of resources, some staff time will be made available for training, development work and digital preservation activities.
3. The need for action is urgent.

## 4. OPTIONS FOR DIGITAL CONTINUITY

- 4.1 There are 4 high level options for achieving the project objectives of digital continuity in archive services across Wales:

#### 4.2 Option 1: Do Nothing

This option means accepting the risks to digital material, and not taking any steps to preserve them. It would continue the current situation in many institutions, i.e. archive services would continue to print digital objects to paper, or store them on digital media (CD/DVD/floppy disk) in strongrooms.<sup>4</sup>

Adopting this option would have no immediate cost implications, but it would not meet any of the project objectives set out in 3.1. The risk of digital obsolescence and media degradation, if stored on original media in a strongroom, is too high and unacceptable. In all cases, except for the simplest, there would be the loss of the material's *significant properties* if printed out. Much digital material is not able to be printed out, due to its structure or the use of complex links.

**This option exposes organisations to considerable risk of loss of information and resulting liability, and is therefore considered untenable.**

#### 4.3 Option 2: Individual Actions

This option would involve each archive service setting up their own digital repository with their own services and developing systems for collecting, ingesting and storing digital objects; managing descriptive information (which identifies and describes their digital material); administering their digital repository; carrying out preservation planning (such as monitoring technology, developing preservation strategies and migration plans); and providing access to their designated community.

Working individually would enable each archive service to tailor implementations to their own requirements, an option which may be particularly relevant to members of ARCW who are not located in local authorities.

The disadvantage would be the cost of setting up and maintaining services and systems to manage the preservation of digital material, which may be difficult to justify to parent organisations against the needs of core services. Cost implications include: specialist staffing skills, which are unlikely to be met by in-house knowledge; and specialist equipment which may incur significant costs. Working individually may also make the solution developed less stable, if the parent organisation makes budget cuts. Additionally, if each archive service works alone there may be interoperability implications for any future collaboration.

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<sup>4</sup> See: McInnes, S & V. Phillips. 2009. p.10.



#### **4.4 Option 3: Collaborative Actions**

This option would involve archive services across Wales working collaboratively on all or some of the functions required for digital preservation.

At one extreme is the establishment of a centre for digital curation and joint repository to receive and manage digital deposits from various sources in Wales. Whilst this would undoubtedly be capable of meeting the project objectives, it is likely to be the most expensive option and all parties would have to make a considerable financial contribution. No detailed analysis of the costs of establishing such a centre have been undertaken, but it would be likely to cost in excess of £500,000 to set up with annual running costs of a similar or higher level. This option would also carry an institutional risk, in that should funding no longer be available for the continuation of the organisation, it would leave no viable alternative solution. It has been assumed that this is not feasible. It is considered to have comparable costs and risks for provision of this service by an external supplier, and this collaborative action has also been discounted.

The third option for collaborative actions is for the sector to work together as a distributed consortium, where similar practices are adopted by all organisations, so that development and training can be carried out as effectively as possible. For example a model digital deposit agreement could be used by all repositories instead of each developing and adopting its own.

Each organisation would have to develop a baseline of skills to deal with simple digital materials. There are, however, areas of digital preservation activity which require the development of more specialist skills. This issue could be addressed by a “community of the willing” where specialist skills are developed by individual repositories, which are then able to support others when particular issues arise. For example, one organisation could develop skills in dealing with the creation of ingest packages for databases, whilst another develops skills in risk and cost assessment for appraisal.

This last option for collaborative activities would enable action to be taken quickly to address some of the urgent needs for digital preservation, for some of the more simple digital objects now being deposited in archive. This would enable the levels of skill and understanding to be increased, which would facilitate the development of a more effective framework for digital preservation.

#### **4.5 Conclusion**

Whilst some areas of digital preservation may be delivered by individual organisations, the most feasible option for successful delivery across archive services in Wales is through collaborative work on a consortium basis. Therefore this report now looks at each of the zones of activity to determine areas for collaboration and priorities for action.

## 5. ACHIEVING THE OBJECTIVES – ACTIVITIES AND BENEFITS

### 5.1 Introduction

With collaborative efforts in mind this report now looks at each of the objectives set out in 3.2: the activities required to achieve them and the benefits which will accrue from implementation.

### 5.2 Objective 1: To ensure that appropriate digital material from all relevant sources can be collected

*Comparable Actions<sup>5</sup>: Identification of potential deposits, deposit negotiations and agreements, delivery or collection of documents, accessions, quarantining, appraisal, and conservation assessment.*

5.2.1 This objective considers the actions to be undertaken prior to the material being taken into, or ingested into, the repository. This is the preparatory stage for the transfer of *submission information packages (SIPs)* from the creator to the digital repository.

