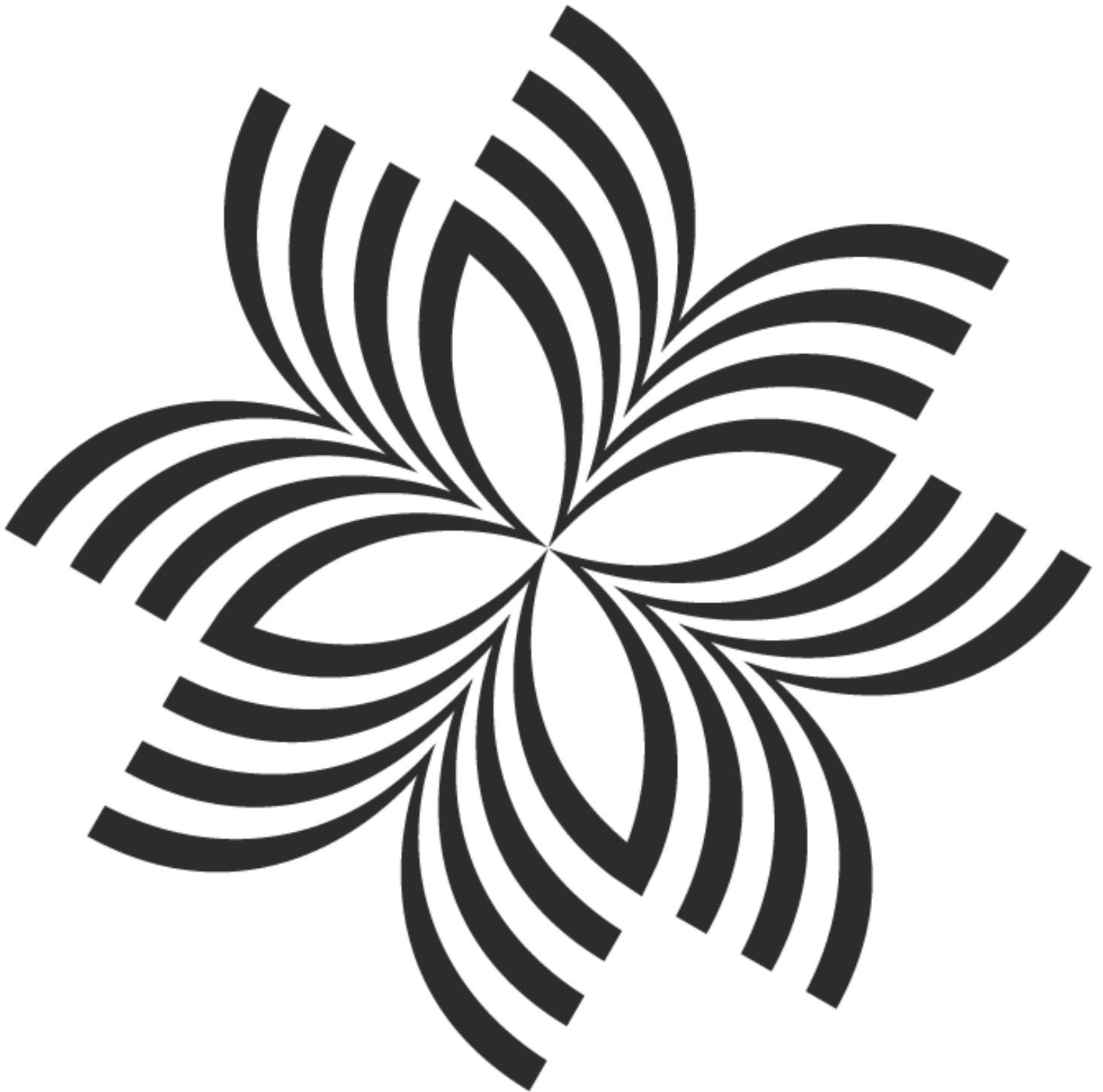


# National Digital Heritage Archive Programme Business Requirements Specification



## Document control

### Revision history

Revision	Date	Author	Reason for change
Version 1	27 January 2005	Sally Pulley	Working draft
Version 2	4 February 2005	Working draft	Cut & paste new material
Version 3	21 February 2005	Working draft	Cut & paste new material
Version 4	1 April 2005	Working draft	Cut & paste new material
Version 5	4 April 2005	Working draft	Cut & paste new material
Versions 6 to 16	April 2005	Sally Pulley	Team review and comments
Version 17	24 May 2005	Sally Pulley	Incorporates changes requested by Steering Committee prior to document sign-off.
Version 18	15 July 2005	Kirsty Smith	Incorporates changes suggested through the internal and external familiarisation process.

### Business Requirement Specification sign-off:

#### NDHA Steering Committee:

Graham Coe  
Project Sponsor

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

#### NDHA Programme Team:

Christine Pullar  
Programme Director

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Steve Knight  
Programme Architect

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

### Acknowledgements

This document uses a Table of Contents that has been adapted from the Volere Requirements Specification Template.

The National Library of New Zealand Te Puna Mātauranga o Aotearoa acknowledges that this document uses material from the Volere Requirements Specification Template, copyright © 1995 - 2004 the Atlantic Systems Guild Limited.

## Table of Contents

<b>PROJECT DRIVERS .....</b>	<b>6</b>
<b>1 THE PURPOSE OF THE NDHA .....</b>	<b>6</b>
1.1 BACKGROUND .....	6
1.2 GOALS .....	7
<b>2 THE PURPOSE OF THIS DOCUMENT .....</b>	<b>7</b>
2.1 THE CONTENT OF THIS DOCUMENT .....	8
2.2 THE VENDOR RELATIONSHIP .....	8
<b>3 CLIENT, CUSTOMER, AND OTHER STAKEHOLDERS.....</b>	<b>8</b>
3.1 CLIENT.....	8
3.2 CUSTOMER.....	9
3.3 INTERNAL STAKEHOLDERS.....	9
3.4 EXTERNAL STAKEHOLDERS .....	11
<b>4 USERS OF THE NDHA .....</b>	<b>13</b>
4.1 INTERNAL USERS.....	13
4.2 EXTERNAL USERS.....	14
4.2.1 <i>Public access</i> .....	14
4.2.2 <i>Third Party Representatives</i> .....	14
4.3 SYSTEM ADMINISTRATION AND MAINTENANCE.....	14
<b>PROJECT CONSTRAINTS .....</b>	<b>15</b>
<b>5 MANDATED CONSTRAINTS.....</b>	<b>15</b>
5.1 SOLUTION DESIGN CONSTRAINTS .....	15
5.2 IMPLEMENTATION TIMEFRAMES .....	15
5.3 TRUST .....	15
<b>6 STANDARDS, NAMING CONVENTIONS AND DEFINITIONS.....</b>	<b>15</b>
6.1 USE OF STANDARDS .....	15
6.2 NAMING CONVENTIONS .....	16
<b>7 RELEVANT ASSUMPTIONS.....</b>	<b>16</b>
<b>FUNCTIONAL REQUIREMENTS .....</b>	<b>18</b>
<b>8 THE SCOPE OF THE WORK .....</b>	<b>18</b>
8.1 THE CURRENT SITUATION [INTERIM PROCESSES].....	18
8.1.1 <i>e-Legal deposit</i> .....	18
8.1.2 <i>Purchased (heritage) e-publications</i> .....	18
8.1.3 <i>Web harvesting</i> .....	18
8.1.4 <i>Unpublished material</i> .....	19
8.1.5 <i>Sound preservation programme</i> .....	19
8.1.6 <i>Digitisation</i> .....	19
8.2 THE CONTEXT OF THE WORK .....	19
8.3 PRESERVATION IN PERPETUITY .....	20
8.4 COMPLIANCE WITH THE OAIS MODEL .....	20
<b>9 THE SCOPE OF THE PRODUCT.....</b>	<b>21</b>
9.1 DEFINITIONS .....	21
9.2 PRIORITISATION.....	21

9.3	OUT OF SCOPE .....	24
9.3.1	<i>Digital Material</i> .....	24
9.3.2	<i>Unique functionality for Other Government Agencies</i> .....	24
9.3.3	<i>OAIS Administration functions</i> .....	25
<b>10</b>	<b>NDHA FUNCTIONAL REQUIREMENTS.....</b>	<b>25</b>
10.1	GENERAL REQUIREMENTS .....	27
10.2	INGEST .....	27
10.2.1	<i>Receive Submission</i> .....	28
10.2.2	<i>Quality Assurance</i> .....	29
10.2.3	<i>Generate Archival Information Package (AIP)</i> .....	29
10.2.4	<i>Generate Descriptive Information</i> .....	30
10.2.5	<i>Coordinate Updates</i> .....	30
10.3	ARCHIVAL STORAGE .....	31
10.3.1	<i>Receive Data</i> .....	31
10.3.2	<i>Manage Storage Hierarchy</i> .....	32
10.3.3	<i>Replace Media</i> .....	33
10.3.4	<i>Error Checking</i> .....	33
10.3.5	<i>Disaster Recovery</i> .....	34
10.3.6	<i>Provide Data</i> .....	34
10.4	DATA MANAGEMENT .....	35
10.4.1	<i>Administer Database</i> .....	35
10.4.2	<i>Perform Queries</i> .....	35
10.4.3	<i>Generate Report</i> .....	36
10.4.4	<i>Receive Database Updates</i> .....	36
10.5	ADMINISTRATION .....	37
10.5.1	<i>Negotiate Submission Agreement</i> .....	37
10.5.2	<i>Manage System Configuration</i> .....	38
10.5.3	<i>Archival Information Update</i> .....	38
10.5.4	<i>Physical Access Control</i> .....	39
10.5.5	<i>Establish Standards and Policies</i> .....	39
10.5.6	<i>Audit Submission</i> .....	40
10.5.7	<i>Activate Requests</i> .....	41
10.5.8	<i>Customer Service</i> .....	41
10.6	PRESERVATION PLANNING .....	41
10.6.1	<i>Monitor Designated Community</i> .....	42
10.6.2	<i>Monitor Technology</i> .....	42
10.6.3	<i>Develop Preservation Strategies and Standards</i> .....	43
10.6.4	<i>Develop Packaging Designs and Migration Plans</i> .....	44
10.7	ACCESS .....	45
10.7.1	<i>Coordinate Access Activities</i> .....	46
10.7.2	<i>Generate DIP</i> .....	47
10.7.3	<i>Deliver Response</i> .....	48
10.8	EXCEPTION MANAGEMENT .....	48
10.9	MANAGEMENT INFORMATION.....	49
10.10	PRODUCER RELATIONSHIP MANAGEMENT .....	50
<b>11</b>	<b>DATA REQUIREMENTS.....</b>	<b>50</b>
11.1	DEVELOPMENT OF THE NDHA DATA MODEL .....	51
	<b>NON-FUNCTIONAL REQUIREMENTS .....</b>	<b>52</b>
<b>12</b>	<b>PERFORMANCE REQUIREMENTS.....</b>	<b>52</b>
12.1	QUALITY OF SERVICE .....	52
12.2	RELIABILITY AND AVAILABILITY .....	53
12.3	CAPACITY .....	53
12.4	SCALABILITY AND EXTENSIBILITY .....	54

- 12.5 LONGEVITY..... 54
- 13 OPERATIONAL MANAGEMENT..... 54**
- 13.1 EXPECTED PHYSICAL ENVIRONMENT ..... 54
- 13.2 EXPECTED TECHNICAL ENVIRONMENT..... 55
- 13.3 PARTNER APPLICATIONS ..... 57
- 13.4 SALES AND DISTRIBUTION OF A COMMERCIAL PRODUCT ..... 57
- 14 MAINTAINABILITY AND PORTABILITY REQUIREMENTS..... 58**
- 14.1 MAINTENANCE ..... 58
- 14.2 SUPPORT ..... 59
- 14.3 PORTABILITY ..... 59
- 14.4 INSTALLATION..... 60
- 15 SECURITY REQUIREMENTS..... 60**
- 15.1 SECURITY STANDARDS..... 60
- 15.2 AUTHENTICATION OF USERS ..... 61
- 15.3 RIGHTS MANAGEMENT AND ACCESS CONTROL ..... 62
- 15.4 INTEGRITY ..... 63
- 15.5 PHYSICAL SECURITY ..... 65
- 15.6 AUDIT ..... 65
- DELIVERY OF NDHA BUSINESS BENEFITS..... 67**
- 16 BUSINESS BENEFITS..... 67**
- 16.1 IDENTIFIED BENEFITS ..... 67
- 16.2 IDENTIFIED ISSUES..... 67
- 17 NDHA PROGRAMME COMPONENTS ..... 68**
- 17.1 GOVERNANCE..... 68
- 17.2 DEVELOPMENT OF CAPACITY AND CAPABILITIES..... 68
- 17.3 COMMUNICATIONS AND STAKEHOLDER MANAGEMENT ..... 69
- 17.4 MANAGEMENT OF EXTERNAL DEPENDENCIES..... 69
- 17.5 SYSTEMS DEVELOPMENT LIFE CYCLE ..... 69
- 17.6 QUALITY MANAGEMENT STRATEGY ..... 70
- 17.7 DATA MIGRATION ..... 71

## PROJECT DRIVERS

### 1 The Purpose of the NDHA

#### 1.1 Background

The National Library of New Zealand (the Library) came into being in 1965.

In May 2003, the National Library of New Zealand Te Puna Mātauranga o Aotearoa Act 2003 was enacted. The purpose of the Library under this act is:

“to enrich the cultural and economic life of New Zealand and its interchanges with other nations by, as appropriate,-

- collecting, preserving, and protecting documents, particularly those relating to New Zealand, and making them accessible for all the people of New Zealand, in a manner consistent with their status as documentary heritage and taongs;
- supplementing and furthering the work of other libraries in New Zealand, and
- working collaboratively with other institutions having similar purposes, including those forming part of the international library community.”

Digital preservation and access to digital material are cornerstones of the Library’s response to a digital world. This response requires specific strategies, policies, and procedures. The Library and others within the library and information sector need to build capacity in technical infrastructure and in the skill base required for digital preservation.

This is highlighted in Part 4 of the Act, which widens the ambit of the Legal Deposit provisions to include electronic documents.

Section 31 –

*(1) The Minister may, by notice in the Gazette, require a publisher of a public document (other than an internet document) to give to the National Librarian, at the publisher’s own expense, a specified number of copies (not exceeding 3) of-*

- (a) the public document in printed form; and*
- (b) if the document is an electronic document, the medium that contains the document.*

*(3) The Minister may, by notice in the Gazette, authorise the national Librarian to make a copy, at any time or times and at his or her discretion, of public documents that are internet documents in accordance with any terms and conditions as to format, public access, or other matters that are specified in the notice.*

Section 33 –

*(1) If, at any time, the National Librarian makes a written request for assistance, a publisher of an electronic document to which a requirement relates must, at the publisher’s own expense, provide reasonable assistance within 20 working days of receiving the request to enable the National Librarian to store and use an identical copy of the document.*

*(2) A written request under subsection (1) may relate to-*

- (a) 1 or more electronic documents; or*
- (b) 1 or more classes of electronic documents.*

The extension of Legal Deposit from the print to the digital makes urgent the need for the Library to find solutions for preserving digital content to ensure its continued access.

The Library is one of a number of national collecting institutions that collect and make accessible digital content. The Library is the first among other national collecting institutions

to experience the urgency of digital preservation. As a result, the Library's solution is the establishment of the National Digital Heritage Archive (NDHA) Programme.

An important, high-level requirement for the NDHA is that it must conform to the Reference Model for an Open Archival Information System (OAIS)<sup>1</sup>, with the end goal of qualifying as a Trusted Digital Repository, according to the certification process currently being developed by an RLG/NARA Task Force<sup>2</sup>. Compliance with standards such as the OAIS should help ensure the longevity of the system that is implemented.

## 1.2 Goals

The Library's goal for the National Digital Heritage Archive Programme is to:

Establish the National Digital Heritage Archive (NDHA) to enable the National Library of New Zealand Te Puna Mātauranga o Aotearoa to meet its mandate to collect, make accessible, and preserve in perpetuity, New Zealand's digital heritage, as defined by the Library's current collection policy.

