A Digital Preservation Environment Maturity Matrix for NSLA Libraries

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ABSTRACT
In this paper, the authors describe the work done within the NSLA Digital Preservation Group to create a list and description of the functional components of an ideal digital preservation environment and a matrix of the current stage of development against each component for each NSLA library. After defining underlying assumptions, the functional components were derived from the OAIS standard. A modified Capability Maturity Model was incorporated as a mechanism for determining each organisation's stage of development against each component. The matrix was then completed by representatives from the Digital Preservation Group in each of the ten NSLA libraries. The respondents were asked to self-rate their organisations for both the current digital preservation situation, and an intended situation in three years' time. NSLA has identified digital preservation as an area of priority. The results from the Digital Preservation Environment Maturity Matrix reveal that NSLA libraries are on the right path but have some way to go before digital preservation processes are mature, sustainable and fit for purpose. Collaboration on policies, products and infrastructure will continue to address these needs.

General Terms
Management, Measurement.

Keywords
Digital Preservation, Capability Assessment, Environment Maturity Matrix, NSLA Libraries.

1. INTRODUCTION
In July 2012, the National and State Libraries of Australasia (NSLA) established a Digital Preservation Group. NSLA is comprised of the National Library of Australia, National Library of New Zealand, State Library of Victoria, State Library of New South Wales, State Library of Queensland, State Library of South Australia, State Library of Western Australia, Northern Territory Library, LINC Tasmania and Libraries ACT. The individual libraries are at differing states in their digital collecting maturity. They all are building and providing access to digital collections but only a few have active digital preservation systems and programs in place.

The objectives of the NSLA Digital Preservation Group were to:

- Gain a shared understanding of current digital collection management practices and workflows in NSLA libraries.
- Share information about digital preservation best practice.
- Determine the core requirements for managing the preservation of digital collections in NSLA libraries and identify opportunities for collaboration.

These objectives took into account the different stages of NSLA libraries in the adoption, development and implementation of digital preservation.

At the time the Group was established it identified six key work packages:

- 1: What is it and why? A statement on digital preservation and set of principles.
- 2: How well? A Digital Preservation Environment Maturity Matrix.
- 3: Who? A Digital Preservation Organisational Capability and Skills Maturity Matrix.
- 4: Nuts and Bolts: A common technical registry for NSLA libraries of file formats with software and hardware dependencies.
- 5: Collaboration and Partnership: A summary of opportunities for international representation and collaboration.
- 6: Confronting the Abyss: A business case for dedicated research into how to preserve difficult digital object types.

This paper focuses on work package 2, describing the work in creating the Digital Preservation Environment Maturity Matrix, and the initial findings from its use by the ten NSLA libraries.

The aim of the work package was to create a list and description of the functional components of an ideal digital preservation environment (keeping the list to a maximum of 20 components) and a matrix of the current stage of development against each component for each NSLA library [1] [2]. The benefits of this approach were designed:

- Firstly, to identify where various libraries currently sit against the list;
- Secondly, to help the libraries to identify development needs; and
- Thirdly, to help NSLA identify collaboration development needs.

The NSLA Digital Preservation Environment Maturity Matrix itself was developed by the Group over the first year of its operation and approved for use by the NSLA CEOs in March 2013. Representatives from the Digital Preservation Group in each of the ten NSLA libraries then completed the matrix (Refer to Table 1 in appendix A), and a summary report was written on these initial findings; outlining the current level of digital preservation maturity across NSLA.

1.1 Related Work

It should be noted that similar work is currently being conducted in at least two other international projects:

- The National Digital Stewardship Alliance in the USA has developed Levels of Digital Preservation, a tiered set of recommendations for how organisations should begin to build or enhance their digital preservation activities. This was used to assess the current state of digital preservation among the NDSA members [3] [4].
- BenchmarkDP, a three-year research project funded by the Vienna Science and Technology Fund, is developing a coherent, systematic approach to assess and compare digital preservation processes, systems and organisational capabilities [5] [6].

The NSLA Digital Preservation Group, via the National Library of Australia, has been in touch with the former and participated in a survey and an iPres workshop organised by the latter. The Group will follow their progress to identify potential areas which could feed into the matrix in the future.

2. MATRIX DEVELOPMENT

The development of the NSLA Digital Preservation Environment Maturity Matrix fell into key areas:

1. Confirmation of the underlying assumptions
2. Identification of the functional components
3. Use of a maturity model

2.1 Underlying Assumptions

The first stage in the development of the matrix was to define a set of underlying assumptions on which the functional components are based. These assumptions were provided at the start of the matrix.