5.2.2 The *pre-ingest stage* prepares digital materials for *ingest* into a digital repository. This stage ensures that documented policies and procedures are in place for both the administrative and technical activities required for the successful transfer of digital material to the digital repository. During this phase agreements between the creator of the digital materials and the repository are formalised and documented, and the digital materials are described and normalised to ensure that they comply with specified requirements.

#### 5.2.3 Pre-Ingest Activities:

The following policies and procedures need to be developed to ensure data are successfully collected and made ready for ingest into the digital repository at the *pre-ingest* stage.

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<sup>5</sup> These Comparable Actions are used throughout this section of the report to illustrate the type of activities when compared with the traditional media archives are more familiar with. The analogy is not intended to be comprehensive.

<b>Administrative Policies</b>	
Collection Policy	Include the scope of the collection and procedures amassing it.
Acquisition Policy	Strategies for developing the collection.
Accessioning Policy	Include deposit guidelines and agreements for working with depositors. Develop a model deposit agreement.
Selection and Appraisal Policy	Includes selection and appraisal criteria for digital material and accessioning and de-accessioning guidelines.
Legal Policy and Guidelines	Include copyright, consent, Intellectual Property Rights, licensing, Data Protection and Freedom of Information, other legal obligations.
Access Policy	Determine who will be allowed access to the material, and authentication procedures.
Preservation Policy	Determine the preservation actions which will be undertaken.
General Guidelines	Deposition guidelines for creators, custodians and users.

<b>Technical Policies</b>	
Metadata standards	Choose metadata standards for description, technical information, administrative information and preservation information. Develop profiles and create cataloguing guidelines, including guidance on the minimum metadata acceptable for ingest.
Packaging standards	Choose of content packaging standards and development of profiles.
File formats	Designate preferred file formats and write guidance on submission.
Unique identifiers	Choose a standard and design a methodology for the assignment of unique identifiers.

#### 5.2.4 Benefits of Planned *Pre-Ingest* Activities:

Developing a consistent and systematic *pre-ingest* function ensures that:

- All digital material worthy of permanent preservation is identified as early as possible;
- All necessary arrangements for digital material selected for permanent preservation are made as early as possible;

- Issues relating to confidentiality, consent, and legal obligations are addressed as early as possible;
- All digital materials are submitted to the Archive at an appropriate standard, and in an appropriate format, thus reducing the need for unnecessary processing at a later stage;
- All digital materials will have the metadata required to ensure intellectual control over time;
- The quality, accessibility and comprehensibility of the *SIPs* can be maintained over time;
- The costs of performing other processes at subsequent stages is reduced.

### **5.3 Objective 2: To facilitate the deposit of digital material, and the creation of appropriate metadata**

*Comparable Actions: Arrangement and packaging, creation of finding aids, transfer of records to strongrooms and finding aids to searchroom and web.*

5.3.1 This objective considers the *Ingest Entity* described in *OAIS*. This allows for the *Submission Information Package* (SIP) to be prepared for ingest into the digital repository, creating an *Archival Information Package* (AIP).

5.3.2 The creation of the AIP is the cornerstone of the *OAIS Functional Model*. A well defined *ingest function* will enable the digital repository to preserve digital material at a specified quality for a specified period of time. The *ingest function* must be developed in collaboration with the other components of the digital repository. Particular care must be taken to ensure that it is aligned with the *pre-ingest* stage, and it is crucial that the requisite management tools are in place.

#### 5.3.3 *Ingest Activities* Include:

The following activities need to be developed for a successful *ingest function*:

Activity	Tasks to be Completed
Architecture Specification	<ul style="list-style-type: none"> <li>• Decide on a centralised or distributed model.</li> <li>• Consider hardware and software options.</li> <li>• Consider storage and back-up options.</li> </ul>
Ingest Procedures	<ul style="list-style-type: none"> <li>• Specify the methodology and software to use.</li> <li>• Establish procedures for quality assurance and validation.</li> <li>• Establish procedures for file format identification.</li> <li>• Establish specifications for metadata to be created at ingest and develop guidelines.</li> <li>• Determine roles and responsibilities.</li> </ul>
Skills	<ul style="list-style-type: none"> <li>• Establish what specialist skills will be required and how these will be obtained.</li> <li>• Establish training requirements of existing staff and how this will be undertaken.</li> </ul>

#### 5.3.4 Benefits of Planned *Ingest* Activities

The main benefits of a successful *ingest function* are as follows:

- It ensures that the boundaries between the selection process and curation have been clearly defined;
- It ensures that all *AIPs* are ingested to the Archive Storage area at an appropriate standard;
- It ensures that the quality, accessibility and comprehensibility of the *AIPs* can be maintained over time;
- It ensures that the administrative and data management area are updated;
- It reduces the costs of performing other processes at subsequent stages.