The business objectives that need to be met to deliver the goal are:

- To provide a trusted environment that will give protection for all digital objects from the moment they come under the control of the Library.
- To provide an environment ensuring the preservation of digital objects from the moment they are ingested into the file repository.
- To ensure the NDHA is designed with regard to international best practice for digital archives.
- To ensure providers and users have confidence in the NDHA.
- To ensure the NDHA is designed and built to enable appropriate access to the digital objects.

## 2 The Purpose of this Document

This document has been developed for two purposes:

- Firstly, to provide the Library with a high-level statement of long-term requirements to support the development of a system and processes for digital preservation; and
- Secondly, to support the selection of a suitable software supplier.

The Library wishes to form a business relationship with a suitable software supplier for the development, maintenance, enhancement and support of commercial software to operate and manage the NDHA.

The software supplier must be capable of commercialising the developed solution to third parties in the international market. The supplier must also have the capability to continue to develop the solution over an extended period. It is unlikely that the Library would be directly involved in such commercialisation.

The Library has been in contact with peer institutions both locally and internationally and there is substantial interest in the NDHA Programme within the cultural heritage community. It is possible that any commercial software developed will have broader application, such as within the patent and pharmaceutical industries.

---

<sup>1</sup> Consultative Committee for Space Data Systems (2002). "Reference Model for an Open Archival Information System (OAIS)". CCSDS 650.0-R-1 – Blue Book. Available at: <http://ssdoo.gsfc.nasa.gov/nost/wwwclassic/documents/pdf/CCSDS-650.0-B-1.pdf>

<sup>2</sup> RLG (2004) "Task Force on Digital Repository Certification". Available at: <http://www.rlg.org/longterm/certification.html>

## 2.1 The Content of this Document

This document provides a high-level statement of the Library's business requirements, as known at April 2005. The requirements are based upon the Reference Model for an Open Archival Information System (OAIS), and note where the Library has requirements in addition to or at variance to the OAIS.

The Library recognises that a commercial product must be standards based. International standards applicable to the implementation and certification of a digital archive are rapidly evolving. The Library expects to undertake further work, in partnership with a software supplier, to determine the standards that will be adopted for the NDHA.

## 2.2 The Vendor Relationship

The Library has completed a Request for Information (RFI) process to identify a suitable software supplier and once the Functional Specification phase is complete move onto a closed Request for Proposal (RFP). The supplier is expected to bring experience of digital publishing and Library systems, including knowledge of the OAIS model, bibliographic systems, and digital preservation technologies.

It is expected that the Library and the software supplier will jointly work to further develop the high-level business requirements into a set of detailed requirements that will support the development of a commercial product.

The Library recognises that trade-offs may need to be made between what will be commercially advantageous, and what may be the optimum solution for the Library. Any such trade-offs will need to be evaluated during future stages of the NDHA Programme.

## 3 Client, Customer, and Other Stakeholders

### 3.1 Client

The passing of the National Library of New Zealand Te Puna Mātauranga o Aotearoa Act 2003 requires the library to collect, preserve and make accessible digital collections in ways that ensure current and future access to New Zealand's documentary heritage. The extension of the legal deposit regime to include digital material highlights the need for the Library to put in place a reliable archive for the preservation of digital material to ensure its ongoing access.

The Library will collect and preserve the following types of digital material:

- published material including material acquired through Legal deposit;
- unpublished material acquired by the Alexander Turnbull Library; and
- targeted digitisation of the Library collections.

While the Library has immediate and urgent drivers for establishing its digital repository, these drivers are also relevant to a range of national collecting institutions, some of which have been identified under the scope of the national digital strategy. As the initiator of a trusted digital repository in New Zealand, the Library can leverage its current involvement with standards to enable cross sector collaborations and interoperability within the public sector.

Development of the NDHA will provide the cornerstone for achieving the Library's Digital Strategy, ensuring access to those collections in ways that support the development of New Zealand's cultural identity. It will:

- Provide enhanced access to digital information for New Zealanders, for example, online databases, electronic journals, especially those with New Zealand content
- Collect digital material, especially those relating to New Zealand and New Zealanders



- Ensure the long-term storage and preservation of New Zealand’s online heritage
- Provide enhanced access to the Library’s collections through digitisation.

### 3.2 Customer

The key customer is the New Zealand Government, which has voted funds for the NDHA’s development and operation.

The NDHA will store and preserve digital objects that are heritage objects. The valuation of the heritage objects will be recorded on the New Zealand Government’s consolidated balance sheet as opposed to the Library’s balance sheet.

### 3.3 Internal Stakeholders

The Library employs approximately 400 staff and has seven business areas that all report to the Chief Executive. The table below provides a high-level analysis of the expected interactions between the NDHA and the business areas.

Interactions are defined in terms of the OAIS reference model. The model defines three general roles that interact with an OAIS compliant system, these are Producers, Consumers, and Management.

**Producer** is the role played by those persons, or client systems, which provide the information to be preserved.

**Consumer** is the role played by those persons, or client systems, that interact with OAIS services to find and acquire preserved digital material of interest.

**Management** is the role played by those who set overall policy as one component in a wider policy domain.

Business Area	Business role	Business Units
Alexander Turnbull Library	<p>Collect, preserve and provide access to a collection of books, photos, letters, drawings, maps, manuscripts, music and sound recordings that document the history of New Zealand and the Pacific. Staff roles include librarians, curators and conservators.</p> <p>There are specialist roles such as Māori Materials Coordinator, Music Archive Librarian and Exhibitions Officer.</p>	<p>ATL Management - Management</p> <p>Research Centre - Consumer</p> <p><b>Unpublished Collections</b></p> <p>Manuscripts and Archives – Producer, Consumer</p> <p>Drawings and Prints – Producer, Consumer</p> <p>Photographic Archive – Producer, Consumer</p> <p>Oral History Archive – Producer, Consumer</p> <p><b>Published Collections</b></p> <p>Sound – Producer, Consumer</p> <p>Cartographic – Producer, Consumer</p> <p>Ephemera – Producer, Consumer</p> <p>Acquisitions - Producer</p> <p>Turnbull Library Pictures - Consumer</p>

Business Area	Business role	Business Units
		National Preservation Office – May be requested to provide preservation advice to external agencies  Preservation – Producer, Consumer
Collection Services	Provide access to the heritage, schools and general collections, are responsible for collection development and collection management, and produce the Library's bibliographic records	<b>Bibliographic Services</b> Collection processing functions – Management <b>Collections Development and Management</b> Document Supply Services – Consumer  Print Disabilities Services - Consumer  Collection Development – Consumer <b>Reference Services</b> Consumer
People, Culture and Resources	Provide support services in the areas of corporate communications, finance, information (including records and information management), human resources, planning and accountability, and property and services	Consumer  Ordering and billing functions will be performed by existing Library systems
Electronic Services	Provide national access to library and information resources by providing application and systems environment support to online clients, and new ventures in digitisation programmes.	Digital Initiatives Unit – Consumer (Access applications)  Digital Strategy Implementation – Producer, Consumer  Technical Services – Management (Technical infrastructure)  Te Puna Support – Consumer (Access applications)
Policy and Information Democracy	Supports the National Library in the development of research and policy advice in its role as a key advisor to Government on information management and delivery.	Policy Development – Management  Evaluation and Research - Outside the scope of the NDHA  Information Strategy - Management
School Services	Support the development of school libraries by offering information and advice on aspects of school library	Producer, Consumer

<b>Business Area</b>	<b>Business role</b>	<b>Business Units</b>
	management and development, and offer a wide range of curriculum-related resources to assist primary and secondary teachers, home schoolers and trainee teachers on section	
Services to Māori	Provide strategic advice on developing an effective partnership with Māori, ensuring the Library achieves its partnership goal. We support the Library's commitment to integrate Māori staff and capability throughout the Library.	Producer, Consumer

### 3.4 External Stakeholders

External stakeholders have been classified into those stakeholders who are primarily interested in the NDHA Programme, and those stakeholders who may interact with, or may be impacted by, the NDHA system.

#### Stakeholders with a primary interest in the NDHA Programme

<b>Stakeholder</b>	<b>Stakeholder Membership</b>	<b>NDHA Programme Roles</b>
The Minister Responsible for the National Library		
Treasury		Monitoring Agency.
State Services Commission		Monitoring Agency.
CEO Advisors		Advice to the CEO on the NDHA Programme.
Audit New Zealand		Independent Quality Assurance.
Archives New Zealand		Representatives from Archives New Zealand are participating in the NDHA Programme.
ICT Standing Committee	This group is comprised of senior IT staff and Chief Executives of government departments.	
Government Communications Group		Advice on the application of the NDHA in other government organisations, and strategic matters affecting the heritage and information sectors.
Education Sector ICT Standing Committee	Comprises CEOs from Career Services, Education Review Office, Ministry of Education [Chair], National Library of New Zealand [Deputy Chair], New Zealand Qualifications Authority, New Zealand Teachers	Co-ordinate liaison with senior business and IT representatives across govt education agencies.

Stakeholder	Stakeholder Membership	NDHA Programme Roles
	Council, Tertiary Education Commission.	
Peer Review Group	Representatives from: The Getty Research Institute Cornell University Royal Library Netherlands Helsinki University Library HATII and ERPANET National Library of Australia Elsevier Science Los Alamos National Laboratory Research Library British Library	A forum for information sharing, and to provide expert advice and guidance to the Library.
Electronic Publisher Stakeholder Reference Group		A representative group with whom the Library can discuss options and test processes for the management of e-Legal Deposit
Vendors	Software suppliers Consultancies	Procurement processes.
Sun		Sun is a preferred supplier of Hardware.  Sun has awarded the Library Center of Excellence status.

**Stakeholders who may interact with, or be impacted by, the NDHA system**

Stakeholder	Stakeholder categories	Interactions
Electronic publishers	Including publishers of newspapers, books, magazines, music and websites. These can be broken down into the following categories: <ul style="list-style-type: none"> <li>• Commercial large scale publishers</li> <li>• Commercial newspaper publishers</li> <li>• Commercial music publishers and Printers</li> <li>• Specialist semi-commercial large scale publishers</li> <li>• Commercial or semi-commercial single title publisher</li> <li>• Non-commercial interest group or public information publisher</li> <li>• Occasional or one-off</li> </ul>	Submission of digital material to the Library

Stakeholder	Stakeholder categories	Interactions
	publisher <ul style="list-style-type: none"> <li>Government agencies</li> </ul>	
Donors	<ul style="list-style-type: none"> <li>Ad hoc</li> <li>Ongoing</li> <li>Vendors</li> </ul>	Submission of digital material to the Library
Libraries	Libraries can be broken down into the following categories: <ul style="list-style-type: none"> <li>Tertiary / academic</li> <li>Public</li> <li>Special / corporate / research</li> <li>Government</li> <li>School Libraries</li> </ul>	New Zealand Libraries that could interact with the NDHA at some level, to obtain digital material for use elsewhere.
Museums and archives	Te Papa NZ Film Archive TVNZ Museums in general Art Galleries in general Archives in general	Support and endorsement of the Library's approach to digital preservation
Public	Researchers New Zealand Educational Institutions Casual users	Access to the Library's collections
Government and Legal	Government agencies Legal bodies Law firms	Submission of digital material to the Library.  Advice and guidance to others engaged in the preservation planning process and negotiations for the NDHA.

## 4 Users of the NDHA

### 4.1 Internal Users

Library staff who need to interact with NDHA functions will have a specific role assigned to them in the NDHA system. Access to NDHA functions and digital material will be dependent on the role assigned, and authentication of the individual staff member.

Library staff who do not need to interact with NDHA functions will have the same level of access as external users.

## **4.2 External Users**

### **4.2.1 Public access**

External users are members of the public, external to Library staff, who wish to access digital material held in the NDHA.

The Library is undertaking market research to ascertain the potential makeup of the user community for the NDHA, both within New Zealand and internationally. The type of user and his/her purpose for accessing NDHA material and expectations of that experience need to be known to support specification of system performance requirements.

Access to digital material held in the NDHA will be provided to the public via collection management systems. Refer Section 13.3: Partner Applications, on page 57, for further information on systems that will interface to the NDHA.

### **4.2.2 Third Party Representatives**

The Library may hold digital material and associated archival information on behalf of third parties. This would create a user group of third party representatives, who may be provided with access to the NDHA to maintain and administer their digital material and any associated information. Third party representatives may only be permitted to access the third party's own digital and information; they may not be provided with access to digital material held in the NDHA that is outside of their collection.

Examples of third parties could be other government agencies, research bodies, and tertiary institutions. Any hosting arrangement would be supported by appropriate contracts and service level agreements.

Public (external user) access to third party digital material may be provided either through the Library's collection management systems (discovery applications), or through a third party discovery application. This will be determined at a later stage in the project.

## **4.3 System administration and maintenance**

System administrators, curators and NDHA staff will require access to the NDHA and its components, in order to ingest, administer, manage, preserve and access objects and their supporting information and structures.

In the future the Library may choose to outsource the management and operation of components of the NDHA.

## PROJECT CONSTRAINTS

### 5 Mandated Constraints

#### 5.1 Solution Design Constraints

The NDHA is to be based on the OAIS Reference Framework developed by Consultative Committee on space data and regarded as the “standard” for digital object repositories. The Library understands that as the OAIS framework has not been fully implemented in an operational system, it will need to be interpreted and modified as a result of the NDHA development.

The Library expects to develop a prototype as part of the NDHA design phase. This approach has been identified as providing:

- A lower risk approach of identifying and testing design principles and selection of standards and products.
- A means of demonstrating the proposed functionality to the stakeholder community when seeking their support and involvement.

The required outputs from the prototype need to be scoped to confirm that this is the best approach.

#### 5.2 Implementation Timeframes

The Library expects that the NDHA will not be fully operational until 2007 at the earliest.

It is expected that development of the NDHA will be prioritised, and that components will be implemented in a phased manner.

#### 5.3 Trust

The NDHA must be capable of being certified by any international organisation developing certification criteria, such as the Research Library Group (RLG) and National Archives and Records Administration (NARA). These organisations are currently developing certification process for Trusted Digital Repositories.

To ensure the NDHA is capable of being certified it must comply with the ISO Standard 14721:2003, the Reference Model for an Open Archival Information System (OAIS) as well as other international standards, guidelines and protocols for both object and user identification, security and access.

## 6 Standards, Naming Conventions and Definitions

#### 6.1 Use of Standards

The NDHA must be designed with regard to international best practice for digital archives.

“International best practice” is interpreted in the Library context to mean “utilising internationally accepted standards and guidelines”. Ongoing research will be required to ensure that the Library takes into account changes to emerging best practice.

The Library is aware that standards for many aspects of the NDHA will evolve over time. The availability (or not) of an appropriate standard or guideline will be one of the decision criteria that are used to determine priorities for NDHA software development.

There will be situations where competing standards exist and a choice needs to be made. Where there is not a clear direction for standards selection, design choices will need to adhere to the following rules:

- There must be a demonstrable rationale for the choice, the rationale must be aligned to the business objectives
- The rationale must be derived from a research based evaluation
- The broader Library requirements must be taken into account as part of the evaluation
- The evaluation may be subject to international peer review [as determined in the specific project plan for the NDHA component being designed].

## 6.2 Naming Conventions

A Glossary of Terms is provided as Appendix A.

## 7 Relevant Assumptions

The NDHA Programme Assumptions Register is used to record assumptions regarding the NDHA Programme, and the individual projects within the overall programme. The Assumptions Register is maintained by the NDHA Programme Director.

The following assumptions should be noted as relevant to this Business Requirements Specification.

# <sup>3</sup>	Assumption
1	That the Library's Collection Policy defines the scope of the NDHA.
3	That external end-users will not be provided with direct access to the NDHA, but will have their access mediated through either the Library's current access systems (for example, ILS and TAPUHI), or through another access system.
4	There will be no, or minimal, duplicate data entry of any metadata in the NDHA.
5	All digital objects must have a unique internal identifier (IID).
6	A persistent ID for each object can be derived in the long term from the IID allocated in the short-term.
7	Digitised material will be stored in the NDHA.
9	That the NDHA is solely for digital objects. The NDHA will not be used to manage physical digital objects; for example CDs.
14	That NDHA does not accommodate a distributed custodial model. All objects hosted will be stored on managed NLNZ sites.
21	Objects in MAC formats that are covered within Collection Policy will be accepted by the archive.
23	Where the NDHA manages other organisations' objects each organisation will require its own submission agreement(s) and storage arrangement.
27	All deliverables documentation will map and show the differences between the OAIS model and NLNZ requirements. This is required for compliance evaluation.
35	A data model will not be developed at the business requirements stage. The data model will be developed at a later time during discussion regarding applicable Metadata Standards.
43	Selective web harvesting will continue to utilise existing systems, namely the Selection

<sup>3</sup> Provides the assumption reference number as recorded in the NDHA Programme Assumptions Register.



	and Administration database (SAD) and HTTrack harvesting software, until such time as a replacement system is implemented as part of the broader NDHA Programme.
47	Assumptions have not been made about whether digitisation is undertaken in-house or by an external third party.
49	There will be a variety of transmission arrangements between publishers and the Library.
53	Digital objects stored in the NDHA are heritage objects therefore their valuation will be recorded on the New Zealand Government's consolidated balance sheet as opposed to the Library's balance sheet.