Interestingly, some members of the Group indicated that the assumptions were not necessarily valid for them, which would have made it difficult to evaluate their response. Therefore, each respondent was asked to state whether the assumption was correct for their organisation at the time of completion of the matrix. This ensured transparency around the assumptions each organisation would be making when completing the matrix, providing an additional level of confidence when comparing the results over time as the completion of the matrix is repeated.

The underlying assumptions in the matrix are that an organisation:

- Is actively collecting digital materials, both born digital and digitised.
- Is committed to preserving its digital materials for the long term.
- Has resources (including staff or vendor with appropriate skills) dedicated to the task.
- Has a sustainable funding model.
- Aims to comply with the open archival information system (OAIS) responsibilities as listed in the matrix.

2.2 Functional Components

Once the underlying assumptions had been defined the next step in the development of the matrix was to identify the functional components.

An ideal digital preservation environment should contain a mix of policies, processes and resources (including staff and technologies). The reference model for an open archival information system (OAIS) is a commonly accepted standard among the digital preservation community [7]. The OAIS standard is a high-level, abstract model, which, amongst other things, "provides a framework, including terminology and concepts, for describing and comparing architectures and operations of existing and future archives". This makes it a good starting point for describing the high-level functional components of an ideal digital preservation environment. A similar approach has been taken previously by a JISC funded project involving The National Archives (TNA) and the UK Data Archive at the University of Essex between 2004 and 2005 [8].

In order to be compliant with the OAIS standard, each library needs to address the following responsibilities:

- Negotiate for and accept information from information producers.
- Obtain sufficient control of the information for long-term preservation.
- Determine the designated user community.
- Ensure the information is independently understandable to the designated community without the need of special resources.
- Follow documented preservation policies and procedures, which ensure that the information is preserved against all reasonable contingencies.
- Make the information available to the designated community [7].

Rather than simply listing the functional components, a set of generic and open-ended questions were framed, which were based on selected functions of individual OAIS entities (refer to Table 2).

The questions were intended to act as a guide and help respondents identify and describe their organisation's current level of digital preservation maturity, as well as assist in planning for the future.

This opened the way for each organisation to determine how to approach the challenges of digital preservation in a manner that best suited their needs. It also acknowledged that an "ideal" digital preservation environment is still to be defined. In applying the framework defined in the matrix in this way it was hoped that the functional components for a digital preservation system could be inferred from the questions and the institutional responses.

The top-level headings of the list followed the functional entities of the OAIS model. The individual questions under each heading were based on selected functions of individual OAIS entities, with some modifications made to the selected functions for the purpose of simplicity and clarity.

Table 2 High level functional components of a digital preservation environment

1. Pre-ingest Activities
What system policies and standards related to digital collecting do you have in place in your library?
What system policies and standards related to digital preservation do you have in place in your library?
2. Ingest
What SIPs do you receive from producers, and how?
How do you validate the SIPs?
How do you generate AIPs from SIPs?
What metadata do you extract from AIPs or collect from other sources, and how?
3. Archival Storage
How are your AIPs stored?
What proactive measures do you take to refresh your archival media/storage?
What routine and special error checking do you perform to make sure that no components of the AIP are corrupted in archival storage or during any internal archival storage data transfers?
What IT disaster recovery plans and business continuity plans does your library have in place to protect your digital assets?
4. Data Management
How do you store, maintain and update metadata for your library's digital collection content?
How do you monitor collection status?

5. Administration
How do you negotiate submission agreements and audit submissions to ensure that they meet your institution's standards?
How do you manage system configuration?
What mechanisms do you provide to restrict or allow physical access to elements of the archive, as determined by archive policies?
How do you establish and maintain system standards and policies?
6. Digital Preservation Planning
How do you monitor changes in the Digital Preservation and ICT technology environments and in the designated community's service requirements and knowledge base?
How do you develop preservation strategies and standards?
How do you develop packaging designs and preservation action plans?
7. Access
How do you provide access to your data?
How do you ensure that the user is authorised to access and receive the requested items?

2.3 Maturity Model

The final stage in the development of the matrix was to incorporate a mechanism for determining each organisation's stage of development against each component. To achieve this, the Group modified the Capability Maturity Model (CMM) [9].