#### 5.4 **Objective 3: To ensure the provision of secure and trusted storage for digital material**

*Comparable Actions: Finding BS5454 compliant storage, placing documents onto shelves and adding information to a location guide; generating data on number of cubic metres of storage space used and available for future*

*expansion; monitoring storage environment; maintaining a disaster plan; processing request slips.*

5.4.1 This objective considers the *Archival Storage Entity* described in *OAIS*. This function provides the necessary services for the effective permanent storage of the *AIPs* within the Archive.

5.4.2 Appropriate storage must be selected taking into account: the frequency with which the digital material will be used; the need for error monitoring and notification and the need for a migration strategy to combat format obsolescence.

5.4.3 Storage Activities include:

Activity	Tasks to be Completed
Storage Policy	Include: <ul style="list-style-type: none"> <li>• Implementation of centralised or distributed storage (determine which).</li> <li>• Provision of common services i.e. operating systems, network services and security services.</li> <li>• Maintenance of the storage environment.</li> <li>• Routines for integrity checking.</li> <li>• Back-up methodologies.</li> <li>• Regular assessment of storage needs for early identification of sharing opportunities.</li> <li>• Guidelines for disaster recovery</li> </ul>
Software	<ul style="list-style-type: none"> <li>• Choice and purchase of management software applications i.e. Fedora, DSpace, DAITTS, aDORe, etc.</li> </ul>

5.4.4 Benefits of planned Storage Activities

Implementation of a rigorous storage policy provides the following benefits:

- The use of the appropriate type of storage;
- Assured long-term storage and curation of digital material;
- Safeguards in place to ensure that digital objects retain integrity and authenticity;
- Migration and refreshment processes in place to ensure the long-term access to digital objects;
- Procedures in place to ensure recoverability in case of a disaster.

## 5.5 Objective 4 - To sustain appropriate administration at place of deposit

*Comparable Actions: Budget setting for repackaging a collection, ensuring humidity monitors are calibrated, controlling access to strongrooms, stock checking, managing relationships with depositors..*

5.5.1 This objective considers the *Administration Entity* described in *OAIS*. This function covers all of the services required for the day-to-day maintenance and operation of the digital repository.

5.5.2 The administrative function is perhaps the most complex function in so far as it is responsible for the coordination of all of the activities carried out by the other functions.

5.5.3 Administration Entity Activities Include:

Activity	Tasks to be Completed
Accessions	<ul style="list-style-type: none"><li>• Create submission policy documents.</li><li>• Ensure that all submissions match repository standards.</li></ul>
Policy Making	<ul style="list-style-type: none"><li>• Establish archive standards and policies.</li></ul>
Systems management	<ul style="list-style-type: none"><li>• Develop procedures to maintain systems configurations for hardware and software.</li><li>• Migrate / update contents of archive.</li><li>• Develop methods to monitor and improve archive operations.</li><li>• Develop statistical reports for the analysis of use</li><li>• Determine necessary access controls.</li></ul>
Strategy	<ul style="list-style-type: none"><li>• Develop / review archive strategy.</li></ul>
Customer service	<ul style="list-style-type: none"><li>• Develop user support program.</li><li>• Devise procedures for activating requests for information products.</li></ul>

5.5.4 Benefits of Good Administration

Good administration provides the benefits of:

- Strong relationships between producers, consumers and management;
- Robust submission agreements taking into account copyright and migration;
- Appropriate policies and procedures in place to support the running and development of the Archive;
- Well configured systems and tools;

- Secure Archive against unauthorised physical access;
- Sufficient metadata about SIPs to enable future discovery;
- Ability to plan for and support large submissions;
- Monitored performance.

## 5.6 Objective 5: To support the preservation planning process

*Comparable Actions: Maintaining technical information on chemical reactions and degradation of different types of photographs, and deciding on actions to minimise the risks such as rephotographing, scanning, and freezing.*

5.6.1 This objective considers the *Preservation Planning Entity* described in *OAIS*, which is responsible for monitoring the digital repository and providing recommendations to ensure that the digital materials are accessible to the *designated community*.