## FUNCTIONAL REQUIREMENTS

### 8 The Scope of the Work

#### 8.1 The Current Situation [Interim Processes]

The Library currently has nascent processes in place for the ingest, management and storage of digital material for the following acquisition and ingest streams:

- e-Legal deposit
- Purchased (heritage) e-publications
- Web harvesting
- Unpublished material
- Sound preservation programme
- Digitisation.

##### 8.1.1 e-Legal deposit

The Library expects that the NHDA will not be operational until 2007 at the earliest. However, the Library is required by the 2003 Act to accept and securely store published digital material from mid 2005 onwards.

Interim e-Legal deposit arrangements, business and system processes will be agreed between the publishing community and the Library. It is expected that the processes will be implemented during June 2005. Part of the arrangements will include the development of a generic submission agreement, to be used by as many e-Legal deposit publishers as possible.

##### 8.1.2 Purchased (heritage) e-publications

It is expected that the Alexander Turnbull Library (ATL) will continue to purchase New Zealand related digital material that is not published within New Zealand. Currently the bulk of this material is offline in format, but it could increasingly be online.

There is a backlog component to this stream, as the Library already holds a number of offline publications within its published heritage collections most of which have not been copied off their original media.

##### 8.1.3 Web harvesting

Selective web harvesting is undertaken by the ATL, it is expected that selective event and subject based harvesting will continue.

The national libraries of Australia, Canada, Denmark, Finland, France, Iceland, Italy, Norway, Sweden, The British Library (UK), The Library of Congress (USA) and the Internet Archive (USA) have acknowledged the importance of international collaboration for preserving Internet content for future generations and therefore decided to form a consortium called the International Internet Preservation Consortium (IIPC).

The goals of the IIPC are:

- To enable the collection of a rich body of Internet content from around the world to be preserved in a way that it can be archived, secured and accessed over time.
- To foster the development and use of common tools, techniques and standards that enable the creation of international archives.
- To encourage and support national libraries everywhere to address Internet archiving

and preservation.

The Library was invited to participate as an observer in the recent IIPC working group meetings in Ottawa. The working group resulted in the collation of a general set of requirements for both selective and domain web harvesting. The general requirements align with the Library's web harvesting needs. Specific requirements remain to be developed, however, it is hoped that a web archiving tool will be developed as a collaborative venture.

#### **8.1.4 Unpublished material**

Small amounts of unpublished digital material are acquired by various sections of the ATL, predominantly the Manuscripts and Archives, Photographic Archive, and the Cartoon Archive sections. The quantity of digital material offered to the Library is continuing to grow, currently most of the material is transferred via offline media.

#### **8.1.5 Sound preservation programme**

With the purchase of the QUADRIGA system, the BWF digital format is the preservation format for the Library's sound collections. Sound conservation staff create master digital files and these are being loaded into the interim Digital Archive storage space. The output from this programme is expected to grow rapidly once CD Juke box functionality is implemented. There will also need to be a retrospective conversion project for the approximately 900GB of sound recording material store on CDA (CD-Rom Audio).

#### **8.1.6 Digitisation**

This covers the output of the Library's current digitisation programme. An initial workflow has been put in place to enable; the loading of new digital images into the current Digital Archive space, the retrieval of copies for processing, and the replacement of existing images.

### **8.2 The Context of the Work**

The passing of the National Library of New Zealand Te Puna Mātauranga o Aotearoa Act 2003 (the Act) mandates the Library to collect, preserve and make accessible digital collections, along with the traditional paper collections, in ways that ensure current and future access to New Zealand's documentary heritage. The extension of the legal deposit regime in Part 4 of the Act to digital material as well as print material, highlights the need for the Library to put in place a reliable archive for the preservation of digital content to ensure its ongoing access.

Neither the Act, nor the consultation document on requirements, covers transmission processes or requirements, other than the right to web harvest. While the Library recognises that publishers do not expect compliance costs, Section 33 (1) of the Act identifies the need for an identical copy of the document to be deposited. Therefore the Library will need to consider the best way(s) of achieving any "push" or "pull" mechanisms.

While e-legal deposit will be the main source of New Zealand e-published resources being added to the NDHA, there may be negotiated and/ or purchased resources as well.

This digital material will be varied in format and style; everything from web sites in the NZ web space to images of New Zealand; and from the personal emails of important national figures to music by New Zealand artists.

Preserving digital material, much more than analog material like books, is a significant challenge. The fundamental problem is that digital material (as opposed to analog material) is subject to technical obsolescence, media decay, and mutability. And over time, this jeopardizes the integrity, authenticity, and trustworthiness of that digital material. The NDHA, as a digital archive, will be responsible for ingesting digital material, storing and managing that digital material and associated metadata, and ensuring that digital material is accessible for the long term – despite the very substantial challenges that technological obsolescence presents.

While the Library has its own unique needs, among national libraries it is not alone in its need to provide for the long-term preservation of digital material. Other libraries around the world, notably the British Library and the Royal Library of the Netherlands (the Koninklijke Bibliotheek, or KB), have also been given similar charges. While each library will have their own particular needs, the Library believes that national libraries – and other institutions responsible for the digital preservation of cultural heritage materials – share certain characteristics and goals, and that their shared (and unique) preservation goals can be met with a system that supports a core set of preservation related functionality that also provides institutions with the flexibility to customise and integrate that functionality with other systems to meet their particular needs and goals.

### **8.3 Preservation in Perpetuity**

The primary purpose of the NDHA is to allow digital objects to be preserved in perpetuity. There are a number of different techniques that have been developed to facilitate the digital preservation process. However, due to the relatively short period that digital information has been in existence, none of these techniques have been able to be fully tested on large-scale functional archives.

The OAIS model proposes media and format migration as the primary form of preservation. To facilitate this the model uses a method of exporting a Dissemination Information Package (DIP), migrating and updating the object and media, then re-importing the object as a Submission Information Package (SIP). While this appears at the outset to be a good preservation model, it may not prove to be the most suitable preservation model for use within the Library. Whilst the dissemination, manipulation and re-ingest cycle is useful for media migration it may not address any of the issues surrounding other digital preservation techniques such as emulation.

It is expected that current digital preservation techniques will continue to be developed and refined as time advances and more digital archives are faced with the problem of preserving their digital objects. The Library cannot presume that any current digital preservation technique will be sufficient; instead the Library will align with current international best practice and presume that digital preservation technology will evolve over time.

The NDHA system, while not prescribing any particular preservation technique, should provide a platform for future preservation work and should be flexible enough to evolve with the evolution of best practice for digital preservation.

It is for this reason that the Library requires a long-term relationship with a software supplier that will support the development of a commercial product.

### **8.4 Compliance with the OAIS model**

The Library has adopted the OAIS as a reference model that provides an internationally accepted terminology and conceptual framework.

It is worth noting that the NDHA, or any OAIS-complaint system, is not just the software components that will provide the system's major functionality, but also:

- The hardware that runs the system and stores the data;
- The preservation planning that must provide the strategy for the system;
- The executive and financial support that will sustain it; and
- The staffing to administrate the system.

All of these must work together, efficiently and effectively, to preserve digital material over time. Any software system developed to support digital preservation must fit into this larger preservation framework.

The Library has adopted the following approach to compliance with the reference model:

**OAIS Concepts:** The OAIS is accepted as a reference model that provides an internationally accepted terminology and conceptual framework.

**OAIS Responsibilities:** The Library's responsibilities are defined by New Zealand legislation. Within this legislation the Library has responsibility to collect, preserve, and make accessible digital collections in ways that ensure current and future access to New Zealand's documentary heritage.

**Detailed Models:** The OAIS functional model has been adopted as a skeleton for the definition of the Library's functional requirements. The requirements are documented at a high level, and the rationale for any modification to the detailed OAIS functions has been documented. Further work is required to define the NDHA data model.

**Preservation Perspectives:** As noted above, the NDHA should be flexible enough to evolve with the evolution of best practice for digital preservation.

**Archive Interoperability.** The design of the NDHA will be based upon international standards and international best practice for digital archives. Further work is required to determine applicable standards for metadata, and the transmission of data between the NDHA and any interfaced systems.

## 9 The Scope of the Product

### 9.1 Definitions

The NDHA is a framework which assures the preservation of digital material within it and is predicated on identity management and workflow management.

Identity management covers two aspects:

- The identity of the user (staff or external user)
- The identity of the digital material including its associated metadata. It is imperative to be able to distinguish one digital object from another and identify the preservation actions for each digital object.

Workflow management covers the processes to select, collect, acquire and ingest objects; preserve objects over time; and to find and access objects as required.

Digital objects refer to two categories of objects:

- "born digital" material, i.e. materials which have no analog equivalent; and
- digital surrogates created as a result of converting analog material to digital form.

### 9.2 Prioritisation

The NDHA Programme Charter defines the priorities for the implementation of NDHA components. The prioritisation is driven by the requirement to build a functioning digital archive that is defined as:

- A storage mechanism that is secure and has the capacity for current digital material and growth over five years from implementation
- Capable of lodging digital material cost-effectively
- Capable of finding and accessing digital material cost effectively.

The priorities are:

Priority	Description	Driver
P1	Mandatory	It is not a functioning digital archive without this feature or is a project management standard prerequisite.
P2	Should have	Treat as a P1 for timing or cost efficiency reasons otherwise delay
P3	Could have	Do sometime in the future as funding is available

The NDHA will need to be based on the OAIS reference model and thus will support its six core functional components of Ingest; Archival Storage; Data Management; Administration; Preservation Planning; and Access. The NDHA scope items are defined within these six components.

The Ingest (meaning add to the Archive) items are:

Priority	Scope item	Description
P1	e-legal Deposit ingest and publisher relationships	Long-term submission agreements and ingest processes using Voyager interfaced to NDHA including strategies for normalisation, media, content, metadata.
P1	Published electronic, purchased deposit, material	Ingest processes using Voyager interfaced to NDHA.
P1	Unpublished ingest and donor relationships	Long-term submission agreements and ingest processes using TAPUHI interfaced to NDHA.
P1	e-Legal Deposit Web archiving (selective)	Replacement functionality for selection decisions which is currently part of Selection Administration Database
P1	e-Legal Deposit Web archiving (whole of domain snapshot)	Development of a system to enable the Library to take whole of domain or sub-domain snapshots.
P2	Sound preservation ingest	Ingest processes using Quadriga interfaced to NDHA.
P2	Digitisation ingest	Ingest processes for bulk digitised objects and digitised on demand objects.
P3	Migration of existing objects	Existing digital objects and associated metadata to be loaded and/or migrated to NDHA.

The Archival Storage items are:

Priority	Scope item	Description
P2	Persistent identifiers	The ISSN/ISBN/ISMN of the digital world. Definition of requirements, evaluation of options and selection and implementation of preferred tool.
P1	Storage structures	Development and implementation of final structures to handle existing digital material. These structural items include: Directory structure Resolution layer Backup and restore functions File naming conventions.

The *Data Management* items are:

Priority	Scope item	Description
P1	Preservation metadata models	Evaluation of PREMIS and NLNZ Preservation metadata models, gap analysis, recommendations for preferred preservation metadata model.
P1	Completed data model	Data dictionary of entities / elements for all business processes.

The *Administration* items are:

Priority	Scope item	Description
P1	Authenticity and integrity	Functions to ensure integrity of the NDHA content over time including such techniques as checksums and fixity.
P1	Security	Physical and logical security protection of objects. Review and possible enhancement of security policy.
P1	KPIs for reliability, availability & performance	Required for hardware infrastructure, system support arrangements for management and operation of the NDHA and access to it. Includes requirements for system software that provides in-depth information about the performance of the system hardware, network, and operating system.
P2	Business continuity and disaster recovery requirements	Required for hardware infrastructure and its support arrangements. This includes looking at the benefits of extending disaster recovery to wider Library systems.

The *Preservation Planning* items are:

Priority	Scope item	Description
P1	Digital Preservation Strategy	Development of the strategy for digital preservation covering file formatting and preferred preservation approach to inform technical and curatorial standards.

Priority	Scope item	Description
P3	Digital Preservation Capability	Tools for preservation activities (for example, normalisation of text to XML or emulation).

The Access items are:

Priority	Scope item	Description
P1	Staff Access	Refers to those Library staff with responsibility for NDHA business processes accessing digital objects via a NDHA online public access catalog (OPAC).
P2	Public Access	Refers to all other Library staff and external users who will access digital material using existing Voyager, ENCompass or TAPUHI OPACs and possibly the NDHA OPAC.
P1	Security and rights management	Two components: User authentication and authorisation which could be a broader application than NDHA as they are needed for the Library generally. Includes assessing e-Government authentication capability Access rights management of object Includes the documentation of requirements and the evaluation of various standards.
P1	Wrapper OAIS packaging	Assessment of existing metadata frameworks , for example, ODRL, METS, MPEG21, ERMI, DIDL <sup>4</sup> . Recommendation for preferred standard.

## 9.3 Out of Scope

### 9.3.1 Digital Material

#### 9.3.1.1 Research Data Archive

There is no research data archive in New Zealand, i.e. for the datasets generated as part of a research programme, as opposed to the publication or report of the research programme.

### 9.3.2 Unique functionality for Other Government Agencies

While it is a business requirement that the NDHA is ultimately capable of hosting the ingest, storage and access of digital material owned by other government agencies or New Zealand institutions, it is beyond the scope of the NDHA Programme to investigate or incorporate any unique features for other agencies or institutions at this stage.

<sup>4</sup> METS - Metadata Encoding and Transmission Standard  
DIDL - Digital Item Declaration Language



### 9.3.3 OAIS Administration functions

The Customer Service function is outside the scope of the initial NDHA development.

Customer Services will be provided using existing Library applications and customer interface mechanisms to support:

- Billing and payment functions
- Consumer requests for access to digital material that is subject to rights management restrictions
- Complaints.

## 10 NDHA Functional Requirements

A high-level requirement for the NDHA is that it must conform to the Reference Model for an Open Archival Information System (OAIS).

An OAIS is an archive, consisting of an organization of people and systems, which has accepted the responsibility to preserve information and make it available for a Designated Community. OAIS provides a conceptual baseline from which the Library can define the core components of the NDHA system.

The reference model addresses a full range of archival information preservation functions including ingest, archival storage, data management, access, and dissemination. The model also addresses the migration of digital information to new media and formats, the data models used to represent the information, the role of software in information preservation, and the exchange of digital information among archives.

It is assumed that the reader is familiar with the Reference Model for an Open Archival Information System (OAIS), Blue Book.<sup>5</sup>

The OAIS functional model is separated into six functional entities and related interfaces.

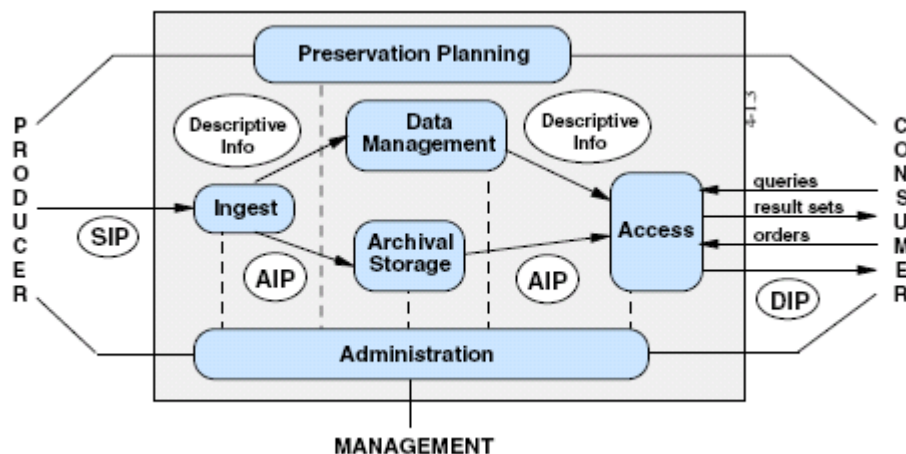


Figure 10.1 OAIS Functional Entities (OAIS Figure 4.1)

A conformant OAIS archive may provide additional services to users that are beyond those required of an OAIS. The diagram below expands the OAIS diagram to demonstrate the conceptual design of the NDHA.