Although CMM was originally developed to measure and manage the improvement in software development processes, the model is flexible and adaptable to more diverse subject areas, such as digital preservation.

There are five levels in the CMM defined as:

Level 1 - Initial

Level 2 - Repeatable

Level 3 - Defined

Level 4 - Managed

Level 5 - Optimising

Detailed definitions were provided with the matrix as examples to demonstrate how CMM could be adapted for use across NSLA to assess the level of digital preservation activities currently in place. These definitions are summarised below:

Level 1 – Initial

At level 1 maturity:

- Processes are usually ad hoc.
- Achievement depends on the competence of the people in the organisation and not on the use of proven processes.
- Organisations often produce products and services that work, but frequently exceed both budget and schedule.

Level 2 – Repeatable

At level 2 maturity:

- Digital preservation achievements are repeatable, but the processes may not repeat for all digital preservation activities in the organisation.
- Process discipline helps ensure that existing practices are retained during times of high pressure.
- Basic digital preservation processes are established to track cost and to match activities to agreed digital preservation objectives.
- There is still a significant risk of exceeding cost and time estimates for the identified activities.

Level 3 - Defined

In addition to meeting the activities in level 2, at level 3 maturity:

- Digital preservation activities are performed and managed according to documented plans.
- The status and the delivery of digital preservation activities and services are visible to management at defined points.
- Standard organisational processes for digital preservation are established and improved over time.
- These standard processes are used to establish consistency across the organisation.
- Management defines digital preservation objectives and ensures that these objectives are met.

Level 4 – Managed

At level 4 maturity:

- Management can effectively control the digital preservation effort, using precise measurements.
- In particular, management can identify ways to adjust and adapt the digital preservation effort to particular activities without measurable losses of quality or deviations from specifications.
- The organisation sets a quantitative quality goal for both digital preservation process and ongoing maintenance and support.
- Sub-processes are selected that significantly contribute to overall performance and the selected sub-processes are controlled using statistical and other quantitative techniques.

Level 5 - Optimising

- At this level the organisation focuses on continually improving process performance through both incremental and innovative technological improvements.
- Quantitative process-improvement objectives are established, continually revised to reflect changing business objectives, and used as criteria in managing process improvement.
- The effects of deployed digital preservation process improvements are measured and evaluated against the quantitative process-improvement objectives.
- Both the defined processes and the organisation's set of standard digital preservation activities and processes are targets of measurable improvement activities.
- Optimising processes that are nimble, adaptable and innovative depends on the participation of an empowered workforce aligned with the business values and objectives of the organisation.
- The organisation's ability to rapidly respond to changes and opportunities is enhanced by finding ways to accelerate and share learning.

Using this five level rating system, in the matrix respondents were asked to self-rate their organisations for both the current digital preservation situation, and an intended situation in three years' time. This allowed an organisation's digital preservation aims to be captured, as well as their current level of activity. As the matrix will be repeated over time it will also allow their actual achievements against these aims to be compared.

As well as the columns for self-rating their level of current and intended maturity against each functional component, the matrix also included a column for commenting on the current state of digital preservation with the institution, providing the opportunity for additional context to be provided to the maturity ratings.

3. MATRIX USE

The completed matrix was distributed to the ten NSLA libraries in February 2013. All initial submissions were received by 22 August 2013. These were discussed at the NSLA Digital Preservation Group meeting in Adelaide, Australia, in September 2013.

At that meeting it was decided to make minor changes to the matrix to ensure a consistent approach to the responses, and NSLA libraries were able to review and modify their responses as required. All final responses were received in October 2013 and integrated into a final report which was signed off by the NSLA CEOs in November 2013 [2].

3.1 Analysis of the Initial Results

The analysis of the responses focused on the assumptions and CMM ratings. The respondents' comments were made available to the NSLA libraries but were not analysed. The overall picture revealed by the matrix across NSLA libraries has been included in this paper, without identification of individual libraries.

3.2 Underlying Assumptions

All of the ten NSLA libraries completed the matrix and reported the following underlying assumptions:

- All libraries are collecting digital materials.
- All libraries are committed to preserving access to their content over time.
- Six out of the ten libraries did not have resources (including staff or vendor with appropriate skills) dedicated to the task of digital preservation.
- Eight out of the ten libraries did not have a sustainable funding model for digital preservation.
- All libraries aim to comply with OAIS responsibilities.

3.3 Matrix Responses

The responses to the matrix were then analysed, as summarised in tables 3 and 4 in appendices B and C.