5.6.2 This process is concerned with setting and maintaining the *Preservation Policy* against current best practice and technological developments, to ensure that risks to digital material are assessed and managed. It does not carry out actual preservation activities. Whilst closely related to the administration function, as a critical component it is elevated to reflect its significance.

### 5.6.3 Activities to Support the Preservation Planning Process:

Activity	Tasks to be Completed
Preservation strategy development	<ul style="list-style-type: none"> <li>• Determine a relevant and robust strategy based on either migration or emulation.</li> </ul>
Media	<ul style="list-style-type: none"> <li>• Select appropriate preservation media.</li> </ul>
File formats	<ul style="list-style-type: none"> <li>• Determine appropriate file formats for preservation use.</li> </ul>
File format identification	<ul style="list-style-type: none"> <li>• Establish which of the available tools for file format identification to implement.</li> </ul>
Data integrity checking	<ul style="list-style-type: none"> <li>• Determine appropriate integrity checks e.g. checksums to ensure confidence that no changes have been made or bit-rot taken place.</li> </ul>
Storage refreshment	<ul style="list-style-type: none"> <li>• Plan for the ongoing update and refreshment of storage media.</li> </ul>
Back-up and disaster recovery	<ul style="list-style-type: none"> <li>• Determine effective backup and disaster recovery strategies.</li> </ul>



Community and technology watch function	<ul style="list-style-type: none"> <li>• Ensure awareness of relevant organisational and political changes, and new and evolving technological processes.</li> </ul>
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#### 5.6.4 Benefits of Preservation Planning

Good preservation planning will ensure the longevity of digital material and enable:

- Appropriate decision making on the actions required to ensure the long-term preservation of digital objects;
- The ability to identify preservation risks to digital material;
- The use of appropriate tools and methodologies.

### 5.7 **Objective 6: To provide effective management of the data**

*Comparable Actions: Recoding levels of document use, updating finding aids, providing information on most heavily used documents.*

5.7.1 This objective considers the *OAIS Data Management Entity*. This entity is not too dissimilar to the storage function. However, it differs in one crucial respect: The Data management entity is responsible for identifying and documenting descriptive and systems information rather than preserving the digital object.

5.7.2 The activities performed by this function will be largely determined by the repository's administration functions.

5.7.3 Data Management Entity Activities Include:

Activity	Tasks to be Completed
Administer the archive database	<ul style="list-style-type: none"> <li>• Develop strategy to populate, manage and facilitate access to database of descriptive information and systems information</li> </ul>
Update database	<ul style="list-style-type: none"> <li>• Develop procedures for updating descriptive information</li> <li>• Develop protocol for updating archive administration</li> <li>• Develop protocol for updating systems configuration</li> </ul>
Perform queries	<ul style="list-style-type: none"> <li>• Develop protocol for answering queries</li> </ul>

Generate reports	<ul style="list-style-type: none"> <li>Consider report topics / templates for Ingest, Access and Administration functions</li> </ul>
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#### 5.7.4 Benefits of good Data Management

The benefits which any strategy should deliver relating to this phase are:

- Ensures the use of the appropriate type of storage i.e. open source database;
- Assures the long-term storage and curation of descriptive information and systems information;
- Ensures the timely response to queries submitted by the access function;
- Ensures that this system has the ability to generate accurate reports as requested by the Ingest, Access or administration functions;
- Ensures that this system has the ability to update descriptive information from the Ingest function;
- Ensures that this system has the ability to update systems information from Administration.

### 5.8 **Objective 7: To facilitate continued and straightforward access to digital material by users**

*Comparable Actions: Registering users and checking ID; receiving and processing request slips, creating surrogate copies for use by public.*

5.8.1 This objective concerns the *OAIS Access Entity*. The Access entity functions as the point of interaction between the repository and its designated community. It is here where (i) queries and requests are dealt with and (ii) copies of digital objects (DIPs) along with the necessary metadata, and software are generated and disseminated.

5.8.2 There are two important things to note here: firstly, The DIP differs from the AIP in that it is a copy of the digital object. Secondly, the accompanying metadata which is generated must be appropriate to the level of access agreed.

