# DELIVERABLE

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**Statement of originality:**

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

# Executive Summary

The E-ARK Project focuses on harmonizing currently fragmented solutions that support Archives services, especially in regard to Ingest, Archival Preservation and Dissemination of information. E-ARK solutions were tested in a series of open pilots in various national contexts, using both existing and near-to-market tools, as well as services developed by partners.

This deliverable provides the final assessment and evaluation of the pilots. Moreover, this deliverable details the technical evaluation of the tools developed within the project.

The assessment presented here is based on the Information Governance Maturity Model described in deliverable 7.5. The maturity model was based on three main sources:

(1) the Trustworthy Repository Assessment Criteria (TRAC)
(2) the Open Archival Information System (OAIS), and
(3) the Producer-Archive Interface Methodology Abstract Standard (PAIMAS/ISO20652).

The first iteration of the maturity model resulted in D7.1, which was applied to assess the E-ARK project pilots before the application of the tools being developed in the project. The results and analysis of that first assessment and evaluation is detailed in D7.2. Now this deliverable uses the information contained in D7.5 to assess the E-ARK pilots at the end of the project, after the application of the outputs of the project.

Additionally, this deliverable also details the technical evaluation of the software tools developed within the scope of the project. It also details, and provides an analysis of, the answers provided by the tool developers. It verifies whether best practices were followed during software development to ensure its sustainability and improve code quality.

The deliverable begins by introducing the concept of maturity models followed by a description of the core terms and definitions used in this domain. This is followed by a description of the assessment process used. Then, the results of the business evaluation using the maturity model are presented and each pilot results are analysed. This is followed by the technical evaluation section where the criteria for the evaluation and the results are presented for each viewpoint of this evaluation. This deliverable then provides conclusions for both the business and technical evaluation. Finally, this deliverable contains one appendix detailing the questionnaire used for the business evaluation.

The business evaluation was performed through a questionnaire that was sent to the pilot owners and was available on-line at http://earksurvey.sysresearch.org. The questionnaire was structured in a set of three sections, one for each of the dimensions of the maturity model. In each section a short description of the dimension was presented followed by the questions. The technical evaluation was available at http://earktecheval.sysresearch.org. This questionnaire contained 15 different sections, one for each of the viewpoints considered in the technical evaluation.

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# 1. Introduction

A Maturity Model consists of a number of entities, including “maturity levels” (often six) which are, from the lowest to the highest, (0) Non Existent, (1) Initial, (2) Basic, (3) Intermediate, (4) Advanced and (5) Optimizing. Any organizational process or aspect can have its own Maturity Model, which expresses quantitatively the maturity level of an organization regarding a certain aspect. A Maturity Model also is a way for organizations to see clearly what they must accomplish in order to pass to the next maturity level.

The use of maturity models is widespread and accepted, both in industry and academia. There are numerous maturity models, with at least one for each of the most trending topics in such areas as Information Technology or Information Systems. Maturity models are widely used and accepted because of their simplicity and effectiveness. They can help an organisation to understand the current level of maturity of a certain aspect in a meaningful way, so that stakeholders can clearly identify strengths to be built upon and weaknesses requiring improvement, and thus prioritise what must be done in order to reach a higher level. This can be used to show the outcomes that will result from that effort, enabling stakeholders to decide if the outcomes justify the effort.

There are several examples of maturity models currently in use. For example, in software engineering there is the classic Software Engineering Institute Capability Maturity Model Integration also known as the CMMI that has been growing in the last twenty years, already covering a set of aspects regarding products and services lifecycles. In the Information Management domain, there also several examples of maturity models such as the Gartner Enterprise Information Management Maturity Model. Other domains where maturity models can be found include management, business process management, energy management, governance and risk management, etc. The previous maturity models are already described and analysed in D7.5. where a state of the art review on maturity models was performed.

This deliverable builds on the knowledge from the maturity models that have been documented in detail in D7.5, process assessment and assessment in general and focus on assessing the maturity levels of the seven pilots of the E-ARK project:

- Pilot 1: SIP creation of relational databases (Danish National Archives);
- Pilot 2: SIP creation and ingest of records (National Archives of Norway);
- Pilot 3: Ingest from government agencies (National Archives of Estonia);
- Pilot 4: Business archives (National Archives of Estonia, Estonian Business Archives);
- Pilot 5: Preservation and access to records with geodata (National Archives of Slovenia);
- Pilot 6: Seamless integration between a live document management system and a long-term digital archiving and preservation service (KEEP SOLUTIONS);
- Pilot 7: Access to databases (National Archives of Hungary).

Additionally, this deliverable also details the technical evaluation of the software tools developed within the scope of the project. It also details the answers and an analysis of these answers provided by the tool developers. It verifies whether best practices were followed during software development to ensure its sustainability and improve code quality.

This deliverable is a continuation of the maturity development method presented in D7.5, and focuses on the three final steps of the development method which are detailed in Section 3. Also, in Section 3, the results of the business evaluation assessment are detailed and analysed. Section 4 details the technical evaluation assessment questionnaire as provides the questions and comments for each of the tool. Finally, Section 5 presents the conclusions for both the business and technical evaluation assessments. Appendix A details the self-assessment questionnaire used to perform the business evaluation.

# 2. Terms and Definitions

This section contains the definitions used throughout this deliverable. Most of the definitions come from SEI CMMI [5] due to the fact that this is one of the most detailed and formal documents containing all the definitions for maturity models and maturity models assessment.

**AIP Class:** An aggregation of AIPs that store the same type of information. AIP classes are important to understand the variety of information that is stored and also to enable correct parsing of all information stored in the Archive. *Note: Definition based on [2]*

**Assessment:** "An examination of one or more processes by a trained team of professionals using an appraisal reference model as the basis for determining, at a minimum, strengths and weaknesses." [5]

**Consumer: "**The role played by those persons, or client systems, who interact with OAIS services to find preserved information of interest and to access that information in detail. This can include other OAISes, as well as internal OAIS persons or systems." [2]

**Content Information:** "A set of information that is the original target of preservation or that includes part or all of that information. It is an Information Object composed of its Content Data Object and its Representation Information." [2]

**Descriptive Information:** "The set of information, consisting primarily of Package Descriptions, which is provided to Data Management to support the finding, ordering, and retrieving of OAIS information holdings by Consumers." [2]

**Information Governance:** "Information governance is the specification of decision rights and an accountability framework to encourage desirable behaviour in the valuation, creation, storage, use, archival and deletion of information. It includes the processes, roles, standards and metrics that ensure the effective and efficient use of information in enabling an organization to achieve its goals."[1]

**Maturity:** "The extent to which an organization has explicitly and consistently deployed processes that are documented, managed, measured, controlled, and continually improved. Organizational maturity can be measured via appraisals." [5]

**Maturity Level:** "Degree of process improvement across a predefined set of process areas in which all goals in the set are attained." [5]

**Preservation Description Information:** "The information which is necessary for adequate preservation of the Content Information and which can be categorized as Provenance, Reference, Fixity, Context, and Access Rights Information." [2]

**Process:** "A set of interrelated activities, which transform inputs into outputs, to achieve a given purpose. The terms process, sub-process and process element form a hierarchy with process as the highest, most general term, sub-processes below it, and process element as the most specific. A particular process can be called a sub-process if it is part of another larger process. It can also be called a process element if it is not decomposed into sub-processes. This definition of process is consistent with the definition of process in ISO 9000, ISO 12207, ISO 15504, and EIA 731." [32]

**Process Assessment:** "A disciplined evaluation of an organizational unit's processes against a Process Assessment Model." [6]

[1] http://blogs.gartner.com/debra_logan/2010/01/11/what-is-information-governance-and-why-is-it-so-hard/

**Producer SIP:** The Information Package submitted by the Producer. It can be transformed by the Archive into an E-ARK SIP. *Note: Definition based on [3]*

**Representation Information:** "The information that maps a Data Object onto more meaningful concepts. An example of Representation Information for a bit sequence which is a FITS file might consist of the FITS standard which defines the format plus a dictionary which defines the meaning in the file of keywords which are not part of the standard. Another example is JPEG software which is used to render a JPEG file; rendering the JPEG file as bits is not very meaningful to humans but the software, which embodies an understanding of the JPEG standard, maps the bits into pixels which can then be rendered as an image for human viewing." [2]

# 3. Business Evaluation Assessment

In order to assess the E-ARK pilots on their maturity regarding information governance, the project has adopted a self-assessment process. In this self-assessment process, a questionnaire is provided to the organization to be assessed which they complete to the best of their knowledge. Then the results are analysed by the assessment team and an assessment report is provided to the organization.

This deliverable continues the application of the maturity model development method presented in D7.5 (and reproduced on Figure 1) and focuses on the application of the maturity model on the use cases after the project pilot, i.e. the three last stages of the method.

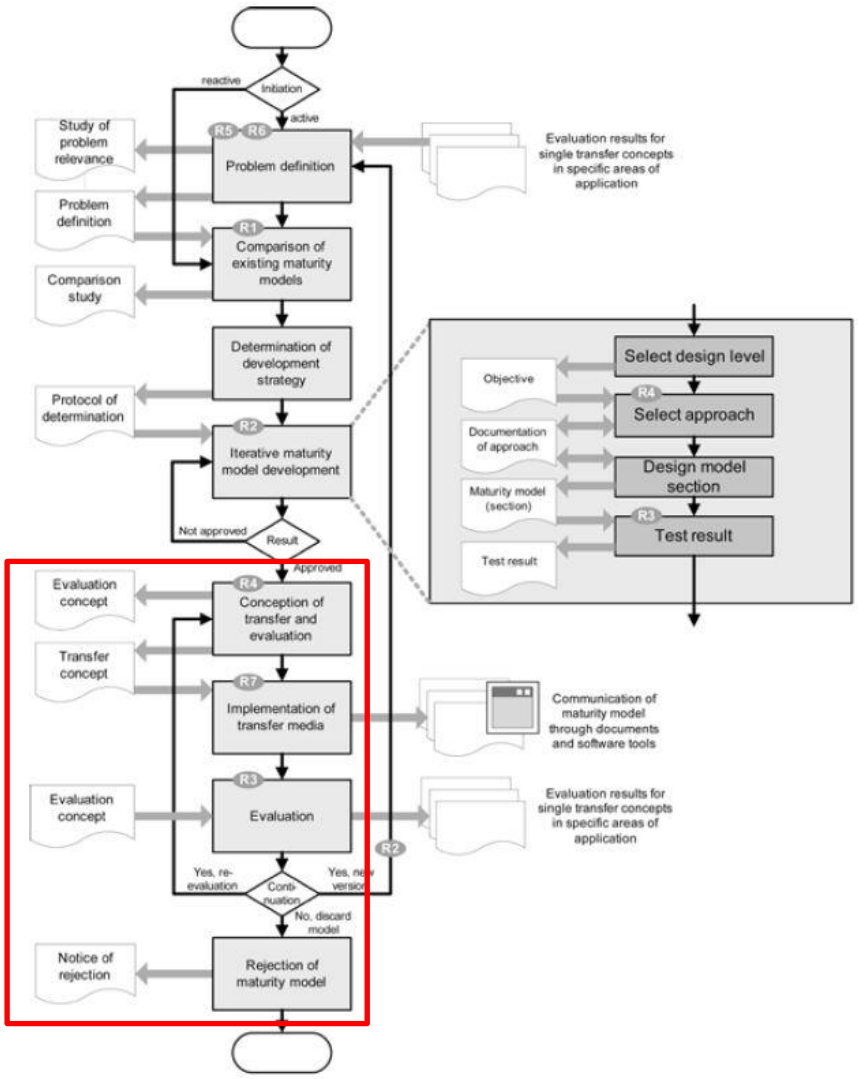


**Figure 1 - Maturity Model Design Procedure [7]**

The concept of transfer and evaluation of the maturity model was defined through the identification of the pilots' capabilities. A capability can be defined as "an ability that an organization, person, or system possesses" that typically requires a combination of "organization, people, processes, and technology" for its realization [4]. The definition of a capability must be implementation-independent, as it might be realized in different ways and measured in different levels of maturity.

The assessment of a particular dimension will then evaluate the degree of realization and performance of the people, processes, and technology that comprise that dimension. One aspect to consider is that each question is created

independent from all the others and all the questions have the same weight to the maturity level calculation. These questions are detailed in Appendix A.

For more detailed analysis for each pilot, a capability model was defined for the processes dimension. A capability can be defined as "an ability that an organization, person, or system possesses" that typically requires a combination of "organization, people, processes, and technology" for its realization [4]. The definition of a capability must be implementation-independent, as it might be realized in different ways and measured in different levels of maturity.

Pilots' capabilities were identified and analysed in D2.1., which sets out the E-ARK general pilot model and defines the purpose and processes of each pilot. Five top-level capabilities were defined: Pre-Ingest, Ingest, Archival Storage Preservation, Data Management, and Access. Table 1 depicts the defined capabilities and its corresponding abilities. As presented in the table, the pilots will have different focus and consequently will aim for different capabilities. For example, pilot 1 and 2 will focus merely on the capabilities of pre-ingest and ingest while other pilots contain the full lifecycle of pre-ingest, ingest, archival storage, data management and access.

**Table 1 - Capability Model and the Pilots**

| Capability | Pilots | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Pre-Ingest | F | F | F | F | F | F | F |
| Ingest | F | F | F | F | T | F | F |
| Archival Storage and Preservation | | T | T | T | T | F | T |
| Data Management | | | T | F | T | T | |
| Access | T | | F | F | F | F | F |

| | |
|---|---|
| F | Focus of the pilot |
| T | Elements also used/tried within the pilot |

The Pre-Ingest capability depicts the abilities to create submission information packages, encompassing the validation and enhancement of a SIP received from producers to create an E-ARK compliant SIP. The assessment of the maturity level must measure these abilities.

The Ingest capability reflects the abilities to create AIPs from the ingested SIPs. As most of the archival solutions available in the market make use of specific archival information packages, a high maturity level will include the creation of the E-ARK AIP from the E-ARK SIP. The Ingest capability also involves the ability to validate the E-ARK SIP received from pre-ingest.

The Archival Storage Preservation capability reflects the abilities to store and preserve the E-ARK AIP on the long term. As the focus of the project is particularly directed towards the processing phases surrounding the archival and preservation of data, the assessment will target the symbolic process of storing the E-ARK AIP.

The Data Management capability represents the ability to manipulate descriptive metadata, allowing the enhancement of existing E-ARK AIP, which will result in new E-ARK AIP.

Finally, the Access capability comprises the abilities to create the DIP, either on a local format or as E-ARK DIP, either on a pre-defined manner (defined as "standard" in the D2.1), where the consumer accesses the requested data, or by special request producing a DIP in a local format or as E-ARK DIP, both produced using sophisticated analysis and presentation tools.

Based on these capabilities definition the processes dimension can be divided into five sections, that identify each capability:

(1) Pre-Ingest,
(2) Ingest,
(3) Archival Storage and Preservation,
(4) Data Management, and
(5) Access.

A detailed analysis of these capabilities will be provided below. This will also compare the results of the initial assessment with the ones of the final assessment, with aim of identifying improvements in these capabilities.

The questionnaire is comprised of three dimensions which are detailed in the D7.5, each of which contains a set of questions. Each question is detailed with the following fields:

1. **ID:** Identifies the number of the question in the overall questionnaire;
2. **Title:** Depicts the main topic the question refers to;
3. **Question:** Details the question itself;
4. **Objective:** Details the objective of that question, what knowledge the question intends to capture;
5. **Notes:** This either clarifies some aspects and/or terms of the question, or details examples of evidence to substantiate the answer for the question;
6. **Terms:** Identifies the terms that are detailed in EVOC. EVOC is the vocabulary manager which makes part of the knowledge centre being developed in work package 7, as part of D7.3 and D7.4;
7. **Answers:** Depicts the five possible answers to the question.
8. **Comment:** A field for respondents to put comments that can be used to substantiate their answer.

The questionnaire introduction provides details on the purpose of the questionnaire, how it will be analysed, and clarifies concepts being used. Appendix A provides a copy of the questionnaire that was presented to the respondents. This consists of a set of questions used to determine the maturity levels of the E-ARK pilots for each of the three dimensions of A2MIGO.

For each question, there is a field that respondents can use to provide additional comments, clarifications or a justification for their answer. These comments are considered by the assessment team when evaluating the answers.

The questionnaire was sent to the pilot owners and was available on-line at http://earksurvey.sysresearch.org. The questionnaire was presented in a set of four tabs, one for each of the dimensions of the maturity model and one for general questions that are used to assess maturity levels 4 and 5 of the other dimensions. Then in each tab a short description of the dimension is presented followed by the questions, objective, notes, terms, answers and a field for comments (shown in Figure 2).

The questionnaire used repeatedly the following concepts:

- Yes, **before the E-ARK project**. Means that specific capability was already available in the organization before the E-ARK project.
- Yes, **after the E-ARK project**. Means that specific capability was made available after the application of the tools developed in the E-ARK project.

This section details the analysis of the results for each of the E-ARK pilots. For each pilot the following is provided:

1. The answer provided for each question;
2. The comments provided in each question, in case there is a comment;
3. The weak points, aspects that should be considered for improvement;
4. The maturity level for each of the dimensions of the questionnaire;

5. An analysis on the percentages of questions answered as “yes” for each dimension and the delta between the initial and the final assessment;
6. Statistics on the results, such as, population size, variance, standard deviation and confidence interval with a confidence level of 95% calculated with a normal distribution for processes dimension (as population size is ≥30) and a t-distribution for management and infrastructure dimension (as population size is <30);
7. A detailed analysis of the improvements on the processes dimension according to the capability model detailed before in this section.

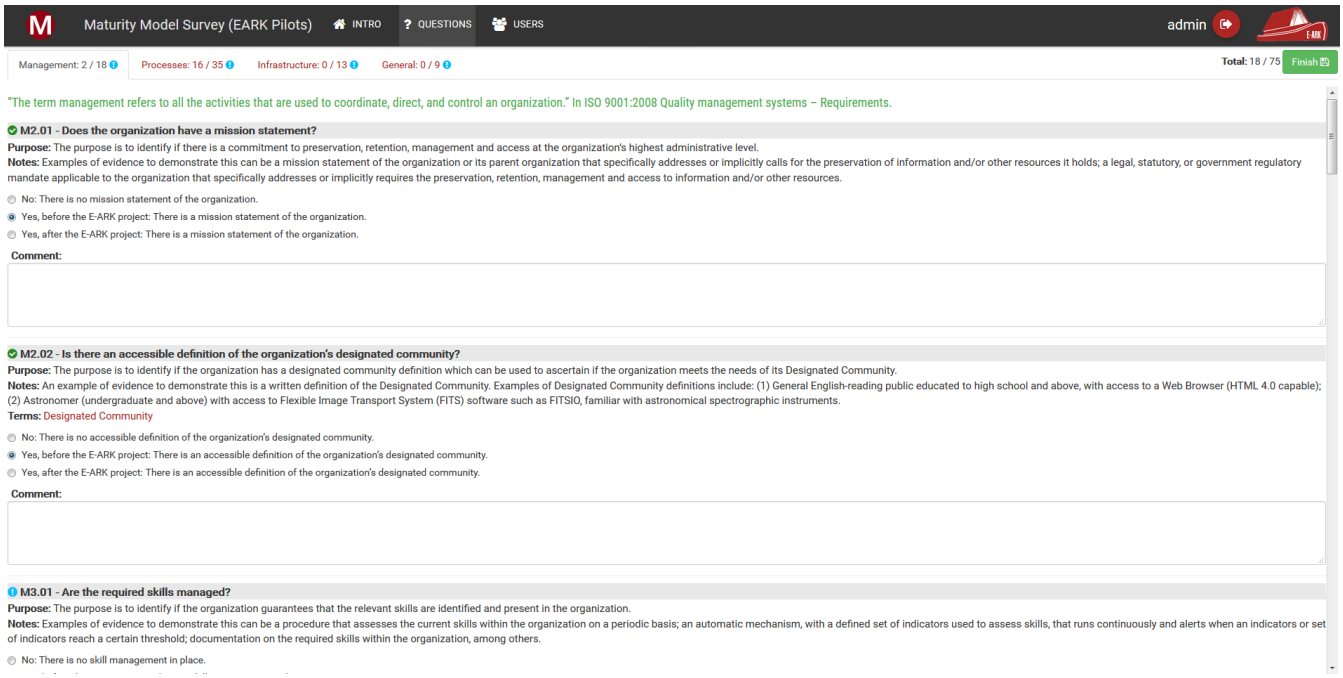


**Figure 2 - On-line Self-Assessment Questionnaire**

In the conclusion of this deliverable there is a comparison and analysis between the pilots, regarding the findings of the self-assessment. Table 2 details the answers provided to each question by each pilot, as well as, the calculated maturity level for each of the dimensions of the questionnaire. In Table 2, ‘YA’ means “Yes, after the E-ARK project”, ‘YB’ means “Yes, before the E-ARK project”, and ‘N’ means “No”. For the Processes Dimension, Pilot’s capabilities were identified through the analysis of deliverable 2.1., which details the E-ARK general pilot model and defines the purpose and processes of each pilot. As presented in Table 2, the pilots have different focus which are depicted in blue and will also use/try certain elements which are depicted in red for the processes dimension.

**Table 2 - Final Results of the Answers for All Pilots**

| ID | Dimension / Criterion | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|---|
| **Management** | | **4** | **2** | **4** | **2** | **4** | **1** | **1** |
| M2.1 | Mission Statement | YB | YB | YB | N | YB | N | N |
| M2.2 | Designated Community Definition | YB | N | YB | N | YB | N | N |
| M3.1 | Skills | YB | N | YB | N | N | N | N |
| M3.2 | Training Plan | YB | N | N | YB | YB | N | N |
| M3.3 | Knowledge Sharing | YB | N | YB | YB | YB | N | N |
| M3.4 | Certification Plan | N | N | N | N | YB | N | N |
| M3.5 | Compliance with Relevant Standards | YB | YB | YB | N | YB | N | YB |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| M3.6 | Preservation Strategic Plan | YB | YB | YB | YB | YB | N | N |
| M3.7 | History of the Changes to Procedures and Operations | YB | N | YB | YB | YB | N | N |
| M3.8 | Transparency and Accountability | YB | N | YB | YB | YB | N | YB |
| M3.9 | Financial Practices and Procedures | YB | YB | YB | YB | YB | N | YB |
| M3.10 | Financial risk, benefit, investment, and expenditure | YB | N | YB | YB | N | N | YB |
| M3.11 | Change Management Process | YB | N | YB | YB | YB | N | N |
| M3.12 | Contracts and deposit agreements | YB | YB | YB | N | YB | N | YB |
| M4.1 | Business Planning Processes | YB | YB | YB | YB | YB | N | N |
| M4.2 | Critical Processes | YB | N | YB | YB | N | N | N |
| M5.1 | Continuous improvement | YB | N | YB | N | YB | N | N |
| M5.2 | Organization recognition among the community | YB | N | YB | YB | YB | N | YA |
| **Processes** | | **4** | **2** | **4** | **1** | **3** | **3** | **4** |
| | **Pre-Ingest** | | | | | | | |
| P2.1 | Deposit Terms Negotiation | YB | YA | YA | N | YA | N | YA |
| P3.1 | Producer SIP Validation | YB | YA | YA | N | YA | YA | YA |
| P3.2 | Provenance verification procedures | YA | N | YA | N | YB | N | YB |
| P3.3 | Enhancement of the Producer SIP | YB | YA | YA | N | N | YA | YA |
| | **Ingest** | | | | | | | |
| P2.2 | Ingest Producer/depositor responses | YB | YB | YB | N | YB | YA | YA |
| P2.3 | AIP generation procedure | YA | YA | YB | N | YB | YB | YA |
| P2.4 | AIP unique identifiers convention | YB | N | YA | N | YB | YB | YA |
| P3.4 | Management of units of description | YA | N | YB | N | YB | YB | YA |
| P3.5 | Ingest SIP verification mechanisms | YB | YA | YB | N | YB | YA | YA |
| P3.6 | Ingest actions and administration processes records | YB | YB | YB | N | YB | YA | YB |
| P3.7 | Legal Rights | YA | YA | YB | YA | YB | N | YA |
| P3.8 | SIP final disposition documentation | YA | N | YA | N | N | YA | YB |
| P3.9 | AIP parsing | YB | N | YA | N | N | YA | YB |
| P3.10 | Preservation Description Information (PDI) acquiring procedures (from a SIP) | YB | YA | YA | N | N | YA | YB |
| P3.11 | Preservation Description Information (PDI) maintaining procedures | YB | N | YA | YA | YB | YA | YB |
| P3.12 | AIP content information testing procedure | N | N | N | N | YB | YB | N |
| P3.13 | AIP completeness and correctness | YB | YA | YA | N | YB | YA | YA |
| P3.14 | AIP creation records | N | YB | YA | YB | YB | YA | YA |
| | **Archival Storage and Preservation** | | | | | | | |
| P2.5 | AIP Storage Procedures | YB | YB | YB | N | YB | YA | YA |
| P2.6 | AIP actions records | YB | YB | YB | N | YB | YB | YB |
| P2.7 | AIP Linking/resolution services | YB | N | YB | N | YB | YB | YB |
| P3.15 | AIP integrity monitoring | YB | YB | YB | N | YB | YA | YB |
| P3.16 | AIP Designated Community Requirements | N | N | YB | N | N | N | N |
| P3.17 | Independent mechanism for content integrity checking | YA | N | YB | N | YB | YA | YB |
| P3.18 | Tools and resources to provide representation information | YB | N | YB | N | YB | YA | YB |
| | **Data Management** | | | | | | | |
| P3.19 | Designated Community information requirements | YA | YB | YB | YA | YA | YA | YB |
| P3.20 | Descriptive information association with the AIP | YB | YB | YB | N | YB | YA | YB |
| P3.21 | Bi-directional linkage between the AIP and descriptive information | YA | N | YA | N | YA | YA | YB |
| | **Access** | | | | | | | |
| P2.8 | Creation of a DIP | YB | N | YB | N | YB | YA | YB |
| P3.22 | Access policies | YB | N | YB | YB | YA | YB | YA |
| P3.23 | Access policies compliance | YB | N | YB | YA | YA | YA | YA |
| P3.24 | Access failures and errors | YB | N | YB | N | N | YA | N |
| P3.25 | Access Data Reports | YB | N | YB | N | YA | YA | YA |
| P3.26 | Access Data Problem/Error Reports | YB | N | YA | N | N | N | N |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| P3.27 | Access Policies and Procedures | YB | N | YA | N | N | N | YA |
| **Infrastructure** | | **5** | **2** | **4** | **4** | **2** | **2** | **3** |
| I2.1 | Archival infrastructure management | YB | N | YB | YB | YA | N | YA |
| I2.2 | Information Objects Location and Quantity | YB | N | YB | YB | N | YA | YA |
| I2.3 | Synchronization Mechanisms | YB | N | YB | YB | N | YA | YB |
| I3.1 | Infrastructure changes | YB | YB | YB | YB | YB | N | N |
| I3.2 | Infrastructure security procedures | YB | YB | YB | YB | N | N | YA |
| I3.3 | Technology watches/monitoring | YB | N | YB | YB | N | YA | N |
| I3.4 | Infrastructure risk management process | YB | N | YB | YB | N | YA | N |
| I3.5 | Disaster preparedness and recovery plan | YB | N | YB | YB | YB | N | YB |
| I3.5 | History of the Changes to Software and Hardware | YB | YB | YB | YB | YB | N | N |
| I3.7 | Preservation Policies | YB | YB | YB | N | YB | N | N |
| I3.8 | Information Integrity Measurements | YB | YB | YB | YB | YB | YB | YB |
| I3.9 | Intellectual Property Rights and Restrictions | YB | YB | YB | | YB | N | YB |
| I4.1 | Infrastructure performance | YB | YB | YB | | N | YB | YB |

Table 3 details the answers provided to each question by each pilot for the general category. The general category details the aspects that are taken into consideration when assessing the maturity levels 4 and 5 of all the dimensions of the A2MIGO. These aspects were considered when calculating the maturity levels in Table 2.

**Table 3 - Final Results of the 'General' Category Answers for All Pilots**

| Q | Criterion | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|---|---|---|---|---|---|---|---|---|
| G4.1 | Process quality and performance objectives | YB | N | YB | YB | N | N | N |
| G4.2 | Measures and analytic techniques for quantitative management | YB | N | YB | N | N | N | N |
| G4.3 | Process Performance Analysis | YB | N | YB | N | N | N | N |
| G4.4 | Process Performance Baselines | YB | N | YB | N | N | N | N |
| G5.1 | Potential Areas for Improvement | YB | N | YA | YB | N | N | N |
| G5.2 | Select and Implement Improvements | YB | N | N | YB | N | N | N |
| G5.3 | Improvement Effects Evaluation | YB | N | N | YB | N | N | N |
| G5.4 | Determine Causes of Selected Outcomes | YB | N | YB | N | N | YA | N |
| G5.5 | Address Causes of Selected Outcomes | YB | N | N | N | N | YA | N |

Note that the maturity model developed in D7.5 is intended for self-assessment. Therefore, each criterion has a specific assigned level corresponding to the maturity level definition. Consequently, an organization can only be on a specific level if it meets the criterion for the previous level. The idea is that organizations can identify and develop an improvement path. The goal in this deliverable is to assess the pilots with regards to their improvement before and after the deployment of e-ark outputs. Therefore, the maturity level is calculated differently by using a weighted distribution of points. Consequently, the maturity level where calculated represents the maturity with regards to the number of criterion met, i.e. the order by which the criterion is obtained in the organization is not considered in the result. Additionally, to align with E-ARK project focus, criterion of maturity level 2 and 3 have the most weight.

Table 4 contains the weights that each maturity level has in the calculation of the maturity levels for each dimension. The weight is defined by the distribution of a 20-point scale. For example, level 2 has the higher weight since it is worth 9 out of 20 points. Each level has an associated point threshold, i.e. to be in a specific level, the organization needs to have at least the number of points defined by the threshold. To accommodate the fact that levels have different numbers of questions, the points per question (awarded for answering “Yes” to a question) were calculated by dividing the number of points the level is worth by the number of questions. For example, the infrastructure dimension has 3

questions associated with level 2 so each of those questions is worth 3 points – the value of the level 2 (9 out of 20) divided by the number of questions in that level (3).