The Library will implement multiple ingest streams. Discovery applications will provide an online Consumer interface to digital material held in the NDHA.

<sup>5</sup> <http://www.ccsds.org/documents/650x0b1.pdf>

The design of the NDHA must enable the Library to manage and preserve digital material on behalf of other third party organisations. These organisations may have additional ingest streams and discovery applications.

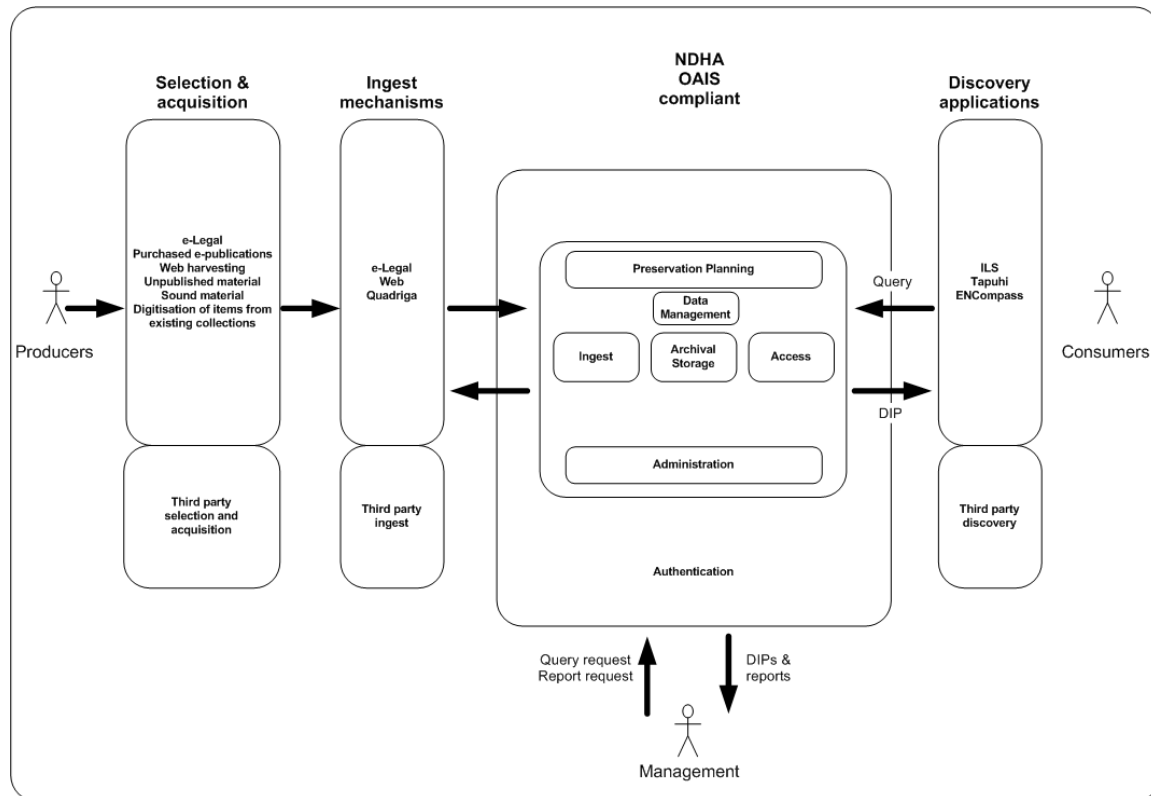


Figure 10.2 NDHA Conceptual Design

The requirements of the Library are noted for each of the OAI functional areas. Specific requirements are also noted for exception management, management information, and producer relationship management.

The Library's functional requirements are presented as a series of statements regarding the behaviour the NDHA system should exhibit, and the policies and facilities that are required to assist the flexible and extensible management of the archive.

Requirements for performance, operational management, maintainability and portability, and security are generic, and are separately documented as:

- Section 12: Performance Requirements, on page 52,
- Section 13: Operational Management, on page 54,
- Section 14: Maintainability and Portability Requirements, on page 58, and
- Section 15: Security Requirements, on page 60.

A data model has not been produced at this stage. Refer to Section 11: Data Requirements, on page 50, for discussion of further work required to develop the data model.

For reference purposes the OAI function descriptions are reproduced using *Italic font*. The requirements of the Library are documented in non-italic font.

A requirement reference number is noted to the left of text that describes the requirement. In the case that a requirement is addressed elsewhere in this document, for example under the non-functional requirements section, then a cross-reference is provided to the relevant section, and the requirement reference number is left blank.

## 10.1 General Requirements

10.1.1	The NDHA will conform to the Reference Model for an Open Archival Information System (OAIS).
10.1.2	The NDHA will be certified as a trusted digital repository in accord with any certification process established internationally, for example, the Research Library Group (RLG) and National Archives and Records Administration (NARA) currently under way in the United States.
10.1.3	The NDHA must comply with the National Library of New Zealand (Te Puna Mātauranga o Aotearoa) Act 2003 and supporting regulations.
10.1.4	The NDHA must comply with New Zealand legislation.
10.1.5	The design of the NDHA must allow the Library to ingest and administer digital material on behalf of other organisations.
10.1.6	The NDHA must support the use of multiple languages for the ingest and maintenance of digital objects and associated metadata.
10.1.7	All digital material that is held in the NDHA will be subject to a valuation process. The nature of the valuation process, and mechanisms required to support review of the NDHA's value, will be identified at a later stage of the NDHA Programme.

## 10.2 Ingest

*Ingest provides the services and functions to accept Submission Information Packages (SIPs) from producers (or from internal elements under Administration control) and prepare the contents for storage and management within the archive. Ingest functions include receiving SIPs, performing quality assurance on SIPs, generating an Archival Information Package (AIP) which complies with the archive's data formatting and document standards, extracting Descriptive Information from the AIPs for inclusion in the archive database, and co-ordinating updates to Archival Storage and Data Management.*

The Library will have multiple ingest streams. Ingest streams include:

- e-legal deposit,
- Purchased e-publications,
- Web harvesting,
- Unpublished material,
- Sound material,
- The digitisation of items from existing collections, and
- Preservation, where existing NDHA material is transformed to a new format.

The Library may develop other ingest streams in the future.

The selection and appraisal of digital material may occur prior to Ingest. Authentication of the material, and virus checking, will be required before an item is appraised.

The Library may receive unsolicited material where material is received from publishers or donors with no prior contact with any Library staff.

All material that is stored in the archive will enter the archive via the Ingest function. The function must support the bulk ingest of material, for example, the bulk migration of digital material created as a result of preservation planning.

### 10.2.1 Receive Submission

*The Receive Submission function provides the appropriate storage capability or devices to receive a SIP from the Producer (or from Administration). Digital SIPs may be delivered via electronic transfer (e.g., FTP), loaded from media submitted to the archive, or simply mounted (e.g., CD-ROM) on the archive file system for access. Non-digital SIPs would likely be delivered by conventional shipping procedures. The Receive Submission function may represent a legal transfer of custody for the Content Information in the SIP, and may require that special access controls be placed on the contents. This function provides a confirmation of receipt of a SIP to the Producer, which may include a request to resubmit a SIP in the case of errors resulting from the SIP submission.*

The Library will develop and communicate preferred formats for the receipt of digital material. However, the NDHA must support the ingest and preservation of material that is provided as a non-preferred format.

The Library will not receive non-digital SIPs. For the digitisation of material in the Library's collections, the digitisation process will be independent of the ingest process.

The Library will require the capability to accept bulk submissions that may be triggered by:

- business restructure,
- the donation of large volumes of digital material,
- the donation of a private collection
- other environmental factors.

10.2.1.1	SIPs are received via electronic transfer or physical digital media (for example, via FTP or CD-R).
10.2.1.2	Producers may define access rights and conditions of use as a component of the SIP.
10.2.1.3	The Library may send a confirmation of receipt of a SIP to a Producer.
10.2.1.4	An error of transmission or receipt may prompt a request for resubmission of a SIP.
10.2.1.5	There must be sufficient storage capacity to support the receipt of both individual SIPs and multiple SIPs. Multiple SIPs may be received from Producers or may be generated during the bulk ingest of digital material produced by a digitisation process or a preservation process.

10.2.1.6	A record of all SIP receipts is maintained for audit and financial control.
----------	---

### 10.2.2 Quality Assurance

*The Quality Assurance function validates (QA results) the successful transfer of the SIP to the staging area. For digital submissions, these mechanisms might include Cyclic Redundancy Checks (CRCs) or checksums associated with each data file, or the use of system log files to record and identify any file transfer or media read/write errors.*

The purpose of Quality Assurance (QA) is to assure the Library that digital material is of sufficient quality to be stored in the NDHA.

10.2.2.1	Virus checks are performed in a separate and secure location.
10.2.2.2	The format of the SIP and the SIP contents are validated.
10.2.2.3	File integrity checks are performed.
10.2.2.4	When unsolicited material is received, content checks are performed.
10.2.2.5	A SIP may be sent to the Audit Submission function in Administration. In this case an audit report will be returned by the Audit Submission function.
10.2.2.6	If a SIP or the SIP contents fails any of the QA criteria then the SIP contents will be transferred to a separate location.
10.2.2.7	A QA error may prompt a request for resubmission.
10.2.2.8	A QA error may prompt a request for internal action.
10.2.2.9	Internal action may result in the creation of a digital object in a preferred format to facilitate ingest.
10.2.2.10	An audit trail is kept of all actions.

### 10.2.3 Generate Archival Information Package (AIP)

*The Generate AIP function transforms one or more SIPs into one or more AIPs that conform to the archive's data formatting and documentation standards. This may involve file format conversions, data representation conversions or reorganization of the content information in the SIPs. The Generate AIP function may issue report requests to Data Management to obtain reports of information needed by the Generate AIP function to produce the Descriptive*

*Information that completes the AIP. This function sends SIPs or AIPs for audit to the Audit Submission function in Administration, and receives back an audit report.*

The Library considers an AIP to be the digital object and all of its associated metadata. A digital object is a single intellectual entity. At any one time the Library may hold more than one “instance” of a digital object. In turn, an individual instance may consist of one or more files. For each digital object the Library will record and maintain a set of metadata. Metadata will be held for the digital object as a whole, each instance of the object and each part of an instance.

The Library has not adopted the OAIS term of “Descriptive Information”. Instead, the Library refers to the generic requirement for the capture and maintenance of metadata. Further work is required to fully identify the Library’s data model and metadata requirements, this is discussed in Section: 11, Data Requirements, on page 50.

The individual components of an AIP may be physically stored in different locations within the archive.

The Library will develop policies that govern where the individual components of an AIP are stored. The policy may vary dependent upon a number of factors; for example, the type of digital object, access rights, and conditions of use.

10.2.3.1	Metadata contained in the SIP is validated and extracted.
10.2.3.2	Metadata is extracted from the Digital Object’s contained within the SIP.
10.2.3.3	Additional metadata is gathered as required. This may require user input. It may also require the automatic extraction of metadata from the SIP.
10.2.3.4	All files and metadata are brought together and placed into an AIP ready for archival within the NDHA.
10.2.3.5	An audit trail is kept of all actions.

**10.2.4 Generate Descriptive Information**

*The Generate Descriptive Information function extracts Descriptive Information from the AIPs and collects Descriptive Information from other sources to provide to Coordinate Updates, and ultimately Data Management. This includes metadata to support searching and retrieving AIPs (e.g., who, what, when, where, why), and could also include special browse products (thumbnails, images) to be used by Finding Aids.*

As noted above, metadata is generated during the Generate Archival Information Package functions.

**10.2.5 Coordinate Updates**

*The Coordinate Updates function is responsible for transferring the AIPs to Archival Storage and the Descriptive Information to Data Management. Transfer of the AIP includes a storage request and may represent an electronic, physical, or a virtual (i.e., data stays in place) transfer. After the transfer is completed and verified, Archival Storage returns a storage confirmation indicating (or verifying) the storage identification information for the AIP. The Coordinate Updates function also incorporates the storage identification information into the*

*Descriptive Information for the AIP and transfers it to the Data Management entity along with a database update request. In return, Data Management provides a database update response indicating the status of the update. Data Management updates may take place without a corresponding Archival Storage transfer when the SIP contains Descriptive Information for an AIP already in Archival Storage.*

As noted above, the individual components of an AIP may be physically stored in different locations within the archive. The Coordinate Updates function transfers components of the AIP to the relevant storage locations, and maintains a record of the location of the components.

10.2.5.1	A unique identifier is assigned to the AIP.
10.2.5.2	Metadata is transferred to relevant metadata repositories (for example ILS and TAPUHI).
10.2.5.3	A fixity check is performed on all files.
10.2.5.4	AIP components are transferred to the relevant storage locations.
10.2.5.5	A record is maintained of the location of AIP components.
10.2.5.6	Integrity checks are performed on digital objects and associated metadata following the transfer operations.
10.2.5.7	An audit trail is kept of all actions.

### 10.3 Archival Storage

*Archival Storage provides the services and functions for the storage, maintenance and retrieval of AIPs. Archival Storage functions include receiving AIPs from Ingest and adding them to permanent storage, managing the storage hierarchy, refreshing the media on which archive holdings are stored, performing routine and special error checking, providing disaster recovery capabilities, and providing AIPs to Access to fulfill orders.*

Also refer:

- Section 12: Performance Requirements, on page 52,
- Section 13: Operational Management, on page 54,
- Section 15: Security Requirements, on page 60.

#### 10.3.1 Receive Data

*The Receive Data function receives a storage request and an AIP from Ingest and moves the AIP to permanent storage within the archive. The transfer request may need to indicate the anticipated frequency of utilization of the data objects comprising the AIP in order to allow the appropriate storage devices or media to be selected for storing the AIP. This function will select the media type, prepare the devices or volumes, and perform the physical transfer to*

*the Archival Storage volumes. Upon completion of the transfer, this function sends a storage confirmation message to Ingest, including the storage identification of the AIPs.*

10.3.1.1	AIP components are received for storage.
10.3.1.2	An appropriate location and appropriate storage media are selected.
10.3.1.3	AIP components are transferred to storage media.
10.3.1.4	Metadata may be updated with storage location information.
10.3.1.5	A record is maintained of the location of AIP components.
10.3.1.6	All Receive Data actions are automated.
10.3.1.7	Fixity checks are performed upon stored objects.
10.3.1.8	Upon completion of the transfer a storage confirmation message is sent to Ingest, including the storage location of AIP components.
10.3.1.9	An audit trail is kept of all actions.

### 10.3.2 Manage Storage Hierarchy

*The Manage Storage Hierarchy function positions, via commands, the contents of the AIPs on the appropriate media based on storage management policies, operational statistics, or directions from Ingest via the storage request. It will also conform to any special levels of service required for the AIP, or any special security measures that are required, and ensures the appropriate level of protection for the AIP. These include on-line, off-line or near-line storage, required throughput rate, maximum allowed bit error rate, or special handling or backup procedures. It monitors error logs to ensure AIPs are not corrupted during transfers. This function also provides operational statistics to Administration summarizing the inventory of media on-hand, available storage capacity in the various tiers of the storage hierarchy, and usage statistics.*

The Manage Storage Hierarchy function must conform to required service level agreements (SLA's), these may include requirements for throughput rate, maximum allowed bit error rate, etc. Refer Section 12.1: Quality of Service, on page 52, for further information.

The function will conform to NDHA security requirements.

10.3.2.1	System functions are monitored during transfer to check for errors.
----------	---



10.3.2.2	Storage statistics are provided for Administration, for example, available storage capacity and usage.
10.3.2.3	All storage functions are automated.
10.3.2.4	Fixity checks are performed upon stored objects.
10.3.2.5	An audit trail is kept of all actions.