Overall, they demonstrated a clear picture of the state of digital preservation within NSLA libraries, and these results were felt to be valid and useful. However, it was difficult to compare the results between the NSLA libraries, in part because the way the maturity model was applied may have led to subjectiveness in the self-assessment.

The responses to questions about the current state of digital preservation with the NSLA libraries, as detailed in table 3 in appendix B, revealed that:

- All NSLA libraries rated themselves well for providing and authorising access to digital collection material, both internally and externally. This also included managing and controlling physical access.
- All NSLA libraries appeared to be doing reasonably well on policies, but more so for collecting than preservation.
- Importantly, the rating for storage of digital materials seemed to be quite low and most NSLA libraries were not actively managing bit-level preservation. Although on average, refreshing media/storage and IT disaster planning seemed to be better managed, the figures are still a concern for some of the smaller libraries.
- All NSLA libraries rated themselves low for digital preservation planning, which shows that they are not yet in a position to do active preservation.

In the rest of the areas, it proved difficult to draw any concrete conclusion because there were large variations between the results for individual libraries. It should be noted that this might have been caused by the unavoidable subjectiveness of the assessments as stated above.

The responses to questions about the intended future state of digital preservation within the NSLA libraries, as detailed in table 4 in appendix C, revealed that:

- There is a large variation in the plans as the ratings for all but two questions range from 1 to 5.
- A small number of NSLA libraries indicated that they did not plan to improve their processes and some planned to stay at an ad hoc level. However, there was an agreement between the majority of libraries that they would like to (sometimes quite significantly) improve their current processes.
- For all questions, over half of the libraries would like to score at least 3, with some indicating that they aim to achieve 5 in three years' time. This was even higher for the last two question regarding Access with over half of the libraries ranking themselves at least 4.

4. FINDINGS FROM THE WORK AND OTHER STUDIES

In general the submissions demonstrated some issues with the questionnaire/matrix:

- The questions in the survey were rather open ended in order not to prescribe answers which may have potentially caused problems in the answers to certain questions. As pointed out by Kulovits cited in [6] 'a clear distinction between business process and information system' is needed.
- The initial analysis also demonstrated that the OAIS reference model on which the survey is based is a very complex concept which made answering the questions challenging for libraries that did not have a detailed understanding of the model**.**
- The CMM methodology proved to be difficult to apply consistently and to achieve objective results for:
    - Within the questionnaire.
    - Applied between libraries.

  However, the generalisations that are provided in 3.3 are felt to be valid and useful.
- Based on the above, some of the assessments raise concerns about whether the results can be taken at face value.

It also must be stressed that CMM is by no means the only approach that could be adopted by the NSLA Digital Preservation Group for assessing the level of digital preservation activities across the NSLA organization. Katuu, as cited in [6] and the Australian National Data Service [10] [11], provide other potentially useful examples.

5. NEXT STEPS

The NSLA Digital Preservation Group intends to continue to develop and extend the environment matrix. The Group may also consider analysing the detailed comments provided with each library's response further.

The Group had also developed a sister matrix, the Digital Preservation Organisational Capability Maturity Matrix (Work Package 3: Who?) that examines how well management and human resource practices support the evolution of digital preservation needs within NSLA libraries. The matrix has been completed and an initial analysis of these findings has been undertaken. At the time of writing, these findings are still to be discussed at a meeting of the Digital Preservation Group.

The NSLA Digital Preservation Group is planning to investigate integrating the results of the environment maturity and the organisational capability maturity matrices to provide a clear picture of progress or inactivity in the area of digital preservation for NSLA and individual libraries.

In addition, in November 2013 the NSLA Digital Preservation Group and ADRI (Australasian Digital Recordkeeping Initiative) met and discussed potential mutual initiatives. At that meeting it was decided that the Archives sector, as represented by ADRI, would also fill out the environment maturity matrix. At the time of writing ADRI members were in the process of doing this and the results are yet to be analysed or compared to those from the NSLA libraries.

The development of a combined environment maturity and organisational capability maturity matrix, combined with the ADRI results would provide a more holistic picture of the state of Digital Preservation in these two sectors in Australasia.

6. CONCLUSION

Overall this work has demonstrated the current variable maturity of NSLA libraries to deal effectively with the preservation of digital materials in their custody. Although some NSLA libraries are more mature than others in some aspects, all libraries are relatively immature in digital preservation matters. This was to be expected for logical preservation but it is unexpected that it is also the case for bit-level preservation (fixity checking, backups, storage media refreshing etc.). Without the preservation of the bits, the ability to preserve the logical content of the files over time is seriously compromised.