**Table 4 - Calculation weights for each maturity level**

| Level | Threshold (0-20) | Points (0-20) | Number of Questions Per Level | | | Points Per Question | | |
|---|---|---|---|---|---|---|---|---|
| | | | Infrastructure | Management | Processes | Infrastructure | Management | Processes |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 5 | 9 | 3 | 2 | 8 | 3 | 4,5 | 1,2 |
| 3 | 10 | 8 | 9 | 12 | 27 | 0,9 | 0,7 | 0,3 |
| 4 | 15 | 2 | 5 | 6 | 4 | 0,4 | 0,4 | 0,5 |
| 5 | 20 | 1 | 5 | 7 | 5 | 0,2 | 0,2 | 0,2 |

# 1. Pilot 1: SIP creation of relational databases (Danish National Archives)

This section details the comments provided for the pilot 1, as well as, an analysis of the results and weak points. It also depicts the distribution of maturity levels for each of the dimensions of the questionnaire for pilot 1. The results of the assessment are depicted in Figure 3, these results were calculated using the weights detailed in Table 4.

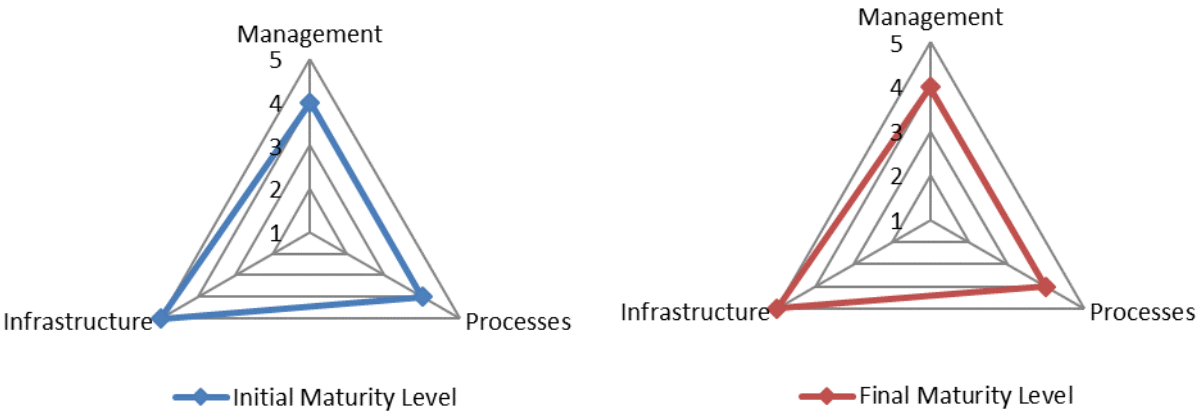


**Figure 3 - Pilot 1 Final Maturity Level Results**

Figure 3 shows that the calculated maturity levels for this pilot range from 4 to 5 before the use of the project outputs. After the use of the project outputs the maturity levels remained the same. However, to fully detect the improvements for this pilot further analysis must be performed.

Despite being at maturity level 4 for the management dimension there are still aspects to enhance (as shown in Table 5), namely the aspects at maturity level 3 were there are still 8% of the criteria not achieved by this pilot which means that there is one criterion not achieved (M3.4).

The processes dimension achieved maturity level 4. By analysing the percentages in Table 5 there is an improvement in the criteria for maturity level 2 which in the initial assessment was at 88% and now in the final assessment is at 100% means that all the criteria for maturity level 2 is now in place. There was also an improvement in maturity level 3 for the processes dimension with a delta of +26%. However, there is still room for improvement in order to be compliant with all the criteria of maturity level 3.

Finally, for the Infrastructure dimension, pilot 1 was already at maturity level 5 with all the criteria met for all maturity levels in the initial assessment. As a result, the maturity level was maintained in the final assessment and no improvement was identified.

**Table 5 - Maturity Level Distribution and Statistics for Each Dimension of Pilot 1**

| Dimension | Maturity Level 2 | | | Maturity Level 3 | | | Maturity Level 4 | | | Maturity Level 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Initial | Final | Delta | Initial | Final | Delta | Initial | Final | Delta | Initial | Final | Delta |
| Management | 100% | 100% | 0% | 92% | 92% | 0% | 100% | 100% | 0% | 100% | 100% | 0% |
| Processes | 88% | 100% | +12% | 63% | 89% | +26% | 100% | 100% | 0% | 100% | 100% | 0% |
| Infrastructure | 100% | 100% | 0% | 100% | 100% | 0% | 100% | 100% | 0% | 100% | 100% | 0% |

**Table 6 – Pilot 1 Maturity Levels confidence intervals calculation**

| Dimension | Population Size | Total Points | | Mean | | Variance | | Standard Deviation | | Confidence Interval (95%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Initial | Final | Initial | Final | Initial | Final | Initial | Final | Initial | Final |
| Management | 22 | 19,33 | 19,33 | 0,33 | 0,33 | 1,19 | 1,19 | 1,09 | 1,09 | ±0,43 | ±0,43 |
| Processes | 27 | 15,91 | 19,11 | 0,29 | 0,29 | 0,13 | 0,11 | 0,36 | 0,34 | ±0,10 | ±0,10 |
| Infrastructure | 44 | 20 | 20 | 0,88 | 0,88 | 0,76 | 0,76 | 0,87 | 0,87 | ±0,38 | ±0,38 |

Figure 4 details the points that pilot 1 achieved for each dimension. The management and infrastructure dimensions achieved the highest results which in turn resulted in a higher maturity level. The confidence intervals (Table 6) indicate the level of uncertainty about each value on the graph. Longer or wider intervals mean more uncertainty. When two intervals for the same dimension do not overlap, it is certain that there has been a high degree of improvement between the initial and final assessments.

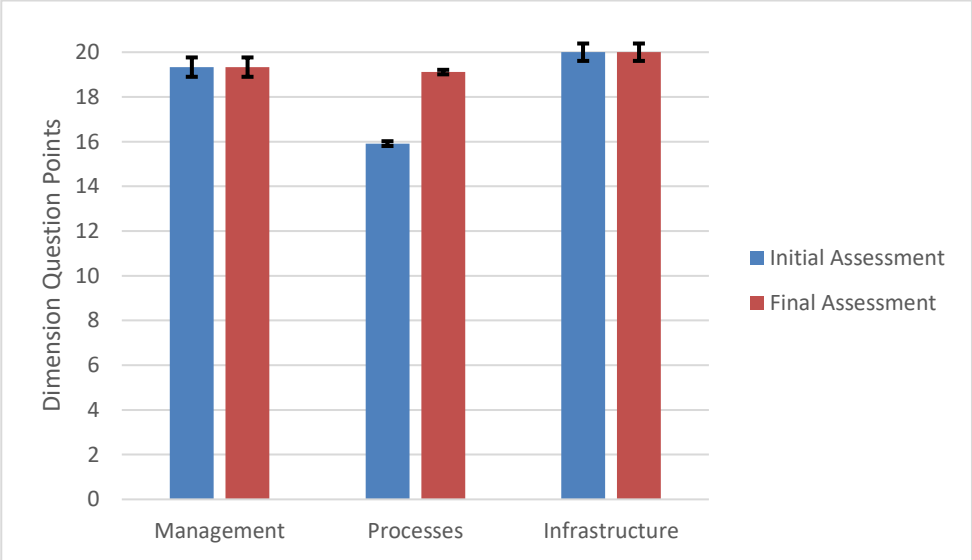


**Figure 4 - Pilot 1 Question Points for Each Dimension and Confidence Intervals**

Table 7 details the improvements in the answers for the processes dimension. As detailed in the beginning of section 3, the colour blue means that a specific criterion is considered a focus for improvement for pilot 1, the colour red means that although is a not a focus it is an aspect to be used or tried in the pilot. The column result depicts if there has been an improvement in the answer provided from the initial to the final assessment or if the answer maintained the same.

As can be seen there is improvement in the criteria for the focus capabilities of pilot 1. There are four criteria in which there was improvement, namely P3.2, P3.4, P3.7 and P3.8. However, there are two criteria in the focus capabilities in which there was no improvement, namely P3.12 and P3.14. There were also other improvements in capabilities that were not the focus of this pilot, such as, P3.17, P3.19 and P3.21.

**Table 7 - Processes Dimension Improvements Detailed Analysis for Pilot 1**

| ID | Capability / Criterion | Initial Assessment | Final Assessment | Result | Improvement |
|---|---|---|---|---|---|
| **Pre-Ingest** | | | | | |
| P2.1 | Deposit Terms Negotiation | Y | Y | Maintained | 25% |
| P3.1 | Producer SIP Validation | Y | Y | Maintained | |
| P3.2 | Provenance verification procedures | N | Y | Improved | |
| P3.3 | Enhancement of the Producer SIP | Y | Y | Maintained | |
| **Ingest** | | | | | |
| P2.2 | Ingest Producer/depositor responses | Y | Y | Maintained | 21% |
| P2.3 | AIP generation procedure | Y | Y | Maintained | |
| P2.4 | AIP unique identifiers convention | Y | Y | Maintained | |
| P3.4 | Management of units of description | N | Y | Improved | |
| P3.5 | Ingest SIP verification mechanisms | Y | Y | Maintained | |
| P3.6 | Ingest actions and administration processes records | Y | Y | Maintained | |
| P3.7 | Legal Rights | N | Y | Improved | |
| P3.8 | SIP final disposition documentation | N | Y | Improved | |
| P3.9 | AIP parsing | Y | Y | Maintained | |
| P3.10 | Preservation Description Information (PDI) acquiring procedures (from a SIP) | Y | Y | Maintained | |
| P3.11 | Preservation Description Information (PDI) maintaining procedures | Y | Y | Maintained | |
| P3.12 | AIP content information testing procedure | N | N | No Improvement | |
| P3.13 | AIP completeness and correctness | Y | Y | Maintained | |
| P3.14 | AIP creation records | N | N | No Improvement | |
| **Archival Storage and Preservation** | | | | | |
| P2.5 | AIP Storage Procedures | Y | Y | Maintained | 14% |
| P2.6 | AIP actions records | Y | Y | Maintained | |
| P2.7 | AIP Linking/resolution services | Y | Y | Maintained | |
| P3.15 | AIP integrity monitoring | Y | Y | Maintained | |
| P3.16 | AIP Designated Community Requirements | N | N | No Improvement | |
| P3.17 | Independent mechanism for content integrity checking | N | Y | Improved | |
| P3.18 | Tools and resources to provide representation information | Y | Y | Maintained | |
| **Data Management** | | | | | |
| P3.19 | Designated Community information requirements | N | Y | Improved | 66% |
| P3.20 | Descriptive information association with the AIP | Y | Y | Maintained | |
| P3.21 | Bi-directional linkage between the AIP and descriptive information | N | Y | Improved | |
| **Access** | | | | | |
| P2.8 | Creation of a DIP | Y | Y | Maintained | 0% |
| P3.22 | Access policies | Y | Y | Maintained | |
| P3.23 | Access policies compliance | Y | Y | Maintained | |
| P3.24 | Access failures and errors | Y | Y | Maintained | |
| P3.25 | Access Data Reports | Y | Y | Maintained | |
| P3.26 | Access Data Problem/Error Reports | Y | Y | Maintained | |
| P3.27 | Access Policies and Procedures | Y | Y | Maintained | |

There were four weak points found in the self-assessment. Weak points are answers that show that there is a lower maturity level on a specific question and that hinder the achievement of a higher maturity level for that dimension of the self-assessment, according to a stages approach where the criteria for a certain maturity level must all be in place for achieving that maturity level.

- **Dimension: Management / Question: M3.4 / Maturity Level: 3 –** This question is related to the certification plan. The answer provided shows that there is no certification plan in place. Standards certification can be used to certify that the processes and procedures implemented in the organization are aligned with best practice, relevant, efficient or effective. They are also a means for potential customers or funders to have a certain degree of confidence in the organization. This is the only question for maturity level 3 which has a negative answer in

the management dimension which inhibits this organization from achieving maturity level 5 for the management dimension and as such it should be addressed.

- **Dimension: Processes / Question: P3.12 / Maturity Level: 3 –** This question is related to the AIP content information testing procedure. The answer provided shows that there is no procedure for testing if the content information of the AIP at its creation is understandable by the designated communities. Together with questions P3.14 and P3.16 these are the only questions for the maturity level 3 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 5 for the processes dimension and as such it should be addressed.
- **Dimension: Processes / Question: P3.14 / Maturity Level: 3 –** This question is related to the AIP creation records. The answer provided shows that the Ingest process does not produce records, according to their legal and regulatory environment, to serve as evidence of the actions performed to create an AIP. This aspect is relevant as to ensure that nothing is omitted from AIP records which might be needed to verify that all AIP have been properly created and in accordance with the documented procedures. Together with questions P3.12 and P3.16 these are the only questions for the maturity level 3 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 5 for the processes dimension and as such it should be addressed.
- **Dimension: Processes / Question: P3.16 / Maturity Level: 3 -** This question is related to AIP Designated Community Requirements. The answer provided shows that there is no procedure to gather and review the AIP requirements from the designated community. Together with questions P3.12 and P3.14 these are the only questions for the maturity level 3 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 5 for the processes dimension and as such it should be addressed.

Table 8 details the comments provided by pilot 1 to the self-assessment questionnaire. It only presents comments that complement the answer provided.

**Table 8 - Pilot 1 Comments**

| Processes | |
|---|---|
| **Question** | **Comment** |
| P2.3 | Currently SIP and AIP are identical. We are in the privileged situation that we can make requirements for SIP delivering parties. |
| P2.8 | But it is highly manual. |
| P3.14 | As mentioned earlier our current SIP format also functions as AIP so there are no actions performed to create an AIP. |

## 3.1. Pilot 2: SIP creation and ingest of records (National Archives of Norway)

This section details the comments provided for the pilot 2, as well as, an analysis of the results and weak points. It also depicts the distribution of maturity levels for each of the dimensions of the questionnaire for pilot 2. The results of the assessment are depicted in Figure 5, these results were calculated using the weights detailed in Table 4.

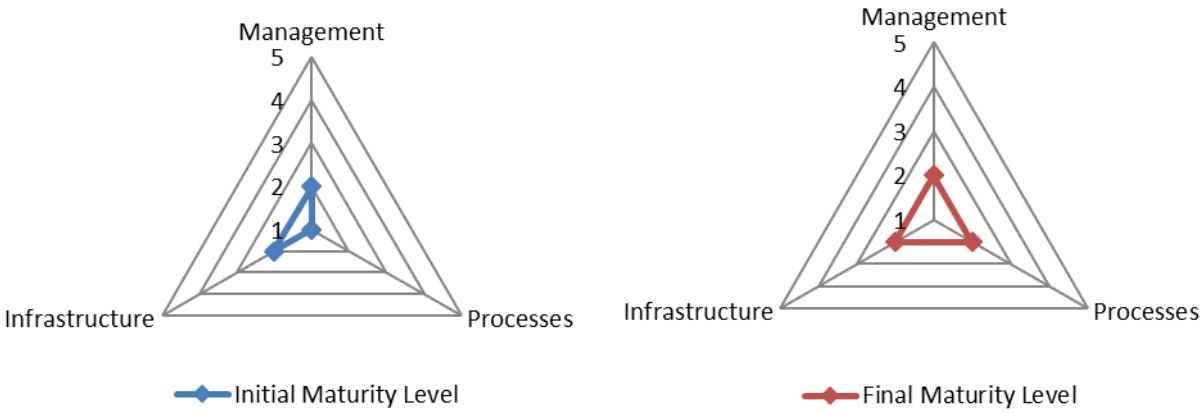


**Figure 5 - Pilot 2 Final Maturity Level Results**

Figure 5 shows that the calculated maturity levels for this pilot range from 1 to 2 before the use of the project outputs. After the use of the project outputs the maturity levels remained the same for the management and infrastructure dimensions and there is an improvement in the processes dimension which is now at maturity level 2. However, to fully detect the improvements for this pilot further analysis must be performed.

The management dimension maintained the maturity level 2 from the initial to the final assessment. There is no improvement detected even when analysing the percentages for each maturity level for this dimension. Pilot 2 should focus its improvement efforts in improving the criteria for maturity level 2 towards achieving 100% of criteria met.

There is a different picture for the processes dimension. In maturity level 2 there is an improvement from 38% to 63% which means there is a delta of +25%. Moreover, there is also improvement in the criteria for maturity level 3 from 19% to 41% with a delta of +22%. As such pilot 2 should also focus its improvement efforts in being compliant with the criteria at maturity level 2.

Finally, the infrastructure dimension maintained the maturity level 2 from the initial to the final assessment. There is no improvement detected even when analysing the percentages for each maturity level for this dimension. Pilot 2 should focus its improvement efforts in improving the criteria for maturity level 2 towards achieving 100% of criteria met.

**Table 9 - Maturity Level Distribution and Statistics for Each Dimension of Pilot 2**

| Dimension | Maturity Level 2 | | | Maturity Level 3 | | | Maturity Level 4 | | | Maturity Level 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Initial | Final | Delta | Initial | Final | Delta | Initial | Final | Delta | Initial | Final | Delta |
| Management | 50% | 50% | 0% | 34% | 34% | 0% | 17% | 17% | 0% | 0% | 0% | 0% |
| Processes | 38% | 63% | +25% | 19% | 41% | +22% | 0% | 0% | 0% | 0% | 0% | 0% |
| Infrastructure | 0% | 0% | 0% | 67% | 67% | 0% | 20% | 20% | 0% | 0% | 0% | 0% |

**Table 10 – Pilot 2 Maturity Levels confidence intervals calculation**

| Dimension | Population Size | Total Points | | Mean | | Variance | | Standard Deviation | | Confidence Interval (95%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Initial | Final | Initial | Final | Initial | Final | Initial | Final | Initial | Final |
| Management | 22 | 7,5 | 7,5 | 0 | 0 | 0,74 | 0,74 | 0,86 | 0,86 | ±0,34 | ±0,34 |
| Processes | 27 | 4,85 | 8,88 | 0 | 0 | 0,08 | 0,12 | 0,28 | 0,35 | ±0,08 | ±0,10 |
| Infrastructure | 44 | 5,73 | 5,73 | 0 | 0 | 0,15 | 0,15 | 0,39 | 0,39 | ±0,17 | ±0,17 |

Figure 6 details the points that pilot 2 achieved for each dimension. The management and processes dimensions achieved the highest pints which in turn resulted in a higher maturity level. The confidence intervals (Table 10) indicate the level of uncertainty about each value on the graph. Longer or wider intervals mean more uncertainty. When two intervals for the same dimension do not overlap, it is certain that there has been a high degree of improvement between the initial and final assessments.

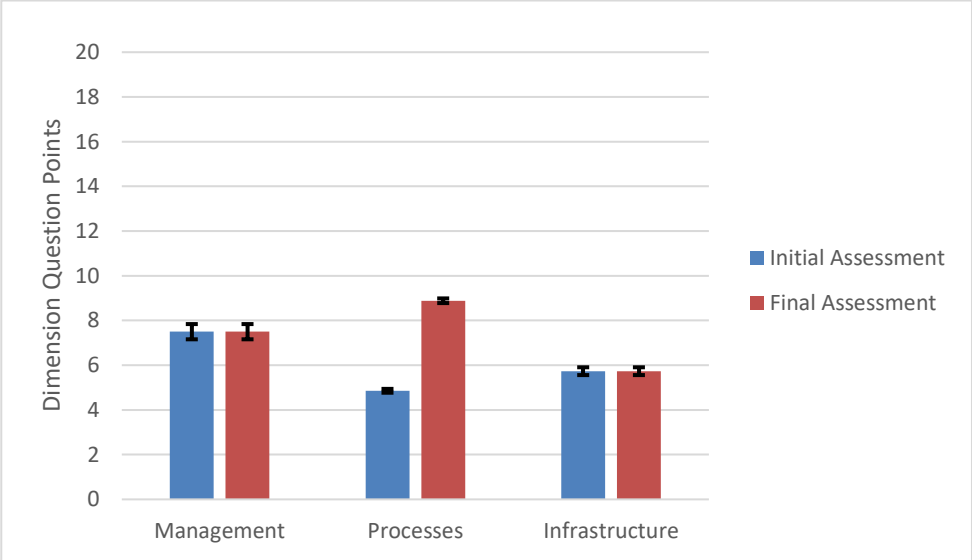


**Figure 6 - Pilot 2 Question Points for Each Dimension and Confidence Intervals**

Table 11 details the improvements in the answers for the processes dimension. As detailed in the beginning of section 3, the colour blue means that a specific criterion is considered a focus for improvement for pilot 2, the colour red means that although is a not a focus it is an aspect to be used or tried in the pilot. The column result depicts if there has been an improvement in the answer provided from the initial to the final assessment or if the answer maintained the same.

As can be seen there is improvement in the criteria for the focus capabilities of pilot 2. There are three improvements in the pre-ingest and five in the ingest capabilities which are the focus capabilities for this pilot. Despite this fact, there are also seven criteria in which there is no improvement, one in the pre-ingest and six in the ingest capabilities.

**Table 11 - Processes Dimension Improvements Detailed Analysis for Pilot 2**

| ID | Capability / Criterion | Initial Assessment | Final Assessment | Result | Improvement |
|---|---|---|---|---|---|
| **Pre-Ingest** | | | | | |
| P2.1 | Deposit Terms Negotiation | N | Y | Improved | 75% |
| P3.1 | Producer SIP Validation | N | Y | Improved | |
| P3.2 | Provenance verification procedures | N | N | No Improvement | |
| P3.3 | Enhancement of the Producer SIP | N | Y | Improved | |
| **Ingest** | | | | | |
| P2.2 | Ingest Producer/depositor responses | Y | Y | Maintained | 35% |
| P2.3 | AIP generation procedure | N | Y | Improved | |
| P2.4 | AIP unique identifiers convention | N | N | No Improvement | |
| P3.4 | Management of units of description | N | N | No Improvement | |
| P3.5 | Ingest SIP verification mechanisms | N | Y | Improved | |
| P3.6 | Ingest actions and administration processes records | Y | Y | Maintained | |
| P3.7 | Legal Rights | N | Y | Improved | |
| P3.8 | SIP final disposition documentation | N | N | No Improvement | |
| P3.9 | AIP parsing | N | N | No Improvement | |
| P3.10 | Preservation Description Information (PDI) acquiring procedures (from a SIP) | N | Y | Improved | |
| P3.11 | Preservation Description Information (PDI) maintaining procedures | N | N | No Improvement | |
| P3.12 | AIP content information testing procedure | N | N | No Improvement | |
| P3.13 | AIP completeness and correctness | N | Y | Improved | |
| P3.14 | AIP creation records | Y | Y | Maintained | |
| **Archival Storage and Preservation** | | | | | |
| P2.5 | AIP Storage Procedures | Y | Y | Maintained | 0% |
| P2.6 | AIP actions records | Y | Y | Maintained | |
| P2.7 | AIP Linking/resolution services | N | N | No Improvement | |
| P3.15 | AIP integrity monitoring | Y | Y | Maintained | |
| P3.16 | AIP Designated Community Requirements | N | N | No Improvement | |
| P3.17 | Independent mechanism for content integrity checking | N | N | No Improvement | |
| P3.18 | Tools and resources to provide representation information | N | N | No Improvement | |
| **Data Management** | | | | | |
| P3.19 | Designated Community information requirements | Y | Y | Maintained | 0% |
| P3.20 | Descriptive information association with the AIP | Y | Y | Maintained | |
| P3.21 | Bi-directional linkage between the AIP and descriptive information | N | N | No Improvement | |
| **Access** | | | | | |
| P2.8 | Creation of a DIP | N | N | No Improvement | 0% |
| P3.22 | Access policies | N | N | No Improvement | |
| P3.23 | Access policies compliance | N | N | No Improvement | |
| P3.24 | Access failures and errors | N | N | No Improvement | |
| P3.25 | Access Data Reports | N | N | No Improvement | |
| P3.26 | Access Data Problem/Error Reports | N | N | No Improvement | |
| P3.27 | Access Policies and Procedures | N | N | No Improvement | |

There were four weak points found in the self-assessment. Weak points are answers that show that there is a lower maturity level on a specific question and that hinder the achievement of a higher maturity level for that dimension of the self-assessment, according to a stages approach where the criteria for a certain maturity level must all be in place for achieving that maturity level.

- **Dimension: Management / Question: M2.2 / Maturity Level: 2 –** This question is related to the Designated Community Definition. The answered provided shows that there is no accessible definition of the organization's designated community. This aspect is relevant as to verify if the organization meets the needs of its Designated Community. This is the only question for maturity level 2 which has a negative answer in the management

dimension which inhibits this organization from achieving maturity level 2 for the management dimension and as such it should be addressed.

- **Dimension: Processes / Question: P2.4 / Maturity Level: 2 –** This question is related to the AIP unique identifiers convention. The answered provided shows that there is no procedure to generate and manage persistent and unique identifiers for an AIP. This aspect is relevant as it ensures that an AIP can be distinguished from all other AIP in the repository. Understand if the organization has records that detail how changes to unique identifiers are to be performed so that AIP don't lose context, are not lost and can be distinguished from all other AIP in the repository. Together with questions P2.7 and P2.8 these are the only questions for the maturity level 2 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 2 for the processes dimension and as such it should be addressed.
- **Dimension: Processes / Question: P2.7 / Maturity Level: 2 –** This question is related to the AIP Linking/resolution services. The answered provided shows that there is no system of reliable linking/resolution services to find a uniquely identified object, regardless of its physical location. This aspect is relevant as it shows if the organization has a system of reliable linking/resolution services to find a uniquely identified object, regardless of its physical location so that all actions related to an AIP can be traced over time, system and storage changes. Together with questions P2.4 and P2.8 these are the only questions for the maturity level 2 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 2 for the processes dimension and as such it should be addressed.
- **Dimension: Processes / Question: P2.8 / Maturity Level: 2 –** This question is related to the Creation of a DIP. The answered provided shows that there is no procedure to create a DIP from an AIP. However, according to the comment for this question the organization has projects aimed at analysing and solving this which Include the knowledge obtained in the E-ARK project, as such, the E-ARK project Outputs have a positive effect in the creation of new procedures to create a DIP from an AIP. Together with questions P2.4 and P2.7 these are the only questions for the maturity level 2 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 2 for the processes dimension however it is already under consideration for improvement.

Table 12 details the comments provided by pilot 2 to the self-assessment questionnaire. It only presents comments that complement the answer provided.

**Table 12 - Pilot 2 Comments**

| **Management** | |
|---|---|
| **Question** | **Comment** |
| M3.3 | Partly, but a long way to go. |
| M3.5 | One of the mentioned standards, ISO14721. |
| M3.6 | Partially. |
| M3.8 | Partially. |
| M3.10 | Partially. |
| **Processes** | |
| **Question** | **Comment** |
| P2.1 | For deposits, according to Noark, the Norwegian records management and transfer standard, the standard defines the terms of deposit. The only negotiation is the schedule for the deposits. For deposits not compliant with the Noark standard. There is an ad-hoc procedure defining the transfer. |
| P2.8 | But we have projects aimed at analysing and solving this. Included here is the knowledge gained in the E-ARK project. |
| P3.10 | Improvement potential here. |
| P3.11 | We are working on it. |
| P3.14 | Improvement potential here. |

| | |
|---|---|
| P3.17 | Working on it. |
| P3.18 | Only a few file formats are currently allowed, e.g., PDF/A, TIFF, and a limited number of others. There are procedures and tools to detect deviations from the acceptable few, but no file identification tools are used. |
| P3.19 | But the E-ARK project will result in improved quality. |
| P3.20 | Improvement potential here. |
| P3.27 | We are using PREMIS but have so far been focusing on AIP generation from SIPs. |
| **Infrastructure** | |
| **Question** | **Comment** |
| I2.1 | Some parts are present, others are missing. |
| I3.1 | With improvement potential. |
| I3.4 | Some risk management is performed, but not a well-defined, holistic one. |
| I3.5 | Several copies, but none off-site. |
| I3.6 | I assume it is. |
| I3.7 | Huge improvement potential. |
| I3.9 | Improvement potential. |
| **General** | |
| **Question** | **Comment** |
| G4.1 | Ad hoc |
| G4.2 | Ad hoc |
| G5.2 | Working on it |

## 3.2. Pilot 3: Ingest from government agencies (National Archives of Estonia)

This section details the comments provided for the pilot 3, as well as, an analysis of the results and weak points. It also depicts the distribution of maturity levels for each of the dimensions of the questionnaire for pilot 3. The results of the assessment are depicted in Figure 7, these results were calculated using the weights detailed in Table 4.

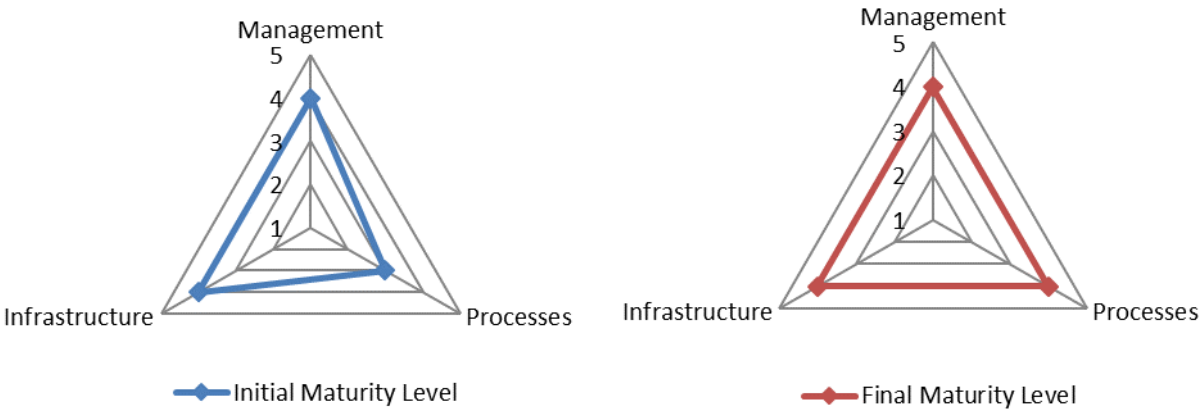


**Figure 7 - Pilot 3 Final Maturity Level Results**

Figure 7 shows that the calculated maturity levels for this pilot range from 3 to 4 in the initial assessment. In the final assessment, there is an enhancement of the maturity level for the processes dimensions which is now at maturity level 4.

The management dimension is at maturity level 4 both in the initial and final assessment. However, by analysing the percentages of answers for this dimension there are improvements in the answers for maturity level 5, from 43% to 58% which represents a delta of +15% as depicted in Table 13. This is mainly due to the criterion G5.1 being satisfied in the final assessment. This pilot should focus its future improvement efforts in improving the criteria for maturity level 3.

The processes dimension registered the highest improvement for pilot 3, which was at maturity level 3 in the initial assessment and in the final assessment is at maturity level 4. There are improvements for the criteria at maturity level 2 with a delta of +25% and 100% of the criteria met, at maturity level 3 with a delta of +45% and 97% of the criteria met, and at maturity level 5 with a delta of +20% and 40% of the criteria met. Despite registering improvements across the most of the maturity levels, there is still one criterion not met at maturity level 3, which is P3.12 which should be the focus of future improvement efforts for this pilot.