### 10.3.3 Replace Media

*The Replace Media function provides the capability to reproduce the AIPs over time. Within the Replace Media function the Content Information and Preservation Description Information (PDI) must not be altered. However, the data constituting the Packaging Information may be changed as long as it continues to perform the same function and there is a straightforward implementation that does not cause information loss. The migration strategy must select a storage medium, taking into consideration the expected and actual rates of errors encountered in various media types, their performance, and their costs of ownership. If media-dependent attributes (e.g., tape block sizes, CD-ROM volume information) have been included as part of the Content Information, a way must be found to preserve this information when migrating to higher capacity media with different storage architectures. Anticipating the terminology of section 0, this function may perform Refreshment, Replication, and Repackaging that is straightforward. An example of such Repackaging is migration to new media under a new operating system and file system, where the Content Information and PDI are independent of the file systems. However, complex repackaging and all transformation are performed under Administration supervision by the Archival Information Update function to ensure information preservation.*

The Library may transfer AIP components across storage repositories in order to manage capacity, or to migrate across storage devices.

The replacement of digital media is considered a component of Preservation Planning.

The replacement of damaged media will be managed as an exception condition. Refer Section: 10.8: Exception Management, on page 48, for further information.

### 10.3.4 Error Checking

*The Error Checking function provides statistically acceptable assurance that no components of the AIP are corrupted during any internal Archival Storage data transfer. This function requires that all hardware and software within the archive provide notification of potential errors and that these errors are routed to standard error logs that are checked by the Archival Storage staff. The PDI Fixity Information provides some assurance that the Content Information has not been altered as the AIP is moved and accessed. Similar information is needed to protect the PDI itself. A standard mechanism for tracking and verifying the validity of all data objects within the archive may also be used. For example, CRCs could be maintained for every individual data file. A higher level of service, such as Reed-Solomon coding to support combined error detection and correction, could also be provided. The storage facility procedures should provide for random verification of the integrity of data objects using CRCs or some other error checking mechanism.*

Error Checking provides statistically accepted assurance to ensure that none of an AIP's components are corrupted via any internal storage function.

All hardware and software layers will be monitored for potential errors. All errors will be recorded and forwarded to Administration for monitoring. Refer Section 15.4: Integrity, on page 63, for further information.

### 10.3.5 Disaster Recovery

*The Disaster Recovery function provides a mechanism for supplicating the digital contents of the archive collection and storing the duplicate in a physically separate facility. This function is normally accomplished by copying the archive contents to some form of removable storage media (e.g. digital linear tape, compact disc), but may also be performed via hardware transport or network data transfers. The details of disaster recovery policies are specified by Administration.*

Refer to Section 12: Performance Requirements, on page 52, and Section 13: Operational Management, on page 54, regarding the adoption of standards for operational management of the NDHA. This includes reference to standards for continuity management and disaster recovery.

10.3.5.1	Fixity checks will be performed on any digital material that is recovered from backup media.
10.3.5.2	An audit trail will be kept of all disaster recovery actions.

### 10.3.6 Provide Data

*The Provide Data function provides copies of stored AIPs to Access. This function receives an AIP request that identifies the requested AIP(s) and provides them on the requested media type or transfers them to a staging area. This function also sends a notice of data transfer to Access upon completion of an order.*

The Provide Data function provides AIP components to Access. Material held in the NDHA may be subject to restrictions relating to access and conditions of use. Refer Section 15.3: Rights Management and Access Control, on page 62, for further information.

Note: While the NDHA will not make digital material available to Consumers on offline electronic storage devices, the Library may as part of its normal copying and reproduction services.

10.3.6.1	AIP components are identified and provided to Access.
10.3.6.2	All data requests are recorded at a level of granularity sufficient to record the originator of the request and the identified components of AIPs.
10.3.6.3	Statistics of AIP requests, both to digital objects and related metadata, will be maintained to support reporting and management information.
10.3.6.4	An audit trail is kept of all actions.

## 10.4 Data Management

*Data Management provides the services and functions for populating, maintaining and accessing both Descriptive Information that identifies and documents archive holdings and administrative data used to manage the archive. Data management functions include administering the archive database functions (maintaining schema and view definitions, and referential integrity), performing database updates (loading new descriptive information or archive administrative data), performing queries on the data management data to generate result sets, and producing reports from these result sets.*

Data Management provides the services and functions for populating, maintaining and accessing both AIP metadata and the system metadata required to manage the archive. This includes, for example, the administration of the archive database(s) (maintaining schema, referential integrity, etc), and performing database updates.

### 10.4.1 Administer Database

*The Administer Database function is responsible for maintaining the integrity of the Data Management database, which contains both Descriptive Information and system information. Descriptive Information identifies and describes the archive holdings, and system information is used to support archive operations. The Administer Database function is responsible for creating any schema or table definitions required to support Data Management functions; for providing the capability to create, maintain and access customized user views of the contents of this storage; and for providing internal validation (e.g., referential integrity) of the contents of the database. The Administer Database function is carried out in accordance with policies received from Administration.*

Policies and procedures will be implemented for the management of NDHA components. These will address the management of all NDHA components including database management functions.

For further information refer:

- Section 13: Operational Management, on page 54,
- Section 14: Maintainability and Portability Requirements, on page 58, and
- Section 15: Security Requirements, on page 60.

### 10.4.2 Perform Queries

*The Perform Queries function receives a query request from Access and executes the query to generate a result set that is transmitted to the requester.*

All queries will be verified against rights management and conditions of use restrictions.

10.4.2.1	Query requests are received from other NDHA functions (for example, Ingest, Access, Administration).
10.4.2.2	The query request may require data to be sourced from different storage locations.
10.4.2.3	A result set is generated.

10.4.2.4	All queries are recorded at a level of granularity sufficient to record the originator of the request and the identified components of AIPs.
10.4.2.5	An audit trail is kept of all actions.

### 10.4.3 Generate Report

*The Generate Report function receives a report request from Ingest, Access or Administration and executes any queries or other processes necessary to generate the report that it supplies to the requester. Typical reports might include summaries of archive holdings by category, or usage statistics for accesses to archive holdings. It may also receive a report request from Access and provides descriptive information for a specific AIP.*

10.4.3.1	Report requests are received from other NDHA functions (for example, Ingest, Access, Administration).
10.4.3.2	Data is sourced using the Perform Query function.
10.4.3.3	Necessary processes are undertaken to format and generate the report.
10.4.3.4	An audit trail is kept of all actions.

### 10.4.4 Receive Database Updates

*The Receive Database Updates function adds, modifies or deletes information in the Data Management persistent storage. The main sources of updates are Ingest, which provides Descriptive Information for the new AIPs, and Administration, which provides system updates and review updates. Ingest transactions consist of Descriptive Information which identifies new AIPs stored in the archive. System updates include all system-related information (operational statistics, Consumer information, and request status). Review updates are generated by periodic reviewing and updating of information values (e.g., contact names, and addresses). The Receive Database Updates function provides regular reports to Administration summarizing the status of updates to the database, and also sends a database update response to Ingest.*

10.4.5.1	Updates are received from other NDHA components (for example, Ingest and Administration).
10.4.5.2	Updates are reported to Administration.
10.4.5.3	There may be a need to coordinate updates with metadata held in other systems.

10.4.5.4	An audit trail will be kept of all actions.
----------	---

## 10.5 Administration

*Administration provides the services and functions for the overall operation of the archive system. Administration functions include soliciting and negotiating submission agreements with producers, auditing submissions to ensure that they meet archive standards, and maintaining configuration management of system hardware and software. It also provides system engineering functions to monitor and improve archive operations, and to inventory, report on, and migrate/update the contents of the archive. It is also responsible for establishing and maintaining archive standards and policies, providing customer support, and activating stored requests.*

### 10.5.1 Negotiate Submission Agreement

*The Negotiate Submission Agreement function solicits desirable archival information for the OAIS and negotiates Submission Agreements with Producers. This function also negotiates a data submission schedule with the Producer. It maintains a calendar of expected Data Submission Sessions that will be needed to transfer one or more SIPs to the OAIS and the resource requirements to support their ingestion. This function receives AIP/SIP templates and customization advice from Preservation Planning and sends SIP designs and SIPs to the Audit Submission function as part of the submission approval process. The data submission formats and procedures must be clearly documented in the archive's data submission policies, and the deliverables must be identified by the Producer in the Submission Agreement.*

Wherever possible, SIP designs and data submission schedules will be negotiated with Producers. These may be renegotiated on a periodic or ad-hoc basis.

SIP design and metadata requirements may be negotiable dependent upon the Producer and the nature of the digital material.

The Library may schedule ingest of specific types of digital material for specific time periods. For example, ingest of large volumes of web harvested material may be scheduled for specific periods when no other material is being ingested.

Also refer to Section 10.10: Producer Relationship Management, on page 50.

10.5.1.1	Submission agreements and schedules are maintained.
10.5.1.2	Submission schedules may be set on a periodic or ad-hoc basis.
10.5.1.3	Submission volumes and schedules are managed and monitored.
10.5.1.4	SIP designs and SIPs are sent to the Audit Submission function.
10.5.1.5	A range of SIP designs are supported.
10.5.1.6	SIP design is dependent upon the Producer and the type of material.

10.5.1.9	An audit trail is kept of all actions.
----------	--

### 10.5.2 Manage System Configuration

*The Manage System Configuration function provides system engineering for the archive system to continuously monitor the functionality of the entire archive system and systematically control changes to the configuration. This function maintains integrity and tractability of the configuration during all phases of the system life cycle. It also audits system operations, system performance, and system usage. It sends report requests for system information to Data Management and receives reports; it receives operational statistics from Archival Storage. It summarizes those reports and periodically provides OAIIS performance information and archive holding inventory reports to Preservation Planning. It sends performance information to Establish Standards and Policies. It receives migration packages from Preservation Planning. It receives system evolution policies from the Establish Standards and Procedures function. Based on these inputs it develops and implements plans for system evolution. It sends change requests, procedures and tools to Archive Information Update.*

The Manage System Configuration function monitors and maintains the NDHA system configuration.

Refer to Section 13: Operational Management, on page 54, and Section 14: Maintainability and Portability Requirements, on page 58.

### 10.5.3 Archival Information Update

*The Archival Information Update function provides a mechanism for updating the contents of the archive. It receives change requests, procedures and tools from Manage System Configuration. It provides updates by sending a dissemination request to Access, updating the contents of the resulting DIPs and resubmitting them as SIPs to Ingest.*

Archival Information Update provides a mechanism for updating Digital Objects (files and metadata) within the archive.

The Library requires the ability to remove an AIP. This may require the:

- removal of digital objects, and the retention of associated metadata, or
- removal of digital objects and all associated metadata.

This action may be triggered by a number of events, for example: receipt of a Court Order for the removal of material; the decision to remove outdated digital access copies; misrepresentation of ownership by a donor.

10.5.3.1	Change requests, actions and tools are received from the Manage System Configuration function.
10.5.3.2	A DIP is requested from the Access function.
10.5.3.3	A DIP may be updated and re-ingested as a SIP.
10.5.3.4	An AIP may be deleted from the archive. This may require the removal of the digital object's files, and the retention of associated metadata, or the removal of both the files and metadata.
10.5.3.5	There may be a need to coordinate the removal of an AIP with the maintenance of metadata held in other systems.

10.5.3.6	An audit trail is kept of all actions.
----------	--

**10.5.4 Physical Access Control**

*The Physical Access Control function provides mechanisms to restrict or allow physical access (doors, locks, guards) to elements of the archive, as determined by archive policies.*

Security requirements, including physical access control, are documented under Section 15: Security Requirements, on page 60.

**10.5.5 Establish Standards and Policies**

*The Establish Standards and Policies function is responsible for establishing and maintaining the archive system standards and policies. It receives budget information and policies such as the OAIIS charter, scope, resource utilization guidelines, and pricing policies from Management. It provides Management with periodic reports. It receives recommendations for archive system enhancement, and proposals for new archive data standards from Preservation Planning. It also receives performance information and archive holding inventories from Manage System Configuration. Based on these inputs, archive standards and policies are established and sent to other Administration functions and the other Functional Entities for implementation. The standards include format standards, documentation standards and the procedures to be followed during the Ingest process. It provides approved standards and migration goals to Preservation Planning. This function will also develop storage management policies (for the Archival Storage hierarchy), including migration policies to assure that archive storage formats do not become obsolete, and database administration policies. It will develop disaster recovery policies. It will also determine security policies for the contents of the archive, including those affecting Physical Access Control and the application of error control techniques throughout the archive.*

NDHA governance arrangements will address responsibility for operational management, financial management, policy creation, and strategy development.

The Library will review existing processes and workflows to determine the extent of change required to manage and preserve digital material.

The Library will maintain system evolution paths for all components of the NDHA. A plan for the evolution of a component will be developed before the component is implemented.

Also refer:

- Section 10.9: Management Information, on page 49.
- Section 10.8: Exception Management, on page 48.
- Section 13: Operational Management, on page 54.
- Section 15: Security Requirements, on page 60.

10.5.5.1	The Library will establish and maintain NDHA standards and policies.
10.5.5.2	The Library will establish governance arrangements for the NDHA.
10.5.5.3	The Library will establish workflows and business processes for NDHA functions.

10.5.5.4	The Library will develop multiple preservation strategies dependent upon, and specific to, the nature of digital material.
----------	--

### 10.5.6 Audit Submission

*The Audit Submission function will verify that submissions (SIP or AIP) meet the specifications of the Submission Agreement. This function receives AIP/SIP reviews from Preservation Planning and may also involve an outside committee (e.g., science and technical review). The audit process must verify that the quality of the data meets the requirements of the archive and the review committee. It must verify that there is adequate Representation Information and PDI to ensure that the Content Information is understandable and independently usable to the Designated Community. The formality of the review will vary depending on internal archive policies. The Audit process may determine that some portions of the SIP are not appropriate for inclusion in the archive and must be resubmitted or excluded. An audit report is provided to Ingest. After the audit process is completed, any liens are reported to the Producer, who will then resubmit the SIP to Ingest or appeal the decision to Administration. After the audit is completed, a final ingest report is prepared and provided to the Producer and to Negotiate Submission Agreement. Audit methods potentially include sampling, periodic review, and peer review.*

The Library will establish a review and audit programme, as required to meet accreditation as a trusted digital archive. External audit may be required to demonstrate compliance with Copyright Law.

The Audit Submission function verifies that a Digital Object conforms to the specification of the Information Package design (SIP or AIP).

If material is not judged as suitable for collection and preservation then the Producer will be notified. In some cases the Producer may be requested to modify the material, or provide alternate material.

10.5.6.1	The Library will establish a review and audit programme.
10.5.6.2	Data in a SIP or AIP is checked to ensure that it meets specified requirements.
10.5.6.3	Required metadata is checked and recorded. Note: Metadata requirements may vary dependent on the information package type (SIP or AIP).
10.5.6.4	Those components of information packages that do not meet requirements are rejected.
10.5.6.5	An audit report is provided to the Ingest QA function.
10.5.6.6	An audit trail will be kept of all actions.



### 10.5.7 Activate Requests

*The Activate Requests function maintains a record of event-driven requests and periodically compares it to the contents of the archive to determine if all needed data is available. If needed data is available, this function generates a dissemination request that is sent to Access. This function can also generate orders on a periodic basis where the length of the period is defined by the Consumers or on the occurrence of an event (e.g., a database update).*

Refer to Section 10.7: Access, on page 45, and Section 10.9: Management Information, on page 49.

### 10.5.8 Customer Service

*The Customer Service function will create, maintain and delete Consumer accounts. It will collect billing information from Access and will send bills and collect payment from Consumers for the utilization of archive system resources. It will respond to general information requests. This function will also collect and respond to feedback on Access services and products. Customer Service will summarize these comments and make them available.*

The Library provides advice and services to schools, the public, and other institutions. Services are provided on-line, and within the National Library premises.

There are multiple public interfaces to collections held by the Library and by other institutions. Refer to Section: 13.3: Partner Applications, on page 57, for information on applications that will interface to the NDHA.