### 5.8.3 Access Entity Activities Include:

Activity	Tasks to be Completed
General access activities	<ul style="list-style-type: none"> <li>• Determine the <i>designated community</i>.</li> <li>• Develop system for discovery of resources</li> <li>• Develop protocol for interaction with Data Management Function.</li> <li>• Develop protocol for interaction with Archival Storage Function.</li> </ul>
Generate <i>Dissemination Information Package (DIP)</i>	<ul style="list-style-type: none"> <li>• Determine appropriate file format and / or media to support dissemination of digital object.</li> <li>• Determine appropriate level of metadata to accompany digital object.</li> </ul>
Validate <i>Dissemination Information Package (DIP)</i>	<ul style="list-style-type: none"> <li>• Develop mechanism to guarantee the integrity of information in the <i>Dissemination Information Package (DIP)</i></li> </ul>
Security	<ul style="list-style-type: none"> <li>• Ensure that consumers have the appropriate access permissions.</li> </ul>

### 5.8.4 Benefits of Ensuring Access

The benefits which any strategy should deliver relating to this phase are:

- Ensure the effective coordination of all access activities including communication with Data Management and Archive Storage entities;
- Ensures that requests for information products i.e. reports, queries, DIPs, etc. are dealt with effectively and efficiently;
- Ensures that the metadata generated and disseminated is appropriate to the agreed access conditions;
- Ensure that the necessary controls are in place to limit access to protected information.
- Ensure that the organisation is in a position to meet its legal obligations for access to digital information.

### 5.9 **Objective 8: To ensure a robust framework is developed and maintained for all digital preservation activities which all ARCW partners are able to adopt**

*Comparable Actions: Managing the service, setting an annual budget, working in partnership, training and developing staff.*

5.9.1 This objective sits outside and above the *OAIS* Functional Model. It aims to ensure that an overall framework of actions which can be used by all partners, within the constraints already identified in the project, can be delivered and that this can be delivered in a sustainable way.

5.9.2 Framework Activities Include:

Activity	Tasks to be Completed
Programme management	<ul style="list-style-type: none"> <li>• Agreement of priorities</li> <li>• Adoption of plans</li> <li>• Allocation of tasks</li> <li>• Programme co-ordination and risk management</li> <li>• Development of grant applications</li> </ul>
Staff development and communications	<ul style="list-style-type: none"> <li>• Training programmes</li> <li>• Sharing skills</li> </ul>

5.9.3 Benefits of planned Framework Activities

The benefits of an overall framework of activities are:

- Co-ordinated actions and efficient use of resources
- Ability to target needs
- Resilience within the framework
- Increased capacity through partnership
- Better management of risk

**6. PROPOSED ROADMAP**

**6.1** It is imperative that progress is made in delivering digital preservation in Wales. In order to achieve this, a Consortium Project which undertakes a phased approach is recommended. This does not set out to plan all aspects of digital preservation from the outset, but rather gives direction to the process, and allows initial steps to be made towards all of the Project Objectives.

**6.2** The actions described in Section 5 (Achieving the Objectives) have been examined and prioritised to develop the following Roadmap. This shows the way ahead in broad detail. It will enable the initial actions which need to be taken to be determined, and build a foundation for future actions. It will allow immediate action from Project Partners while skills and resources to undertake later phases can be established.

### 6.3 Initiation Phase – Establishing the Project

The Initiation Phase will establish the Consortium Project by identifying participating Partners and the extent and nature of their collections which require digital preservation activities. This will inform the development of a Project Plan which takes account of the Partners needs and resources to participate.

<b>Phase 1: Initiation Phase – Establishing the Project</b>	
•	Identify ARCW partners who wish to participate in Framework Activities
•	Undertake a scoping study of existing digital preservation requirements.
•	Develop the Project Plan.
•	Set up the Project organisation and controls.
•	Each archive service to identify resource availability.
•	Agree Project Plan.
•	Agree communication strategy

### 6.4 Phase 2 – Establishing the Project Parameters

Phase 2 will establish collaborative policies and procedures to enable preservation activities to be undertaken by the Project Partners. It will establish the software tools which will be required to manage and deliver material to users, and the training requirements of participating staff.

<b>Phase 2: Establishing the Project Parameters</b>	
<p><b>Objective 1</b> (To ensure that appropriate digital material from all relevant sources can be collected)</p>	<ul style="list-style-type: none"> <li>• Provide recommendations on inclusion of digital records in collections policies</li> <li>• Set up a model depositors agreement</li> <li>• Select a metadata standard for adoption by all ARCW members</li> <li>• Select a packaging standard for adoption by all ARCW members</li> <li>• Identify a system for applying unique identifiers to information packages</li> <li>• Set up a file format policy for adoption by ARCW members</li> </ul>
<p><b>Objective 2</b> (to facilitate the deposit of digital material, and the creation of appropriate metadata)</p>	<ul style="list-style-type: none"> <li>• Identify a software package suitable for use by all ARCW members for the ingest of SIPs and dissemination of DIPs</li> <li>• Set up model procedures for quality assurance and validation of SIPs</li> </ul>