Finally, the infrastructure dimension maintained maturity level 4 both in the initial and final assessment. The criteria for maturity level 2, 3 and 4 are all met by this pilot and there was an improvement of +40% in the criteria met for maturity level 5. Future improvements should only me embraced after the improvements to the other dimensions being finalized.

**Table 13 - Maturity Level Distribution and Statistics for Each Dimension of Pilot 3**

| Dimension | Maturity Level 2 | | | Maturity Level 3 | | | Maturity Level 4 | | | Maturity Level 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Initial | Final | Delta | Initial | Final | Delta | Initial | Final | Delta | Initial | Final | Delta |
| Management | 100% | 100% | 0% | 84% | 84% | 0% | 100% | 100% | 0% | 43% | 58% | +15% |
| Processes | 75% | 100% | +25% | 52% | 97% | +45% | 100% | 100% | 0% | 20% | 40% | +20% |
| Infrastructure | 100% | 100% | 0% | 100% | 100% | 0% | 100% | 100% | 0% | 0% | 40% | +40% |

**Table 14 – Pilot 3 Maturity Levels confidence intervals calculation**

| Dimension | Population Size | Total Points | | Mean | | Variance | | Standard Deviation | | Confidence Interval (95%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Initial | Final | Initial | Final | Initial | Final | Initial | Final | Initial | Final |
| Management | 22 | 18,09 | 18,23 | 0,33 | 0,33 | 1,24 | 1,23 | 1,11 | 1,11 | ±0,44 | ±0,43 |
| Processes | 27 | 13,09 | 19,10 | 0,29 | 0,29 | 0,13 | 0,11 | 0,36 | 0,34 | ±0,10 | ±0,10 |
| Infrastructure | 44 | 19,2 | 19,4 | 0,88 | 0,88 | 0,82 | 0,81 | 0,90 | 0,90 | ±0,40 | ±0,39 |

Figure 8 details the points that pilot 3 achieved for each dimension. The management and infrastructure dimensions achieved the highest points which in turn resulted in a higher maturity level. The confidence intervals (Table 14) indicate the level of uncertainty about each value on the graph. Longer or wider intervals mean more uncertainty. When two intervals for the same dimension do not overlap, it is certain that there has been a high degree of improvement between the initial and final assessments.

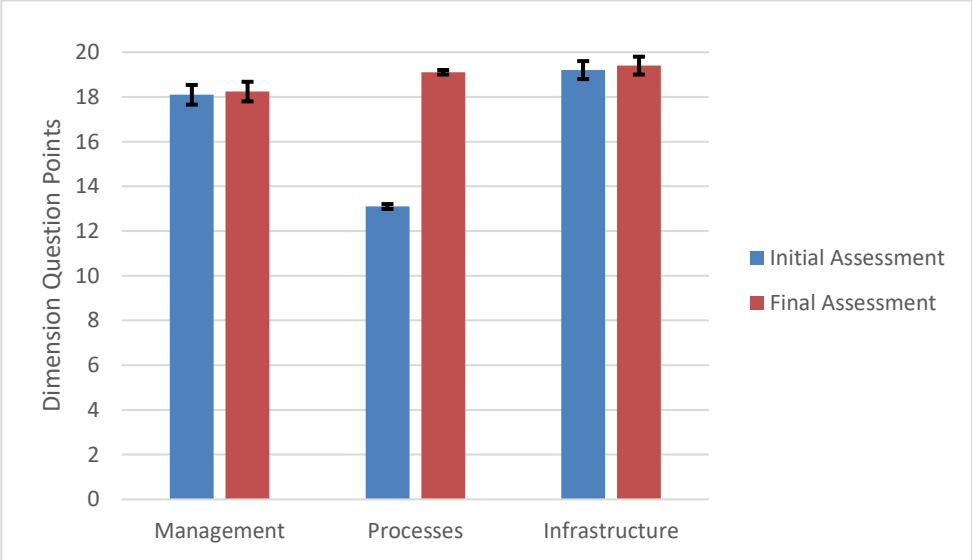


**Figure 8 - Pilot 3 Question Points for Each Dimension and Confidence Intervals**

Table 15 details the improvements in the answers for the processes dimension. As detailed in the beginning of section 3, the colour blue means that a specific criterion is considered a focus for improvement for pilot 3, the colour red means that although is a not a focus it is an aspect to be used or tried in the pilot. The column result depicts if there has been an improvement in the answer provided from the initial to the final assessment or if the answer maintained the same.

As can be seen there are several improvements in the focus capabilities of pilot 3. Pre-ingest and Ingest registered several improvements. To a lower extent data management and access also registered improvements. Most of the criteria for the focus capabilities was already met in the initial assessment. However, P3.13 was the only criterion that was not met neither in the initial nor in the final assessment and should be take into consideration in future improvement efforts.

**Table 15 - Processes Dimension Improvements Detailed Analysis for Pilot 3**

| ID | Capability / Criterion | Initial Assessment | Final Assessment | Result | Improvement |
|---|---|---|---|---|---|
| **Pre-Ingest** | | | | | |
| P2.1 | Deposit Terms Negotiation | N | Y | Improved | 100% |
| P3.1 | Producer SIP Validation | N | Y | Improved | |
| P3.2 | Provenance verification procedures | N | Y | Improved | |
| P3.3 | Enhancement of the Producer SIP | N | Y | Improved | |
| **Ingest** | | | | | |
| P2.2 | Ingest Producer/depositor responses | Y | Y | Maintained | 50% |
| P2.3 | AIP generation procedure | Y | Y | Maintained | |
| P2.4 | AIP unique identifiers convention | N | Y | Improved | |
| P3.4 | Management of units of description | Y | Y | Maintained | |
| P3.5 | Ingest SIP verification mechanisms | Y | Y | Maintained | |
| P3.6 | Ingest actions and administration processes records | Y | Y | Maintained | |
| P3.7 | Legal Rights | Y | Y | Maintained | |
| P3.8 | SIP final disposition documentation | N | Y | Improved | |
| P3.9 | AIP parsing | N | Y | Improved | |
| P3.10 | Preservation Description Information (PDI) acquiring procedures (from a SIP) | N | Y | Improved | |
| P3.11 | Preservation Description Information (PDI) maintaining procedures | N | Y | Improved | |
| P3.12 | AIP content information testing procedure | N | N | No Improvement | |
| P3.13 | AIP completeness and correctness | N | Y | Improved | |
| P3.14 | AIP creation records | N | Y | Improved | |
| **Archival Storage and Preservation** | | | | | |
| P2.5 | AIP Storage Procedures | Y | Y | Maintained | 0% |
| P2.6 | AIP actions records | Y | Y | Maintained | |
| P2.7 | AIP Linking/resolution services | Y | Y | Maintained | |
| P3.15 | AIP integrity monitoring | Y | Y | Maintained | |
| P3.16 | AIP Designated Community Requirements | Y | Y | Maintained | |
| P3.17 | Independent mechanism for content integrity checking | Y | Y | Maintained | |
| P3.18 | Tools and resources to provide representation information | Y | Y | Maintained | |
| **Data Management** | | | | | |
| P3.19 | Designated Community information requirements | Y | Y | Maintained | 33% |
| P3.20 | Descriptive information association with the AIP | Y | Y | Maintained | |
| P3.21 | Bi-directional linkage between the AIP and descriptive information | N | Y | Improved | |
| **Access** | | | | | |
| P2.8 | Creation of a DIP | Y | Y | Maintained | 28% |
| P3.22 | Access policies | Y | Y | Maintained | |
| P3.23 | Access policies compliance | Y | Y | Maintained | |
| P3.24 | Access failures and errors | Y | Y | Maintained | |
| P3.25 | Access Data Reports | Y | Y | Maintained | |
| P3.26 | Access Data Problem/Error Reports | N | Y | Improved | |
| P3.27 | Access Policies and Procedures | N | Y | Improved | |

There were three weak points found in the self-assessment. Weak points are answers that show that there is a lower maturity level on a specific question and that hinder the achievement of a higher maturity level for that dimension of the self-assessment, according to a stages approach where the criteria for a certain maturity level must all be in place for achieving that maturity level.

- **Dimension: Management / Question: M3.2 / Maturity Level: 3 –** This question is related to the Training Plan. The answered provided shows that there is no training plan developed and implemented in the organization. This aspect is relevant as a training plan outlines the competencies to be obtained by individuals, the time frame for achieving these competencies; the training to be undertaken; the delivery modes for the training; among other things. Together with question M3.4 these are the only questions for the maturity level 3 of the

management dimension that have a negative response and inhibits this organization from achieving maturity level 4 for the management dimension and as such it should be addressed.

- **Dimension: Management / Question: M3.4 / Maturity Level: 3 –** This question is related to the certification plan. The answer provided shows that there is no certification plan in place. Standards certification can be used to certify that the processes and procedures implemented in the organization are aligned with best practice, relevant, efficient or effective. They are also a means for potential customers or funders to have a certain degree of confidence in the organization. Together with question M3.2 these are the only questions for the maturity level 3 of the management dimension that have a negative response and inhibits this organization from achieving maturity level 4 for the management dimension and as such it should be addressed.
- **Dimension: Processes / Question: P3.12 / Maturity Level: 3 –** This question is related to the AIP content information testing procedure. The answer provided shows that there is no procedure for testing if the content information of the AIP at its creation is understandable by the designated communities. This is the only question for maturity level 3 which has a negative answer in the processes dimension which inhibits this organization from achieving maturity level 4 for the processes dimension and as such it should be addressed.

No comments were provided by pilot 3 to further complement the answers provided for each of the questions of the business evaluation.

## 3.3. Pilot 4: Business archives (National Archives of Estonia, Estonian Business Archives)

This section details the comments provided for the pilot 4, as well as, an analysis of the results and weak points. It also depicts the distribution of maturity levels for each of the dimensions of the questionnaire for pilot 4. The results of the assessment are depicted in Figure 11, these results were calculated using the weights detailed in Table 4.

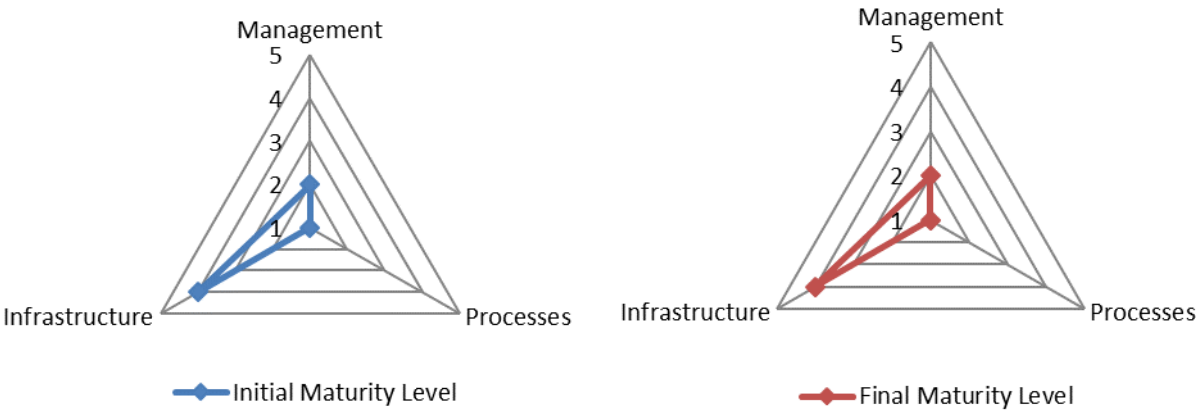


**Figure 9 - Pilot 4 Final Maturity Level Results**

Figure 9 shows that the calculated maturity levels for this pilot range from 1 to 4 in the initial assessment. In the final assessment, the same results were achieved with maturity levels ranging from 1 to 4. However, to fully understand the improvements for this pilot further analysis must be performed by interpreting the maturity level distribution detailed in Table 16.

The management dimension achieved maturity level 1 both in the initial and final assessment. There are no improvements detected for this dimension even when analysing the percentages for this dimension. As a result, in future improvement efforts pilot 4 should focus on improving the criteria for maturity level 2 in the management dimension.

The processes dimension did not register and improvement of the maturity level between the initial and final assessment. However, by analysing the maturity level distribution percentages there is an improvement at maturity level 3 with a delta of +15%. Future improvements efforts for the processes dimension should focus on improving the criteria for maturity level 2 for this dimension.

In the infrastructure dimension achieved maturity level 4 both in the initial and final assessment. There was no improvement detected, even when looking at the maturity level distribution percentages for this dimension. As a result, in future improvement efforts pilot 4 should focus on improving the criteria for maturity level 3 in the infrastructure dimension in order to reach 100%.

**Table 16 - Maturity Level Distribution and Statistics for Each Dimension of Pilot 4**

| Dimension | Maturity Level 2 | | | Maturity Level 3 | | | Maturity Level 4 | | | Maturity Level 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Initial | Final | Delta | Initial | Final | Delta | Initial | Final | Delta | Initial | Final | Delta |
| Management | 0% | 0% | 0% | 67% | 67% | 0% | 50% | 50% | 0% | 58% | 58% | 0% |
| Processes | 0% | 0% | 0% | 8% | 23% | +15% | 25% | 25% | 0% | 60% | 60% | 0% |
| Infrastructure | 100% | 100% | 0% | 89% | 89% | 0% | 40% | 40% | 0% | 60% | 60% | 0% |

**Table 17 - Pilot 4 Maturity Levels confidence intervals calculation**

| Dimension | Population Size | Total Points | | Mean | | Variance | | Standard Deviation | | Confidence Interval (95%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Initial | Final | Initial | Final | Initial | Final | Initial | Final | Initial | Final |
| Management | 22 | 6,90 | 6,90 | 0,14 | 0,14 | 0,08 | 0,08 | 0,28 | 0,28 | ±0,11 | ±0,11 |
| Processes | 27 | 1,69 | 2,87 | 0 | 0 | 0,01 | 0,01 | 0,10 | 0,12 | ±0,03 | ±0,03 |
| Infrastructure | 44 | 17,51 | 17,51 | 0,64 | 0,64 | 0,90 | 0,90 | 0,94 | 0,94 | ±0,42 | ±0,42 |

Figure 10 details the points that pilot 4 achieved for each dimension. The management and infrastructure dimensions achieved the highest scores which in turn resulted in a higher maturity level. The confidence intervals (Table 17) indicate the level of uncertainty about each value on the graph. Longer or wider intervals mean more uncertainty. When two intervals for the same dimension do not overlap, it is certain that there has been a high degree of improvement between the initial and final assessments.

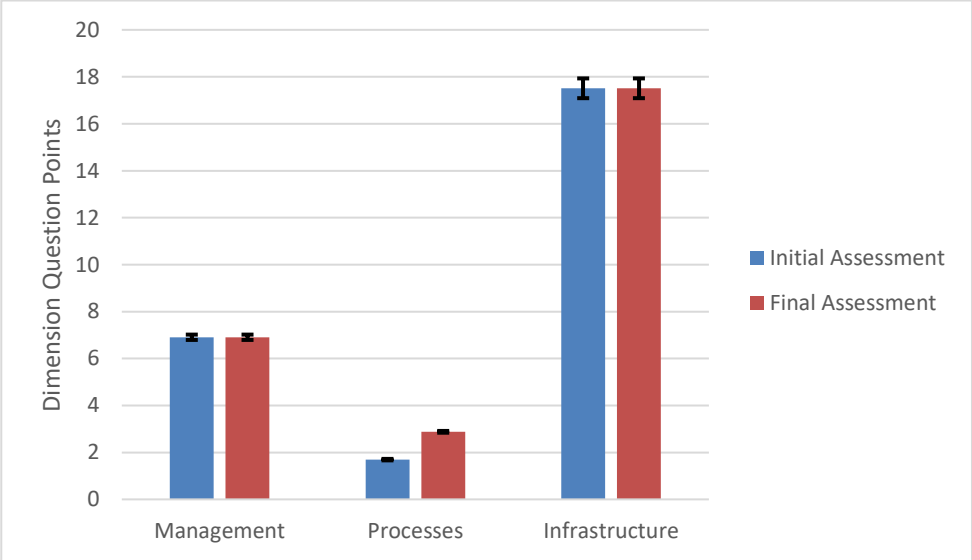


**Figure 10 - Pilot 4 Question Points for Each Dimension and Confidence Intervals**

Table 18 details the improvements in the answers for the processes dimension. As detailed in the beginning of section 3, the colour blue means that a specific criterion is considered a focus for improvement for pilot 4, the colour red means that although is a not a focus it is an aspect to be used or tried in the pilot. The column result depicts if there has been an improvement in the answer provided from the initial to the final assessment or if the answer maintained the same.

Pilot 4 did not register many improvements in its focus capabilities. Improvements were detected in the Ingest, Data Management and Access capabilities. However, for most of the criteria in its focus capabilities there was no improvement detected. Future improvement efforts for pilot 4 should focus on achieving the criteria at maturity level 2 for its core capabilities.

**Table 18 - Processes Dimension Improvements Detailed Analysis for Pilot 4**

| ID | Capability / Criterion | Initial Assessment | Final Assessment | Result | Improvement |
|---|---|---|---|---|---|
| **Pre-Ingest** | | | | | |
| P2.1 | Deposit Terms Negotiation | N | N | No Improvement | 0% |
| P3.1 | Producer SIP Validation | N | N | No Improvement | |
| P3.2 | Provenance verification procedures | N | N | No Improvement | |
| P3.3 | Enhancement of the Producer SIP | N | N | No Improvement | |
| **Ingest** | | | | | |
| P2.2 | Ingest Producer/depositor responses | N | N | No Improvement | 14% |
| P2.3 | AIP generation procedure | N | N | No Improvement | |
| P2.4 | AIP unique identifiers convention | N | N | No Improvement | |
| P3.4 | Management of units of description | N | N | No Improvement | |
| P3.5 | Ingest SIP verification mechanisms | N | N | No Improvement | |
| P3.6 | Ingest actions and administration processes records | N | N | No Improvement | |
| P3.7 | Legal Rights | N | Y | Improved | |
| P3.8 | SIP final disposition documentation | N | N | No Improvement | |
| P3.9 | AIP parsing | N | N | No Improvement | |
| P3.10 | Preservation Description Information (PDI) acquiring procedures (from a SIP) | N | N | No Improvement | |
| P3.11 | Preservation Description Information (PDI) maintaining procedures | N | Y | Improved | |
| P3.12 | AIP content information testing procedure | N | N | No Improvement | |
| P3.13 | AIP completeness and correctness | N | N | No Improvement | |
| P3.14 | AIP creation records | Y | Y | Maintained | |
| **Archival Storage and Preservation** | | | | | |
| P2.5 | AIP Storage Procedures | N | N | No Improvement | 0% |
| P2.6 | AIP actions records | N | N | No Improvement | |
| P2.7 | AIP Linking/resolution services | N | N | No Improvement | |
| P3.15 | AIP integrity monitoring | N | N | No Improvement | |
| P3.16 | AIP Designated Community Requirements | N | N | No Improvement | |
| P3.17 | Independent mechanism for content integrity checking | N | N | No Improvement | |
| P3.18 | Tools and resources to provide representation information | N | N | No Improvement | |
| **Data Management** | | | | | |
| P3.19 | Designated Community information requirements | N | Y | Improved | 33% |
| P3.20 | Descriptive information association with the AIP | N | N | No Improvement | |
| P3.21 | Bi-directional linkage between the AIP and descriptive information | N | N | No Improvement | |
| **Access** | | | | | |
| P2.8 | Creation of a DIP | N | N | No Improvement | 14% |
| P3.22 | Access policies | Y | Y | Maintained | |
| P3.23 | Access policies compliance | N | Y | Improved | |
| P3.24 | Access failures and errors | N | N | No Improvement | |
| P3.25 | Access Data Reports | N | N | No Improvement | |
| P3.26 | Access Data Problem/Error Reports | N | N | No Improvement | |
| P3.27 | Access Policies and Procedures | N | N | No Improvement | |

There were three weak points found in the self-assessment. Weak points are answers that show that there is a lower maturity level on a specific question and that hinder the achievement of a higher maturity level for that dimension of the self-assessment, according to a stages approach where the criteria for a certain maturity level must all be in place for achieving that maturity level.

- **Dimension: Management / Question: M2.1 / Maturity Level: 2 –** This question is related to the Mission Statement. The answered provided shows that there is no mission statement of the organization. This aspect is relevant as it identifies if there is a commitment to preservation, retention, management and access at the organization's highest administrative level. Together with question M2.2 these are the only questions for the

maturity level 2 of the management dimension that have a negative response and inhibits this organization from achieving maturity level 2 for the management dimension and as such it should be addressed.

- **Dimension: Management / Question: M2.2 / Maturity Level: 2 –** This question is related to the Designated Community Definition. The answered provided shows that there is no accessible definition of the organization's designated community. This aspect is relevant as to verify if the organization meets the needs of its Designated Community. Together with question M2.1 these are the only questions for the maturity level 2 of the management dimension that have a negative response and inhibits this organization from achieving maturity level 2 for the management dimension and as such it should be addressed.
- **Dimension: Infrastructure / Question: I3.7 / Maturity Level: 3 –** This question is related to the Preservation Policies. The answered provided shows that there are no Preservation Policies in place to ensure the organization's Preservation Strategic Plan will be met. This aspect is relevant as it identifies if the organization can fulfil the part of its mission related to preservation. This is the only question for maturity level 3 which has a negative answer in the infrastructure dimension which inhibits this organization from achieving maturity level 3 for the infrastructure dimension and as such it should be addressed.

Table 23 details the comments provided by pilot 4 to the self-assessment questionnaire. It only presents comments that complement the answer provided.

**Table 19 - Pilot 4 Comments**

| Management | |
|---|---|
| **Question** | **Comment** |
| M3.1 | When our Clients acquire it then we transfer skills and knowledge. |
| M3.3 | Knowledge is always shared. |
| M3.5 | ISO are always nice to have, but not needed. |

## 3.4. Pilot 5: Preservation and access to records with geodata (National Archives of Slovenia)

This section details the comments provided for the pilot 5, as well as, an analysis of the results and weak points. It also depicts the distribution of maturity levels for each of the dimensions of the questionnaire for pilot 5. The results of the assessment are depicted in Figure 11, these results were calculated using the weights detailed in Table 4.

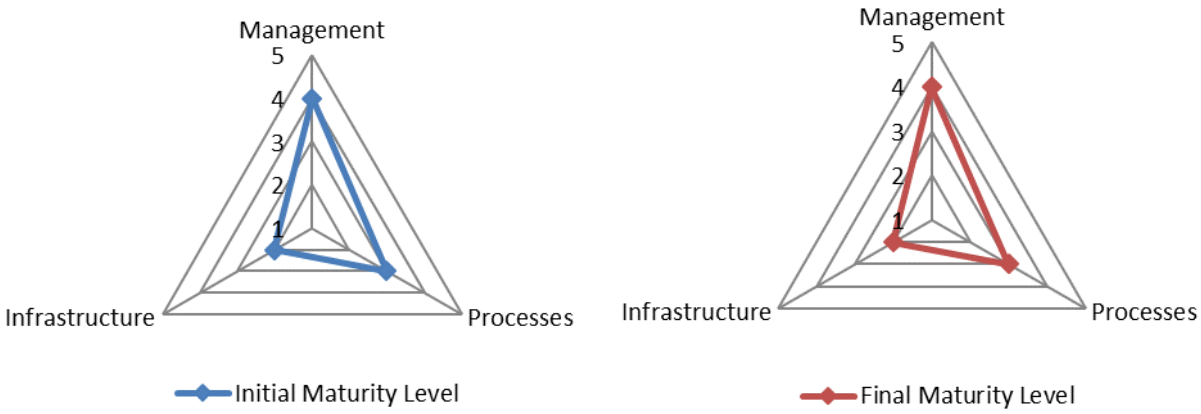


**Figure 11 - Pilot 5 Final Maturity Level Results**

Figure 11 shows that the calculated maturity levels for this pilot range from 2 to 4 in the initial assessment. In the final assessment, the same results were achieved with maturity levels ranging from 2 to 4. However, to fully understand the improvements for this pilot further analysis must be performed by interpreting the maturity level distribution detailed in Table 20.

The management dimension achieved maturity level 4 both in the initial and final assessment. There are no improvements detected for this dimension even when analysing the percentages for this dimension. As a result, in future improvement efforts pilot 5 should focus on improving the criteria for maturity level 3 in the management dimension in order to reach 100% of criteria met.

The processes dimension achieved maturity level 3 both in the initial and final assessment. However, by analysing Table 20 there are improvements in the criteria of maturity level 2 which is now at 100%, a delta of +12% from the initial assessment. There is also improvement in the criteria for maturity level 3 which is now at 71%, representing a delta of +22% from the initial assessment. Future improvement efforts for this dimension should focus on improving the criteria at maturity level 3 in order to reach 100%.

The infrastructure dimension achieved maturity level 1 both in the initial and final assessment. However, there are improvements in the criteria for maturity level 2 which is now at 34%, which represents a delta of +34%. As a result, in future improvement efforts pilot 5 should focus on further improving the criteria for maturity level 2 in the infrastructure dimension in order to reach a higher percentage of criteria met.

**Table 20 - Maturity Level Distribution and Statistics for Each Dimension of Pilot 5**

| Dimension | Maturity Level 2 | | | Maturity Level 3 | | | Maturity Level 4 | | | Maturity Level 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Initial | Final | Delta | Initial | Final | Delta | Initial | Final | Delta | Initial | Final | Delta |
| Management | 100% | 100% | 0% | 84% | 84% | 0% | 17% | 17% | 0% | 29% | 29% | 0% |
| Processes | 88% | 100% | +12% | 49% | 71% | +22% | 0% | 0% | 0% | 0% | 0% | 0% |
| Infrastructure | 0% | 34% | +34% | 67% | 67% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |

**Table 21 - Pilot 5 Maturity Levels confidence intervals calculation**

| Dimension | Population Size | Total Points | | Mean | | Variance | | Standard Deviation | | Confidence Interval (95%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Initial | Final | Initial | Final | Initial | Final | Initial | Final | Initial | Final |
| Management | 22 | 16,28 | 16,28 | 0,14 | 0,14 | 1,30 | 1,30 | 1,14 | 1,14 | ±0,45 | ±0,45 |
| Processes | 27 | 11,72 | 14,62 | 0 | 0,29 | 0,15 | 0,15 | 0,39 | 0,39 | ±0,11 | ±0,11 |
| Infrastructure | 44 | 5,33 | 8,33 | 0 | 0 | 0,15 | 0,48 | 0,39 | 0,69 | ±0,17 | ±0,30 |

Figure 12 details the points that pilot 5 achieved for each dimension. The management and processes dimensions achieved the highest points which in turn resulted in a higher maturity level. The confidence intervals (Table 21) indicate the level of uncertainty about each value on the graph. Longer or wider intervals mean more uncertainty. When two intervals for the same dimension do not overlap it is certain that there has been a high degree of improvement between the initial and final assessments.

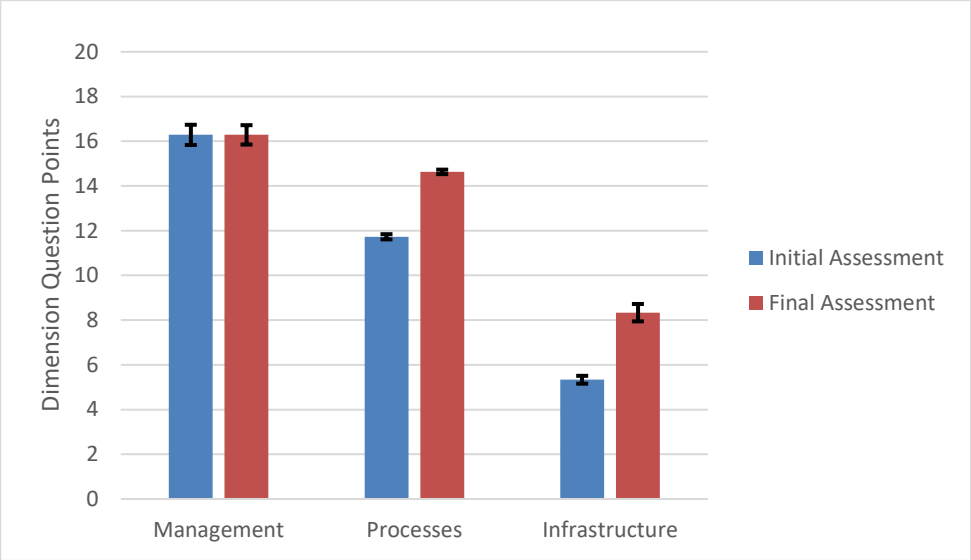


**Figure 12 - Pilot 5 Question Points for Each Dimension and Confidence Intervals**

Table 22 details the improvements in the answers for the processes dimension. As detailed the beginning of section 3, the colour blue means that a specific criterion is considered a focus for improvement for pilot 5, the colour red means that although is a not a focus it is an aspect to be used or tried in the pilot. The column result depicts if there has been an improvement in the answer provided from the initial to the final assessment or if the answer maintained the same.

Pilot 5 registered improvements in pre-ingest and access, which are its focus capabilities and also in data management one of the capabilities used and tried in this pilot. There are two criteria improved in pre-ingest (P2.1 and P3.1) and one criterion with no improvement (P3.3) as a result future improvement effort should focus on improving P3.3. The Ingest capability did not register any improvement, most of the criteria maintained its result. However, P3.8-P3.10 di not register any improvement which means that future improvements to this capability should focus on these criteria. For the archival storage and preservation capability most criteria maintained its result and no improvements were detected.

Further improvements should focus on achieving P3.16 in order to meet all the criteria for this capability. Data Management improved two of the criteria for this capability and as result all the criteria is now achieved. Finally, in the access capability were detected three improvements however P3.24, P3.26 and P3.27 still did not register any improvement. As a result, further improvement effort for this capability should focus on achieving these criteria.