## 10.6 Preservation Planning

*Preservation Planning provides the services and functions for monitoring the environment of the OAIS and providing recommendations to ensure that the information stores in the OAIS remain accessible to the Designated User Community over the long-term, even if the original computing environment becomes obsolete. Preservation planning functions include evaluating the contents of the archive and periodically recommending archival information updates to migrate current archive holdings, developing recommendations for archive standards and policies, and monitoring changes in the technology environment and in the Designated Community's service requirements and Knowledge base. Preservation Planning also designs IP templates and provides design assistance and review to specialise these templates into SIPs and AIPs for specific submissions. Preservation Planning also develops detailed Migration plans, software prototypes and test plans to enable implementation of Administration migration goals.*

Preservation Planning is essentially a management entity and most of requirements relate to policy development.

The Library is the lead organisation in New Zealand for digital preservation; its peers are international as opposed to local. To ensure the NDHA is designed for international application, NDHA design and preservation planning strategies must be based upon up to date knowledge of international thinking. The Library will keep in touch with international organisations running relevant projects and will monitor their progress. The importance of ongoing research is recognised, and the Library will involve international experts in matters that do not have an active discussion forum.

The Library may provide advice on guidance on digital preservation methods and techniques to other institutions.

The Library may implement multiple preservation strategies dependant upon the nature of the digital material within the NDHA.

### 10.6.1 Monitor Designated Community

The requirements of this function are described in the terms of the OAIS model.

The Monitor Designated Community function:

10.6.1.1	<i>Interacts with archive Consumers and Producers to track changes in their service requirements and available product technologies.</i>
10.6.1.2	<i>Consumer and Producer service requirements might include data formats, media choices, preferences for software packages, or new computing platforms.</i>
10.6.1.3	<i>Consumer and Producer service requirements might include mechanisms for communicating with the archive.</i>
10.6.1.4	<i>This function may be accomplished via surveys, via a periodic formal review process, or via community workshops where feedback is solicited.</i>
10.6.1.5	<i>This function may be accomplished by individual interactions.</i>
10.6.1.6	<i>Provides reports to the Develop Preservation Strategies and Standards function.</i>
10.6.1.7	<i>Provides requirements alerts to the Develop Preservation Strategies and Standards function.</i>
10.6.1.8	<i>Provides emerging standards to the Develop Preservation Strategies and Standards function.</i>
10.6.1.9	<i>Sends preservation requirements to Develop Packaging Designs.</i>
10.6.1.10	<i>An audit trail will be kept of all actions.</i>

### 10.6.2 Monitor Technology

*The Monitor Technology function is responsible for tracking emerging digital technologies, information standards and computing platforms (i.e., hardware and software) to identify technologies which could cause obsolescence in the archive's computing environment and prevent access to some of the archives current holdings. This function may contain a prototyping capability for better evaluation of emerging technologies and receive prototype requests from Develop Preservation Strategies and Standards and from Develop Package Designs and Migration Plans. This function sends reports, external data standards, prototype results and technology alerts to Develop Preservation Strategies and Standards. It also sends prototype results to Develop Package Designs and Migration Plans.*

10.6.2.1	It is expected that the NDHA will consist of an n tier distributed architecture. The Library will monitor emerging technologies in order to maintain and evolve the architecture.
10.6.2.2	The Library will monitor information standards, including metadata standards and data interface standards.
10.6.2.3	The Library may prototype new technology to develop preservation strategies.
10.6.2.4	An audit trail will be kept of all actions.

### 10.6.3 Develop Preservation Strategies and Standards

As previously noted, the Library may develop and implement multiple preservation strategies dependant upon the nature of digital material within the NDHA. The Library will endeavour to retain the look and feel of an object during the development of a preservation strategy.

The requirements of this function are described in the terms of the OAIS model.

10.6.3.1	<i>The function is responsible for developing and recommending strategies and standards to enable the archive to better anticipate future changes in the Designated Community service requirements that would require migration of some current archive holdings or new submissions.</i>
10.6.3.2	<i>The function is responsible for developing and recommending strategies and standards to enable the archive to better anticipate technology trends that would require migration of some current archive holdings or new submissions.</i>
10.6.3.3	<i>Receives reports from Monitor Designated Communities.</i>
10.6.3.4	<i>Receives reports from Monitor Technology.</i>
10.6.3.4	<i>Receives performance information from Administration.</i>
10.6.3.5	<i>Receives inventory reports from Administration.</i>
10.6.3.6	<i>Receives summarized consumer comments from Administration.</i>
10.6.3.7	<i>Sends recommendations on system evolution to Administration.</i>
10.6.3.8	<i>Receives external data standards from Monitor Technology.</i>

10.6.3.9	<i>Produces profiles of those standards that are sent to Administration as proposals on their potential usage.</i>
10.6.3.10	<i>Receives issues from Develop Packaging Designs and Migration Plans in the case of unanticipated submission requirements</i>
10.6.3.11	<i>Responds with advice to handle new requirements.</i>
10.6.3.12	An audit trail will be kept of all actions.

#### **10.6.4 Develop Packaging Designs and Migration Plans**

The Library may request local or international peer review of preservation plans. The Library will test preservation actions in order to determine their effectiveness across a range of digital objects.

The requirements of this function are described in the terms of the OAIS model.

10.6.4.1	<i>Develops new IP designs and detailed migration plans and prototypes to implement Administration policies and directives.</i>
10.6.4.2	<i>Provides advice on the application of these IP designs and Migration plans to specific archive holdings and submissions.</i>
10.6.4.3	<i>Receives archive approved standards and migration goals from Administration.</i>
10.6.4.4	<i>Standards include format standards, metadata standards and documentation standards.</i>
10.6.4.5	<i>Applies these standards to preservation requirements.</i>
10.6.4.6	<i>Provides AIP and SIP template designs to Administration.</i>
10.6.4.7	<i>Provides customization advice and AIP/SIP review to Administration on the application of those designs.</i>
10.6.4.8	<i>If this function encounters submissions that are not covered by existing standards and procedures, it can send issues to Develop Preservation Strategies and Standards.</i>

10.6.4.9	<i>If submissions are encountered that are not covered by existing standards and procedures, it can receive advice, including new standards, from Develop Preservation Strategies and Standards, to assist in meeting the new submission requirements.</i>
10.6.4.10	<i>The migration goals received by this function tend to involve transformations of the AIP, including transformations of the Content Information to avoid loss of access due to technology obsolescence.</i>
10.6.4.11	<i>The response to the migration goals may involve the development of new AIP designs.</i>
10.6.4.12	<i>The response to the migration goals may involve the development of prototype software.</i>
10.6.4.13	<i>The response to the migration goals may involve the development of test plans.</i>
10.6.4.14	<i>The response to the migration goals may involve the development of community review plans.</i>
10.6.4.15	<i>The response to the migration goals may involve the development of implementation plans for phasing in the new AIPs.</i>
10.6.4.16	<i>This process may call on expertise or resources from other functions within Preservation Planning, such as prototype development from the Monitor Technology.</i>
10.6.4.17	<i>This effort also will require consultation from the other functional areas and from the Designated Community.</i>
10.6.4.18	<p><i>Once the migration plan, associated AIP designs, and software have been tested and approved, this function sends the entire migration package to Administration, which will schedule and perform the actual migration.</i></p> <p>The Library may undertake a bulk extract of digital material in order to perform preservation actions upon a related set of digital objects.</p>
10.6.4.19	An audit trail will be kept of all actions.

## 10.7 Access

*Access provides the services and functions that support Consumers in determining the existence, description, location, and availability of information stored in the OASIS, and allowing Consumers to request and receive information products. Access functions include*

*communicating with Customers to receive requests, applying controls to limit access to specially protected information. Coordinating the execution of requests to successful completion, generating responses (Dissemination Information Packages, result sets, reports) and delivering the responses to Consumers.*

As noted under Section 10.5.8: Customer Service on page 41, the Library provides advice and service to schools, the public, and other organisations. These services may be provided on-line, or within Library premises.

The Library is commissioning formal research into changing user behaviour and usage patterns in the on-line environment. User profiles will be reviewed on a periodic basis to identify trend information.

### **10.7.1 Coordinate Access Activities**

*The Coordinate Access Activities function provides a single user interface to the information holdings of the archive. This interface will normally be via computer network or dial-up link to an on-line service, but might also be implemented in the form of a walk-in facility, printed catalog ordering service, or fax-back type service. Three categories of Consumer requests are distinguished: query requests, which are executed in Data Management and return immediate result sets for presentation to the user; report requests, which may require a number of queries and produce formatted reports for delivery to the Consumer; and orders, which may access either or both Data Management and Archival Storage to prepare a formal Dissemination Information Package (DIP) for on- or off-line delivery. An order may be an Adhoc Order that is executed only once, or an Event Based Order that will be maintained by the Activate Requests function in Administration, and initiated by a dissemination request that may result in periodic deliveries of requested items. The Archival Information Update function in Administration also submits dissemination requests to obtain DIPs needed to perform its update functions. Other special request types are allowed, but are not detailed. This function will determine if resources are available to perform a request, assure that the user is authorized to access and receive the requested items, and notify the Consumer that a request has been accepted or rejected (possibly with an estimate of request cost and an option to cancel the request). It will then transfer the request to Data Management or to the Generate DIP function for execution. This function also provides assistance to OAIS Consumers including providing status of orders and other Consumer support activities in response to an assistance request.*

The Coordinate Access Activities function provides an application interface layer that will support access functions.

Access functions facilitate the use of digital objects and associated metadata by Consumers. Rights restrictions may limit the level of access that can be provided to Library staff and external parties.

Users may access digital objects independently through Library applications such as Timeframes, Papers Past, and Discover. Access to restricted material may be dependent upon curatorial mediation. In order to access physical material in the Library's collections, a researcher may need to contact the Library and request access to material. In this case the Consumer may need to book an appointment with a Library curator and be accompanied by the curator to a designated research area.

Appointment bookings, and the negotiation of access to restricted material, will be managed outside of the NDHA.

While the NDHA will not normally provide external parties with physical copies of digital material that is held in the NDHA, The Library may as part of its normal copying and reproduction services. Limited print facilities will be made available.

In the event that a physical copy of material is required, this will be managed through the Administration function.

The Library will not implement an ordering system as a component of the NDHA.

As previously noted, a key requirement of the NDHA is that it is designed to allow the Library to manage digital material on behalf of other government agencies or libraries. This will create new relationships between the Library and the other organisations.

10.7.1.1	<p>Some Library staff will require the ability to directly search the NDHA. Search criteria may be based upon the type of digital object, or the metadata associated with a digital object. Searches may result in the generation of reports, or the retrieval of digital material from the archive.</p> <p>The nature of the search process, and the mechanisms needed to support the process, will be determined at a later stage of the NDHA Programme.</p>
10.7.1.2	<p>Separate interfaces are required for:</p> <ul style="list-style-type: none"> <li>• staff performing NDHA functions and</li> <li>• public access.</li> </ul>
10.7.1.3	<p>Personalisation will be related to the roles and capabilities of users.</p>
10.7.1.4	<p>An audit trail will be kept of all actions.</p>

## 10.7.2 Generate DIP

*The Generate DIP function accepts a dissemination request, retrieves the AIP from Archival Storage, and moves a copy of the data to a staging area for further processing. This function also transmits a report request to Data Management to obtain Descriptive Information needed for the DIP. If special processing is required, the Generate DIP function accesses data objects in staging storage and applies the requested processes. The types of operations, which may be carried out, include statistical functions, sub-sampling in temporal or spatial dimensions, conversions between different data types or output formats, and other specialized processing (e.g., image processing). This function places the completed DIP response in the staging area and notifies the Coordinate Access Activities function that the DIP is ready for delivery.*

The Generate DIP function accepts a dissemination request, and retrieves the information required to form a DIP.

10.7.2.1	<p>Data returned as a result of a dissemination request may consist of:</p> <ul style="list-style-type: none"> <li>• one or more digital objects and associated metadata, or</li> <li>• one or more items of metadata, or</li> <li>• a response that indicates the Consumer is not authorised to access the material requested.</li> </ul>
10.7.2.2	<p>An audit trail will be kept of all actions.</p>

### 10.7.3 Deliver Response

*The Deliver Response function handles both on-line and off-line deliveries of responses (DIPs, result sets, reports and assistance) to Consumers. For on-line delivery, it accepts a response from Coordinate Access Activities and prepares it for on-line distribution in real time via communication links. It identifies the intended recipient, determines the transmission procedure requested, places the response in the staging area to be transmitted, and supports the on-line transmission of the response. For off-line delivery it retrieves the response from the Coordinate Access Activities function, prepares packing lists and other shipping records, and then ships the response. When the response has been shipped, a notice of shipped order is returned to the Coordinate Access Activities function and billing information is submitted to Administration.*

The deliver response function handles the online delivery of responses to Consumers. The Library will not provide offline delivery services.

On-line delivery to external users will be managed through resource discovery applications.

10.7.3.1	The Library will implement standards for application interface protocols.
10.7.3.2	The Library will implement standards for the transfer of data between applications.
10.7.3.3	An audit trail will be kept of all actions.

### 10.8 Exception Management

An exception condition is an unusual or unacceptable state of events encountered during the operation of the NDHA. Examples include data errors, application errors, and faults as well as a variety of business events such as regulatory and business non-compliance.

Exception conditions may be triggered by a number of different environmental or system conditions. For example, an exception condition may be triggered by:

- The detection of a virus
- The detection of storage media failure
- Network failure
- The penetration of physical defences
- A fire/flood alert in a NDHA computer room.

Also refer to Section 13: Operational Management, on page 54, and Section 15: Security Requirements, on page 60.

10.8.1	An exception condition will trigger an alert.
10.8.2	An exception condition may trigger an automated process.



10.8.3	An exception condition may trigger the automated shut down of one or more components of the NDHA.
10.8.4	Alerts may be notified to one or more personnel or external organisations.
10.8.5	An alert may require user acknowledgement of actions taken.
10.8.6	An exception conditions may need to be resolved manually.
10.8.7	An alert may be escalated should no user acknowledgement be received within a designated time period.
10.8.8	The escalation of an alert may trigger further alerts to one or more personnel or external organisations.
10.8.9	The escalation of an alert may trigger an automated process, or the automatic shut down of one or more components of the NDHA.
10.8.10	A record will be kept of all exception conditions.
10.8.11	An audit trail will be kept of all actions.

## 10.9 Management Information

Management information will be required to support strategic planning, Library management functions, capacity planning, workflow optimisation, and communication with external stakeholders.

For example, information may be required on the growth in volume of specific types of digital formats across time, on the number of digital objects received on a monthly basis, and patterns of public access.

10.9.1	The NDHA must support the production of management information reports, and statistics.
10.9.2	Reports may be generated in an ad-hoc manner.
10.9.3	Standard reports may be run automatically, report production may be triggered by a reporting calendar or by a specific system event.
10.9.4	Reports may be specific to a time period, or

10.9.5	Reports may provide information across a specified set of time periods.
10.9.6	Reports and statistics may provide information at a unitary level (for example, a report specific to a Producer, a digital object, or an event), or may provide information that is aggregated at higher levels.
10.9.7	An audit trail will be kept of all actions.

## 10.10 Producer Relationship Management

In the Library context the term Producer should be understood to cover those producing published material (publishers) and those who provide unpublished material (donors).

The Library will proactively work with publishers and donors to agree the content, quality and format of digital material. Some Producers may have irregular schedules and will submit material on an ad-hoc basis.

The NDHA must be capable of accepting bulk donations of material due to company restructure, the donation of a collection, or the death of a donor.

Predetermined or default submission agreements will be required where a Producer is not previously known to the Library and/or is providing digital material that is not in a preferred format.

10.10.1	The Library will maintain Producer details.
10.10.2	Producer information may be maintained during ongoing communication with the Producer.
10.10.3	Producer information may be created after digital material has been submitted to the Library.
10.10.5	The Library will need to maintain a record of communications with Producers. The mechanisms required to maintain the record will be identified at a later stage of the NDHA Programme.
10.10.4	An audit trail will be kept of all actions.

## 11 Data Requirements

The Library will implement an interim digital object lifecycle model to support the management of digital material prior to the implementation of the NDHA. Further work is required to develop the full NDHA data model.

Where applicable, the Library will adopt a universal set of internationally accepted metadata requirements.

## 11.1 Development of the NDHA Data Model

The NDHA data model must support the gathering, cataloguing, versioning, long-term preservation, security, authentication, management, and dissemination of digital objects. The data model must also support the effective searching of digital objects.