	<ul style="list-style-type: none"> <li>• Establish a model policy for file format identification</li> </ul>
<b>Objective 3</b> (to ensure the provision of secure and trusted storage for digital material)	<ul style="list-style-type: none"> <li>• Set up a specification for digital preservation storage including security and back up requirements for implementation by all partners</li> </ul>
<b>Objective 4</b> (to sustain appropriate administration at places of deposit)	<ul style="list-style-type: none"> <li>• Establish a model submission policy</li> </ul>
<b>Objective 5</b> (to support the preservation planning process)	<ul style="list-style-type: none"> <li>• Provide guidance on establishing preservation strategies</li> <li>• Identify appropriate file formats for preservation</li> <li>• Review and recommend a tool for use by all ARCW members for file format identification</li> <li>• Identify data quality checking procedures</li> </ul>
<b>Objective 6</b> (to ensure effective management of the digital material)	<ul style="list-style-type: none"> <li>• Establish profiles and cataloguing guidelines for the chosen metadata and packaging standards.</li> <li>• Establish a procedure for creating AIPs</li> </ul>
<b>Objective 7</b> (to facilitate continued and straightforward access to digital material by users)	<ul style="list-style-type: none"> <li>• Set up a model access policy</li> <li>• Set up guidance to enable archive repositories to determine their designated community</li> <li>• Facilitate development of protocol for the interaction of data management function and the archive storage function</li> </ul>
<b>Objective 8</b> (to ensure a robust framework is developed and maintained for all digital preservation activities which all ARCW partners are able to adopt)	<ul style="list-style-type: none"> <li>• Identify training requirements and a plan for training provision</li> <li>• Carry out horizon scan to find instances of good practice which could be implemented</li> <li>• Apply for funding to implement sections of the roadmap</li> </ul>

### 6.5 Phase 3 – Early Implementation

Phase 3 will start to implement the Project through establishing the technical implementation, including: the storage environment; tools for making DIPs available and access controls. It will establish staff training on the identification of “at risk” material, the creation of AIPs and develop user services.

<b>Phase 3: Early Implementation</b>	
<p><b>Objective 1</b> (To ensure that appropriate digital material from all relevant sources can be collected)</p>	<ul style="list-style-type: none"> <li>• Set up guidance for depositors on issues such as copyright, file format and basic records management</li> <li>• Establish a model appraisal policy</li> </ul>
<p><b>Objective 2</b> (to facilitate the deposit of digital material, and the creation of appropriate metadata)</p>	<ul style="list-style-type: none"> <li>• Set up training for staff on the creation of AIPs</li> </ul>
<p><b>Objective 3</b> (to ensure the provision of secure and trusted storage for digital material)</p>	<ul style="list-style-type: none"> <li>• Facilitate implementation of storage specifications, including operating system, security, management software, maintenance and back-up.</li> </ul>
<p><b>Objective 4</b> (to sustain appropriate administration at places of deposit)</p>	<ul style="list-style-type: none"> <li>• Determine necessary access controls</li> <li>• Develop model procedures for maintaining systems configuration</li> </ul>
<p><b>Objective 5</b> (to support the preservation planning process)</p>	<ul style="list-style-type: none"> <li>• Provide material to assist repositories to engage with parent organisations and potential depositors to identify digital material at risk of loss.</li> <li>• Set up guidance and training on file format identification and data checking</li> </ul>
<p><b>Objective 6</b> (to ensure effective management of the digital material)</p>	<ul style="list-style-type: none"> <li>• Develop procedure for updating archive administration</li> <li>• Develop procedure for updating systems configuration</li> <li>• Develop protocol for answering enquiries</li> <li>• Specification for alignment of archive management database with storage system</li> </ul>
<p><b>Objective 7</b> (to facilitate continued and straightforward access to digital material by users)</p>	<ul style="list-style-type: none"> <li>• Individual archive services establish procedures and tools for making DIPs available</li> <li>• Select format for dissemination</li> </ul>
<p><b>Objective 8</b> (to ensure a robust framework is developed and maintained for all digital preservation activities which all ARCW partners are able to adopt)</p>	<ul style="list-style-type: none"> <li>• Provide training in line with the training plan</li> <li>• Develop ways for enabling staff to share skills and knowledge with other ARCW members</li> </ul>

## 6.6 Phase 4 – Embedding Processes

Phase 4 will embed the established processes into day-to-day practice while investigating the issues surrounding the provision of a shared portal for user access.