All libraries (at varying levels) indicated that they require sustainable funding and staffing models. The survey also demonstrated a need to develop or improve their capability through scalable ways to ingest digital content, collect technical metadata as well as monitor, plan and take preservation actions over time.

NSLA has identified digital preservation as an area of priority. The importance of this area to NSLA libraries is reflected in the creation of the Digital Preservation Group and its support of the Group's work to date. The results from the Digital Preservation Environment Maturity Matrix reveal that NSLA libraries are on the right path but have some way to go before digital preservation processes are mature, sustainable and fit for purpose. Collaboration on policies, products and infrastructure will continue to address these needs.

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8. REFERENCES

[1] NSLA Digital Preservation: Project Scope, deliverable 2. Available at http://www.nsla.org.au/sites/default/files/publications/3.2 Digital Preservation.pdf

[2] Pearson, D. and Coufal, L. 2013. National and State Libraries of Australasia, Digital Preservation Work Package 2: Ideal Digital Preservation environment and a matrix of the current stage of development against each component for each NSLA library. Unpublished NSLA Report, Melbourne. For a copy of this report contact the authors.

[3] NSDA Levels of Preservation. Available at http://www.digitalpreservation.gov/ndsa/activities/levels.html

[4] Phillips, M., Bailey, J., Goethals, A. and Owens, T. 2013. The NDSA Levels of Digital Preservation: An Explanation and Uses. IS&T Archiving, Washington. http://www.digitalpreservation.gov/ndsa/working_groups/documents/NDSA_Levels_Archiving_2013.pdf

[5] BenchmarkDP. Available at http://benchmark-dp.org/

[6] Becker, C. and Cardoso, E. 2014. 'Report on the Capability Assessment and Improvement Workshop (CAIW) at iPRES 2013' in *D-Lib Magazine*, Vol. 20, No. 3/4 (March/April 2014).

[7] OAIS ISO 14721:2012. Available at http://public.ccsds.org/publications/archive/650x0m2.pdf

[8] Beedham, H., Missen, J., Palmer, M. and Ruusalepp, R. 2005. 'Assessment of UKDA and TNA Compliance with OAIS and METS Standards'. Available at http://www.jisc.ac.uk/media/documents/programmes/preservation/oaismets.pdf

[9] Capability Maturity Model (CMM Self Rating). Available at http://www.selectbs.com/process-maturity/what-is-the-capability-maturity-model

[10] ANDS Research Data Management Framework: Capability Maturity Guide. Available at http://ands.org.au/guides/dmframework/dmf-capability-maturity-guide.html

[11] ANDS Research Data Management Framework: Capability Maturity Guide. Available at http://ands.org.au/assets/images/guides/dmf-capability-maturity-guide.png

Appendix A

Table 1 NSLA Libraries completing the matrix

NSLA Library	Location	Ongoing staff (2013) **Source:** *NSLA Workforce Data Report, November 2013*	Matrix completed by
Libraries ACT	Canberra	n/a	Senior Management staff
National Library of Australia	Canberra	418	Digital Preservation staff
National Library of New Zealand	Wellington	299	Digital Preservation staff
State Library of New South Wales	Sydney	300	Senior Management staff
Northern Territory Library	Darwin	53 (2012)	Senior Management staff
State Library of Queensland	Brisbane	233	Physical Preservation staff
State Library of South Australia	Adelaide	131	Senior Management staff
LINC Tasmania	Hobart	350	Senior Management staff
State Library of Victoria	Melbourne	286	Technology & Collection staff
State Library of Western Australia	Perth	170	Senior Management staff