Metadata standards are required that support the creation of digital objects that can be preserved, as well as facilitate the reproduction of master objects into derivative digital objects for access. Standards must also support the production of multiple generations of derivative digital objects for both preservation and access.

There are a number of descriptive metadata schemas employed internationally. There is no accepted international standard or best practice for preservation metadata.

A number of institutions and fora are undertaking work on the development of metadata standards that can be internationally accepted for digital archives. These include the OCLC Preservation Metadata: Implementation Strategies (PREMIS), the Library of Congress' METS (Metadata Encoding and Transfer Standard) and MODS (Metadata Object Description Schema).

The Library has undertaken work on the development of a preservation metadata schema; this schema will require review in the light of the ongoing international work.

Work to define the data model must address the concept of wrapping the metadata around the digital object, and maintaining the metadata within the digital archive, as opposed to the maintenance of the metadata in a separate repository.

International literature<sup>6</sup> identifies that best practice is to create metadata at the information creation stage, as this is where long-term archiving and preservation must start. Metadata routinely collected at this point would be relatively easy, consistent, reliable and automatic.

Metadata must be maintained on an ongoing basis, in terms of the update of descriptive information, the maintenance of Intellectual Property (IP) property rights, the recording of preservation and migration actions, and the creation of different instances, or access copies, of an object to support both external and internal access requirements.

---

<sup>6</sup> Report on the Meeting of Experts on Digital Preservation: Metadata Specifications, U.S. Government Printing Office, June 14, 2004

## NON-FUNCTIONAL REQUIREMENTS

### 12 Performance Requirements

#### 12.1 Quality of Service

The NDHA will provide consistent and measurable levels of service to users, in a cost efficient and scalable manner. Levels of service may be defined that are specific to one or more users, for example, a Producer, a dissemination access path, or to a defined set of Library staff. The expected levels of service will be documented in the form of Service Level Agreements (SLAs).

This will require the Library to define internal business processes, identify the range of services that are delivered to internal and external users, and determine the respective priorities for the delivery of services.

The Library must ensure that services to users are delivered within the agreed SLA parameters. To ensure SLA parameters can be met, all components of a service must be monitored and managed.

An external user may access the NDHA via various different resource discovery services. In order to meet defined levels of service, there is a need to 'look through' the user interface to determine the reliability, availability, and performance, required from each of the architectural and human components that collectively must work in combination to provide the service. For example, the network must provide sufficient bandwidth to meet expected response times, storage must provide the ability to process and store large volumes of objects.

The NDHA may contain equipment and software provided by multiple hardware and software vendors. The NDHA management architecture must provide the information necessary to monitor and manage the archive regardless of the provenance of a component.

The SLAs will also define requirements for continuity of service. This will in turn flow into requirements for business continuity planning and disaster recovery planning, and will identify requirements for robustness, fault tolerance, and recoverability in the event of failure or natural disaster.

To ensure SLAs can be met; reliability, availability, performance, capacity, and business continuity requirements must be defined for all components of a service. This will include the:

- Network – including switches, routers etc
- Applications
- Servers
- Storage
- Security
- Physical environment
- Systems management processes
- User interface applications, for example, TAPUHI, or ILS
- Pre-Ingest systems, for example the web harvesting system
- User access devices and associated software, for example Personal Computers and associated presentation software such as PDF readers.

The Library may adopt internationally recognised standards for operational management of the NDHA, two examples of such standards being ITIL and DRI International. This is further addressed under Section 13: Operational Management, on page 54.

12.1.1	The NDHA will provide consistent and measurable levels of service to users.
12.1.2	Expected levels of service will be documented in the form of Service Level Agreements (SLAs).

## 12.2 Reliability and Availability

Currently the Library's on-line systems are internally supported during normal business hours (8.00am to 5.00pm) but remain operational in a non-supported manner outside of these hours. In practice this results in most on-line functionality being available to both staff and public an estimated 98-99% of the time outside of business hours.

There is a push from the Library's business units for a fully supported 24x7 operation. The costs of providing such a service are seen as prohibitive when compared with the benefits provided. There is however a widely held view that the Library is increasingly operating in a global environment and as more research material is made available on-line, there will be increasing pressure to ensure that the system is continuously available to worldwide users. There is also a demand for a supported on-line operation for staff users at an earlier time than the current 8.00am.

12.2.1	The design of the NDHA, the systems and environment must enable 24x7 operation.
12.2.2	The design of the NDHA must allow the system to be continuously available to worldwide users.

## 12.3 Capacity

The Library's policy, where both print and electronic formats have been published, is currently to prefer to collect the print. However, this may change over time.

The Library currently has nascent processes in place for the ingest, management, and storage of digital material for the following acquisition and ingest streams. This material will be maintained within an interim file repository.

Some or all of the digital material held within the interim file repository will require migration to the NDHA.

In the future, the Library may be requested to manage digital material on behalf of other organisations.

12.3.1	The NDHA must have capacity to accept digital material migrated from an interim file repository.
12.3.2	The NDHA must have capacity to support the management of digital objects for multiple ingest streams. Ingest streams include:

12.3.3	<ul style="list-style-type: none"> <li>• e-Legal deposit</li> </ul>
12.3.4	<ul style="list-style-type: none"> <li>• Purchased e-publications</li> </ul>
12.3.5	<ul style="list-style-type: none"> <li>• Web harvesting</li> </ul>
12.3.6	<ul style="list-style-type: none"> <li>• Unpublished material</li> </ul>
12.3.7	<ul style="list-style-type: none"> <li>• Sound material</li> </ul>
12.6.8	<ul style="list-style-type: none"> <li>• The digitisation of items from the existing collections.</li> </ul>
12.3.9	The NDHA must be capable of extension to allow the Library to manage and maintain digital material on the behalf of third parties.

Refer Appendix B for estimates of the growth of digital material for the years 2005 to 2009.

### 12.4 Scalability and Extensibility

12.4.1	The NDHA design must allow for growth of the digital archive across time, without loss of archival content.
12.4.2	The NDHA solution must recognise the cost of storage as the archive will continue to grow across time, both in terms of overall size and the diversity of digital material.

### 12.5 Longevity

12.5.1	The NDHA must support the preservation of, and access to, digital objects and metadata in perpetuity.
--------	---

## 13 Operational Management

### 13.1 Expected Physical Environment

13.1.1	The NDHA will reside in New Zealand but will use a distributed architecture to deliver specific services and to maintain digital objects and associated metadata
13.1.2	NDHA functions may be implemented at more than one site, for example, at both Wellington and Auckland
13.1.3	Components of the NDHA may reside at different physical locations.
13.1.4	Ingest processes may take place at different locations.

13.1.5	The design of the NDHA must allow the Library to hold and administer digital archive material on behalf of other organisations.
13.1.6	The NDHA will be managed by the Library.
13.1.7	Management of NDHA components may be outsourced at some point in the future.
13.1.8	Backups will be held at one or more secure locations within New Zealand.
13.1.9	To mitigate against any natural disaster, backups may be held offshore at suitable secure locations.
13.1.10	The physical environment will include a testing and staging environment.
13.1.11	Any development environment needs to be maintained separately from the production, test and staging environments.
13.1.12	The physical environment is expected to comply with international standards and international best practice.
13.1.13	A disaster recovery capability will be required.

## 13.2 Expected Technical Environment

Refer Appendix C: Existing Software and Hardware Infrastructure, for an overview of the Library's current technical environment.

The Library has a strong relationship with Sun Microsystems Inc which was recently re-affirmed when the Library entered into a three year contract with Computerland as the preferred supplier of Sun hardware and equipment to the Library.

The Library's deployment environment for its enterprise systems has evolved over the past five years, largely as a consequence of what has been most appropriate for the major applications rather than as an overall planned strategy. The main features of the enterprise systems deployment environment are:

- Sun Solaris hardware
- Oracle database management system
- Java, or native, run time environment using Apache Tomcat.

Considerable investment has now been made in this infrastructure to the extent that it has become a de facto standard for the Library and support skill sets have become focussed around the above components. To replace this infrastructure, or to construct a parallel environment to run alongside the present, would be a costly exercise in terms of additional hardware, licenses and operational support.

Although significant changes to the deployment environment cannot be ruled out in the future, the justification for any such changes would have to take into account the total cost of ownership, potential integration issues and general disruption associated with moving from or adding to the current technical infrastructure.

Operations management standards must be designed to support the preservation of digital information in perpetuity, and to support the certification of the NDHA as a trusted environment. As noted under Section 12: Performance Requirements, the Library may adopt internationally recognised standards for operational management of the NDHA, two examples of such standards being ITIL and DRI International.

The IT Infrastructure Library, ITIL (®)<sup>7</sup>, is a series of documents that are used to aid the implementation of a framework for IT Service Management (ITSM)<sup>8</sup>. The best-practice processes promoted in ITIL both support and are supported by the British Standards Institution's Standard for IT Service Management (BS15000).

The ITIL framework addresses:

- Service Support
- Service Delivery
- Planning to Implement Service Management
- ICT Infrastructure Management
- Applications Management
- Security Management
- The Business Perspective.

The ITIL service delivery standard consists of five disciplines:

- Service level management
- Capacity management
- Continuity management
- Availability management
- IT financial management.

The ITIL service support standard consists of six disciplines:

- Configuration management
- Incident management
- Problem management
- Change management
- Service/help desk
- Release management.

DRI International administers educational and certification programs for those engaged in the practice of business continuity planning and management.

13.2.1	The Library will adopt internationally recognised standards for operational management of the NDHA.
--------	---

<sup>7</sup> ITIL ® is a Registered Trade Mark, and a Registered Community Trade Mark of the Office of Government Commerce, and is Registered in the U.S. Patent and Trademark Office

<sup>8</sup> <http://www.itil-itsm-world.com/>



13.2.2	The archive will preserve digital information for perpetuity. No information can be lost from the archive.
--------	--

### 13.3 Partner Applications

A fundamental requirement of the Library is that related data held in disparate systems can be accessed and combined for presentation to online users. This is particularly true for digital material where it is necessary to combine the digital object with descriptive and other metadata about that object to present users with a comprehensive view.

For published material this combined view is readily obtained as all components are held within the Voyager/ENCompass environment which is designed to interconnect digital objects with their relevant metadata. However, for unpublished material the TAPUHI system is only concerned with descriptive metadata. TAPUHI will require upgrade to support links to relevant digital objects.

13.3.1	The NDHA will be required to interface with: <ul style="list-style-type: none"> <li>• the Integrated Library System (ILS), a Voyager system</li> </ul>
13.3.2	<ul style="list-style-type: none"> <li>• ENCompass</li> </ul>
13.3.3	<ul style="list-style-type: none"> <li>• TAPUHI.</li> </ul>
13.3.4	The NDHA may be required to interface with federated search engines and portals.
13.3.5	The NDHA will be required to interface pre-ingest systems, specifically: <ul style="list-style-type: none"> <li>• Quadriga</li> </ul>
13.3.6	<ul style="list-style-type: none"> <li>• Web harvesting Tool (The Curator's tool).</li> </ul>
13.3.7	It is expected that the NDHA will require interfaces to systems to support: <ul style="list-style-type: none"> <li>• Performance management and capacity planning</li> </ul>
13.3.8	<ul style="list-style-type: none"> <li>• Authentication and authorisation</li> </ul>
13.3.9	<ul style="list-style-type: none"> <li>• Acquisitions and selection.</li> </ul>
13.3.10	It is expected that a commercial solution may require interfaces to systems to support: <ul style="list-style-type: none"> <li>• Customer care</li> </ul>
13.3.11	<ul style="list-style-type: none"> <li>• Central billing.</li> </ul>

### 13.4 Sales and Distribution of a Commercial Product

The Library's technical capability resides in systems infrastructure management, knowledge of specialist products, and the creation of web based products and services enabling access to the Library's collections.

The Library wishes to form a business relationship with a suitable software supplier for the development, maintenance, enhancement and support of commercial software to operate and manage the NDHA.

The software supplier must be capable of commercialising the developed solution to third parties in the international market and continue to develop that solution over an extended period.

While expecting some return on its Intellectual Property, it is unlikely that the Library would be directly involved in such commercialisation.

13.4.1	The Library and the software supplier will enter into a long-term business arrangement supported by appropriate contracts.
13.4.2	The Library and the software supplier will agree Intellectual Property (IP) rights and ownership of NDHA components.
13.4.3	The Library and the software supplier will agree priorities for NDHA development.
13.4.4	The Library and the software supplier will agree priorities for commercialising and marketing NDHA components.
13.4.5	The Library and the software supplier will agree: <ul style="list-style-type: none"> <li>the role that the Library will play in the commercialisation of software, including</li> </ul>
13.4.6	<ul style="list-style-type: none"> <li>the role that the Library will play in ongoing development of commercial products.</li> </ul>

## 14 Maintainability and Portability Requirements

### 14.1 Maintenance

As noted under Section: 12.1, Quality of Service, the NDHA must provide consistent and measurable levels of service to users, in a cost efficient and scalable manner. Expected levels of service will be documented in the form of Service Level Agreements (SLAs).

As noted under Section: 13.2, Expected Technical Environment, the Library will implement a framework of service management and maintenance processes to meet service availability and business continuity requirements.

The Library will adopt an end-to-end service delivery concept; this will require a holistic view of maintenance requirements across all NDHA components and partner applications (refer section 13.3: Partner Applications).

14.1.1	Hardware maintenance will be covered under the terms of the agreement with the selected hardware vendor, under agreed Service Level Agreements (SLAs).
14.1.2	Software maintenance releases will be tested before implementation in the NDHA production environment.
14.1.3	The Library will expect software providers to comply with international software testing standards.
14.1.4	The Library will enter into a contract, or SLA, with software providers, for the development, installation, and maintenance of software.

## 14.2 Support

14.2.1	The Library and software provider(s) will agree support requirements. Such support requirements will encompass the: <ul style="list-style-type: none"> <li>• Support requirements of the Library, and</li> </ul>
14.2.2	<ul style="list-style-type: none"> <li>• Specific requirements for support of any hosted third parties.</li> </ul>
14.2.3	Support requirements will include: <ul style="list-style-type: none"> <li>• support of the NDHA application</li> </ul>
14.2.4	<ul style="list-style-type: none"> <li>• support of enhancements</li> </ul>
14.2.5	<ul style="list-style-type: none"> <li>• support of any clients who purchase commercialised NDHA software components.</li> </ul>
14.2.6	The support arrangements may include definition of requirements in terms of: <ul style="list-style-type: none"> <li>• Help desk functions</li> </ul>
14.2.7	<ul style="list-style-type: none"> <li>• Processes and procedures</li> </ul>
14.2.8	<ul style="list-style-type: none"> <li>• Levels of support</li> </ul>
14.2.9	<ul style="list-style-type: none"> <li>• Responsibilities for problem analysis and problem resolution</li> </ul>
14.2.10	<ul style="list-style-type: none"> <li>• Response times.</li> </ul>

## 14.3 Portability

The Library, whilst it has a preferred technical platform, recognises that the NDHA must be developed on a platform that will allow commercialisation of the product.

Changes in hardware, software, data storage platforms etc make it critical to ensure preservation practices are established to enable access to national cultural heritage information that meets future research needs.

The Library's preferred technical platform is described in Appendix C.

14.3.1	The NDHA must be capable of evolution and migration.
14.3.2	Evolution and migration must be possible across hardware devices.
14.3.3	Evolution and migration must be possible across software components.
14.3.4	Evolution and migration must be possible across data storage platforms.
14.3.5	A set of software tools will be maintained to allow preservation of objects.
14.3.6	A set of software tools will be maintained to allow the presentation of objects.
14.3.7	A set of software tools will be maintained to create transformed copies of digital objects.

## 14.4 Installation

Installation of new hardware, software, and process components will be managed under operational management processes that govern service delivery and service support.

14.4.1	The installation of new components will be performed to agreed standards.
14.4.2	The testing of new components will be performed to agreed standards.

## 15 Security Requirements

### 15.1 Security Standards

Digital material held in the NDHA will be a vital asset for New Zealand. It is therefore important that a suitable set of security controls and procedures is achieved.

The Library may adopt the Australian / New Zealand Standard for Information Technology<sup>9</sup>. Related standards are SAA/SNZ HB 231:2004 – Information Security Risk Management Guidelines, and AS/NZS 4360:2004 – Risk Management.

The standard is intended to provide a common basis for developing organisational security standards and effective security management practice and to provide confidence in inter-organisational dealings.