**Table 22 - Processes Dimension Improvements Detailed Analysis for Pilot 5**

| ID | Capability / Criterion | Initial Assessment | Final Assessment | Result | Improvement |
|---|---|---|---|---|---|
| **Pre-Ingest** | | | | | |
| P2.1 | Deposit Terms Negotiation | N | Y | Improved | 50% |
| P3.1 | Producer SIP Validation | N | Y | Improved | |
| P3.2 | Provenance verification procedures | Y | Y | Maintained | |
| P3.3 | Enhancement of the Producer SIP | N | N | No Improvement | |
| **Ingest** | | | | | |
| P2.2 | Ingest Producer/depositor responses | Y | Y | Maintained | 0% |
| P2.3 | AIP generation procedure | Y | Y | Maintained | |
| P2.4 | AIP unique identifiers convention | Y | Y | Maintained | |
| P3.4 | Management of units of description | Y | Y | Maintained | |
| P3.5 | Ingest SIP verification mechanisms | Y | Y | Maintained | |
| P3.6 | Ingest actions and administration processes records | Y | Y | Maintained | |
| P3.7 | Legal Rights | Y | Y | Maintained | |
| P3.8 | SIP final disposition documentation | N | N | No Improvement | |
| P3.9 | AIP parsing | N | N | No Improvement | |
| P3.10 | Preservation Description Information (PDI) acquiring procedures (from a SIP) | N | N | No Improvement | |
| P3.11 | Preservation Description Information (PDI) maintaining procedures | Y | Y | Maintained | |
| P3.12 | AIP content information testing procedure | Y | Y | Maintained | |
| P3.13 | AIP completeness and correctness | Y | Y | Maintained | |
| P3.14 | AIP creation records | Y | Y | Maintained | |
| **Archival Storage and Preservation** | | | | | |
| P2.5 | AIP Storage Procedures | Y | Y | Maintained | 0% |
| P2.6 | AIP actions records | Y | Y | Maintained | |
| P2.7 | AIP Linking/resolution services | Y | Y | Maintained | |
| P3.15 | AIP integrity monitoring | Y | Y | Maintained | |
| P3.16 | AIP Designated Community Requirements | N | N | No Improvement | |
| P3.17 | Independent mechanism for content integrity checking | Y | Y | Maintained | |
| P3.18 | Tools and resources to provide representation information | Y | Y | Maintained | |
| **Data Management** | | | | | |
| P3.19 | Designated Community information requirements | N | Y | Improved | 66% |
| P3.20 | Descriptive information association with the AIP | Y | Y | Maintained | |
| P3.21 | Bi-directional linkage between the AIP and descriptive information | N | Y | Improved | |
| **Access** | | | | | |
| P2.8 | Creation of a DIP | Y | Y | Maintained | 42% |
| P3.22 | Access policies | N | Y | Improved | |
| P3.23 | Access policies compliance | N | Y | Improved | |
| P3.24 | Access failures and errors | N | N | No Improvement | |
| P3.25 | Access Data Reports | N | Y | Improved | |
| P3.26 | Access Data Problem/Error Reports | N | N | No Improvement | |
| P3.27 | Access Policies and Procedures | N | N | No Improvement | |

There were four weak points found in the self-assessment. Weak points are answers that show that there is a lower maturity level on a specific question and that hinder the achievement of a higher maturity level for that dimension of the self-assessment, according to a stages approach where the criteria for a certain maturity level must all be in place for achieving that maturity level.

- **Dimension: Infrastructure / Question: I2.2 / Maturity Level: 2 –** This question is related to Information Objects Location and Quantity. The answer provided shows that there are no procedures to manage the number and location of copies of all Information objects. This aspect is relevant as it can assert that the organization is providing an authentic copy of a particular information object. Together with question I2.3 these are the only questions for the maturity level 2 of the infrastructure dimension that have a negative response and inhibits this organization from achieving maturity level 2 for the infrastructure dimension and as such it should be addressed.
- **Dimension: Infrastructure / Question: I2.3 / Maturity Level: 2 –** This question is related to Synchronization Mechanisms. The answer provided shows that there are no mechanisms in place to ensure any/multiple copies of information objects are synchronized. This aspect is relevant to ensure that multiple copies of an information object remain identical, within a time established as acceptable by the organization, and that a copy can be used to replace a corrupted copy of the object. Together with question I2.2 these are the only questions for the maturity level 2 of the infrastructure dimension that have a negative response and inhibits this organization from achieving maturity level 2 for the infrastructure dimension and as such it should be addressed.
- **Dimension: Management / Question: M3.1 / Maturity Level: 3 –** This question is related to required Skills. The answer provided shows that there is no skill management in place. This aspect is relevant to guarantee that the relevant skills are identified and present in the organization. Together with question M3.10 these are the only questions for the maturity level 3 of the management dimension that have a negative response and inhibits this organization from achieving maturity level 3 for the management dimension and as such it should be addressed.
- **Dimension: Management / Question: M3.10 / Maturity Level: 3 –** This question is related to Financial risk, benefit, investment, and expenditure. The answer provided shows that there are no procedures to analyse and report on financial risk, benefit, investment, and expenditure. This aspect is relevant as it identifies if the organization can demonstrate that the organization has identified and documented these categories, and actively manages them, including identifying and responding to risks, describing and leveraging benefits, specifying and balancing investments, and anticipating and preparing for expenditures. (including assets, licenses, and liabilities). Together with question M3.1 these are the only questions for the maturity level 3 of the management dimension that have a negative response and inhibits this organization from achieving maturity level 3 for the management dimension and as such it should be addressed.

Table 23 details the comments provided by pilot 5 to the self-assessment questionnaire. It only presents comments that complement the answer provided.

**Table 23 - Pilot 5 Comments**

| Management | |
|---|---|
| **Question** | **Comment** |
| M2.2 | We have a designated community of producers of archival data, by law. However, we do not have a specified community of users, since we provide services to all. |
| M3.2 | We have a training plan in place from our previous project, however it wasn't implemented in practice yet. |
| M3.3 | National Archive educate local archives on periodical bases and our users (producers) need to attend our conferences periodically in order to maintain their status as a qualified designated archive specialist within their organisation. However, there is a lot of room for improvement. |
| M3.6 | We have a national preservation strategy of digital archiving. 1st strategy was started in 2010 and since 2016 new strategy is in place. |
| M3.7 | We have a national ERMS in which official procedures are handled. |
| M3.11 | Within our ERMS system |
| M5.1 | The new national 5-year strategy builds on the results of the last period. |

| Processes | |
|---|---|
| **Question** | **Comment** |
| P2.1 | However, during the E-ARK project we have updated our procedures for the case of geodata - we didn't have it. |
| P2.8 | We have updated the DIP format specifications for geodata after the E-ARK project - as results of the project. |
| P3.2 | Using the hash of the Zip file our system - ScopeArchive ensures the provenance against the Submission agreement. |
| P3.6 | Yes, although we still do it on paper |
| P3.7 | Yes, although we still do it on paper |
| P3.8 | Our current system does not track SIP status. If it is rejected, we need to manually delete it |
| P3.10 | We can only add a document describing any changes. This is something that we plan to implement for geodata in the future. |
| P3.12 | By creating a test DIP as a part of the Ingest process |
| P3.13 | By the ScopeArchive system |
| P3.14 | We produce ingest logs within ScopeArchive system |
| P3.15 | File hashes are written in ScopeArchive, and AIPs are stored in Fedora. They can be checked on demand. |
| P3.18 | We have the tools for geodata as a result of E-ARK project |
| P3.23 | DIP contains PREMIS data |
| P3.26 | It is all done manually on case to case bases. |
| **Infrastructure** | |
| **Question** | **Comment** |
| I2.1 | Our infrastructure is managed by the ministry of Public Administration' cloud. Every change or request needs to be reported. However, this was implemented since 1.1.2017 and was not connected to the activities on E-ARK project. |
| I3.1 | Our infrastructure is managed by the ministry of Public Administration' cloud. Every change or request needs to be reported. However, this was implemented since 1.1.2017 and was not connected to the activities on E-ARK project. |
| I3.6 | We document software changes, but hardware changes can be seen by inspecting the financial and purchase information's. |
| I3.8 | Within ScopeArchive |
| I3.9 | Within ScopeArchive |

## 3.5. Pilot 6: Seamless integration between a live document management system and a long-term digital archiving and preservation service (KEEP SOLUTIONS)

This section details the comments provided for the pilot 6, as well as, an analysis of the results and weak points. It also depicts the distribution of maturity levels for each of the dimensions of the questionnaire for pilot 6. The results of the assessment are depicted in Figure 13, these results were calculated using the weights detailed in Table 4.

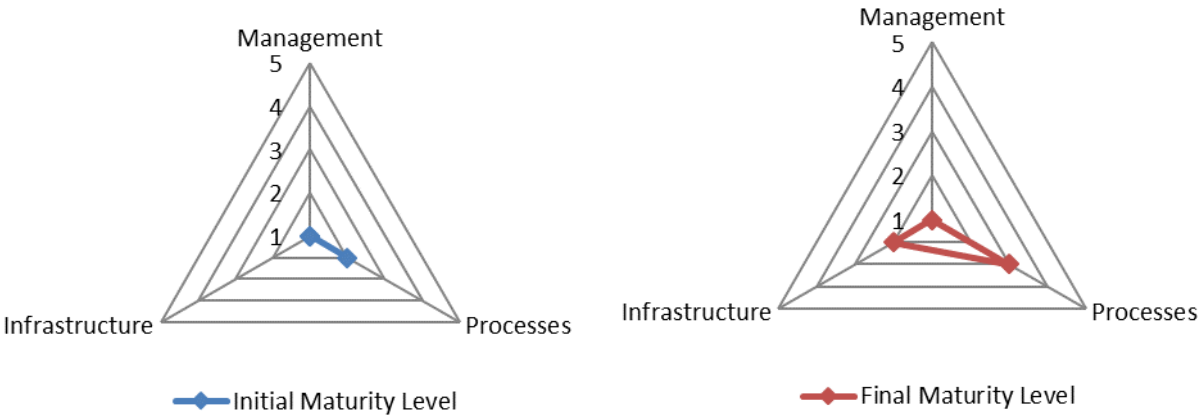


**Figure 13 - Pilot 6 Final Maturity Level Results**

Figure 13 shows that the calculated maturity levels for this pilot range between 1 and 2 in the initial assessment. In the final assessment, there are improvements in the processes dimension which is now at maturity level 3 and in the infrastructure dimension which is now at maturity level 2. One aspect to take into consideration for pilot 6 is that this a purely technological pilot with no national archive behind it. As such, the results for the management and infrastructure dimensions don't have an impact in the success of the pilot and the focus should instead be on the processes dimension which registered great improvements as can be seen in Figure 13 and Table 24.

The management dimension achieved maturity level 1 both in the initial and final assessment. There are no improvements detected for this dimension even when analysing the percentages for this dimension for the criteria of maturity level 2, 3 and 4. There are improvements in maturity level 5 which is now at 29%, a delta of +29% which resulted from the achievement of criteria G5.4 and G5.5. As a result, in future improvement efforts pilot 6 should focus on improving the criteria for maturity level 2 in the management dimension.

The processes dimension achieved maturity level 2 in the initial assessment and maturity level 3 in the final assessment. Thera re improvements in the criteria for maturity level 2 which is now at 88% representing a delta of +38%. Improvements continue at maturity level 3 with 82% of the criteria being achieved, a delta of +70%. Finally, maturity level 5 also registered improvements now at 40% with a delta of +40%. Future improvements to the processes dimension should focus towards achieving 100% in the maturity level 2 criteria.

Finally, the infrastructure dimension achieved maturity level 1 in the initial assessment which improved to maturity level 2 in the final assessment. There are improvements in the criteria for maturity level 2 now at 67% representing a delta of +67%. Improvements were also detected at maturity level 3 which is now at 34% with a delta of +22%. Finally, maturity

level 5 also registered improvements now at 40% which represents a delta of +40%. Future improvements to the infrastructure dimension should focus towards achieving 100% in the maturity level 2 criteria.

**Table 24 - Maturity Level Distribution and Statistics for Each Dimension of Pilot 6**

| Dimension | Maturity Level 2 | | | Maturity Level 3 | | | Maturity Level 4 | | | Maturity Level 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Initial | Final | Delta | Initial | Final | Delta | Initial | Final | Delta | Initial | Final | Delta |
| Management | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 29% | +29% |
| Processes | 50% | 88% | +38% | 12% | 82% | +70% | 0% | 0% | 0% | 0% | 40% | +40% |
| Infrastructure | 0% | 67% | +67% | 12% | 34% | +22% | 20% | 20% | 0% | 0% | 40% | +40% |

**Table 25 - Pilot 6 Maturity Levels confidence intervals calculation**

| Dimension | Population Size | Total Points | | Mean | | Variance | | Standard Deviation | | Confidence Interval (95%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Initial | Final | Initial | Final | Initial | Final | Initial | Final | Initial | Final |
| Management | 22 | 0 | 0,28 | 0 | 0 | 0 | 0,01 | 0 | 0,03 | 0 | ±0,01 |
| Processes | 27 | 5,38 | 14,79 | 0 | 0,29 | 0,10 | 0,13 | 0,32 | 0,36 | ±0,09 | ±0,10 |
| Infrastructure | 44 | 1,28 | 9,46 | 0 | 0 | 0,03 | 0,75 | 0,19 | 0,86 | ±0,08 | ±0,38 |

Figure 14 details the points that pilot 6 achieved for each dimension. The processes dimension achieved the highest points which in turn resulted in a higher maturity level. The confidence intervals (Table 25) indicate the level of uncertainty about each value on the graph. Longer or wider intervals mean more uncertainty. When two intervals for the same dimension do not overlap, it is certain that there has been a high degree of improvement between the initial and final assessments.

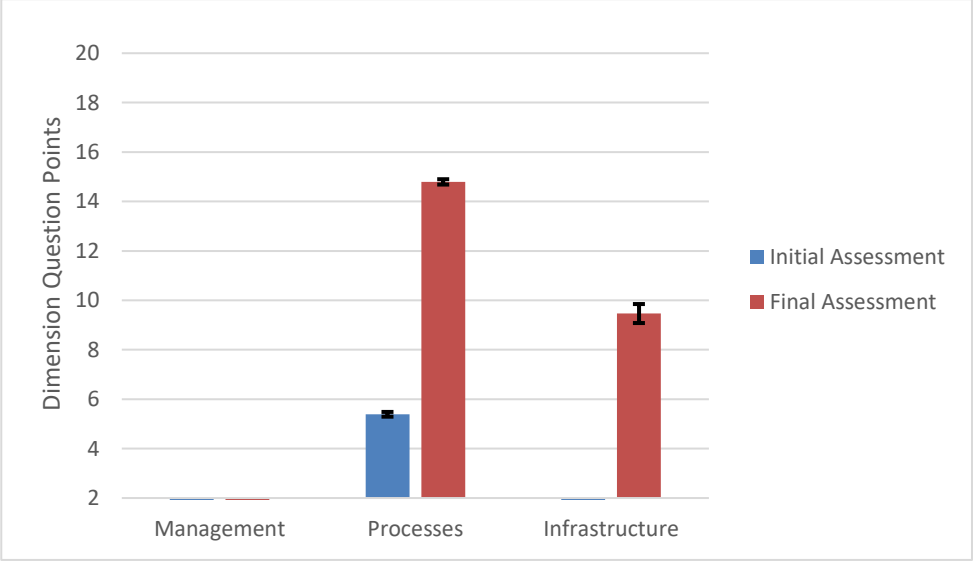


**Figure 14 - Pilot 6 Question Points for Each Dimension and Confidence Intervals**

Table 26 details the improvements in the answers for the processes dimension. As detailed in the beginning of section 3, the colour blue means that a specific criterion is considered a focus for improvement for pilot 6, the colour red means that although is a not a focus it is an aspect to be used or tried in the pilot. The column result depicts if there has been an improvement in the answer provided from the initial to the final assessment or if the answer maintained the same.

Pilot 6 registered improvements in all the capabilities in the processes dimension. Pre-ingest registered two improvements, ingest registered nine improvements which represents 64% of the criteria for this capability, archival storage and preservation achieved four improvements, data management achieved 100% of improvement, and finally

access registered three improvements. However, there are still several criteria with no improvements in all capabilities besides data management. As such, future improvement effort should focus on achieving P2.1 which is the only missing criterion for maturity level 2 and then focus on the criteria for maturity level 3.

**Table 26 - Processes Dimension Improvements Detailed Analysis for Pilot 6**

| ID | Capability / Criterion | Initial Assessment | Final Assessment | Result | Improvement |
|---|---|---|---|---|---|
| **Pre-Ingest** | | | | | |
| P2.1 | Deposit Terms Negotiation | N | N | No Improvement | 50% |
| P3.1 | Producer SIP Validation | N | Y | Improved | |
| P3.2 | Provenance verification procedures | N | N | Improved | |
| P3.3 | Enhancement of the Producer SIP | N | Y | No Improvement | |
| **Ingest** | | | | | |
| P2.2 | Ingest Producer/depositor responses | N | Y | Improved | 64% |
| P2.3 | AIP generation procedure | Y | Y | Maintained | |
| P2.4 | AIP unique identifiers convention | Y | Y | Maintained | |
| P3.4 | Management of units of description | Y | Y | Maintained | |
| P3.5 | Ingest SIP verification mechanisms | N | Y | Improved | |
| P3.6 | Ingest actions and administration processes records | N | Y | Improved | |
| P3.7 | Legal Rights | N | N | No Improvement | |
| P3.8 | SIP final disposition documentation | N | Y | Improved | |
| P3.9 | AIP parsing | N | Y | Improved | |
| P3.10 | Preservation Description Information (PDI) acquiring procedures (from a SIP) | N | Y | Improved | |
| P3.11 | Preservation Description Information (PDI) maintaining procedures | N | Y | Improved | |
| P3.12 | AIP content information testing procedure | Y | Y | Maintained | |
| P3.13 | AIP completeness and correctness | N | Y | Improved | |
| P3.14 | AIP creation records | N | Y | Improved | |
| **Archival Storage and Preservation** | | | | | |
| P2.5 | AIP Storage Procedures | N | Y | Improved | 57% |
| P2.6 | AIP actions records | Y | Y | Maintained | |
| P2.7 | AIP Linking/resolution services | Y | Y | Maintained | |
| P3.15 | AIP integrity monitoring | N | Y | Improved | |
| P3.16 | AIP Designated Community Requirements | N | N | No Improvement | |
| P3.17 | Independent mechanism for content integrity checking | N | Y | Improved | |
| P3.18 | Tools and resources to provide representation information | N | Y | Improved | |
| **Data Management** | | | | | |
| P3.19 | Designated Community information requirements | N | Y | Improved | 100% |
| P3.20 | Descriptive information association with the AIP | N | Y | Improved | |
| P3.21 | Bi-directional linkage between the AIP and descriptive information | N | Y | Improved | |
| **Access** | | | | | |
| P2.8 | Creation of a DIP | N | Y | Improved | 42% |
| P3.22 | Access policies | Y | Y | Maintained | |
| P3.23 | Access policies compliance | N | Y | Improved | |
| P3.24 | Access failures and errors | N | Y | Improved | |
| P3.25 | Access Data Reports | N | Y | No Improvement | |
| P3.26 | Access Data Problem/Error Reports | N | N | No Improvement | |
| P3.27 | Access Policies and Procedures | N | N | No Improvement | |

There were five weak points found in the self-assessment. Weak points are answers that show that there is a lower maturity level on a specific question and that hinder the achievement of a higher maturity level for that dimension of the self-assessment, according to a stages approach where the criteria for a certain maturity level must all be in place for achieving that maturity level.

- **Dimension: Processes / Question: P3.2 / Maturity Level: 3 –** This question is related to Provenance verification procedures. The answer provided shows that there are no procedures in place to verify the provenance of all

deposited objects and the comment to this question shows that these procedures are performed as a manual task that happens outside of the system. This aspect is relevant as it identifies if the organization has mechanisms to guarantee the provenance of the information to be Ingested. Together with the other question identified as week points these are the only questions for the maturity level 3 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 3 for the processes dimension and as such they must be taken into consideration for improvement.

- **Dimension: Processes / Question: P3.7 / Maturity Level: 3 –** This question is related to Legal Rights The answer provided shows that there is no procedure to manage legal rights during Ingest and the comment provided to this question shows that in fact this procedure exists as a manual task not contemplated within the system. This aspect is relevant as it identifies if the Archive can manage the legal rights (copyright, data protection, and ownership) of objects during Ingest into the Archive. In this sense managing legal rights involves checking if the content being ingested has legal rights associated; check if the content is not duplicated from previous ingests or even plagiarized from other Producers. It also includes creating access restrictions to certain objects when the producer requests it. Together with the other question identified as week points these are the only questions for the maturity level 3 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 3 for the processes dimension and as such they must be taken into consideration for improvement.
- **Dimension: Processes / Question: P3.16 / Maturity Level: 3 –** This question is related to AIP Designated Community Requirements. The answer provided shows that there is no procedure to gather and review the AIP requirements from the designated community. Together with the other question identified as week points these are the only questions for the maturity level 3 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 3 for the processes dimension and as such they must be taken into consideration for improvement.
- **Dimension: Processes / Question: P3.26 / Maturity Level: 3 –** This question is related to Access Data Problem/Error Reports. The answer provided shows that there is no mechanism to solve problem reports about errors in data or responses from Consumers and the comment to this question shows that there is feedback mechanism that exists outside the system. This aspect is relevant as it identifies if the organization investigates and resolves both incident and problem reports about errors in data or responses from Consumers essential to become a trustworthy source of information. Together with the other question identified as week points these are the only questions for the maturity level 3 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 3 for the processes dimension and as such they must be taken into consideration for improvement.
- **Dimension: Processes / Question: P3.27 / Maturity Level: 3 –** This question is related to Access Policies and Procedures. The answer provided shows that there is no records of policies and procedures that enable the dissemination of digital objects while maintaining traceability to the originals and evidence supporting their authenticity. This aspect is relevant as it identifies if the organization maintains an auditable chain of authenticity from the AIP to a DIP. Together with the other question identified as week points these are the only questions for the maturity level 3 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 3 for the processes dimension and as such they must be taken into consideration for improvement.

Table 27 details the comments provided by pilot 6 to the self-assessment questionnaire. It only presents comments that complement the answer provided.

**Table 27 - Pilot 6 Comments**

| Processes | |
|---|---|
| **Question** | **Comment** |
| P2.1 | Such negotiation shall happen outside of the system. |
| P2.2 | The ingest process can be monitored in real time by the archivist. The producer can be notified after ingest of either the success or failure of the ingest process. |
| P2.3 | The transformation of SIPs into AIPs occurs mechanically during the ingest process. |
| P2.4 | IDs are unique, but not persistent (as a Handle). |
| P2.5 | The E-ARK API spec |
| P2.6 | PREMIS events are recorded for every relevant action. |
| P2.7 | I'm not so sure what to answer here. |
| P2.8 | One can run a task that generates DIPs from AIPs. |
| P3.1 | This Yes is for the E-ARK SIP. The repository supported other SIP types. |
| P3.2 | This is manual task that happens outside of the system. |
| P3.3 | SIPs are never changed. They are stored as they come. However, the archivist can make documented changes to the AIP that has been generated from the ingest SIP. |
| P3.4 | Descriptive units can be created and edited on the repository after ingest. |
| P3.7 | This is a manual operation. |
| P3.9 | With a little bit of creativity, this can be done. However, the definition of classes is more at the representation level and not at the AIP level. |
| P3.10 | There is a rough mechanism based on the format registry. It's not perfect, but it's a start. |
| P3.11 | There is a rough mechanism based on the format registry. It's not perfect, but it's a start. |
| P3.12 | After ingest, it's possible to have an archivist sample the SIPs stored in a quarantine area and check its understandability. When comfortable, all a selection of the SIPs can be accepted into the repository. |
| P3.13 | The repository produces an inventory report that can be compared with the same report created at the producer side. |
| P3.15 | There is a task for that. |
| P3.18 | There is a format registry. |
| P3.19 | The discovery capability can be adjusted to meet the requirements of the Designed Community. |
| P3.22 | Access is defined via permissions. |
| P3.25 | Logs |
| P3.26 | The feedback mechanism happens outside the system. |
| **Infrastructure** | |
| **Question** | **Comment** |
| I2.2 | This happens at many different levels and its very dependent of the architecture. But it's possible. |
| I2.3 | There is an ingest task that creates on replica of an AIP. |
| I3.3 | There is a risk register that can be used to manage technology obsolescence risks. |
| I3.4 | There is a risk register that can be used to manage technology obsolescence risks. |
| **General** | |
| **Question** | **Comment** |
| G5.4 | There is a risk management capability. |
| G5.5 | There is a risk management capability. |

## 3.6. Pilot 7: Access to databases (National Archives of Hungary)

This section details the comments provided for the pilot 7, as well as, an analysis of the results and weak points. It also depicts the distribution of maturity levels for each of the dimensions of the questionnaire for pilot 1. The results of the assessment are depicted in Figure 15, these results were calculated using the weights detailed in Table 4.

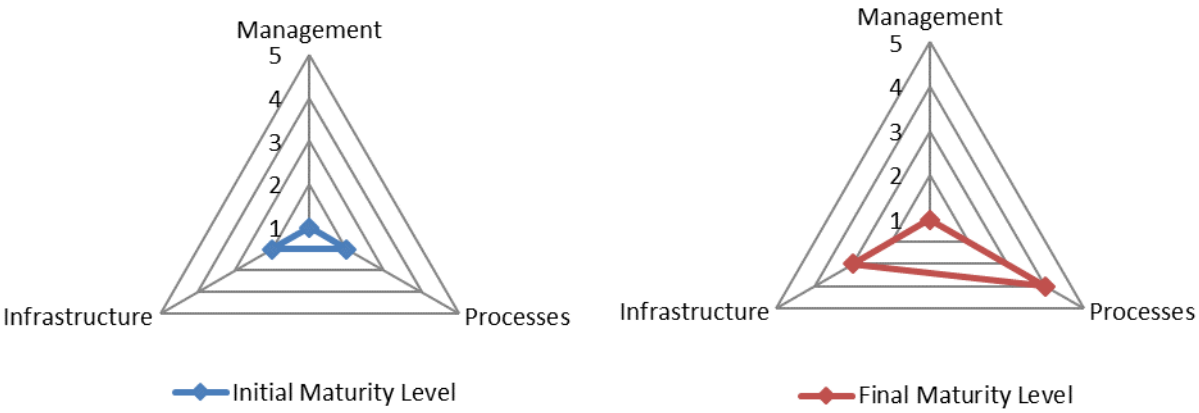


**Figure 15 - Pilot 7 Final Maturity Level Results**

Figure 15 shows that the calculated maturity levels for pilot 7 range between maturity level 1 and 2 bin the initial assessment. However, in the final assessment there is an improvement of the maturity levels for both the processes and infrastructure dimensions which are now at maturity level 4 and 3 respectively.

The management dimension achieved maturity level 1 both in the initial and final assessment. There are no improvements detected for this dimension even when analysing the percentages for this dimension for the criteria of maturity level 2, 3 and 4. There are improvements in maturity level 5 which is now at 15%, a delta of +15% which resulted from the achievement of criterion M5.2. As a result, future improvement efforts for pilot 7 should focus on improving the criteria for maturity level 2 in the management dimension.

The processes dimension achieved maturity level 2 in the initial assessment and maturity level 3 in the final assessment. Thera re improvements in the criteria for maturity level 2 which is now at 100% representing a delta of +62%. Improvements continue at maturity level 3 with 86% of the criteria being achieved, a delta of +34%. Future improvements to the processes dimension should focus towards achieving 100% in the maturity level 3 criteria.

Finally, the infrastructure dimension achieved maturity level 2 in the initial assessment which improved to maturity level 3 in the final assessment. There are improvements in the criteria for maturity level 2 now at 100% representing a delta of +66%. Improvements were also detected at maturity level 3 which is now at 45% with a delta of +11%. Future improvements to the infrastructure dimension should focus towards achieving 100% in the maturity level 3 criteria for the infrastructure dimension.

**Table 28 - Maturity Level Distribution and Statistics for Each Dimension of Pilot 7**

| Dimension | Maturity Level 2 | | | Maturity Level 3 | | | Maturity Level 4 | | | Maturity Level 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Initial | Final | Delta | Initial | Final | Delta | Initial | Final | Delta | Initial | Final | Delta |
| Management | 0% | 0% | 0% | 42% | 42% | 0% | 0% | 0% | 0% | 0% | 15% | +15% |
| Processes | 38% | 100% | +62% | 52% | 86% | +34% | 0% | 0% | 0% | 0% | 0% | 0% |
| Infrastructure | 34% | 100% | +66% | 34% | 45% | +11% | 20% | 20% | 0% | 0% | 0% | 0% |

**Table 29 – Pilot 7 Maturity Levels confidence intervals calculation**

| Dimension | Population Size | Total Points | | Mean | | Variance | | Standard Deviation | | Confidence Interval (95%) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Initial | Final | Initial | Final | Initial | Final | Initial | Final | Initial | Final |
| Management | 22 | 3,33 | 3,47 | 0 | 0 | 0,06 | 0,06 | 0,25 | 0,25 | ±0,10 | ±0,10 |
| Processes | 27 | 7,52 | 15,81 | 0 | 0,29 | 0,08 | 0,14 | 0,29 | 0,38 | ±0,08 | ±0,11 |
| Infrastructure | 44 | 6,06 | 12,95 | 0 | 0 | 0,44 | 1,03 | 0,66 | 1,01 | ±0,29 | ±0,45 |

Figure 16 details the points that pilot 7 achieved for each dimension. The processes and infrastructure dimensions achieved the highest scores which in turn resulted in a higher maturity level. The confidence intervals (Table 29) indicate the level of uncertainty about each value on the graph. Longer or wider intervals mean more uncertainty. When two intervals for the same dimension do not overlap, it is certain that there has been a high degree of improvement between the initial and final assessments.

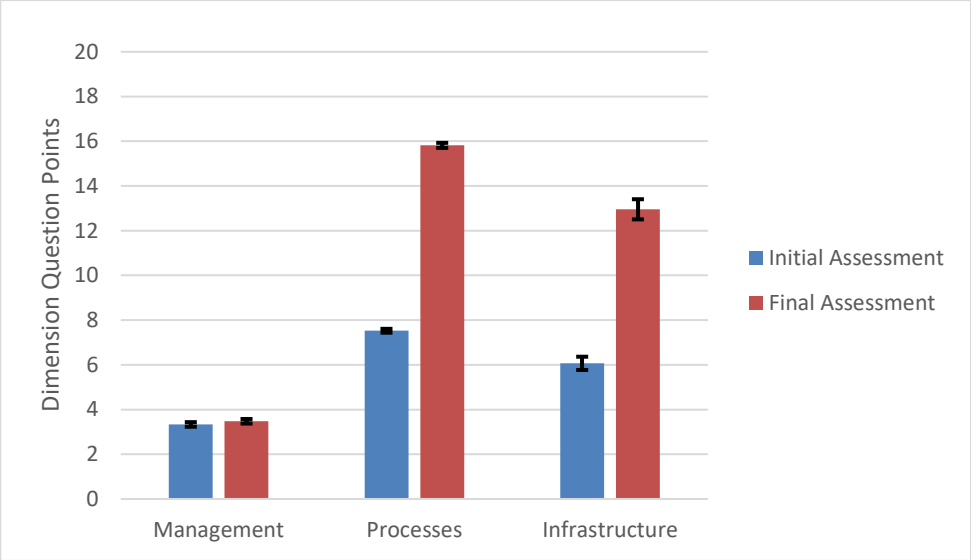


**Figure 16 - Pilot 7 Question Points for Each Dimension and Confidence Intervals**

Table 30 details the improvements in the answers for the processes dimension. As detailed in the beginning of section 3, the colour blue means that a specific criterion is considered a focus for improvement for pilot 7, the colour red means that although is a not a focus it is an aspect to be used or tried in the pilot. The column result depicts if there has been an improvement in the answer provided from the initial to the final assessment or if the answer maintained the same.