Appendix B

Table 3 Statistical analysis of the current CMM ratings

Current	CMM Rating Count					Mean	Median	Mode
	1	2	3	4	5			
1. Pre-ingest activities								
What system policies and standards related to digital collecting do you have in place in your Library?	4	4	1	1	0	1.9	2	-
What system policies and standards related to digital preservation do you have in place in your Library?	6	3	1	0	0	1.5	1	1
2. Ingest								
What SIPs do you receive from producers, and how?	6	2	2	0	0	1.6	1	1
How do you validate the SIPs?	6	3	0	1	0	1.6	1	1
How do you generate AIPs from SIPs?	5	3	0	2	0	1.9	1-2	1
What metadata do you extract from AIPs or collect from other sources, and how?	6	3	0	1	0	1.6	1-2	1
3. Archival storage								
How are your AIPs stored?	5	3	1	1	0	1.8	1-2	1
What proactive measures do you take to refresh your archival media/storage?	5	3	0	2	0	1.9	1-2	1
What routine and special error checking do you perform to make sure that no components of the AIP are corrupted in archival storage or during any internal archival storage data transfers?	6	1	3	0	0	1.7	1	1
What IT disaster recovery plans and business continuity plans does your Library have in place to protect your digital assets?	3	4	2	1	0	2.1	2	2
4. Data management								
How do you store, maintain and update metadata for your Library's digital collection content?	2	6	1	1	0	2.1	2	2
How do you monitor collection status?	7	2	1	0	0	1.4	1	1
5. Administration								
How do you negotiate submission agreements and audit submissions to ensure that they meet your institution's standards?	5	2	3	0	0	1.8	1-2	1
How do you manage system configuration?	5	2	2	1	0	1.9	1-2	1
What mechanisms do you provide to restrict or allow physical access to elements of the archive, as determined by archive policies?	2	1	4	3	0	2.8	3	3
How do you establish and maintain system standards and policies?	4	2	4	0	0	2.0	2	-
6. Digital preservation planning								
How do you monitor changes in the Digital Preservation and ICT technology environments and in the designated community's service requirements and knowledge base?	7	2	1	0	0	1.4	1	1
How do you develop preservation strategies and standards?	7	1	2	0	0	1.5	1	1
How do you develop packaging designs and preservation actions plans?	7	2	1	0	0	1.4	1	1
7. Access								
How do you provide access to your data?	1	1	5	3	0	3.0	3	3
How do you assure that the user is authorised to access and receive the requested items?	1	1	7	1	0	2.8	3	3

Appendix C

Table 4 Statistical analysis of the future CMM ratings

Future	CMM Rating Count					Mean	Median	Mode
	1	2	3	4	5			
1. Pre-ingest activities								
What system policies and standards related to digital collecting do you have in place in your Library?	2	2	1	3	2	3.1	3-4	4
What system policies and standards related to digital preservation do you have in place in your Library?	3	1	2	3	1	2.8	3	-
2. Ingest								
What SIPs do you receive from producers, and how?	2	3	2	2	1	2.7	2-3	2
How do you validate the SIPs?	2	3	1	3	1	2.8	2-3	-
How do you generate AIPs from SIPs?	1	3	2	2	2	3.1	3	2
What metadata do you extract from AIPs or collect from other sources, and how?	1	3	2	3	1	3	3	2
3. Archival storage								
How are your AIPs stored?	1	4	1	2	2	3	2-3	2
What proactive measures do you take to refresh your archival media/storage?	1	4	0	2	3	3.2	4	2
What routine and special error checking do you perform to make sure that no components of the AIP are corrupted in archival storage or during any internal archival storage data transfers?	1	3	1	2	3	3.3	3-4	-
What IT disaster recovery plans and business continuity plans does your Library have in place to protect your digital assets?	0	4	1	1	4	3.5	3-4	-
4. Data management								
How do you store, maintain and update metadata for your Library's digital collection content?	0	4	2	3	1	3.1	3	2
How do you monitor collection status?	2	3	2	2	1	2.7	2-3	2
5. Administration								
How do you negotiate submission agreements and audit submissions to ensure that they meet your institution's standards?	2	3	2	2	1	2.7	2-3	2
How do you manage system configuration?	2	2	3	2	1	2.8	3	3
What mechanisms do you provide to restrict or allow physical access to elements of the archive, as determined by archive policies?	1	2	1	5	1	3.3	4	4
How do you establish and maintain system standards and policies?	2	1	2	3	2	3.2	3-4	4
6. Digital preservation planning								
How do you monitor changes in the Digital Preservation and ICT technology environments and in the designated community's service requirements and knowledge base?	2	1	4	2	1	2.9	3	3
How do you develop preservation strategies and standards?	1	2	4	2	1	3	3	3
How do you develop packaging designs and preservation actions plans?	2	2	3	2	1	2.8	3	3
7. Access								
How do you provide access to your data?	1	0	1	5	3	3.9	4	4
How do you assure that the user is authorised to access and receive the requested items?	1	1	1	4	3	3.7	4	4