<b>Phase 4: Embedding Processes</b>	
<b>Objective 1</b> (To ensure that appropriate digital material from all relevant sources can be collected)	<ul style="list-style-type: none"> <li>Establish a model acquisition strategy for encouraging digital deposits</li> </ul>
<b>Objective 2</b> (to facilitate the deposit of digital material, and the creation of appropriate metadata)	<ul style="list-style-type: none"> <li>Facilitate individual archive services in the implementation of integrity checking on data storage</li> <li>Set up guidelines for disaster recovery</li> </ul>
<b>Objective 3</b> (to ensure the provision of secure and trusted storage for digital material)	<ul style="list-style-type: none"> <li>Carry out regular assessment of storage needs for early identification of sharing opportunities</li> </ul>
<b>Objective 4</b> (to sustain appropriate administration at places of deposit)	<ul style="list-style-type: none"> <li>Facilitate individual archive services in the implementation of the migration of content</li> </ul>
<b>Objective 5</b> (to support the preservation planning process)	<ul style="list-style-type: none"> <li>Facilitate individual archive services to plan for update and refreshment of storage media</li> </ul>
<b>Objective 7</b> (to facilitate continued and straightforward access to digital material by users)	<ul style="list-style-type: none"> <li>Investigate the use of a shared Welsh portal for making DIPS available</li> <li>Set up a mechanism to guarantee the integrity of DIPS</li> <li>Establish appropriate access permissions</li> </ul>

## 6.6 Phase 5 – Improving Service

Phase 5 will reflect on and improve achievements to date, through review and community watch.

<b>Phase 5: Improving Service</b>	
<b>Objective 3</b> (to ensure the provision of secure and trusted storage for digital material)	<ul style="list-style-type: none"> <li>Individual archive services to set up disaster contingency plans</li> </ul>



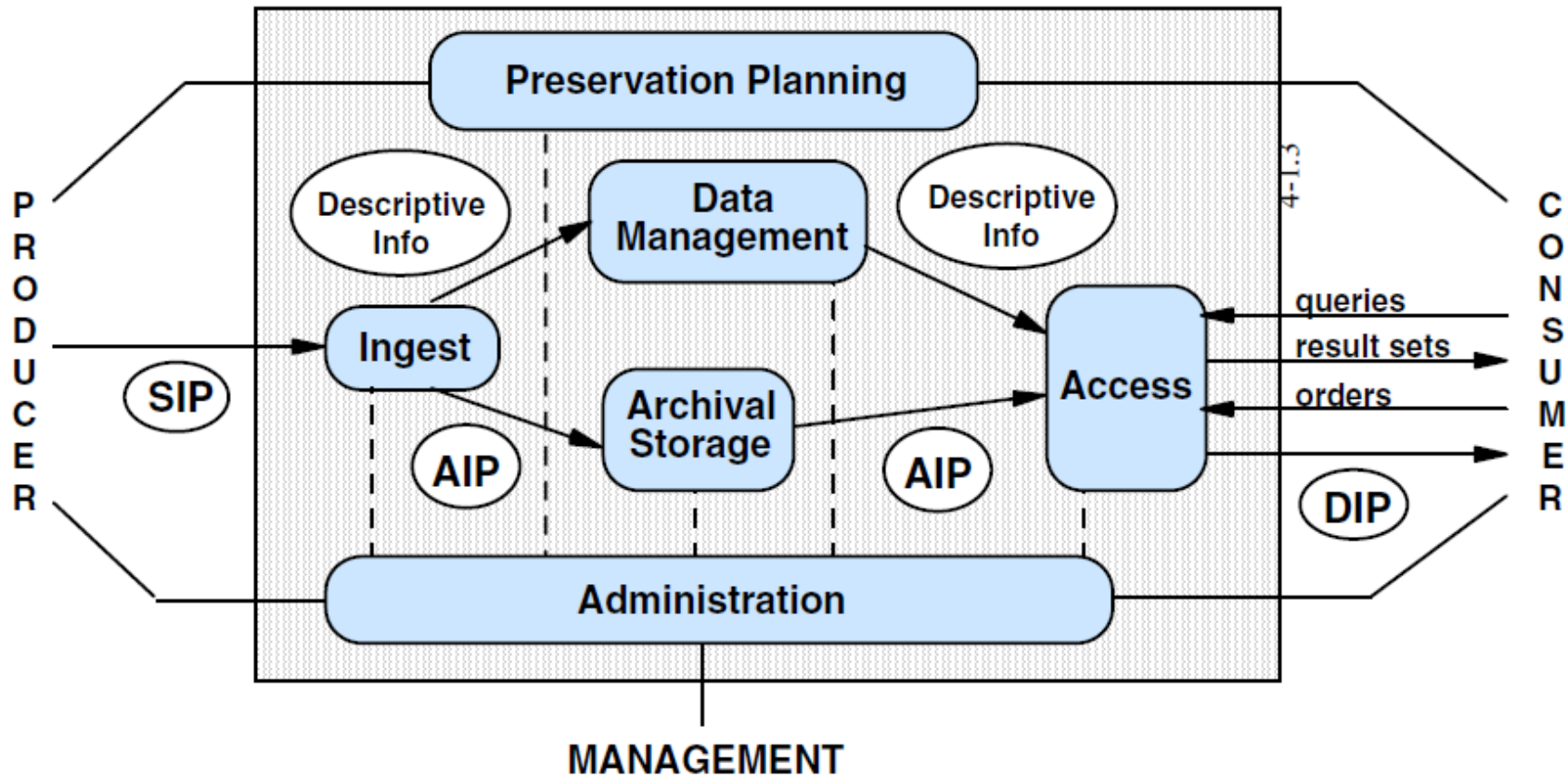
<p><b>Objective 4</b> (to sustain appropriate administration at places of deposit)</p>	<ul style="list-style-type: none"> <li>• Review submission policy</li> <li>• Establish user support programmes</li> <li>• Develop methods to monitor and improve archive operations</li> </ul>
<p><b>Objective 5</b> (to support the preservation planning process)</p>	<ul style="list-style-type: none"> <li>• Ensure awareness of organisational and political changes and new and evolving technological processes</li> </ul>
<p><b>Objective 7</b> (to facilitate continued and straightforward access to digital material by users)</p>	<ul style="list-style-type: none"> <li>• Individual archive services or families of archive services with similar designated communities set up procedures for community watch</li> </ul>