Pilot 7 registered improvements in the pre-ingest, ingest, archival storage and preservation, and access capabilities. Pre-ingest registered three improvements, ingest registered eight improvements which represents 57% of the criteria for this capability, archival storage and preservation achieved one improvement, and finally access registered four improvements. However, there are still several criteria with no improvements in the ingest, archival storage and preservation, and access capabilities. As such, future improvement effort should focus on achieving the missing criteria which are part of the focus capabilities for pilot 6 namely P3.12 for ingest, as well as, P3.24 and P3.26 for access.

**Table 30 - Processes Dimension Improvements Detailed Analysis for Pilot 7**

| ID | Capability / Criterion | Initial Assessment | Final Assessment | Result | Improvement |
|---|---|---|---|---|---|
| **Pre-Ingest** | | | | | |
| P2.1 | Deposit Terms Negotiation | N | Y | Improved | 75% |
| P3.1 | Producer SIP Validation | N | Y | Improved | |
| P3.2 | Provenance verification procedures | Y | Y | Maintained | |
| P3.3 | Enhancement of the Producer SIP | N | Y | Improved | |
| **Ingest** | | | | | |
| P2.2 | Ingest Producer/depositor responses | N | Y | Improved | 57% |
| P2.3 | AIP generation procedure | N | Y | Improved | |
| P2.4 | AIP unique identifiers convention | N | Y | Improved | |
| P3.4 | Management of units of description | N | Y | Improved | |
| P3.5 | Ingest SIP verification mechanisms | N | Y | Improved | |
| P3.6 | Ingest actions and administration processes records | Y | Y | Maintained | |
| P3.7 | Legal Rights | N | Y | Improved | |
| P3.8 | SIP final disposition documentation | Y | Y | Maintained | |
| P3.9 | AIP parsing | Y | Y | Maintained | |
| P3.10 | Preservation Description Information (PDI) acquiring procedures (from a SIP) | Y | Y | Maintained | |
| P3.11 | Preservation Description Information (PDI) maintaining procedures | Y | Y | Maintained | |
| P3.12 | AIP content information testing procedure | N | N | No Improvement | |
| P3.13 | AIP completeness and correctness | N | Y | Improved | |
| P3.14 | AIP creation records | N | Y | Improved | |
| **Archival Storage and Preservation** | | | | | |
| P2.5 | AIP Storage Procedures | N | Y | Improved | 14% |
| P2.6 | AIP actions records | Y | Y | Maintained | |
| P2.7 | AIP Linking/resolution services | Y | Y | Maintained | |
| P3.15 | AIP integrity monitoring | Y | Y | Maintained | |
| P3.16 | AIP Designated Community Requirements | N | N | No Improvement | |
| P3.17 | Independent mechanism for content integrity checking | Y | Y | Maintained | |
| P3.18 | Tools and resources to provide representation information | Y | Y | Maintained | |
| **Data Management** | | | | | |
| P3.19 | Designated Community information requirements | Y | Y | Maintained | 0% |
| P3.20 | Descriptive information association with the AIP | Y | Y | Maintained | |
| P3.21 | Bi-directional linkage between the AIP and descriptive information | Y | Y | Maintained | |
| **Access** | | | | | |
| P2.8 | Creation of a DIP | Y | Y | Maintained | 57% |
| P3.22 | Access policies | N | Y | Improved | |
| P3.23 | Access policies compliance | N | Y | Improved | |
| P3.24 | Access failures and errors | N | N | No Improvement | |
| P3.25 | Access Data Reports | N | Y | Improved | |
| P3.26 | Access Data Problem/Error Reports | N | N | No Improvement | |
| P3.27 | Access Policies and Procedures | N | Y | Improved | |

There were six weak points found in the self-assessment. Weak points are answers that show that there is a lower maturity level on a specific question and that hinder the achievement of a higher maturity level for that dimension of the self-assessment, according to a stages approach where the criteria for a certain maturity level must all be in place for achieving that maturity level.

- **Dimension: Management / Question: M2.1 / Maturity Level: 2 –** This question is related to the Mission Statement. The answered provided shows that there is no mission statement of the organization. This aspect is relevant as it identifies if there is a commitment to preservation, retention, management and access at the organization's highest administrative level. Together with question M2.2 these are the only questions for the

maturity level 2 of the management dimension that have a negative response and inhibits this organization from achieving maturity level 2 for the management dimension and as such it should be addressed.

- **Dimension: Management / Question: M2.2 / Maturity Level: 2 –** This question is related to the Designated Community Definition. The answered provided shows that there is no accessible definition of the organization's designated community. This aspect is relevant as to verify if the organization meets the needs of its Designated Community. Together with question M2.1 these are the only questions for the maturity level 2 of the management dimension that have a negative response and inhibits this organization from achieving maturity level 2 for the management dimension and as such it should be addressed.
- **Dimension: Processes / Question: P3.12 / Maturity Level: 3 –** This question is related to the AIP content information testing procedure. The answer provided shows that there is no procedure for testing if the content information of the AIP at its creation is understandable by the designated communities. Together with questions P3.16, P3.24 and P3.26 these are the only questions for the maturity level 3 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 3 for the processes dimension and as such it should be addressed.
- **Dimension: Processes / Question: P3.16 / Maturity Level: 3 –** This question is related to AIP Designated Community Requirements. The answer provided shows that there is no procedure to gather and review the AIP requirements from the designated community. Together with questions P3.12, P3.24 and P3.26 these are the only questions for the maturity level 3 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 3 for the processes dimension and as such it should be addressed.
- **Dimension: Processes / Question: P3.24 / Maturity Level: 3 –** This question is related to Access failures and errors. The answer provided shows that there is no mechanism to log and review access failures and errors. This aspect is relevant as it identifies if the organization maintains a log and reviews all access failures and errors, which can help identify security threats and access system failures. Together with questions P3.12, P3.16 and P3.26 these are the only questions for the maturity level 3 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 3 for the processes dimension and as such it should be addressed.
- **Dimension: Processes / Question: P3.26 / Maturity Level: 3 –** This question is related to Access Data Problem/Error Reports. The answer provided shows that there is no mechanism to solve problem reports about errors in data or responses from Consumers. This aspect is relevant as it identifies if the organization investigates and resolves both incident and problem reports about errors in data or responses from Consumers essential to become a trustworthy source of information. Together with questions P3.12, P3.16 and P3.24 these are the only questions for the maturity level 3 of the processes dimension that have a negative response and inhibits this organization from achieving maturity level 3 for the processes dimension and as such it should be addressed.

Table 31 details the comments provided by pilot 1 to the self-assessment questionnaire. It only presents comments that complement the answer provided.

**Table 31 - Pilot 7 Comments**

| Management | |
|---|---|
| **Question** | **Comment** |
| M5.2 | A marketing and PR strategy was developed in 2015. |
| **Processes** | |
| **Question** | **Comment** |
| P2.1 | With the new legislation, it has been improved during EARK: 34/2016. (XI. 30.) EMMI regulation on the procedures and technical requirements of transferring digitally stored records to public archives |
| P2.2 | Before the project only Preservica workflow controlled the processes including successful/failed transfer feedback and feedback at the end of successful/failed ingest. Since then 34/2016. (XI. 30.) EMMI has regulated it by law. |
| P2.3 | Defined, documented at process level carrying out by Preservica workflow |
| P2.4 | Preservica does it. |
| P2.5 | Preservica XIP format AIPs are stored at defined storages with well-defined procedures |
| P2.6 | Preservica has full log record on performed actions. |
| P3.1 | NAH offers an SIP creator tool for Producers to ensure compliance, besides during ingest process there are workflow steps to check content, format, structure, security and legal compliance. |
| P3.2 | For online transfer only official government authority account through government system can be used. |
| P3.3 | Archival description can be added during AIP creation process. |
| P3.4 | AIP creation contains a workflow step when archivist can decide about splitting, merging, rearranging SIP contents. |
| P3.5 | Both manual and automatic workflow steps are available to validate content for completeness and correctness. |
| P3.7 | It is expected to contain metadata of legal restrictions with the transferred data. Archives conduct same processes for digitals applied also for analogue data. |
| P3.8 | Yes, auto generated messages are sent on both successful and failed transfer and ingest. |
| P3.9 | Collections according to archival hierarchy are made of individual AIPs. |
| P3.10 | AIP contains all the acquired PDI from SIP and additional PDI on archiving. Hungarian SIP is a METS container with accompanying checksum, so by definition should contain all type of PDI components. |
| P3.11 | Mainly in AIP, partly in Archival Information System. |
| P3.13 | Automatic process by Preservica. |
| P3.14 | Full log is created and maintained by Preservica. |
| P3.23 | New Reading room policy was issued in 2016 included new rules on digital delivery. |
| P3.25 | Both administrative manual and automatized mechanisms are applied to register use and access. |
| P3.27 | For different kind of objects/users/services different procedures are applied. For online services watermarks, for on-demand services user and access registry, for onsite service user log is applied. |
| **Infrastructure** | |
| **Question** | **Comment** |
| I2.1 | Of course infrastructure was managed before E-ark, but it is highly improved during the project time. |
| I2.2 | Improvement of these procedures is an ongoing process. |
| I2.3 | There is a master copy in Preservica. Automatized synchronization processes are applied for backup copies. |
| I3.2 | There was an information security policy from 2013. It was improved last year and will be developed further this year according to the respective Hungarian law. |
| I3.5 | As part of the above-mentioned I3.02 policies. |
| I4.1 | More precise answer is partly. |

# 4. Technical Evaluation Assessment

This section details how the technical evaluation of the software tools developed within the scope of the project were evaluated. It also details the answers and an analysis of these answers provided by the tool developers. The aim is for tool owners to assess their software tools. It verifies whether best practices were followed during software development to ensure its sustainability and improve code quality.

This questionnaire was made available on-line and was comprised of 115 criteria. Each question had a three-point scale answer; either (1) Yes, (2) Partial or (3) No. Tool Developers could provide additional comments with the answers to enhance feedback as depicted in Figure 17.

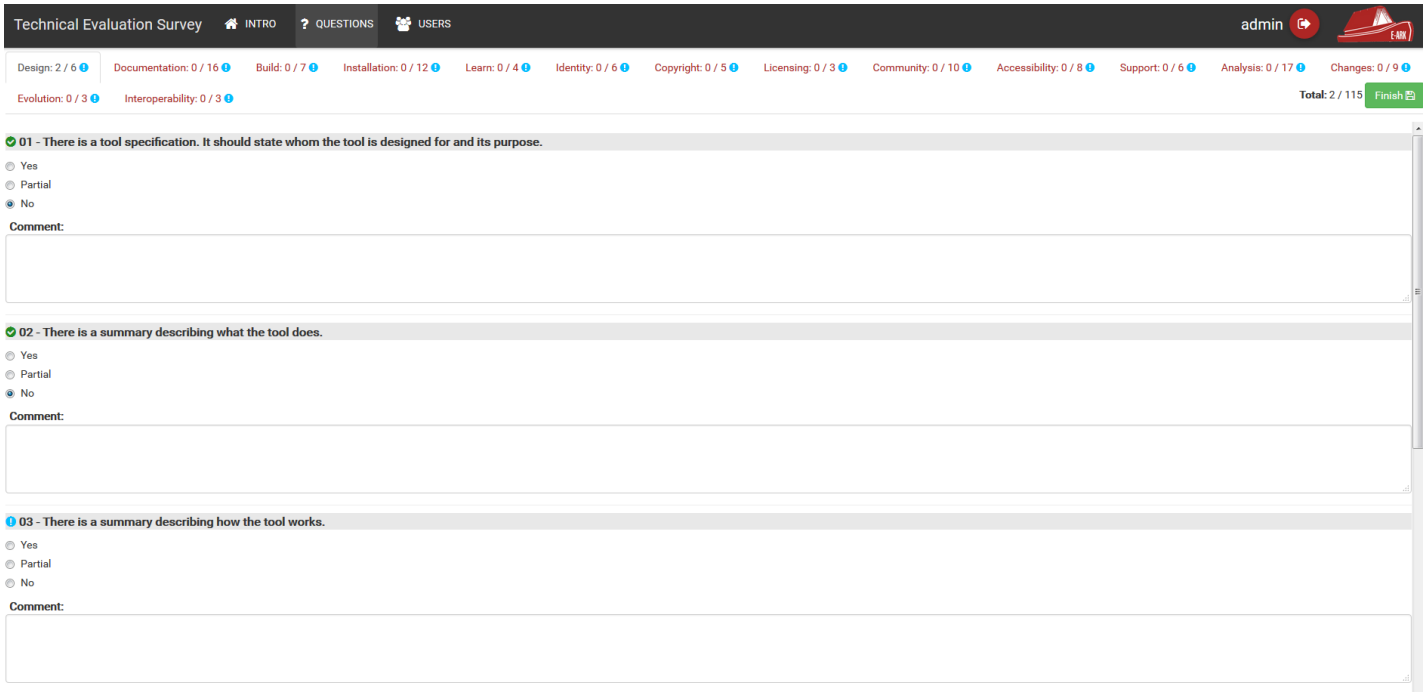


**Figure 17 - Technical Evaluation On-line Assessment Questionnaire**

This section focus on assessing the technical aspects of the tools developed in the E-ARK project:

- Tool 1: Data Preservation Toolkit (KEEP Solutions);
- Tool 2: RODA-In (KEEP Solutions);
- Tool 3: RODA Repository (KEEP Solutions);
- Tool 4: Database Visualization Toolkit (KEEP Solutions);
- Tool 5: Universal Archiving Module (National Archives of Estonia);
- Tool 6: ERMS Export Module (Magenta);
- Tool 7: Access Software in compliance with OAIS (Magenta), which comprises the Search and Display GUI; Order Management Tool; and IP Viewer;
- Tool 8: CMIS Portal/Viewer (Magenta);
- Tool 9: E-ARK Web (Austria Institute of Technology), which comprises the SIP to AIP Converter; the E-ARK Web Search; and the AIP2DIP Converter;
- Tool 10: Large Scale Storage and Indexing Backend (Austria Institute of Technology), which comprises the HDFS Storage; the SOLR Index; and the Lilly-Ingest;

- Tool 11: ESSArch Suite (ES Solutions), which comprises the ESSArch Tools for Producer; the ESSArch Tools for Archive; and the ESSArch Preservation Platform.

This questionnaire is based on several checklists available, such as, the Open Planets Foundation Labs Software Development Guidelines [2]; The SCAPE Project Functional Review Process [3]; the Software Sustainability Institute Evaluation Checklist[4] and The SEI CERT Coding Standards[5]. All these sources were analysed and the relevant questions were selected for this checklist. The following sections will detail the questionnaire. This questionnaire is comprised of 15 different viewpoints, each of these viewpoints has a set of criteria which will be detailed in the following sections. These sections also present the answers the tool developers provided for each criterion and an analysis of the results.

## 4.1. Design

The Design viewpoint focuses on assessing the overall design characteristics of a tool, such as, the specification of the tool's purpose, the rationale behind its design and the use cases specification. Table 32 details the assessment criteria used for this viewpoint.

**Table 32 - Technical Evaluation Design Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| DES.1 | There is a tool specification. It should state whom the tool is designed for and its purpose. |
| DES.2 | There is a summary describing what the tool does. |
| DES.3 | There is a summary describing how the tool works. |
| DES.4 | The design rationale is available. It should state key design decisions with any deviations to the original plan. |
| DES.5 | An architectural overview, including diagrams is available. |
| DES.6 | The descriptions for the intended use cases are available. |

Table 33 details the answers provided for each tool for each of the assessment criteria regarding the design viewpoint. In this table 'Y' stands for Yes, 'N' for No and 'P' for Partial. Each tool is identified by T'X' which stands for Tool 'X', as identified in the introduction for this section.

**Table 33 - Technical Evaluation Assessment Results for the Design Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DES.1 | Y | Y | Y | P | Y | Y | P | N | N | Y | Y |
| DES.2 | Y | Y | Y | P | Y | Y | Y | Y | Y | Y | Y |
| DES.3 | Y | N | Y | P | Y | P | Y | Y | Y | Y | P |
| DES.4 | Y | N | Y | Y | P | N | N | N | N | Y | N |
| DES.5 | Y | N | Y | Y | P | N | Y | Y | Y | Y | P |
| DES.6 | Y | Y | Y | P | Y | N | Y | Y | N | Y | Y |

Table 34 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the design viewpoint. It only presents comments that complement the answer provided.

[2] http://wiki.opf-labs.org/display/PT/Software+Development+Guidelines
[3] http://wiki.opf-labs.org/display/SP/The+SCAPE+Functional+Review+Process
[4] https://www.software.ac.uk/online-sustainability-evaluation
[5] https://www.securecoding.cert.org/confluence/display/seccode/SEI+CERT+Coding+Standards

**Table 34 - Technical Evaluation Assessment Comments for the Design Viewpoint**

| Criterion | Comment |
|---|---|
| **Tool 1** | |
| DES.1 | http://www.database-preservation.com/ |
| DES.2 | http://www.database-preservation.com/ |
| DES.3 | http://www.database-preservation.com/ |
| DES.4 | Documentation exists but it is not public yet. |
| DES.5 | Documentation exists but it is not public yet. |
| DES.6 | http://www.database-preservation.com/ |
| **Tool 2** | |
| DES.1 | Evidence on http://rodain.roda-community.org |
| DES.2 | Evidence on http://rodain.roda-community.org |
| DES.3 | The inner workings of the tool are not documented as such. However, the source code is public. |
| **Tool 3** | |
| DES.1 | http://www.roda-community.org/ |
| DES.2 | http://www.roda-community.org/ |
| DES.3 | http://www.roda-community.org/ |
| DES.4 | http://www.roda-community.org/features/ |
| DES.5 | http://www.roda-community.org/features/ |
| DES.6 | http://www.roda-community.org/what-is-roda/ |
| **Tool 4** | |
| DES.1 | http://visualization.database-preservation.com/ |
| DES.2 | http://visualization.database-preservation.com/ |
| DES.3 | http://visualization.database-preservation.com/ |
| DES.4 | Documentation exists but it is not public yet. |
| DES.5 | Documentation exists but it is not public yet. |
| DES.6 | http://visualization.database-preservation.com/more documentation exists but it is not public yet. |
| **Tool 5** | |
| DES.1 | A tool specification is available as a set of functional requirements which was used for the development of the tool (only in Estonian) |
| DES.2 | A short summary in Estonian and English is available on the tool website (http://www.arhiiv.ee/en/universal-archiving-module/). |
| DES.3 | A summary in Estonian and English is available on the tool website (http://www.arhiiv.ee/en/universal-archiving-module/). |
| DES.4 | Limited information available in development documentation |
| DES.5 | Partially available within development documentation and user guides. |
| DES.6 | Extensive user and installation guides are available, as well as videos. |
| **Tool 8** | |
| DES.2 | GitHub Readme page. |
| DES.5 | Ongoing documentation at the time of this survey. |
| DES.6 | Ongoing documentation at the time of this survey. |
| **Tool 9** | |
| DES.1 | The E-ARK Web SIP creator was contributed as an add-on to complete E-ARK web. For this reason, there is no specification. |
| DES.2 | Part of GitHub project. |
| DES.3 | Part of GitHub project. |
| **Tool 10** | |
| DES.1 | Yes, as part of deliverable D6.1 and D6.2 |
| DES.2 | Yes, as part of deliverable D6.1 and D6.2 |
| DES.3 | Yes, as part of the GitHub project |
| DES.4 | Yes, as part of deliverable D6.1 and D6.2 |

| Criterion | Comment |
|---|---|
| DES.5 | Yes, as part of deliverable D6.1 and D6.2 |
| DES.6 | Yes, as part of deliverable D6.1 and D6.2 |
| **Tool 11** | |
| DES.1 | Not a newly developed tool. Has existed since 2010 based on requirements from National Archives of Norway |
| DES.2 | Both in the app and the overall documentation |
| DES.3 | Documentation will be updated and complete at the end of the project. |
| DES.4 | Design as well as requirements has changed over time in the project and therefore several designs and requirements lists have existed. |
| DES.5 | Part of the overall documentation |
| DES.6 | In the overall documentation |

## 4.2. Documentation

The Documentation viewpoint focuses on assessing the overall documentation of a tool, such as, User and API Documentation, documentation version control and availability channels, and troubleshooting guides. Table 35 details the assessment criteria used for this viewpoint.

**Table 35 - Technical Evaluation Documentation Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| DOC.1 | It provides a summary of the tool, its intended users and its applications. |
| DOC.2 | Is partitioned into sections for each user type, such as a technical admin, developer or standard user. |
| DOC.3 | States the assumed background and expertise of the reader for each class of user. |
| DOC.4 | The documentation lists all resources for further information. |
| DOC.5 | Consists of clear, step-by-step instructions. |
| DOC.6 | Gives examples of what the user will see at each step. e.g. a screen shot or command-line excerpts. |
| DOC.7 | Symptoms and their step-by-step solutions are provided for all problems and error messages. |
| DOC.8 | It states all command names with their correct syntax. |
| DOC.9 | It lists all available menus, their parameters and error messages. These should be exactly as they appear on screen or should be typed. |
| DOC.10 | It uses teletype-style fonts for command-line inputs and outputs, source code fragments, function names and class names etc. |
| DOC.11 | All plain-text files (e.g. READMEs) use indentation and underlining (e.g. === and ---) to structure the text. |
| DOC.12 | Plain-text files (e.g. READMEs) do NOT use TAB characters to indent the text. |
| DOC.13 | API documentation (e.g. Javadoc or Doxygen), documents APIs completely (e.g. configuration files, property names etc.) |
| DOC.14 | The documentation is held under version control alongside the code. |
| DOC.15 | The documentation is available through the E-ARK project web site. |
| DOC.16 | The documentation on the E-ARK project web site makes clear what version of the tool it refers to. |

Table 36 details the answers provided for each tool for each of the assessment criteria regarding the documentation viewpoint. In this table 'Y' stands for Yes, 'N' for No and 'P' for Partial. Each tool is identified by T'X' which stands for Tool 'X', as identified in the introduction for this section.

**Table 36 - Technical Evaluation Assessment Results for the Documentation Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DOC.1 | Y | Y | Y | Y | Y | Y | P | Y | Y | Y | Y |
| DOC.2 | Y | N | Y | P | Y | Y | Y | Y | N | P | Y |
| DOC.3 | Y | N | Y | N | P | N | N | N | N | Y | Y |
| DOC.4 | Y | Y | Y | Y | Y | N | Y | Y | P | Y | Y |
| DOC.5 | Y | Y | Y | Y | Y | P | Y | Y | Y | P | Y |
| DOC.6 | Y | Y | Y | Y | Y | Y | Y | Y | Y | P | Y |
| DOC.7 | Y | Y | P | N | P | N | N | P | P | N | P |
| DOC.8 | Y | Y | P | Y | Y | N | P | N | P | P | P |
| DOC.9 | P | N | P | N | Y | N | N | Y | Y | N | P |
| DOC.10 | Y | N | Y | Y | P | Y | N | N | N | N | P |
| DOC.11 | Y | N | Y | Y | P | N | P | Y | Y | Y | P |
| DOC.12 | Y | N | Y | Y | P | Y | Y | P | Y | Y | P |
| DOC.13 | N | P | P | Y | N | P | N | P | P | Y | P |
| DOC.14 | P | N | Y | Y | Y | Y | P | Y | Y | Y | P |
| DOC.15 | Y | N | N | P | N | Y | N | Y | N | P | N |
| DOC.16 | Y | N | N | N | N | N | N | P | N | Y | N |

Table 37 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the documentation viewpoint. It only presents comments that complement the answer provided.

**Table 37 - Technical Evaluation Assessment Comments for the Documentation Viewpoint**

| Question | Comment |
|---|---|
| **Tool 1** | |
| DOC.1 | http://www.database-preservation.com/ |
| DOC.2 | http://www.database-preservation.com/ |
| DOC.3 | http://www.database-preservation.com/ |
| DOC.4 | http://www.database-preservation.com/ |
| DOC.5 | http://www.database-preservation.com/ |
| DOC.6 | http://www.database-preservation.com/ |
| DOC.7 | Instructions are provided for the most common problems, and other errors include instructions on how to let developers know about new problems. |
| DOC.8 | http://www.database-preservation.com/ |
| DOC.9 | Not all error messages and their detailed causes are present in the documentation, although they are supposed to be either understandable on their own or only understandable by a developer. |
| DOC.10 | http://www.database-preservation.com/ |
| DOC.11 | The closest thing to a structured plain-text file is the README file, which is written using markdown. https://raw.githubusercontent.com/keeps/db-preservation-toolkit/master/README.md |
| DOC.12 | https://raw.githubusercontent.com/keeps/db-preservation-toolkit/master/README.md |
| DOC.14 | The README is on the same repository as the code. But some documentation is in the project's wiki: https://github.com/keeps/db-preservation-toolkit/wiki |
| DOC.15 | Via a link to http://www.database-preservation.com/ |
| DOC.16 | The documentation on the E-ARK project web site links to http://www.database-preservation.com/ which always has the information about the most recent version. |
| **Tool 2** | |
| DOC.1 | Evidence on http://rodain.roda-community.org |
| DOC.4 | Evidence on http://rodain.roda-community.org section "Further reading" |
| DOC.5 | Videos available on http://rodain.roda-community.org |
| DOC.6 | Videos available on http://rodain.roda-community.org |

| Question | Comment |
|---|---|
| DOC.7 | Check the Troubleshooting section. |
| DOC.8 | http://rodain.roda-community.org |
| DOC.14 | It has to be generated from source code. |
| **Tool 3** | |
| DOC.2 | http://www.roda-community.org/user-guide/ |
| DOC.6 | http://www.roda-community.org/screenshots/ |
| DOC.7 | http://www.roda-community.org/user-guide/ |
| DOC.8 | https://github.com/keeps/roda |
| DOC.11 | Uses Markdown |
| DOC.12 | Uses Markdown |
| DOC.13 | Currently 20% of public API is documented (checked via code analysis) |
| **Tool 4** | |
| DOC.1 | http://www.database-preservation.com/<br>http://visualization.database-preservation.com/ |
| DOC.2 | http://visualization.database-preservation.com/<br>Only technical admin instructions are present |
| DOC.4 | http://www.database-preservation.com/<br>http://visualization.database-preservation.com/ |
| DOC.5 | http://visualization.database-preservation.com/ |
| DOC.6 | http://visualization.database-preservation.com/ |
| DOC.8 | http://visualization.database-preservation.com/ |
| DOC.13 | REST API documented via Swagger endpoint |
| DOC.15 | E-ARK project website links to E-ARK fork of the tool, which is outdated. |
| **Tool 5** | |
| DOC.2 | Documentation for different user types is split into different documents. |
| DOC.3 | The documentation is intended for a closed and well-known stakeholder group (i.e. agency records managers), as such much of the background is assumed implicitly. |
| DOC.4 | Most documentation has been gathered to a single product website, references between technical, political and process documentation exist. |
| DOC.7 | The guidelines usually concentrate on the "positive" workflow and does not provide much on errors and problems. |
| DOC.13 | Not relevant --> there is no API available |
| DOC.15 | Documentation only available on the website of NAE. |
| **Tool 6** | |
| DOC.15 | It's on GitHub |
| DOC.16 | It's on GitHub |
| **Tool 7** | |
| DOC.11 | Technical READMEs use Markdown mark-up language to structure the text. |
| **Tool 8** | |
| DOC.6 | Ongoing documentation at the time of this survey. |
| **Yool 10** | |
| DOC.5 | It is a backend system, not a tool. |
| DOC.6 | It is a backend system, not a tool but a step-by-step tutorial for the front-end is available. |
| DOC.8 | It is a backend system, not a tool. |
| DOC.9 | It is a backend system, not a tool. |
| DOC.10 | No direct user input |
| DOC.15 | Website and/or GitHub |
| DOC.16 | Through the deliverable |
| **Tool 11** | |
| DOC.8 | Uses sometimes OS commands |

| Question | Comment |
|---|---|
| DOC.9 | Some result sets are logged and not presented in the GUI. |
| DOC.13 | We use several doc tools, not just Doxygen |
| DOC.14 | Source code etc. yes, some guidelines not always |
| DOC.15 | On GitHub, in the apps and on respective web site |
| DOC.16 | Will be updated as the new release will be available 31/1/17 |

## 4.3. Build

The Build viewpoint focuses on assessing if the tool provides all the necessary packages needed for future users and developers to build the tool from the source code, and to check if tests are provided to verify that the tool can be built with the available packages. Table 38Table 35 details the assessment criteria used for this viewpoint.

**Table 38 - Technical Evaluation Build Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| BUI.1 | There are instructions on the E-ARK project web site for building the tool. |
| BUI.2 | An automated build (e.g. Make, ANT, custom solution) is used to build the tool. |
| BUI.3 | There is a list of all third-party build dependencies which are not bundled. It should include their web addresses, suitable versions, licences and whether these are mandatory or optional. |
| BUI.4 | Dependency management systems are used to automatically download dependencies (e.g. ANT, Ivy, Maven or custom solution). |
| BUI.5 | All mandatory third-party build dependencies are currently available. Please state the date this check was performed. |
| BUI.6 | All optional third-party build dependencies are currently available. Please state the date this check was performed. |
| BUI.7 | Tests are provided to verify the build has succeeded. |

Table 39 details the answers provided for each tool for each of the assessment criteria regarding the build viewpoint. In this table 'Y' stands for Yes, 'N' for No and 'P' for Partial. Each tool is identified by T'X' which stands for Tool 'X', as identified in the introduction for this section.

**Table 39 - Technical Evaluation Assessment Results for the Build Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BUI.1 | Y | N | Y | N | N | N | N | Y | Y | P | N |
| BUI.2 | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | N |
| BUI.3 | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | Y |
| BUI.4 | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | P |
| BUI.5 | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | P |
| BUI.6 | Y | N | Y | Y | Y | Y | N | Y | Y | Y | N |
| BUI.7 | Y | Y | Y | P | Y | Y | N | N | P | Y | P |

Table 40 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the build viewpoint. It only presents comments that complement the answer provided.