<sup>9</sup> Australian / New Zealand Standard AS/NZS ISO/IEC 17799:2001, Information Technology – Code of practice for information security management.

The standard addresses the following areas:

- Security policy
- Organisational security
- Asset classification and control
- Personnel security
- Physical and environmental security
- Communications and operations management
- Access control
- Network access control
- Operating system access control
- Application access control
- Monitoring system access and use
- Mobile computing and teleworking
- Systems development and maintenance
- Business continuity management
- Compliance.

The security requirements documented in this Section will be expanded during future stages of the project. Hence the requirements should be noted as being incomplete, and being provided for information only.

15.1.1	The Library will review the Australian / New Zealand Standard for Information Technology to determine applicability to the NDHA.
15.1.2	A security policy will be developed to provide management direction and support for NDHA security.
15.1.3	A NDHA security framework will be developed. This will map across business functions and down through the layers of the technical architecture.
15.1.4	The security framework will address NDHA interfaces with Producers, Consumers and Management.

## 15.2 Authentication of Users

Access rights will be specific to the combination of user permissions and AIP rights management. AIP rights management is addressed under Section 15.3: Rights Management and Access Control, below.

Users of the system can be broadly categorised as:

- Library staff, for example librarians and curators
- System administrators

- System operators
- Interfacing systems.

Access control and rights management will also apply to:

- Audit logs
- System logs
- System files
- Software components.

The Library will develop an authentication and access management system to monitor and control access to the NDHA and other Library applications. Access within the NDHA will be monitored; access rights may be controlled at the individual object level.

15.2.1	Access rights may be associated with the metadata relating to an individual object, i.e. the object may be embargoed, with limited internal staff access being available to metadata. Both an object and its related metadata may be embargoed in terms of public access.
15.2.2	Access will need to accommodate computer interface access.
15.2.3	Access rights may be defined for a specific individual user.
15.2.4	Access rights may be defined for a group of users.
15.2.5	Access mechanisms must be sufficiently granular to allow the identification of individual users, in order to maintain audit logs of actions performed by users.

### 15.3 Rights Management and Access Control

Material held in the NDHA will be subject to the National Library of New Zealand Te Puna Mātauranga o Aotearoa Act 2003 and the Copyright Act 1994 and its amendments.

Access provisions to legal deposit material are contained in the National Library of New Zealand Te Puna Mātauranga o Aotearoa Act 2003.

In addition, the NDHA will be required to hold sensitive material that will be embargoed for an extended period (for example, 50 to 100 years). Such material cannot be accessed by anyone other than designated staff, and all access or actions relating to the material must be recorded and notified.

Some material may be donated to the Library under strict terms of confidentiality. Access to such material may be subject to a number of restrictions agreed with the donors, such restrictions may relate to access methods and user authorisations. All access or actions relating to the material must be recorded and notified.

15.3.1	Access rights and conditions of use will be held for each digital object and its related metadata.
15.3.2	Access rights and conditions of use will be machine readable and actionable.
15.3.3	New Zealand Copyright Law will be applicable to some digital objects.
15.3.4	International copyright law will be applicable to some digital objects.
15.3.5	Access conditions may be specific to a digital object.
15.3.6	Access conditions include Open access, where items are freely available via internal or external delivery mechanisms.
15.3.7	Access conditions include access where items are only available via an internal delivery mechanism.
15.3.8	Access conditions include Restricted access, where access requires permission or satisfaction of some criteria; authorised user access is via an internal or a secure delivery mechanism.
15.3.9	Access restrictions may be time based. For example, access may be restricted for 20 years, with restrictions being reviewed after 20 years have elapsed.
15.3.10	Access conditions include software licensing Terms and Conditions.
15.3.11	Access rights may be defined by location. Some digital material may only be accessible at a terminal that is located on Library premises.
15.3.12	In addition to restrictions defined by location, there may be a restriction on the number of concurrent users who may access the material.
15.3.13	Under the conditions of the National Library of New Zealand Te Puna Mātauranga o Aotearoa Act 2003, the number of users who may simultaneously access an object may be restricted.

## 15.4 Integrity

The key purpose of the NDHA is to preserve digital material in perpetuity.

15.4.1	The integrity of a digital object is confirmed during the ingest process.
--------	---

15.4.2	Data transformations must be verified to ensure integrity post transformation.
15.4.3	All encoding and mappings must be documented.
15.4.4	Hardware will be subject to integrity checks prior to installation.
15.4.5	Software will be subject to integrity checks prior to installation.
15.4.6	Digital storage media will be integrity checked on a regular basis.
15.4.7	Digital objects will be integrity checked on a regular basis.
15.4.8	NDHA software will be integrity checked on a regular basis.
15.4.9	Backup systems will be subject to regular integrity checks.
15.4.10	Backup and recovery routines must ensure that all components of an AIP can be recovered to the same state.
15.4.11	Backup and recovery routines will include objects being restored to a test server on a periodic basis.
15.4.12	Backup and recovery routines will include the restore of applications to a running state on a periodic basis.
15.4.13	Anti-virus software protection must prevent infection by malicious or unwanted software.
15.4.14	Anti-virus software protection must have specific focus on the checking of digital material during the Ingest process.
15.4.15	There must be a record kept of which virus patterns were used to check a digital object and its related metadata.
15.4.16	Should a virus <sup>10</sup> be detected as a result of a new virus pattern being received, a process will be required to retrospectively identify and scan digital objects and related metadata which has been scanned against prior virus patterns.

<sup>10</sup> For the purpose of these statements class Trojans, Spyware and related Malware as viruses



15.4.17	Where vulnerabilities are identified, retrospective validation of objects is required to address any time gap between the point of vulnerability and the point of discovery, and/or the point of vulnerability and the point of a fix being applied. This may apply across process, hardware, software and network components.
---------	--

### 15.5 Physical Security

15.5.1	Access to the NDHA will be strictly controlled.
15.5.2	The NDHA system will be protected against unauthorised access.
15.5.3	The NDHA installation will be protected against unauthorised access.
15.5.4	The NDHA system will be monitored to detect any unauthorised attempt to access the system, or penetrate system security mechanisms.
15.5.5	The NDHA premises will be monitored by electronic security devices.
15.5.6	Operator access to software and hardware will be restricted and monitored.
15.5.7	Operational processes will be monitored.
15.5.8	Operational processes will be subject to regular review.

### 15.6 Audit

15.6.1	The system must record actions undertaken on a digital object and its related metadata.
15.6.7	The NDHA will be subject to external audit.
15.6.8	External audit will include audit to ensure compliance with Library policies and procedures.
15.6.9	External audit will include audit to ensure compliance with applicable New Zealand legislation.

15.6.10	Compliance with certification processes associated with maintaining status as a trusted digital repository.
---------	---

## DELIVERY OF NDHA BUSINESS BENEFITS

### 16 Business Benefits

#### 16.1 Identified Benefits

The Library expects major strategic benefits to be generated from the NDHA Programme, for example:

- The Library will comply with the National Library of New Zealand (Te Puna Mātauranga o Aotearoa) Act 2003 and supporting regulations.
- New Zealand's digital heritage is preserved and accessible.
- The NDHA system is successfully commercialised by the chosen software development supplier minimising the Library's risk of needing to fund the ongoing support and enhancement alone.
- The Library has the capability to lead New Zealand's heritage and research institutions in digital preservation.
- The Library is able to contribute to the international digital preservation community.
- The viability and credibility of the Library as a leading cultural institution is enhanced.
- Staff across the Library enhance their skills and capability through involvement in the development and operation of the National Digital Heritage Archive.
- The NDHA Programme will enable other organisations, especially government agencies, that choose to engage with the programme to build their own skills and capability.

The NDHA Programme will put in place policies, processes and resources for the ongoing collection, preservation, and access to New Zealand's digital heritage.

The introduction of digital archive technologies, processes, and techniques will lead to the review of existing processes and workflows. In order to exploit the full potential of the NDHA, there is a need to transparently address identified risks and issues, and to plan for business change.

#### 16.2 Identified Issues

Review of the OAIS reference model has identified that the NDHA requirements can not be viewed in isolation. The NDHA will need to interface with Library systems, and technical infrastructure, business and operational capability must be built to support and operate NDHA components.

Three key issues have been recorded in the NDHA Programme Issues Register.

Issue #	Description
56	Metrics re continuity of service requirements are needed for Library systems.
60	The need for standards is one of the basic requirements for the NDHA. However, there is no definition of how broadly the standards theme needs to be applied.
65	There is a requirement to identify the originator of each individual action relating to a Digital Object and its metadata. Must the originator always be recorded at a level that allows the specific individual (i.e. the internal or external person who originated the action) to be identified?

## 17 NDHA Programme Components

The NDHA Programme will co-ordinate the activities required to implement the NDHA. Programme components include:

- Governance
- Development of the Library's capacity and capabilities
- Communications and stakeholder management
- Management of external dependencies
- Systems development life cycle phasing and timing
- Quality management strategy
- Data migration.

### 17.1 Governance

A Governance structure has been established. The structure is grounded in the Library's programme management methodology and the Guidelines for Managing and Monitoring Major IT Programmes<sup>11</sup>.

### 17.2 Development of Capacity and Capabilities

The Library believes that the NDHA Programme will trigger a transformation of business functions as the management of digital material becomes a core part of the Library's purpose.

To achieve this, the Library expects its staff to enhance capability through involvement in the various phases of development and implementation of the NDHA. The Library intends that, where practical, staff with the necessary skills will become members of the Programme team, adopting team leader and team member roles in all aspects of the Programme including the technical design phase.

It is expected that the Library will introduce some change to existing processes and workflows in order to exploit the potential of the NDHA. A Business Change Manager, reporting to the NDHA Programme Director, will lead the change programme.

17.2.1	A change programme will be developed.
17.2.2	New processes and workflows will be designed and tested.
17.2.3	Additional staff positions may be created for the management of the technical infrastructure.
17.2.4	Additional staff positions may be created to manage and operate the repository.
17.2.5	Training material will be developed to support the transition to the new processes.

<sup>11</sup> Guidelines for Managing and Monitoring Major IT Programmes, State Services Commission and the Treasury, August 2001

17.2.6	Staff will be trained in new processes and techniques.
--------	--

### **17.3 Communications and Stakeholder Management**

A communications advisor has been seconded to the NDHA Programme. A communications strategy is in place supported by communication plans that are updated on a six monthly basis.

### **17.4 Management of External Dependencies**

Some external dependencies have already been identified; others will arise during the course of the programme. Four important external dependencies are:

- The future of TAPUHI. Library staff requirements for access to the contents of the NDHA may trigger review of the future of TAPUHI.
- Authentication. The Library requires user authentication mechanisms for the NDHA and for other systems.
- RLF Certification. The Library is dependant upon the RLG and NARA timeframes for release of the Trusted Digital Repository certification process.
- The International Internet Preservation Consortium's timetable for the development of a web selection and harvesting tool.

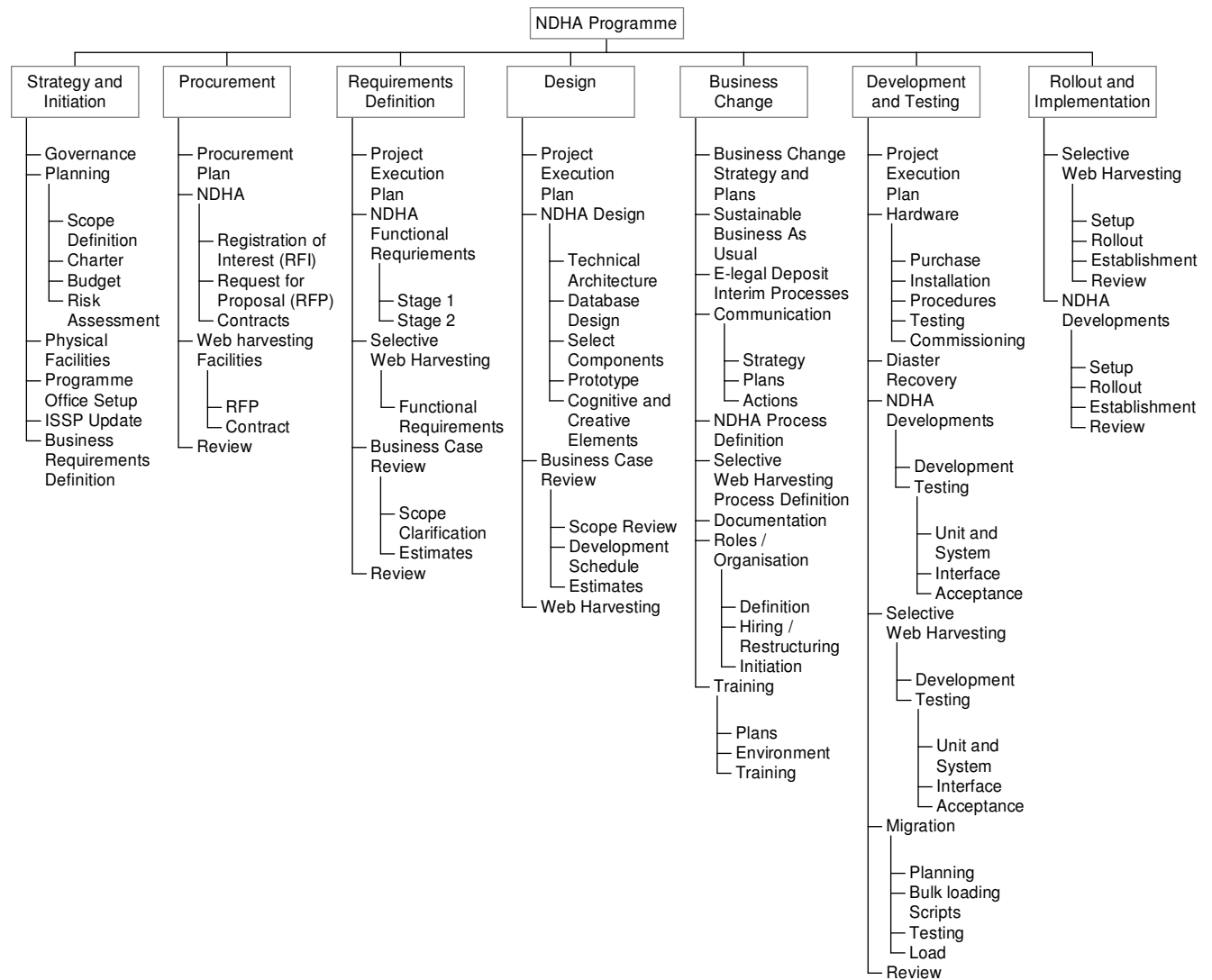
### **17.5 Systems Development Life Cycle**

This document will be used as the starting point to determine the Library's detailed requirements.

The NDHA Programme will follow the standard modular approach consistent with the Guidelines for Managing and Monitoring Major IT projects, issued by Treasury and State Services Commission.

The work breakdown structure is likely to be as depicted in the diagram below. Details of activities within each stream may vary as a result of the planning process.

Each phase will be described in detail in a series of project execution plans, with each phase composed of formal planning and review activities as well as the many unique delivery activities.



### 17.6 Quality Management Strategy

The Library expects the NDHA to be accepted as a trusted digital repository. This drives the need for quality management techniques that enable the NDHA design and operation to be measured against international standards and best practice guidelines.

The NDHA Quality Management Strategy has been prepared using five core principles:

- Dependence on the quality of relationships with the Library’s ‘consumer’ and ‘producer’ stakeholders - to understand how to meet the needs (both explicit and implied) of those stakeholder groups.
- Strong leadership and strategic vision - to establish and then maintain unity of purpose and adherence to the goals and objectives of the programme.
- Involvement of people – ensuring there is the right environment for people to become fully involved in achieving the NDHA objectives and that individual abilities are used and nurtured for the Library’s benefit.
- Objective approach to decision making - facilitated by pertinent data and information which is sufficiently accurate, reliable, and accessible.
- Programme management methodology.

## 17.7 Data Migration

Some or all of the digital material held within the interim file repository will require migration to the NDHA. It is envisaged that this may require:

- Re-format of the preservation object
- Re-format to create a copy of the object that will support public access
- The generation of metadata
- Quality checks of the objects held within the NDHA, including qualitative checks of “look and feel”.

Metadata may be provided to collection information systems such as ILS and TAPUHI.