6.7 The consortium approach undertaken in 5 phases, outlined above, will allow work towards digital continuity in Welsh Archive Services to commence within a short timescale, and initially be undertaken within existing skills and resources. This phased method will allow time for the development of shared services, while establishing skills and financial resources for the implementation of later phases.

## APPENDIX 1: Glossary and Abbreviations

<b>Administration Entity</b>	The administrative function of preservation activities.
<b>Archival information package (AIP)</b>	An information package which consists of a digital object and the descriptive and preservation metadata associated with it. Packaging standards are usually employed to keep these together as a logical unit.
<b>ARCW</b>	Archives and Records Council, Wales
<b>Archival Storage Entity</b>	The storage function of preservation activities.
<b>CCSDS</b>	Consultative Committee for Space Data Systems
<b>Checksum</b>	A unique numerical signature derived from a file
<b>Designated Community</b>	A group of potential users for whom an archive is collected, and who should be able to understand the material contained in it.
<b>Digital object</b>	A discrete piece of digital content such as a document, image, database etc along with its associated metadata and identifier.
<b>Dissemination information package (DIP)</b>	Digital information received as the result of an interrogation of a digital archive.
<b>DROID</b>	An open source tool developed and distributed by TNA to identify file formats
<b>Ingest Entity</b>	The activities undertaken to take digital material into a repository: acceptance of digital material from their creators; prepares it for storage; and ensures that the required metadata is attached.
<b>Metadata</b>	Descriptive information about digital material.
<b>METS</b>	Metadata Encoding and Transmission Standard, a packaging standard which ensures that related digital objects are linked.
<b>Migration</b>	Changing data to different file formats e.g. a Word 95 text document to pdf.
<b>OAIS</b>	Open Archival Information System
<b>Pre-ingest</b>	The activities undertaken before digital material is accepted into a repository e.g.
<b>PDF</b>	Portable Document Format
<b>Preservation Planning Entity</b>	The planning function of preservation activities.
<b>Preservation Description Information (PDI)</b>	Information required to ensure the preservation of a digital object: Provenance, reference, fixity, and context information
<b>PRONOM</b>	An online registry of technical information such as file formats, software products etc to support digital preservation services.
<b>Submission Information Package (SIP)</b>	Digital material as it is delivered to the archive service by the creator.
<b>TNA</b>	The National Archives
<b>UKDA</b>	UK Data Archive
<b>XML</b>	Extensible Markup Language

APPENDIX 2: OAIS Functional Model<sup>6</sup>



<sup>6</sup> Consultative Committee for Space Data Systems (January 2002). *Reference Model for an Open Archival Information System (OAIS)*. Blue Book, p4-1

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