**Table 40 - Technical Evaluation Assessment Comments for the Build Viewpoint**

| Question | Comment |
|---|---|
| **Tool 1** | |
| BUI.1 | Via a link to http://www.database-preservation.com/ where the instructions are located. |

| Question | Comment |
|---|---|
| BUI.2 | https://github.com/keeps/db-preservation-toolkit/blob/master/pom.xml |
| BUI.3 | https://github.com/keeps/db-preservation-toolkit/blob/master/pom.xml |
| BUI.4 | https://github.com/keeps/db-preservation-toolkit/blob/master/pom.xml |
| BUI.5 | 19 December 2016 |
| BUI.6 | 19 December 2016 |
| BUI.7 | https://github.com/keeps/db-preservation-toolkit/tree/master/dbptk-core/src/test |
| **Tool 2** | |
| BUI.1 | The tool has its own web site. |
| BUI.2 | Maven |
| BUI.3 | Under maven. |
| BUI.4 | Maven |
| BUI.5 | 2016-12-12 |
| BUI.6 | Not applicable. There are no optional dependencies |
| **Tool 3** | |
| BUI.1 | https://github.com/keeps/roda/wiki/Developer-guide |
| BUI.2 | Maven |
| BUI.3 | https://github.com/keeps/roda/blob/master/INSTALL.md |
| BUI.4 | Maven |
| BUI.5 | Last checked today, 2016-12-21.<br>Building is checked via https://travis-ci.org/keeps/roda |
| BUI.6 | Last checked today, 2016-12-21.<br>Building is checked via https://travis-ci.org/keeps/roda |
| BUI.7 | Test coverage is 13%<br>Test execution is checked via https://travis-ci.org/keeps/roda<br>Test coverage is checked via https://codecov.io/gh/keeps/roda (not yet in master but in dev branches) |
| **Tool 4** | |
| BUI.5 | 19 December 2016 |
| BUI.6 | 19 December 2016 |
| BUI.7 | Minimal testing exists. |
| **Tool 5** | |
| BUI.1 | The tool can be built with Visual Studio by following the standard documentation. |
| BUI.2 | Visual Studio is used for an automated build. |
| BUI.3 | DevExpress (mandatory), v10.2.6.0, https://www.devexpress.com/<br>Saxon-B (mandatory), v9.1.0.8, https://sourceforge.net/projects/saxon/files/Saxon-B/<br>Jhove (mandatory), v1.11, 2013-09-29, https://github.com/openpreserve/jhove<br>JodConverter (mandatory), v2.2.2,<br>http://www.artofsolving.com/opensource/jodconverter.html |
| BUI.4 | Visual Studio Dependencies Manager can be used. |
| BUI.5 | 27.12.2016 |
| BUI.7 | Visual Studio informs users about the success or errors. |
| **Tool 6** | |
| BUI.1 | It's on GitHub |
| **Tool 7** | |
| BUI.5 | Checked January 11th, 2017 |
| BUI.6 | Checked January 11th, 2017 |
| **Tool 10** | |
| BUI.5 | Continuously checked |
| BUI.6 | Constantly checked through continuous integration |
| **Tool 11** | |
| BUI.1 | Application is built with Python which is a script language, e.g. it does not need to be compiled or build. |

| Question | Comment |
|---|---|
| BUI.2 | We use different tools to setup all required libraries but no make/build is done (see answer question 23) |
| BUI.3 | Is described in requirements.txt |
| BUI.4 | Some scripts downloads required libraries. |
| BUI.5 | During installation, a version check is done for the required python dependencies, not OS dependencies. |
| BUI.6 | We don't have any optional dependencies. |
| BUI.7 | We don't "build" the application. Tests can be performed on the back-end and front-end. |

## 4.4. Installation

The Installation viewpoint focuses on assessing whether tool provides instructions for its installation, as well as, to check if all the dependencies needed for users to successfully install the tool in a new machine are provided. Table 41 details the assessment criteria used for this viewpoint.

**Table 41 - Technical Evaluation Installation Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| INS.1 | There are instructions on the E-ARK project web site for installing the tool. |
| INS.2 | There is a list of all third-party install dependencies that are not bundled, along with web addresses, suitable versions, licences and whether these are mandatory or optional. |
| INS.3 | All mandatory third-party install dependencies are currently available. |
| INS.4 | All optional third-party install dependencies are currently available. |
| INS.5 | Tests are provided to verify the install has succeeded. |
| INS.6 | When an archive (e.g. TAR.GZ or ZIP) is unpacked, it creates a single directory with the files within. It does not spread its contents all over the current directory. |
| INS.7 | When the tool is installed, its contents are organised into sub-directories (e.g. docs for documentation, libs for dependent libraries) as appropriate. |
| INS.8 | All source and binary distributions have a README.TXT with the tool name, web site, how/where to get help, version, date, licence and copyright (or where to find this information), location of entry point into user documentation. |
| INS.9 | All GUIs contain a Help menu with commands. It should display the project name, web site, how/where to get help, version, date, licence with copyright (or where to find this information) and the location of entry point into user doc. |
| INS.10 | All other content distributed as an archive contains a README.TXT with tool name, web site, nature, how /where to get help, date. |
| INS.11 | Installers allow users to decide the installation path. |
| INS.12 | Uninstallers uninstall every file or warns user of any files that were not removed. The location of the files that remain should be displayed to the user after the uninstallation has completed. |

Table 42 details the answers provided for each tool for each of the assessment criteria regarding the installation viewpoint. In this table ‘Y’ stands for Yes, ‘N’ for No and ‘P’ for Partial. Each tool is identified by T’X’ which stands for Tool ‘X’, as identified in the introduction for this section.

**Table 42 - Technical Evaluation Assessment Results for the Installation Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| INS.1 | Y | N | Y | P | N | N | N | Y | Y | P | Y |
| INS.2 | Y | N | Y | Y | Y | Y | N | Y | Y | Y | N |
| INS.3 | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| INS.4 | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | N |
| INS.5 | Y | N | N | Y | Y | N | N | P | Y | P | Y |
| INS.6 | N | N | Y | N | Y | Y | Y | N | Y | Y | Y |
| INS.7 | N | N | P | Y | Y | Y | Y | Y | Y | Y | Y |
| INS.8 | P | Y | Y | P | N | N | P | N | Y | Y | Y |
| INS.9 | N | Y | Y | P | Y | N | N | N | P | P | P |
| INS.10 | N | N | Y | Y | N | N | N | N | Y | Y | Y |
| INS.11 | Y | N | Y | Y | Y | Y | Y | N | Y | N | N |
| INS.12 | Y | N | N | N | Y | N | N | N | N | N | Y |

Table 43 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the installation viewpoint. It only presents comments that complement the answer provided.

**Table 43 - Technical Evaluation Assessment Comments for the Installation Viewpoint**

| Criterion | Comment |
|---|---|
| **Tool 1** | |
| INS.1 | The tool is executable as-is, it does not have an installation process. But it can be considered that downloading the tool is installing it. |
| INS.2 | http://www.database-preservation.com/ |
| INS.3 | http://www.database-preservation.com/ |
| INS.5 | Being able to run the tool proves that all the required dependencies are installed. The tool itself has no installation process. |
| INS.8 | The source code contains the information. The binary distribution is a single JAR file, which does not contain a README.TXT. |
| INS.11 | The user decides where to place the JAR file. |
| INS.12 | Removing the folder where the JAR file is located removes the whole application, together with any logs that were generated. Other files that were created by the application (e.g. SIARD files) should be managed by the user. |
| **Tool 2** | |
| INS.1 | The tool has its own web page. |
| INS.8 | On the tool website. |
| INS.11 | Not applicable. There is no installer. Just a jar file. |
| INS.12 | Not applicable. There is no installer. Just a jar file. |
| **Tool 3** | |
| INS.1 | https://github.com/keeps/roda/blob/master/INSTALL.md |
| INS.2 | https://github.com/keeps/roda/blob/master/INSTALL.md |
| INS.7 | Installation uses docker or needs a bit more complex system, with dependencies (Apache Tomcat, Apache Solr, Apache Zookeeper) and different installation structured. |
| INS.12 | Uninstall is a bit more complex, it depends on Docker image uninstall and virtual folders configuration, or the exact way the production system architecture was designed. |
| **Tool 4** | |
| INS.1 | E-ARK project website links to E-ARK fork of the tool, which is outdated. |

| Criterion | Comment |
|---|---|
| | http://visualization.database-preservation.com/ contains the instructions to run the tool. The tool is executable as-is, it does not have an installation process. But it can be considered that downloading and extracting the tool is installing it. |
| INS.5 | Being able to run the tool proves that all the required dependencies are installed. The tool itself has no installation process. |
| INS.8 | The source code contains this information. The binary distribution does not. |
| INS.9 | The web interface does have links to http://visualization.database-preservation.com/ |
| INS.11 | By deciding where to extract the files |
| INS.12 | Some files may be saved in a directory configurable by the user. Those files are not deleted when removing the application folder (as there is no uninstaller). |
| **Tool 5** | |
| INS.1 | Installation instructions are available on NAE's web page as UAM is NAE's tool. |
| INS.2 | Short list of dependencies can be found on NAE's web page. |
| INS.5 | The installer informs users about the success or errors. |
| INS.8 | No separate README.TXT file is needed as the installer comes as a MSI package. |
| INS.10 | No separate README.TXT file is needed as the installer comes as a MSI package. |
| **Tool 6** | |
| INS.1 | It's on GitHub |
| **Tool 7** | |
| INS.8 | Source code is distributed via GitHub using GIT. README, version info, licensing info, and modification dates. |
| **Tool 8** | |
| INS.6 | Delivered via GitHub. |
| INS.11 | No installers at the moment. |
| **Tool 9** | |
| INS.12 | GitHub checkout install |
| **Tool 11** | |
| INS.2 | Requirements are defined in requirements.txt which addresses required package and correct version. |
| INS.5 | You can simply run a whole workflow test |
| INS.6 | Dedicated destination paths exist |
| INS.9 | System info exist, user guideline is under dev, will also be available by the GUI |
| INS.11 | Fixed as a python site package |
| INS.12 | By using pip uninstall. |

## 4.5. Learn

The Learn viewpoint focuses on assessing if the tool provides starting guides, instructions, reference guides and other documentation that can be used by users and developers to quickly learn how to use the tool and extend it, fi relevant. Table 44 details the assessment criteria used for this viewpoint.

**Table 44 - Technical Evaluation Learn Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| LEA.1 | A getting started guide is provided outlining a basic example of using the tool. |
| LEA.2 | Instructions are provided for all use cases. |
| LEA.3 | Reference guides are provided for all command-line, GUI and configuration options. |
| LEA.4 | If appropriate, API documentation is provided for developers. |

Table 45 details the answers provided for each tool for each of the assessment criteria regarding the installation viewpoint. In this table 'Y' stands for Yes, 'N' for No and 'P' for Partial. Each tool is identified by T'X' which stands for Tool 'X', as identified in the introduction for this section.

**Table 45 - Technical Evaluation Assessment Results for the Learn Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LEA.1 | Y | N | Y | P | Y | Y | P | P | Y | Y | P |
| LEA.2 | Y | N | P | P | Y | N | Y | N | P | P | P |
| LEA.3 | Y | P | N | N | Y | N | N | P | Y | Y | P |
| LEA.4 | Y | P | Y | Y | Y | P | N | Y | Y | Y | P |

Table 46 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the learn viewpoint. It only presents comments that complement the answer provided.

**Table 46 - Technical Evaluation Assessment Comments for the Learn Viewpoint**

| Criterion | Comment |
|---|---|
| **Tool 1** | |
| LEA.1 | http://www.database-preservation.com/ |
| LEA.2 | http://www.database-preservation.com/ |
| LEA.3 | http://www.database-preservation.com/<br>https://github.com/keeps/db-preservation-toolkit/wiki/Application-usage |
| LEA.4 | Via Javadoc. |
| **Tool 2** | |
| LEA.4 | Only Javadoc. |
| **Tool 3** | |
| LEA.1 | https://github.com/keeps/roda#quick-start |
| LEA.2 | Not for all use cases. |
| LEA.3 | Some documentation is still lacking. |
| LEA.4 | Swagger framework is used for documentation. |
| **Tool 4** | |
| LEA.1 | Not yet public nor bundled with the tool. |
| LEA.2 | Not yet public nor bundled with the tool. |
| LEA.4 | Via Javadoc. |
| **Tool 11** | |
| LEA.1 | Under construction |
| LEA.2 | Under construction |
| LEA.3 | Under construction |
| LEA.4 | Under construction |

## 4.6. Identity

The Identity viewpoint purpose is the verify if there is an established identity for the tool. This includes a name and a logo. There should also be guaranteed that no trade-mark is violated by the tool name or logo. Table 47 details the assessment criteria used for this viewpoint.

**Table 47 - Technical Evaluation Identity Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| IDE.1 | The tool has a logo. |
| IDE.2 | The tool has a distinct name within its application area. |

| | |
|---|---|
| IDE.3 | A search by Google on the distinct name plus keywords from the application area throws up the E-ARK project web site in the first page of matches. |
| IDE.4 | The tool has a distinct name regardless of its application area. |
| IDE.5 | A search by Google on the name plus keywords from the application area throws up the E-ARK project web site in the first page of matches. |
| IDE.6 | The tool name does not violate an existing trade-mark. |

Table 48 details the answers provided for each tool for each of the assessment criteria regarding the identity viewpoint. In this table 'Y' stands for Yes, 'N' for No and 'P' for Partial. Each tool is identified by T'X' which stands for Tool 'X', as identified in the introduction for this section.

**Table 48 - Technical Evaluation Assessment Results for the Identity Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| IDE.1 | Y | N | Y | Y | Y | Y | Y | Y | N | N | N |
| IDE.2 | Y | N | Y | Y | Y | Y | Y | Y | P | Y | Y |
| IDE.3 | P | Y | Y | P | N | P | N | N | N | P | N |
| IDE.4 | Y | Y | Y | Y | Y | Y | Y | Y | P | Y | P |
| IDE.5 | P | Y | Y | Y | N | P | N | N | N | P | N |
| IDE.6 | Y | N | Y | Y | Y | N | Y | Y | Y | Y | P |

Table 49 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the identity viewpoint. It only presents comments that complement the answer provided.

**Table 49 - Technical Evaluation Assessment Comments for the Identity Viewpoint**

| Criterion | Comment |
|---|---|
| **Tool 1** | |
| IDE.1 | http://www.database-preservation.com/ |
| IDE.3 | Searching "Database Preservation Toolkit" lists the official tool page (http://www.database-preservation.com/), which links to the E-ARK page and contains documentation about the tool. |
| IDE.5 | Searching "Database Preservation Toolkit" lists the official tool page (http://www.database-preservation.com/), which links to the E-ARK page and contains documentation about the tool. |
| **Tool 3** | |
| IDE.3 | http://www.roda-community.org/ is the first match. |
| IDE.4 | Search by "roda" on google (incognito mode) shows project site on first page. |
| **Tool 4** | |
| IDE.3 | Searching "Database Visualization Toolkit" lists the official tool page (http://visualization.database-preservation.com/), which contains documentation about the tool. |
| **Tool 5** | |
| IDE.3 | A search throws up the product webpage not the E-ARK site. |
| IDE.5 | A search throws up the product webpage not the E-ARK site. |
| IDE.6 | In EU there is no other trademark with the same name in the same application area. |
| **Tool 8** | |
| IDE.3 | Not tested at this point. |
| IDE.5 | Not tested at this point. |
| **Tool 9** | |
| IDE.2 | The name is related to the project name. |
| **Tool 11** | |
| IDE.1 | Tool name in site description header |
| IDE.3 | Most probably ES Solutions |

| Criterion | Comment |
|---|---|
| IDE.4 | It is a tool for Producers |
| IDE.5 | Most probably ES Solutions |
| IDE.6 | Not that we are aware of |

## 4.7. Copyright

The Copyright viewpoint purpose is to confirm that the tool adheres to copyright regulations. As such, each tool should have a statement to its copyright, as well as, a license statement and authorship contact and information. Table 50 details the assessment criteria used for this viewpoint.

**Table 50 - Technical Evaluation Copyright Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| COP.1 | The E-ARK project web site states the tool copyright. |
| COP.2 | The E-ARK project web site states who developed/develops the tool, including the funders etc. |
| COP.3 | If there are multiple web sites which allow access to the tool then these all state exactly the same copyright, licencing and authorship. |
| COP.4 | Each source code file has a copyright statement. |
| COP.5 | Each source code file has a licence header. |

Table 51 details the answers provided for each tool for each of the assessment criteria regarding the copyright viewpoint. In this table 'Y' stands for Yes, 'N' for No and 'P' for Partial. Each tool is identified by T'X' which stands for Tool 'X', as identified in the introduction for this section.

**Table 51 - Technical Evaluation Assessment Results for the Copyright Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| COP.1 | P | N | Y | N | N | N | N | Y | Y | P | Y |
| COP.2 | P | N | Y | N | N | Y | N | Y | N | P | Y |
| COP.3 | Y | N | Y | P | N | N | N | Y | Y | Y | Y |
| COP.4 | Y | N | P | Y | P | N | N | N | Y | N | Y |
| COP.5 | Y | N | N | Y | P | N | N | N | N | N | Y |

Table 52 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the copyright viewpoint. It only presents comments that complement the answer provided.

**Table 52 - Technical Evaluation Assessment Comments for the Copyright Viewpoint**

| Criterion | Comment |
|---|---|
| **Tool 1** | |
| COP.1 | The E-ARK page includes a link to the official tool page, which contains the tool copyright. |
| COP.2 | The E-ARK page includes a link to the official tool page, which contains who developed/develops the tool. |
| COP.3 | The tool is available from GitHub and from its official website (which fetches information from GitHub, so they always display the same information). |
| **Tool 3** | |
| COP.4 | License is on the main source folder, following GitHub guidelines. |
| COP.5 | License is on the main source folder, following GitHub guidelines. |
| **Tool 4** | |

| Criterion | Comment |
|---|---|
| COP.3 | The tool is available from GitHub and from its official website (which fetches information from GitHub, so they always display the same information).<br>E-ARK project web site does not update automatically. |
| **Tool 5** | |
| COP.1 | No copyright information on the E-ARK web site or the product web site. |
| COP.3 | The tool is only accessible from the tool website. |
| COP.4 | Not each source code file. |
| COP.5 | Not each source code file. |

## 4.8. Licensing

The Licensing viewpoint aims at verifying if a tool adheres to a licensing scheme that is available in all resources of the tool, such as, sources and binary files, and detailed in tool web site. Table 53 details the assessment criteria used for this viewpoint.

**Table 53 - Technical Evaluation Licensing Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| LIC.1 | The E-ARK project web site states the tool licence. |
| LIC.2 | The tools source and binaries contains a licence. |
| LIC.3 | The tool has an open source licence. |

Table 54 details the answers provided for each tool for each of the assessment criteria regarding the licensing viewpoint. In this table 'Y' stands for Yes, 'N' for No and 'P' for Partial. Each tool is identified by T'X' which stands for Tool 'X', as identified in the introduction for this section.

**Table 54 - Technical Evaluation Assessment Results for the Licensing Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LIC.1 | P | N | N | N | N | N | N | Y | Y | Y | Y |
| LIC.2 | P | P | Y | Y | P | N | Y | N | Y | Y | Y |
| LIC.3 | Y | Y | Y | Y | P | Y | Y | Y | Y | Y | Y |

Table 55 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the licensing viewpoint. It only presents comments that complement the answer provided.

**Table 55 - Technical Evaluation Assessment Comments for the Licensing Viewpoint**

| Criterion | Comment |
|---|---|
| **Tool 1** | |
| LIC.1 | The E-ARK page includes a link to the official tool page, which contains the tool license. |
| LIC.2 | The source contains the license. |
| LIC.3 | LGPLv3 |
| **Tool 2** | |
| LIC.2 | The binaries yes. |
| **Tool 3** | |
| LIC.1 | But it is the main project site. |
| LIC.2 | Appears on the web UI |
| LIC.3 | LGPLv3 |
| **Tool 4** | |

| | |
|---|---|
| LIC.3 | LGPLv3 |
| **Tool 5** | |
| LIC.1 | The tool license is not stated on the E-ARK web site nor the tool web site. |
| LIC.3 | The tool and the code is legally owned by NAE. |

## 4.9. Community

The Community viewpoint focuses on checking if the tool has a community behind it. This includes the identification of users, details of success stories, a list of partners and collaborators, a list of publications, as well as, external parties that are in some way involved in the development, use and dissemination of the tool. Table 56 details the assessment criteria used for this viewpoint.

**Table 56 - Technical Evaluation Community Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| COM.1 | The E-ARK project web site has a statement of the number of users, developers and members for the tool. |
| COM.2 | The E-ARK project web site contains success stories for the tool. |
| COM.3 | The E-ARK project web site has quotes from satisfied users of the tool. |
| COM.4 | The E-ARK project web site has list of important partners or collaborators for the tool. |
| COM.5 | The E-ARK project web site has a list of publications related to the tool. |
| COM.6 | The E-ARK project web site has a list of any third-party publications that cite the tool. |
| COM.7 | The E-ARK project web site has list of software that uses or bundles the tool. |
| COM.8 | Users are requested to cite the E-ARK project if publishing papers based on results derived from the tool. |
| COM.9 | Users exist who are not members of the E-ARK project. |
| COM.10 | Developers exist who are not members of the E-ARK project. |

Table 57 details the answers provided for each tool for each of the assessment criteria regarding the community viewpoint. In this table 'Y' stands for Yes, 'N' for No and 'P' for Partial. Each tool is identified by T'X' which stands for Tool 'X', as identified in the introduction for this section.

**Table 57 - Technical Evaluation Assessment Results for the Community Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| COM.1 | N | N | N | N | N | P | N | N | N | N | P |
| COM.2 | N | N | N | N | N | Y | N | N | N | P | P |
| COM.3 | N | N | N | N | N | P | N | N | N | N | P |
| COM.4 | N | N | Y | N | N | Y | N | N | N | P | P |
| COM.5 | P | N | Y | N | N | Y | N | N | N | P | N |
| COM.6 | P | N | Y | N | N | N | N | N | N | N | P |
| COM.7 | N | N | N | N | N | N | N | N | N | N | P |
| COM.8 | N | N | N | N | N | N | N | N | N | N | P |
| COM.9 | Y | Y | Y | Y | Y | Y | N | N | N | Y | Y |
| COM.10 | P | Y | Y | N | P | N | N | N | N | Y | N |

Table 58 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the community viewpoint. It only presents comments that complement the answer provided.

**Table 58 - Technical Evaluation Assessment Comments for the Community Viewpoint**

| Criterion | Comment |
|---|---|
| **Tool 1** | |
| COM.5 | It links to http://www.database-preservation.com/ which includes the list. |
| COM.6 | It links to http://www.database-preservation.com/ which includes the list. |
| COM.10 | All current developers are members of the E-ARK Project. |
| **Tool 3** | |
| COM.4 | http://www.roda-community.org/partners-sponsers/ |
| COM.5 | http://www.roda-community.org/publications/ |
| COM.6 | http://www.roda-community.org/publications/ |
| COM.9 | Portuguese National Archives, European National Archives |
| COM.10 | https://github.com/keeps/roda/graphs/contributors |
| **Tool 9** | |
| COM.8 | E-ARK Web is not this type of tool. |

## 4.10.Accessibility

The accessibility viewpoint aims at verifying how the tool is made available to its communities. Table 59 details the assessment criteria used for this viewpoint.

**Table 59 - Technical Evaluation Accessibility Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| ACC.1 | Binary distributions are available (whether for free, with payment or by registration). |
| ACC.2 | Binary distributions are available without the need for any registration or authorisation of access by the project. |
| ACC.3 | Source distributions are available (whether for free, with payment or by registration). |
| ACC.4 | Source distributions are available without the need for any registration or authorisation of access by the project. |
| ACC.5 | Access to source code repository is available (whether for free, with payment or by registration). |
| ACC.6 | Anonymous read-only access to source code repository exists. |
| ACC.7 | Ability to browse source code repository online. |
| ACC.8 | The Repository is hosted externally to a single organisation / institution in a sustainable third-party repository (e.g. SourceForge, GoogleCode, LaunchPad, GitHub) which will live beyond the lifetime of any current funding line. |

Table 60 details the answers provided for each tool for each of the assessment criteria regarding the accessibility viewpoint. In this table 'Y' stands for Yes, 'N' for No and 'P' for Partial. Each tool is identified by T'X' which stands for Tool 'X', as identified in the introduction for this section.

**Table 60 - Technical Evaluation Assessment Results for the Accessibility Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ACC.1 | Y | N | Y | Y | Y | N | N | N | N | N | N |
| ACC.2 | Y | N | Y | Y | Y | N | N | N | N | N | N |
| ACC.3 | Y | N | Y | Y | Y | N | Y | Y | Y | Y | Y |
| ACC.4 | Y | N | Y | Y | P | N | Y | Y | Y | Y | Y |
| ACC.5 | Y | N | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| ACC.6 | Y | N | Y | Y | N | Y | Y | Y | Y | Y | Y |
| ACC.7 | Y | Y | Y | Y | P | Y | Y | Y | Y | Y | Y |
| ACC.8 | Y | Y | Y | Y | N | Y | Y | Y | Y | Y | Y |

Table 61 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the accessibility viewpoint. It only presents comments that complement the answer provided.

**Table 61 - Technical Evaluation Assessment Comments for the Accessibility Viewpoint**

| Criterion | Comment |
|---|---|
| **Tool 1** | |
| ACC.1 | Available for free. |
| ACC.3 | Available for free. |
| ACC.5 | Available for free. |
| ACC.7 | https://github.com/keeps/db-preservation-toolkit |
| ACC.8 | GitHub |
| **Tool 3** | |
| ACC.1 | Docker images and pre-compiled binaries at https://github.com/keeps/roda/releases |
| ACC.3 | https://github.com/keeps/roda |
| ACC.4 | https://github.com/keeps/roda |
| ACC.5 | https://github.com/keeps/roda |
| ACC.6 | https://github.com/keeps/roda |
| ACC.7 | https://github.com/keeps/roda |
| ACC.8 | GitHub |
| **Tool 4** | |
| ACC.8 | GitHub |
| **Tool 5** | |
| ACC.4 | Source code is only available from NAE upon request. |
| ACC.6 | Source code is only available from NAE upon request. |
| ACC.7 | Via SVN clients. |
| **Tool 11** | |
| ACC.1 | No binary distributions exist since it is developed in Python. |
| ACC.2 | No binary distributions exist since it is developed in Python. |

## 4.11.Support

This viewpoint aim is to check if the tool provides means to get support when the need arises. As such, there should be documentation detailing the steps that users and developers must take in order to get support for the tool. Table 62 details the assessment criteria used for this viewpoint.

**Table 62 - Technical Evaluation Support Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| SUP.1 | The E-ARK project web site has a page describing how to get support for the tool. |
| SUP.2 | The user documentation has a page describing how to get support for the tool. |
| SUP.3 | The tool describes how to get support (in a README for command-line tools or a Help -> About window in a GUI). |
| SUP.4 | Above pages/windows/files describe, or link to, a description of “how to ask for help” e.g. cite version number, send transcript, error logs etc. |
| SUP.5 | The tool contains an e-mail address, giving users a point of contact for support. |
| SUP.6 | The tools resources are hosted externally to a single organization / institution in a sustainable third-party repository (e.g. SourceForge, GoogleCode, LaunchPad, GitHub) which will live beyond the lifetime of the E-ARK project. |

Table 63 details the answers provided for each tool for each of the assessment criteria regarding the support viewpoint. In this table 'Y' stands for Yes, 'N' for No and 'P' for Partial. Each tool is identified by T'X' which stands for Tool 'X', as identified in the introduction for this section.

**Table 63 - Technical Evaluation Assessment Results for the Support Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SUP.1 | P | N | Y | N | N | P | N | N | N | P | P |
| SUP.2 | Y | N | N | Y | Y | Y | N | Y | N | P | Y |
| SUP.3 | Y | N | Y | Y | Y | N | N | Y | N | P | Y |
| SUP.4 | Y | N | N | Y | N | N | N | N | N | N | Y |
| SUP.5 | Y | Y | Y | Y | N | N | N | Y | N | Y | P |
| SUP.6 | Y | Y | Y | Y | N | Y | Y | Y | Y | Y | Y |

Table 64 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the support viewpoint. It only presents comments that complement the answer provided.

**Table 64 - Technical Evaluation Assessment Comments for the Support Viewpoint**

| Criterion | Comment |
|---|---|
| **Tool 1** | |
| SUP.1 | The web site links to http://www.database-preservation.com/ which contains this information |
| SUP.2 | http://www.database-preservation.com/ |
| SUP.4 | They link to the "new issue" page, which asks the user for information about the problem: https://github.com/keeps/db-preservation-toolkit/issues/new |
| SUP.5 | http://www.database-preservation.com/ includes a support section, linking to https://www.keep.pt/contactos/?lang=en which includes the email info@keep.pt |
| SUP.6 | GitHub |
| **Tool 2** | |
| SUP.5 | On the web site. |
| **Tool 3** | |
| SUP.1 | http://www.roda-community.org/paid-support/ |
| SUP.3 | On the footer of the Web UI. |
| SUP.6 | GitHub, DockerHub. |
| **Tool 4** | |
| SUP.4 | They link to the "new issue" page, which asks the user for information about the problem: https://github.com/keeps/db-visualization-toolkit/issues/new |
| SUP.5 | http://visualization.database-preservation.com/ includes a support section, linking to https://www.keep.pt/contactos/?lang=en which includes the email info@keep.pt |
| SUP.6 | GitHub |
| **Tool 5** | |
| SUP.1 | Support / contact information is available on the tool website |
| SUP.2 | Support / contact information is available |
| SUP.3 | Support / contact information is available |
| **Tool 8** | |
| SUP.2 | See project README. |
| **Tool 11** | |
| SUP.2 | Under construction |
| SUP.5 | Configurable |

## 4.12.Analysis

The Analysis viewpoint aims at analysing the overall structure of the source code and naming conventions, and also verify if coding standards are followed. Table 65 details the assessment criteria used for this viewpoint.

**Table 65 - Technical Evaluation Analysis Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| ANA.1 | All source code is structured into modules or packages. |
| ANA.2 | All source code structure relates clearly to the architecture or design. |
| ANA.3 | If appropriate, project files for IDEs are provided. |
| ANA.4 | The source code repository is a revision control system. |
| ANA.5 | The source codes repository structure and how this maps to the tool's components is documented. |
| ANA.6 | Each source release is snapshots of the repository. |
| ANA.7 | All source code is commented. |
| ANA.8 | Source code comments are written in an API document generation mark-up language e.g. Javadoc or Doxygen. |
| ANA.9 | All source code is correctly indented according to coding standards. |
| ANA.10 | Source code uses appropriate class, package and variable names. |
| ANA.11 | There are no old source code files that should be handled by version control e.g. "SomeComponentOld.java". |
| ANA.12 | There is no commented out code. |
| ANA.13 | Auto-generated source code is in separate directories from other source code. |
| ANA.14 | How to regenerate the auto-generated source code is documented. |
| ANA.15 | Coding standards are recommended by the tool. |
| ANA.16 | Coding standards are required to be observed. |
| ANA.17 | Tool-specific coding standards are consistent with the community or generic coding standards (e.g. for C, Java, etc.). |

Table 66 details the answers provided for each tool for each of the assessment criteria regarding the analysis viewpoint. In this table 'Y' stands for Yes, 'N' for No and 'P' for Partial. Each tool is identified by T'X' which stands for Tool 'X', as identified in the introduction for this section.

**Table 66 - Technical Evaluation Assessment Results for the Analysis Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ANA.1 | Y | N | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| ANA.2 | Y | N | Y | Y | Y | P | P | P | Y | Y | Y |
| ANA.3 | Y | N | Y | Y | Y | N | N | N | N | P | Y |
| ANA.4 | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| ANA.5 | Y | P | Y | Y | P | P | N | N | Y | Y | N |
| ANA.6 | Y | Y | Y | Y | Y | N | N | N | Y | Y | Y |
| ANA.7 | P | N | P | P | Y | P | P | P | Y | P | P |
| ANA.8 | Y | P | Y | Y | N | N | N | Y | Y | P | P |
| ANA.9 | Y | Y | Y | Y | Y | Y | P | Y | Y | Y | Y |
| ANA.10 | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| ANA.11 | Y | N | Y | Y | Y | P | Y | N | Y | Y | N |
| ANA.12 | P | N | P | P | P | P | N | N | N | N | N |
| ANA.13 | Y | Y | Y | Y | Y | Y | Y | Y | Y | P | N |
| ANA.14 | Y | N | Y | P | P | N | Y | P | Y | P | Y |
| ANA.15 | Y | N | Y | Y | Y | N | N | N | N | P | Y |
| ANA.16 | N | N | Y | N | Y | N | N | N | N | P | N |
| ANA.17 | Y | N | Y | Y | Y | Y | Y | P | Y | Y | Y |

Table 67 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the analysis viewpoint. It only presents comments that complement the answer provided.

**Table 67 - Technical Evaluation Assessment Comments for the Analysis Viewpoint**

| Criterion | Comment |
|---|---|
| **Tool 1** | |
| ANA.3 | Style-checking and formatting for eclipse and intellij. |
| ANA.5 | The architecture is documented, the (maven) modules relate to the architecture and the source code directory structure directly relates to the (maven) modules. |
| ANA.6 | Via git tags, https://github.com/keeps/db-preservation-toolkit/releases example for v2.0.0-beta4.0: https://github.com/keeps/db-preservation-toolkit/tree/2.0.0-rc4.0 |
| ANA.7 | The most significant parts are commented. |
| ANA.8 | Javadoc. |
| ANA.12 | There is some commented out code. |
| ANA.13 | Usually generated by maven somewhere inside the "target" folder. |
| ANA.14 | http://www.database-preservation.com/ |
| ANA.17 | Consistent for Java |
| **Tool 2** | |
| ANA.5 | Its maven oriented. Standard structure. |
| **Tool 3** | |
| ANA.1 | Maven modules |
| ANA.2 | https://github.com/keeps/roda/wiki/Developer-guide#-how-the-code-is-laid-out |
| ANA.3 | https://github.com/keeps/roda/wiki/Developer-guide#-how-to-set-up-the-development-environment |
| ANA.4 | Git |
| ANA.5 | https://github.com/keeps/roda/wiki/Developer-guide#-how-the-code-is-laid-out |
| ANA.6 | Git tag - https://github.com/keeps/roda/releases |
| ANA.7 | 20% of public API is documented |
| ANA.9 | Using formatter and check style configuration for code style. |
| ANA.12 | Some issues of commented-out code. |
| ANA.17 | Code Analysis follows SonarHQ quality gate, standard check style and formatting which were further fine-tuned. |
| **Tool 4** | |
| ANA.3 | Style-checking and formatting for eclipse and intellij. |
| ANA.5 | The architecture is documented, the (maven) modules relate to the architecture and the source code directory structure directly relates to the (maven) modules. |
| ANA.6 | Via git tags, https://github.com/keeps/db-preservation-toolkit/releases example for v2.0.0-beta4.0: https://github.com/keeps/db-preservation-toolkit/tree/2.0.0-rc4.0 |
| ANA.7 | The most significant parts are commented. |
| ANA.8 | Javadoc. |
| ANA.12 | There is some commented out code. |
| ANA.13 | Usually generated by maven somewhere inside the "target" folder. |
| ANA.14 | http://www.database-preservation.com/ |
| ANA.17 | Consistent for Java |
| **Tool 5** | |
| ANA.5 | Covered by Visual Studio documentation. |
| ANA.14 | Covered by Visual Studio documentation. |
| **Tool 9** | |
| ANA.13 | There is no auto-generated code, if there would be it would be outside of the other sources. |
| ANA.14 | There is no auto-generated code, if there would be it would be documented how to create it. |
| **Tool 11** | |
| ANA.2 | According to OAIS, etc. |

| Criterion | Comment |
|---|---|
| ANA.3 | Eclipse |
| ANA.4 | GitHub |
| ANA.7 | Most of it |
| ANA.8 | Most is, the API is REST which by itself is well documented |
| ANA.13 | Python files *.py generates *.pyc files while they are processed |
| ANA.14 | Python describes this |

## 4.13. Changes

The Changes viewpoint aims at assessing the procedures in place that guide all the changes of the tool. These include documentation and policies that guide how changes must be performed and communicated to users and developers. Table 68 details the assessment criteria used for this viewpoint.

**Table 68 - Technical Evaluation Changes Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| CHA.1 | The tool has a defined Contributions Policy. |
| CHA.2 | The Contributions Policy is publicly available. |
| CHA.3 | Non project User and Developer members can contribute. |
| CHA.4 | The tool has defined a stability / deprecation policy for components and APIs etc. |
| CHA.5 | The stability / deprecation policy is publicly available. |
| CHA.6 | All releases document the deprecated components / APIs in its release. |
| CHA.7 | All releases document the removed / changed components or APIs in its release. |
| CHA.8 | Changes within the source code repository are e-mailed to a mailing list. |
| CHA.9 | This e-mailing list is freely publically available. |

Table 69 details the answers provided for each tool for each of the assessment criteria regarding the changes viewpoint. In this table 'Y' stands for Yes, 'N' for No and 'P' for Partial. Each tool is identified by T'X' which stands for Tool 'X', as identified in the introduction for this section.

**Table 69 - Technical Evaluation Assessment Results for the Changes Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CHA.1 | Y | Y | Y | Y | N | N | N | N | N | P | Y |
| CHA.2 | N | Y | Y | N | N | N | N | N | N | P | P |
| CHA.3 | Y | Y | Y | Y | Y | N | Y | Y | Y | P | Y |
| CHA.4 | N | N | Y | N | P | N | N | N | N | P | Y |
| CHA.5 | N | N | N | N | N | N | N | N | N | N | P |
| CHA.6 | Y | Y | N | Y | N | N | N | N | N | N | P |
| CHA.7 | Y | Y | P | Y | P | N | N | N | N | N | P |
| CHA.8 | Y | N | N | Y | N | Y | P | Y | N | N | Y |
| CHA.9 | Y | N | N | Y | N | Y | Y | N | N | N | Y |

Table 70 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the changes viewpoint. It only presents comments that complement the answer provided.

**Table 70 - Technical Evaluation Assessment Comments for the Changes Viewpoint**

| Criterion | Comment |
|---|---|
| **Tool 1** | |

| Criterion | Comment |
|---|---|
| CHA.1 | GitHub workflow. Public contributions are allowed and reviewed by project members. |
| CHA.6 | https://github.com/keeps/db-preservation-toolkit/releases |
| CHA.7 | https://github.com/keeps/db-preservation-toolkit/releases |
| CHA.8 | Yes, to GitHub repository subscribers. |
| CHA.9 | Via GitHub repository subscription. |
| **Tool 2** | |
| CHA.1 | https://github.com/keeps/roda-in |
| **Tool 3** | |
| CHA.2 | https://github.com/keeps/roda/wiki/Developer-guide#-how-to-contribute |
| CHA.3 | https://github.com/keeps/roda/wiki/Developer-guide#-how-to-contribute |
| **Tool 4** | |
| CHA.1 | GitHub workflow. Public contributions are allowed and reviewed by project members. |
| CHA.6 | https://github.com/keeps/db-preservation-toolkit/releases |
| CHA.7 | https://github.com/keeps/db-preservation-toolkit/releases |
| CHA.8 | Yes, to GitHub repository subscribers. |
| CHA.9 | Via GitHub repository subscription. |
| **Tool 5** | |
| CHA.7 | Only major changes are documented. |
| CHA.8 | There is no e-mailing list for source code changes. |
| **Tool 8** | |
| CHA.6 | Not in place for the moment. |
| CHA.7 | Not in place for the moment. |
| **Tool 9** | |
| CHA.3 | GitHub pull request. |
| CHA.7 | No release management. |
| **Tool 11** | |
| CHA.2 | Under construction |
| CHA.5 | Under construction |
| CHA.6 | Under construction |
| CHA.7 | Under construction |
| CHA.8 | Based on GitHub |

## 4.14. Evolution

The evolution viewpoint focus on verifying if the tool has a defined evolution plan. This plan should detail the funding lines, roadmaps, plans and milestones. Table 71 details the assessment criteria used for this viewpoint.

**Table 71 - Technical Evaluation Evolution Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| EVO.1 | The E-ARK project web site describes the tool roadmap or plans or milestones (either on a web page or within a ticketing system). |
| EVO.2 | The E-ARK project web site describes how the tool is funded and sustained. |
| EVO.3 | The E-ARK project web site describes end dates of the current funding lines. |

Table 72 details the answers provided for each tool for each of the assessment criteria regarding the evolution viewpoint. In this table 'Y' stands for Yes, 'N' for No and 'P' for Partial. Each tool is identified by T'X' which stands for Tool 'X', as identified in the introduction for this section.

**Table 72 - Technical Evaluation Assessment Results for the Evolution Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EVO.1 | Y | N | Y | N | N | N | N | N | N | P | P |
| EVO.2 | N | N | P | N | N | Y | N | N | N | P | Y |
| EVO.3 | N | N | N | N | N | Y | N | Y | N | P | P |

Table 73 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the evolution viewpoint. It only presents comments that complement the answer provided.

**Table 73 - Technical Evaluation Assessment Comments for the Evolution Viewpoint**

| Criterion | Comment |
|---|---|
| **Tool 1** | |
| EVO.1 | It points to http://www.database-preservation.com/ which points to the GitHub repository, where the milestones can be found https://github.com/keeps/db-preservation-toolkit/milestones |
| EVO.2 | I did not find that information for this specific tool at http://www.eark-project.com/resources/eark-tools |
| EVO.3 | I did not find that information for this specific tool at http://www.eark-project.com/resources/eark-tools |
| **Tool 3** | |
| EVO.1 | Yes, at https://github.com/keeps/roda/milestones |
| EVO.2 | http://www.roda-community.org/governance/ |
| **Tool 4** | |
| EVO.1 | It points to http://www.database-preservation.com/ which points to the GitHub repository, where the milestones can be found https://github.com/keeps/db-preservation-toolkit/milestones |
| EVO.2 | I did not find that information for this specific tool at http://www.eark-project.com/resources/eark-tools |
| EVO.3 | I did not find that information for this specific tool at http://www.eark-project.com/resources/eark-tools |
| **Tool 5** | |
| EVO.1 | No such information on the E-ARK nor the tool website |
| EVO.2 | No such information on the E-ARK nor the tool website. Funding is implicitly guaranteed by NAE and the Estonian government. |
| EVO.3 | No such information on the E-ARK nor the tool website. Funding is "forever" guaranteed by NAE and the Estonian government. |

## 4.15. Interoperability

This viewpoint aim is to assess if the tool promotes interoperability by using mature open standards and by performing tests that demonstrate the use of these open standards. Table 74 details the assessment criteria used for this viewpoint.

**Table 74 - Technical Evaluation Interoperability Viewpoint Assessment Criteria**

| ID | Criterion |
|---|---|
| INT.1 | The tool uses open standards. |
| INT.2 | The tool uses mature, ratified and non-draft open standards. |
| INT.3 | The tool provides tests demonstrating its compliance to open standards. |

Table 75 details the answers provided for each tool for each of the assessment criteria regarding the interoperability viewpoint. In this table 'Y' stands for Yes, 'N' for No and 'P' for Partial. Each tool is identified by T'X' which stands for Tool 'X', as identified in the introduction for this section.

**Table 75 - Technical Evaluation Assessment Results for the Interoperability Viewpoint**

| ID | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| INT.1 | Y | N | Y | Y | Y | Y | Y | P | Y | Y | Y |
| INT.2 | Y | P | Y | Y | Y | Y | Y | N | Y | Y | Y |
| INT.3 | Y | N | P | Y | N | N | N | N | P | P | N |

Table 76 details the comments provided by tool developers to the technical evaluation self-assessment questionnaire for the interoperability viewpoint. It only presents comments that complement the answer provided.

**Table 76 - Technical Evaluation Assessment Comments for the Interoperability Viewpoint**

| Criterion | Comment |
|---|---|
| **Tool 1** | |
| INT.3 | The tool uses components that provide the open standard functionality (like creating a ZIP file), those are assumed to have been tested.<br>For standards implemented by the tool, like the SIARD standard, tests are provided to ensure the validity and completeness of the created SIARD files. |
| **Tool 3** | |
| INT.3 | Some standards are checked against the schemas within the unit tests. |
| **Tool 4** | |
| INT.3 | The tool uses components that provide the open standard functionality (like reading a ZIP file), those are assumed to have been tested. |
| **Tool 5** | |
| INT.1 | Programmed in .NET, data is handled in XML, one of the output formats is the E-ARK SMURF SIP |
| INT.2 | Programmed in .NET, data is handled in XML, one of the output formats is the E-ARK SMURF SIP |
| **Tool 9** | |
| INT.3 | Validation tasks check the correct use of structural metadata (METS). |

# 5. Conclusions

The following subsections describe the main conclusions taken from the business and technical evaluation presented above. The section concludes with some final words about the results achieved in this deliverable.

## 5.1. Business Evaluation

Figure 18 depicts a comparison between the pilots for the initial assessment. Pilot 1 is the one which achieved the best overall results, especially the infrastructure dimension achieved the best results. Pilot 3 achieved the second-best results. However, there are still some enhancements to perform in the processes and infrastructure dimensions where it achieved maturity level 3. Pilot 5 also shows a high-level maturity across the dimensions measured in the initial assessment. However, as in pilot 2, there are still some important enhancements to perform to the infrastructure capability. The other four pilots showed similar results among the dimensions. With some exceptions for pilot 4, where it shows higher maturity levels for the infrastructure dimension. Another exception are pilots 6 and 7 which show higher maturity levels for the processes dimension.

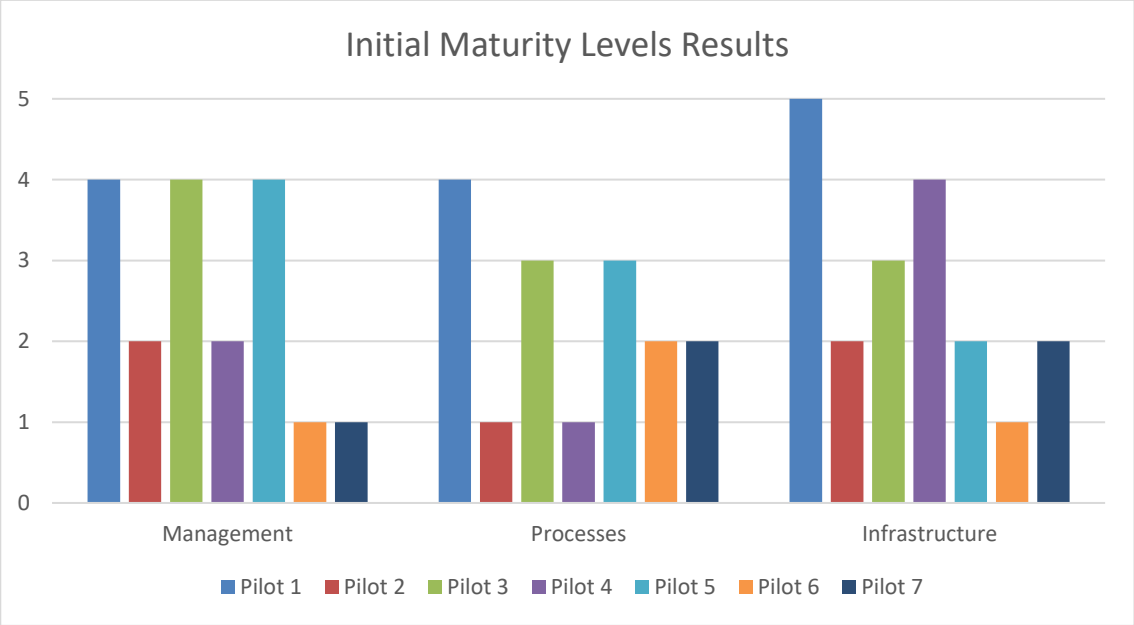


**Figure 18 - Initial Results of the Maturity Levels for All Pilots**

The results of the E-ARK project helped the pilots improve their maturity level and as result improved archival practice as can be seen by analysing the results of the final assessment depicted in Figure 19.The final results show several improvements in the overall maturity levels for all pilots. One aspect to take into consideration is that E-ARK outputs focus on the processes dimension as such this is the dimension where the most improvements are as illustrated in Figure 20. Other aspect to take into consideration is that pilot 6 is a purely technological pilot with no national archive behind it. As such, the results for the management and infrastructure dimensions don't have an impact in the success of the pilot and the focus should instead be on the processes dimension which registered improvements from maturity level 2 in the first assessment to maturity level 3 in the final assessment.

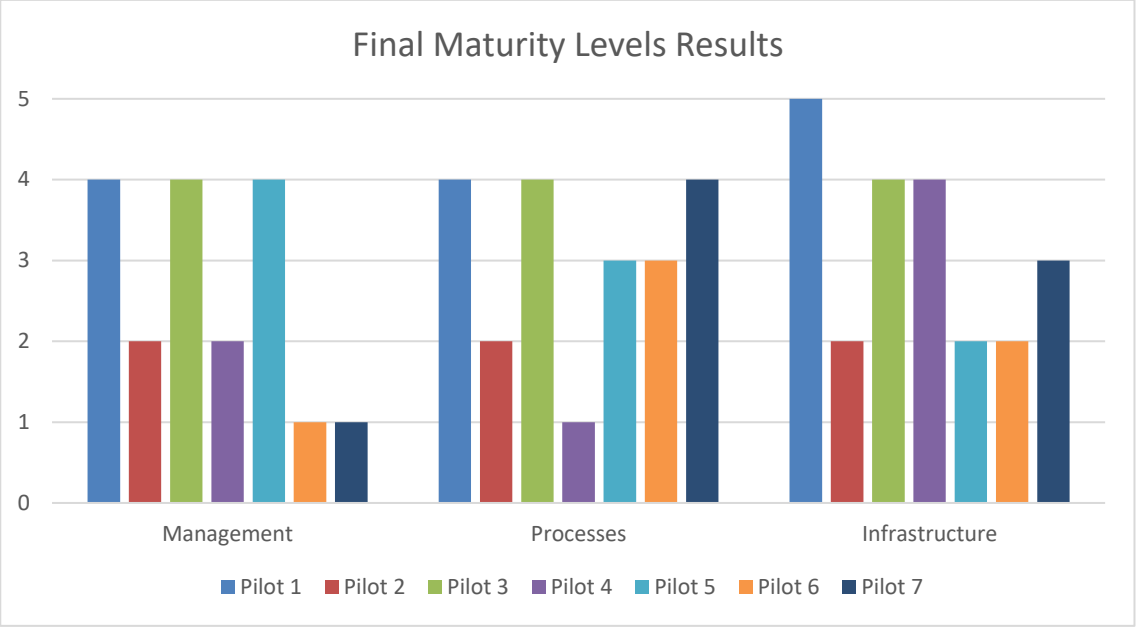


**Figure 19 - Final Results of the Maturity Levels for All Pilots**

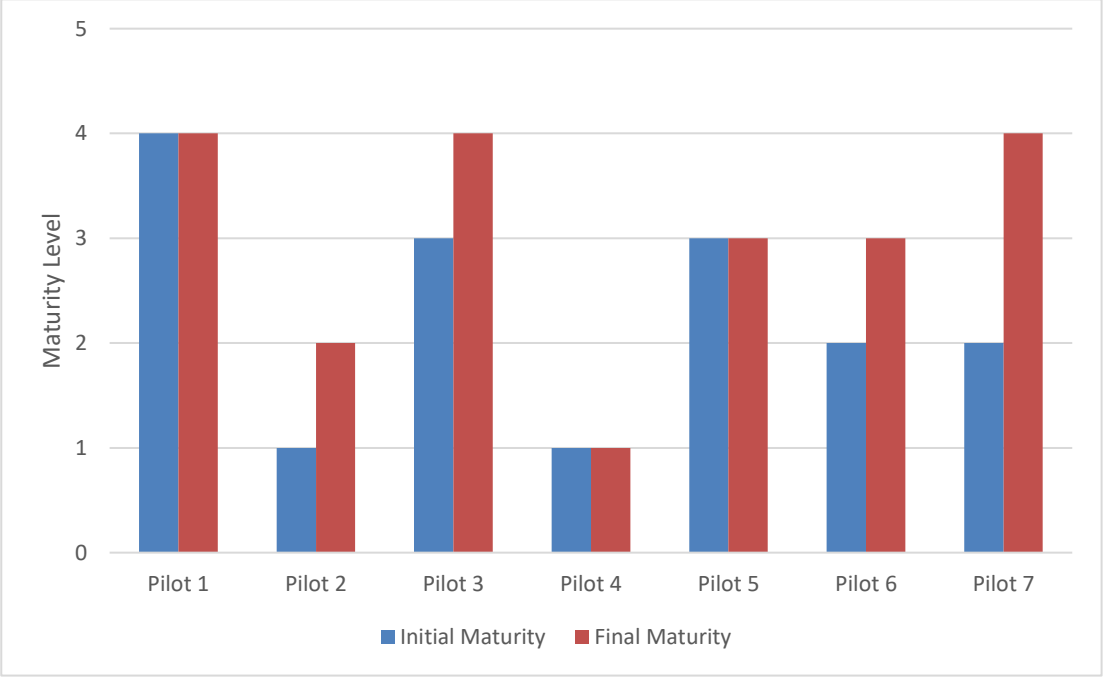


**Figure 20 – Process Dimension Improvement of the Maturity Levels for All Pilots**

Pilot 1 was the one that registered the best results in the initial assessment as result there are no changes in the overall maturity levels for the dimensions, although there are some fine-grained improvements which are detailed in Figure 21. Pilot 2 has an improvement in the maturity level for the processes dimension which was at level 1 in the initial assessment and was improved to maturity level 3 in this final assessment. Other pilots that have achieved improvements in the processes dimension are pilots 3 which was at maturity level 3 and is now at maturity level 4, pilot 6 which was at maturity level 2 and is now at maturity level 3 and finally pilot 7 which greatly improved from maturity level 2 to maturity level 4.

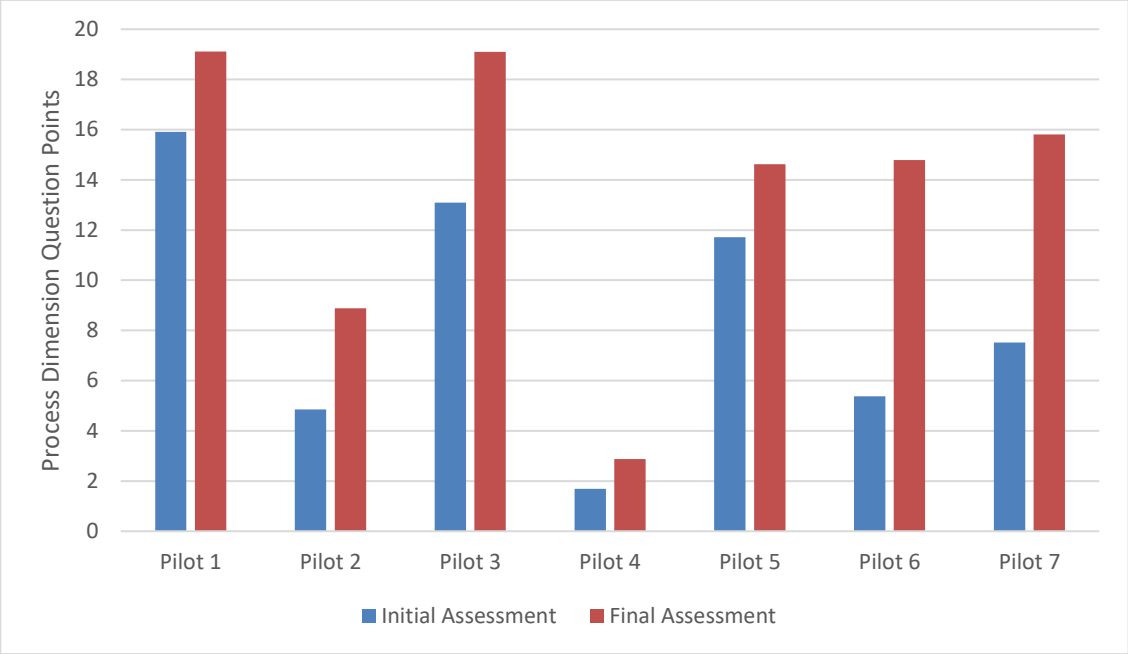


**Figure 21. - Process Dimension Improvement for All Pilots**

The management dimension did not have any maturity level improvement from the initial to the final assessment. However, if the fine details of this dimension are analysed in each of the pilots reports in section 3 it is clear that there have been improvements to several criteria of this dimensions, especially for the criteria at higher maturity levels.

Finally, there are also improvement in the infrastructure dimension for pilots 3, 6 and 7. Pilot 3 improved from maturity level 3 to maturity level 4, pilot 6 improved from maturity level 1 to maturity level 2 and pilot 7 went from maturity level 2 to maturity level 3.

As can be seen in Table 77, there are five main criteria were the majority of the pilots answered “No”, which means that is an aspect that is either too complex to implement or is not considered relevant by most organizations. The first one refers to skills, which purpose is to identify if the organization guarantees that the relevant skills are identified and present in the organization. This is an important aspect for business continuity and talent retention. There should be a periodic analysis of new trends in knowledge and technology related to archival science in order to guarantee that organizations have people with the knowledge to understand and implement these new trends. This can be achieved in several ways however some examples can be the existence of a procedure that assesses the current skills within the organization on a periodic basis; an automatic mechanism, with a defined set of indicators used to assess skills, that runs continuously and alerts when an indicator, or set of indicators, reach(es) a certain threshold; documentation on the required skills within the organization, among others.

The second is related to a certification plan. Standards certification can be used to certify that the processes and procedures implemented in the organization are aligned with best practice, relevant, efficient or effective. They are also a means for potential customers or funders to have a certain degree of confidence in the organization. As such this a relevant aspect related to the management of the archive. One aspect to take into consideration is that this criterion focus on verifying the existence of a certification plan and not the existence of any certification. As such, organizations that have identified relevant standards and planned for certification in the future if a certain standard is considered relevant are compliant with this criterion.

In the processes dimension, there are criteria where most of the pilots answered "No". Criterion P3.12 which is related to the AIP content information testing procedure. The purpose of this criterion is to identify if the organization has a procedure for testing if the content information of the AIP at its creation is understandable by the designated communities so that all Ingested objects are deemed relevant and usable by the designated community. This aspect is relevant to guarantee that all object in the archive are indeed usable by the designated community otherwise these objects can be considered a burden instead of an asset.

**Table 77 - Criteria with most answers 'No' in the business evaluation**

| Dimension | ID | Criterion | Number of Pilots which answered 'No' |
|---|---|---|---|
| Management | M3.1 | Skills | 5 |
| Management | M3.4 | Certification Plan | 6 |
| Processes | P3.12 | AIP content information testing procedure | 5 |
| Processes | P3.16 | AIP Designated Community Requirements | 6 |
| Processes | P3.26 | Access Data Problem/Error Reports | 5 |

Criterion P3.16 is related to AIP Designated Community Requirements. This criterion can also be related to P3.12, it focuses on identifying if there is a procedure to gather and review the AIP requirements from the designated community. This procedure should then provide inputs to the AIP content information testing procedure. The objective is to guarantee that the designated community has a strong relationship with the organization which in turn will improve the trustworthiness of the organization. By complying with this criterion, the organization guarantees that the requirements of the designated community are taken into consideration when creating and maintaining the AIPs. In turn this guarantees that the holding of the archive will in fact be relevant to the actual designated community.

Finally, P3.26 is related to Access Data Problem/Error Reports. This aspect is relevant as it identifies if the organization investigates and resolves both incident and problem reports about errors in data or responses from Consumers essential to become a trustworthy source of information. Consumers need to retrieve archived information in the organization, as such, when problems arise it is very important that consumers know that they can count on the archiving organization to help them solving their problems and it greatly improves the trustworthiness of the organization.

Finally, focusing on the criteria in which was detected most improvement, there are eight criteria in where the majority of the pilots improved, all in the processes dimension the main focus of the E-ARK project as depicted in Table 78.

The first one (P2.1) belongs to the pre-ingest capability and refers to the deposit terms negotiation; which purpose is to identify if an archive can negotiate the terms of deposit with Producers. The terms of deposit might include the specification of the metadata that must be included at the time of deposit, the schedule and method of deposit, the responsibilities of the Producer and the Archive regarding the information being ingested, among other examples. This aspect guarantees that there is a procedure to negotiate the terms of deposit between the Producer and the Archive.

The second aspect (P3.1) also belongs to the pre-ingest capability and refers to the producer SIP validation, which purpose is to identify if the Archive validates the Producer SIP regarding format and structure. If the SIP has deviations the Archive might reject the SIP and request the Producer to deliver a corrected SIP. This guarantees that there are validation procedures for a producer SIP.

**Table 78 - Criteria with most improvement in the business evaluation**

| Dimension | ID | Criterion | Number of Pilots which improved |
|---|---|---|---|
| Processes | P2.1 | Deposit Terms Negotiations | 4 |
| Processes | P3.1 | Producer SIP Validation | 5 |
| Processes | P3.3 | Enhancement of the Producer SIP | 4 |
| Processes | P3.7 | Legal Rights | 4 |
| Processes | P3.13 | AIP completeness and correctness | 4 |
| Processes | P3.19 | Designated Community Information Requirements | 4 |
| Processes | P3.21 | Bi-directional linkage between the AIP and descriptive information | 4 |
| Processes | P3.23 | Access policies compliance | 4 |

Criterion P3.3 also belongs to the pre-ingest capability and refers to the enhancement of the Producer SIP, which purpose is to to identify if the organization has mechanisms to guarantee the provenance of the information to be Ingested. This is achieved by digital processing and data verification and validation, and through exchange of ownership evidences, such as, submission agreements, deposit agreements, etc.

Next is criterion P3.7, which belongs to the ingest capability, and refers to the legal rights. The purpose is to identify if the Archive can manage the legal rights (copyright, data protection, and ownership) of objects during Ingest into the Archive. In this sense managing legal rights involves checking if the content being ingested has legal rights associated; check if the content is not duplicated from previous ingests or even plagiarized from other Producers. It also includes creating access restrictions to certain objects when the producer requests it. This aspect guarantees that there are legally binding submission agreements or deposit agreements, and there is evidence of appropriate technological measures to assure that legal rights are managed, such as, logs from procedures and authentications.

Criterion P3.13 also belongs to the ingest capability and focus on AIP completeness and correctness. Its purpose is to identify if the organization verifies the completeness and correctness of each AIP when it is created to ensure that all AIP can be traced back to the SIP provided by Producers. One aspect to take into consideration is that AIP completeness and correctness is not universal and depends on what was agreed between the Producer and Archive during the submission agreement negotiations. An AIP is correct if it complies with the schema that was defined. A SIP is complete if all information necessary to understand, identify and retrieve the AIP is present. This is achieved by having a description of the procedure that verifies completeness and correctness of the AIP and the logs of this procedure.

Focusing now on the data management capability, criterion P3.19 refers to the designated community information requirements. Its purpose is to identify if the Archive enables discovery of its holdings. This is achieved by having retrieval and descriptive information, discovery metadata, such as Dublin Core, and other documentation describing the objects. P3.21 refers to the bi-directional linkage between the AIP and descriptive information. The purpose of this criterion is to identify if the Archive ensures that all AIP can be located and retrieved. An archive must have procedures on how to establish and maintain relationships between the descriptive information and the AIP, and should ensure that every AIP has descriptive information associated with it and that all descriptive information must point to at least one AIP. This is achieved by having descriptive metadata and also unique, persistent identifiers associated with the AIP or by having documented relationship between the AIP and its metadata.

The last aspect where the most improvement was detected is P3.23 which belongs to the access capability and refers to the access policies compliance. Its purpose is to identify if the organization complies with accesses policies defined with the designated communities. Failure to comply might affect the trust that designated community has on the organization about the support of the user community. This is achieved by having policies publicly available to the user communities, and by performing audits on access requests.

As can be seen by the detailed analysis of the pilots, the E-ARK project outputs did indeed help archival organizations to improve their maturity level for information governance. Despite E-ARK focusing mainly on the aspects taken into consideration for the processes dimension, there are several other improvements in the other dimensions. However, there is a clear sign that future work on the management and infrastructure dimensions through other channels can definitely help organizations to further improve these dimensions. By looking beyond, the knowledge from archival science, data management, and information management, these organizations can find further guidance on how reach higher maturity levels for these dimensions in domains, such as, process management, IT Governance and Information security management.

## 5.2. Technical Evaluation

The technical evaluation main idea is to assess future tasks for the E-ARK sustainability board. Thus, this evaluation does not focus on whether a certain tool correctly developed using all the appropriate standards and rules but instead on what aspects should be take into consideration to successfully create a plan for the sustainability of the E-ARK outputs.

Analysing the results for each of the viewpoints in Table 79, there are three main viewpoints which must be taken into consideration for the sustainability plan which are the community viewpoint with 80% of negative answers, changes viewpoint with 56% of negative answers and evolution viewpoint with 67% of negative answers.

**Table 79 - Technical Evaluation Percentages for "No" and "Yes" answers for each tools and viewpoint**

| Mean for all Tools | | Viewpoint | T1 | | T2 | | T3 | | T4 | | T5 | | T6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N | Y | | N | Y | N | Y | N | Y | N | Y | N | Y | N | Y |
| 17% | 67% | Design | 0% | 100% | 50% | 50% | 0% | 100% | 0% | 33% | 0% | 67% | 50% | 33% |
| 19% | 50% | Documentation | 6% | 81% | 56% | 38% | 13% | 63% | 25% | 63% | 19% | 50% | 44% | 44% |
| 14% | 86% | Build | 0% | 100% | 29% | 71% | 0% | 100% | 14% | 71% | 14% | 86% | 14% | 86% |
| 25% | 58% | Installation | 33% | 58% | 67% | 33% | 17% | 75% | 17% | 58% | 25% | 75% | 50% | 50% |
| 25% | 25% | Learn | 0% | 100% | 50% | 0% | 25% | 50% | 25% | 25% | 0% | 100% | 50% | 25% |
| 33% | 67% | Identity | 0% | 67% | 50% | 50% | 0% | 100% | 0% | 83% | 33% | 67% | 17% | 50% |
| 40% | 40% | Copyright | 0% | 60% | 100% | 0% | 20% | 60% | 40% | 40% | 60% | 0% | 80% | 20% |
| 33% | 67% | Licensing | 0% | 33% | 33% | 33% | 33% | 67% | 33% | 67% | 33% | 0% | 67% | 33% |
| 80% | 10% | Community | 60% | 10% | 80% | 20% | 50% | 50% | 90% | 10% | 80% | 10% | 40% | 40% |
| 25% | 75% | Accessibility | 0% | 100% | 75% | 25% | 0% | 100% | 0% | 100% | 25% | 50% | 50% | 50% |
| 33% | 33% | Support | 0% | 83% | 67% | 33% | 33% | 67% | 17% | 83% | 67% | 33% | 50% | 33% |
| 24% | 59% | Analysis | 6% | 82% | 59% | 29% | 0% | 88% | 6% | 76% | 6% | 76% | 35% | 35% |
| 56% | 22% | Changes | 33% | 67% | 44% | 56% | 44% | 44% | 33% | 67% | 67% | 11% | 78% | 22% |
| 67% | 0% | Evolution | 67% | 33% | 100% | 0% | 33% | 33% | 100% | 0% | 100% | 0% | 33% | 67% |
| 33% | 67% | Interoperability | 0% | 100% | 67% | 0% | 0% | 67% | 0% | 100% | 33% | 67% | 33% | 67% |
| Percentages >50% / Total Questions | | | 2/15 | 11/15 | 8/15 | 2/15 | 0/15 | 11/15 | 2/15 | 10/15 | 5/15 | 7/15 | 3/15 | 3/15 |

| Mean for all Tools | | Viewpoint | T7 | | T8 | | T9 | | T10 | | T11 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N | Y | | N | Y | N | Y | N | Y | N | Y | N | Y |
| 17% | 67% | Design | 17% | 67% | 33% | 67% | 50% | 50% | 0% | 100% | 17% | 50% |
| 19% | 50% | Documentation | 44% | 31% | 19% | 56% | 31% | 44% | 19% | 50% | 13% | 38% |
| 14% | 86% | Build | 57% | 43% | 14% | 86% | 0% | 86% | 0% | 86% | 43% | 14% |
| 25% | 58% | Installation | 50% | 42% | 50% | 42% | 8% | 83% | 17% | 58% | 25% | 67% |
| 25% | 25% | Learn | 50% | 25% | 25% | 25% | 0% | 75% | 0% | 75% | 0% | 0% |
| 33% | 67% | Identity | 33% | 67% | 33% | 67% | 50% | 17% | 17% | 50% | 50% | 17% |
| 40% | 40% | Copyright | 100% | 0% | 40% | 60% | 40% | 60% | 40% | 20% | 0% | 100% |
| 33% | 67% | Licensing | 33% | 67% | 33% | 67% | 0% | 100% | 0% | 100% | 0% | 100% |
| 80% | 10% | Community | 100% | 0% | 100% | 0% | 100% | 0% | 50% | 20% | 20% | 10% |
| 25% | 75% | Accessibility | 25% | 75% | 25% | 75% | 25% | 75% | 25% | 75% | 25% | 75% |
| 33% | 33% | Support | 83% | 17% | 33% | 67% | 83% | 17% | 17% | 33% | 0% | 67% |
| 24% | 59% | Analysis | 41% | 41% | 41% | 35% | 24% | 76% | 6% | 53% | 29% | 59% |
| 56% | 22% | Changes | 67% | 22% | 78% | 22% | 89% | 11% | 56% | 0% | 0% | 56% |
| 67% | 0% | Evolution | 100% | 0% | 67% | 33% | 100% | 0% | 0% | 0% | 0% | 33% |
| 33% | 67% | Interoperability | 33% | 67% | 67% | 0% | 0% | 67% | 0% | 67% | 33% | 67% |
| Percentages >50% / Total Questions | | | 5/15 | 5/15 | 4/15 | 7/15 | 4/15 | 8/15 | 1/15 | 8/15 | 0/15 | 8/15 |

The **community viewpoint** focuses on verifying how the tool is made available to its communities. Having a big and strong community helps in the sustainability of the tool as there is more man power which can be used to further maintain and improve the tool.

The **changes viewpoint** aims at assessing the procedures in place that guide all the changes of the tool. These include documentation and policies that guide how changes must be performed and communicated to users and developers. Having good channels for disseminating changes in the tool can act as a publicity channel for the tool as interest parties

will be aware that the tool is under development and alive. It can also act as a way to attract new customers and developers.

The **evolution viewpoint** focuses on verifying if the tool has a defined evolution plan. An evolution plan can be incorporated into a sustainability plan and can be used to guarantee users that the tool development will continue, which in turn can affect their decision when selecting and supporting new tools.

As can be seen, these three viewpoints are of great importance for the sustainability of the tools developed during the E-ARK project and as a result there should be ways to mitigate this issues issued by the sustainability board. On the other hand, there are several viewpoints which demonstrate the successful application of best practice in software development of the E-ARK outputs which account for the majority of the assessed viewpoints, such as, design, build, accessibility, among others.

Table 80 details the criteria to which most tool developers answered "No". Of the total 11 tools developed in the project 9 answered "No" to COM.1 and COM.3. While 10 answered "No" to COM.7, COM.8 and CHA.5. A relevant aspect to note that most of these criteria are from the community viewpoint which was the viewpoint that achieved the highest percentage of negative answers from tool developers.

**Table 80 - Criteria with most answers 'No' in the technical evaluation**

| Viewpoint | ID | Criterion | Number of Developers which answered 'No' |
|---|---|---|---|
| Community | COM.1 | The E-ARK project web site has a statement of the number of users, developers and members for the tool. | 9 |
| Community | COM.3 | The E-ARK project web site has quotes from satisfied users of the tool. | 9 |
| Community | COM.7 | The E-ARK project web site has list of software that uses or bundles the tool. | 10 |
| Community | COM.8 | Users are requested to cite the E-ARK project if publishing papers based on results derived from the tool. | 10 |
| Changes | CHA.5 | The stability / deprecation policy is publicly available. | 10 |

COM.1 is about the existence of numbers of users, developers and members around the tool. The dissemination of these figures can be used by potential users to motivate the adoption of the tool by an organization. As stated before, a big and strong community assures potential user that the tool is under active development and has a strong support and adoption. One aspect to take into consideration is that many of the tools of the E-ARK project were first developed in the project, as such, some of these tools are still seen as prototypes. As such, the high number of negative answers should not be taken too seriously but instead as a great improvement opportunity.

COM.3 is related to actual quotes from satisfied users of the tool. Positive statements from highly influential individuals in the user community can help potentials user to build trust on the tool and its community. COM.7 aims at verifying if there is a list of software that uses or bundles the tool. As many of the tools developed in the E-ARK project are still considered prototypes most of the tools are not bundled with any other tools. As E-ARK tools mature this trend will certainly change and as a result the sustainability board should plan for this fact. COM.8 aims at verifying if users are requested to cite the E-ARK project if publishing papers based on results derived from the tool. This is a great opportunity to further disseminate the success of the project outputs in the future which should be a central aspect of the sustainability plan.

Finally, CHA.5 focuses on the stability/deprecation policy. This policy aims at guaranteeing developers and users that any changes in the tool will be backwards-compatible, that new features will not break or change the meaning of existing features, and if for some reason a feature is removed or replaced, it will be declared deprecated but will remain in the tool for some time to allow user to adapt. This is an important aspect for potential user to build trust in a tool and its development community and should be taken into consideration in the sustainability plan.

## 5.3. Final Words

This self-assessment consisted of following a series of predetermined steps in which the pilot owners answer a series of questions that resulted in the determination of maturity levels. As can be seen by going through section 3, the self-assessment questionnaire enabled a detailed analysis and comparison of the pilots and proved useful in identifying weak points and strengths of the pilots. Using the results, it is then possible for pilots to identify points of improvement which can then lead to the creation of an improvement path. In the D7.2 it was identified that there was still room for improvement of the questionnaire, as there were some comments left by the pilot owners regarding the difficulty of answering some questions. These comments were taken into consideration in the final version of the maturity model (in D7.5) and in this deliverable. One other aspect to take into consideration is that in D7.2 only one of the maturity model dimensions was assessed. However, in D7.5 the questions to assess the other two dimensions were included so that all organizations can use the Information Governance Maturity Model and enhance their current practice. These questions are also detailed in this deliverable in Appendix A.

This deliverable focuses on the last three stages of the maturity model development method (see section 3) that concentrate on the transfer and evaluation of the maturity model. Deliverable 7.5 details the final iteration of the development of the maturity model based on the initial assessment in D7.2 to improve and extend the maturity model. Finally, this deliverable conducts a new self-assessment using the final version of the maturity model right at the end of the project timeline. Table 81 defines the focus of each deliverable based on the development method and represents the roadmap followed during the development of the maturity model.

**Table 81 - Roadmap of the maturity model development and application according to project deliverables**

| Deliverable | Development Method Stages | | | | | | |
|---|---|---|---|---|---|---|---|
| | Problem Definition | Comparison of existing maturity models | Determination of development strategy | Iterative maturity model development | Conception of transfer and evaluation | Implementation of transfer media | Evaluation |
| D7.1: A Maturity Model for Information Governance – initial version [Deliverable date: M12] | ■ | ■ | ■ | ■ | | | |
| D7.2: Initial Assessment and Evaluation [Deliverable date: M18] | | | | ■ | ■ | ■ | ■ |
| D7.5: A Maturity Model for Information Governance – final version [Deliverable date: M36] | ■ | ■ | ■ | ■ | | | |
| D7.6: Final Assessment and Evaluation [Deliverable date: M36] | | | | ■ | ■ | ■ | ■ |

■ Focus of the deliverable

■ To be used in the deliverable

# 6. References

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# Appendices

## A. A2MIGO Self-assessment questionnaire

This section details the self-assessment questionnaire to assess a scenario according to the A2MIGO. The questionnaire is comprised of three main sections, one for each of the maturity model dimensions, with a set of questions in each section. Each question is structured in a table with the following fields:

9. **ID:** Which identifies the number of the question in the overall questionnaire;
10. **Title:** Which depicts the main topic the question refers to;
11. **Question:** Which details the question itself;
12. **Objective:** Which details the objective of that question, what knowledge the question intends to capture;
13. **Notes:** Which either clarifies some aspects and/or terms of the question or details examples of evidence to substantiate the answer for the question;
14. **Terms:** Which identifies the terms that are detailed in EVOC. EVOC is the vocabulary manager which makes part of the knowledge centre being developed in work package 7, as part of D7.3 and D7.4;
15. **Answers:** Which depicts the five possible answers to the question;
16. **Source:** Which details the source from which that specific question originates.

The questionnaire starts by providing an introduction. This introduction provides details on the purpose of the questionnaire, how it will be analysed, and clarifies concepts being constantly used throughout the questionnaire. Sections A.2 to A.5 detail the questionnaire that can be used to calculate the information governance maturity levels.

### A.1. Introduction

This questionnaire consists of a set of questions that will be used to determine the information governance maturity level of the organization for each of the three dimensions of the maturity model. All questions are mandatory.

For each question, there is a field that respondents can use to provide additional comments, clarifications or a justification to the answer. These comments will be considered by the assessment team when evaluating the answers.

### A.2. Management

This section details the questions used in the self-assessment to calculate the maturity levels for the management dimension.

| | |
|---|---|
| **ID** | M2.1 |
| **Title** | Mission Statement |
| **Question** | Does the organization have a mission statement? |
| **Purpose** | The purpose is to identify if there is a commitment to preservation, retention, management and access at the organization's highest administrative level. |
| **Notes** | Examples of evidence to demonstrate this can be a mission statement of the organization or its parent organization that specifically addresses or implicitly calls for the preservation of information and/or other resources it holds; a legal, statutory, or government regulatory mandate applicable to the organization that specifically addresses or implicitly requires the preservation, retention, management and access to information and/or other resources. |

| | |
|---|---|
| **Terms** | - |
| **Answers** | No: There is no mission statement of the organization. |
| | Yes: There is a mission statement of the organization. |
| **Source** | TRAC – Criterion 3.1.1 [1] |

| | |
|---|---|
| **ID** | M2.2 |
| **Title** | Designated Community Definition |
| **Question** | Is there an accessible definition of the organization's designated community? |
| **Purpose** | The purpose is to identify if the organization has a designated community definition which can be used to ascertain if the organization meets the needs of its Designated Community. |
| **Notes** | An example of evidence to demonstrate this is a written definition of the Designated Community. Examples of Designated Community definitions include: (1) General English-reading public educated to high school and above, with access to a Web Browser (HTML 4.0 capable); (2) Astronomer (undergraduate and above) with access to Flexible Image Transport System (FITS) software such as FITSIO, familiar with astronomical spectrographic instruments. |
| **Terms** | Designated Community (http://evoc.sysresearch.org/E-ARK/OAIS/Designated%20Community) |
| **Answers** | No: There is no accessible definition of the organization's designated community. |
| | Yes: There is an accessible definition of the organization's designated community. |
| **Source** | TRAC – Criterion 3.3.1 [1] |

| | |
|---|---|
| **ID** | M3.1 |
| **Title** | Skills |
| **Question** | Are the required skills managed? |
| **Purpose** | The purpose is to identify if the organization guarantees that the relevant skills are identified and present in the organization. |
| **Notes** | Examples of evidence to demonstrate this can be a procedure that assesses the current skills within the organization on a periodic basis; an automatic mechanism, with a defined set of indicators used to assess skills, that runs continuously and alerts when an indicator or set of indicators reach a certain threshold; documentation on the required skills within the organization, among others. |
| **Terms** | - |
| **Answers** | No: There is no skill management in place. |
| | Yes: There is skill management in place. |
| **Source** | COBIT 4.1 – Page 21 [8] |

| | |
|---|---|
| **ID** | M3.2 |
| **Title** | Training Plan |
| **Question** | Is there a training plan developed and implemented in the organization? |
| **Purpose** | The purpose is to identify if a training plan is developed and implemented in the organization. A training plan outlines the competencies to be obtained, the time frame for achieving these competencies, the training to be undertaken; the delivery modes for the training; among other things. |
| **Notes** | Examples of evidence to demonstrate this can be a procedure that assesses the current training plan within the organization on a periodic basis; an automatic mechanism, with a defined set of indicators used to measure the efficacy and applicability of the training plan, that runs continuously and alerts when an indicator, or set of indicators reach a certain threshold, among others. |
| **Terms** | - |
| **Answers** | No: There is no training plan. |
| | Yes: The training plan is developed and implemented. |
| **Source** | COBIT 4.1 – Page 21 [8] |

| | |
|---|---|
| **ID** | M3.3 |
| **Title** | Knowledge Sharing |
| **Question** | Is knowledge sharing part of the organizational culture? |
| **Purpose** | The purpose is to identify if the organization share the knowledge existent in the organization man power and if it has a focus on information governance. |
| **Notes** | Knowledge sharing refers to the organizational systematic effort to share the knowledge that exists in the organization. This means sharing experiences, hard and soft skills, as well as, lessons learned in external training that can enrich the organizational knowledge. Knowledge sharing can be achieved through several means, such as, internal training, wikis and shared documentation. |
| **Terms** | - |
| **Answers** | No: There is no knowledge sharing within the organization. |
| | Yes: Knowledge sharing within the organization is performed. |
| **Source** | COBIT 4.1 – Page 21 [8] |

| | |
|---|---|
| **ID** | M3.4 |
| **Title** | Certification Plan |
| **Question** | Is there a certification plan developed and implemented in the organization? |
| **Purpose** | The purpose is to identify if the organization has undergone certification, or if it has plans to do it. |
| **Notes** | Standards certification can be used to certify that the processes and procedures implemented in the organization are aligned with best practice, relevant, efficient or effective. They are also a means for potential customers or funders to have a certain degree of confidence in the organization. Standards Certification must be issued by a recognized organization. Standards might include IEEE, ISO or other relevant standards. |
| **Terms** | - |
| **Answers** | No: There is no certification plan. |
| | Yes: The certification plan is developed and implemented. |
| **Source** | COBIT 4.1 – Page 21 [8] |

| | |
|---|---|
| **ID** | M3.5 |
| **Title** | Compliance with Relevant Standards |
| **Question** | Does the organization assess the compliance with relevant standards? |
| **Purpose** | The purpose is to identify if the organization seeks compliance with relevant standards, such as, the ISO27001 standard for information security management, the ISO14721 standard for the open archival information system, the ISO16363 standard for trustworthy repository assessment checklist, the ISO20652 standard for the Producer-Archive Interface Methodology Abstract Standard, among others. |
| **Notes** | Examples of evidence to demonstrate this can be documentation of the analysis of relevant standards for the organization, documentation of the analysis of a specific standard for the organization, plans on adopting measures from relevant standards, documentation of adopted measures from relevant standards. |
| **Terms** | - |
| **Answers** | No: There is no compliance assessment with relevant standards. |
| | Yes: Compliance assessment with relevant standards is performed. |
| **Source** | COBIT 4.1 – DS5 – Pages 117-120 [8] |

| | |
|---|---|
| **ID** | M3.6 |
| **Title** | Preservation Strategic Plan |

| | |
|---|---|
| **Question** | Is there a Preservation Strategic Plan? |
| **Purpose** | The purpose is to identify if there is a Preservation Strategic Plan that helps the organization make administrative decisions, shape policies, and allocate resources in order to successfully preserve its holdings. The strategic plan should be based on the organization's established mission, and on its defined values, vision and goals. Strategic plans typically cover a particular finite time period, normally in the 3-5 year range. |
| **Notes** | Examples of evidence to demonstrate this can be a Preservation Strategic Plan; meeting minutes; documentation of administrative decisions which have been made. |
| **Terms** | - |
| **Answers** | No: There is no Preservation Strategic Plan. |
| | Yes: There is a Preservation Strategic Plan. |
| **Source** | TRAC – Criterion 3.1.2 and 3.1.2.2 [1] |

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|---|---|
| **ID** | M3.7 |
| **Title** | History of the Changes to Procedures and Operations |
| **Question** | Is there an audit trail of the changes to operations and procedures of the organization? |
| **Purpose** | The purpose is to identify if the organization can provide an 'audit trail' through which stakeholders can identify and trace decisions. |
| **Notes** | Examples of evidence to demonstrate this can be file retention and disposal schedules and policies; copies of earlier versions of policies and procedures; minutes of meetings. |
| **Terms** | - |
| **Answers** | No: There is no audit trail of the changes to operations and procedures of the organization. |
| | Yes: There is an audit trail of the changes to operations and procedures of the organization. |
| **Source** | TRAC – Criterion 3.3.3 [1] |

| | |
|---|---|
| **ID** | M3.8 |
| **Title** | Transparency and Accountability |
| **Question** | Are there transparency and accountability policies for actions related to the operation and management of the organization? |
| **Purpose** | The purpose is to identify if there is transparency in the organization, in the sense of being available to anyone who wishes to know, is the best assurance that the organization operates in accordance with accepted standards and practices. |
| **Notes** | Examples of evidence to demonstrate this can be reports of financial and technical audits and certifications; disclosure of governance documents, independent program reviews, and contracts and agreements with providers of funding and critical services. |
| **Terms** | - |
| **Answers** | No: There are no transparency and accountability policies for actions related to the operation and management of the organization. |
| | Yes: There are transparency and accountability policies for actions related to the operation and management of the organization. |
| **Source** | TRAC – Criterion 3.3.4 [1] |

| | |
|---|---|
| **ID** | M3.9 |
| **Title** | Financial Practices and Procedures |
| **Question** | Does the organization have financial practices and procedures? |
| **Purpose** | The purpose is to identify if the organization can protect itself against malfeasance or other activity that might threaten its economic viability. Achieved by financial practices and procedures which are transparent, compliant with relevant accounting standards and practices, and audited by third parties in accordance with territorial legal requirements. |

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| **Notes** | Examples of evidence to demonstrate this can be demonstrated dissemination requirements for business planning and practices; citations to or examples of accounting and audit requirements, standards, and practice; audited annual financial statements. |
| **Terms** | - |
| **Answers** | No: There are no financial practices or procedures. |
| | Yes: There are financial practices or procedures. |
| **Source** | TRAC – Criterion 3.4.2 [1] |

| | |
|---|---|
| **ID** | M3.10 |
| **Title** | Financial risk, benefit, investment, and expenditure |
| **Question** | Are there procedures to analyse and report on financial risk, benefit, investment, and expenditure? |
| **Purpose** | The purpose is to identify if the organization can demonstrate that the organization has identified and documented these categories, and actively manages them, including identifying and responding to risks, describing and leveraging benefits, specifying and balancing investments, and anticipating and preparing for expenditures. (including assets, licenses, and liabilities). |
| **Notes** | Examples of evidence to demonstrate this can be a risk register; technology infrastructure investment planning documents; cost/benefit analyses; financial investment documents and portfolios; requirements for and examples of licenses, contracts, and asset management; evidence of revision based on risk analysis. |
| **Terms** | - |
| **Answers** | No: There are no procedures to analyse and report on financial risk, benefit, investment, and expenditure. |
| | Yes: There are procedures to analyse and report on financial risk, benefit, investment, and expenditure. |
| **Source** | TRAC – Criterion 3.4.3 [1] |

| | |
|---|---|
| **ID** | M3.11 |
| **Title** | Change Management Process |
| **Question** | Is there a change management process that identifies changes to critical processes that potentially affect the organization's ability to comply with its mandatory responsibilities? |
| **Purpose** | The purpose is to identify if the organization can document not only the current processes, but the prior processes that were applied to its holdings. |
| **Notes** | Examples of evidence to demonstrate this can be documentation of change management process; assessment of risk associated with a process change; analysis of the expected impact of a process change; comparison of logs of actual changes to processes versus associated analyses of their impact and criticality. |
| **Terms** | - |
| **Answers** | No: There is no change management process that identifies changes to critical processes that potentially affect the organization's ability to comply with its mandatory responsibilities. |
| | Yes: There is a change management process that identifies changes to critical processes that potentially affect the organization's ability to comply with its mandatory responsibilities. |
| **Source** | TRAC – Criterion 5.1.1.6.1 [1] |

| | |
|---|---|
| **ID** | M3.12 |
| **Title** | Contracts and deposit agreements |
| **Question** | Are there procedures to acquire and maintain appropriate contracts or deposit agreements for information objects that it manages, preserves, and/or to which it provides access? |

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|---|---|
| **Purpose** | The purpose is to identify if the organization can ensure that it has the rights and authorizations needed to enable it to collect and preserve information objects over time, make that information available to its Designated Community, and defend those rights when challenged. |
| **Notes** | Examples of evidence to demonstrate this can be Properly signed and executed deposit agreements and licenses in accordance with local, national, and international laws and regulations; policies on third-party deposit arrangements; definitions of service levels and permitted uses; policies on the treatment of 'orphan works' and copyright dispute resolution; reports of independent risk assessments of these policies; procedures for regularly reviewing and maintaining agreements, contracts, and licenses. |
| **Terms** | - |
| **Answers** | No: There are no procedures to acquire and maintain appropriate contracts or deposit agreements for information objects that it manages, preserves, and/or to which it provides access. |
| | Yes: There are procedures to acquire and maintain appropriate contracts or deposit agreements for information objects that it manages, preserves, and/or to which it provides access. |
| **Source** | TRAC – Criterion 3.5.1 [1] |

| | |
|---|---|
| **ID** | M4.1 |
| **Title** | Business Planning Processes |
| **Question** | Are there short and long-term business planning processes in place? |
| **Purpose** | The purpose is to identify if the organization performs a business planning process which can be used to ensure the viability of the organization over the period it has promised to provide access to its contents for its Designated Community. |
| **Notes** | Examples of evidence to demonstrate this can be up-to-date, multi-year strategic, operating or business plans; audited annual financial statements; financial forecasts with multiple budget scenarios; contingency plans; market analysis. |
| **Terms** | Designated Community (http://evoc.sysresearch.org/E-ARK/OAIS/Designated%20Community) |
| **Answers** | No: There are neither short nor long-term business planning processes in place. |
| | Yes: There are short and long-term business planning processes in place. |
| **Source** | TRAC – Criterion 3.4.1 [1] |

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|---|---|
| **ID** | M4.2 |
| **Title** | Critical Processes |
| **Question** | Is there an identification of the critical processes of the organization? |
| **Purpose** | The purpose is to identify if the critical processes can be monitored to ensure that they continue to meet the mandatory responsibilities and to ensure that any changes to those processes are examined and tested. |
| **Notes** | An example of evidence to demonstrate this is a traceability matrix between processes and mandatory requirements. |
| **Terms** | - |
| **Answers** | No: There is no identification of the critical processes of the organization. |
| | Yes: There is an identification of the critical processes of the organization. |
| **Source** | TRAC – Criterion 5.1.1.6 [1] |

| | |
|---|---|
| **ID** | M5.1 |
| **Title** | Continuous improvement |
| **Question** | Is continuous improvement of information governance implemented by the organization as part of the organizational culture? |
| **Purpose** | The purpose is to identify if the organization is always striving for continuous improvement of their management policies and procedures, as well as, skills and other relevant aspects of management. |

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| **Notes** | Examples of evidence to demonstrate this can be the outputs of management review, corrective action and preventive action processes. However, if all the analysis, correcting and reviewing doesn't result in changes, then there is no improvement. |
| **Terms** | - |
| **Answers** | No: Continuous improvement of information governance is not implemented by the organization as part of the organizational culture. |
| | Yes: Continuous improvement of information governance is implemented by the organization as part of the organizational culture. |
| **Source** | COBIT 4.1 – Page 21 [8] |

| | |
|---|---|
| **ID** | M5.2 |
| **Title** | Organization recognition among the community |
| **Question** | Is there a publication or outreach and marketing plan for the organization outputs? |
| **Purpose** | The purpose is to identify if peers recognize the organization as a good example of information governance through the dissemination of implemented procedures and innovative approaches to information governance. |
| **Notes** | When an organization is recognized among its community for its innovative and outstanding practice of information governance this means that their practices are potentially high calibre and are continuously improving. This can be achieved through the publication of papers, keynote presentation invitations, journal articles, among other examples. |
| **Terms** | - |
| **Answers** | No: There is no publication or outreach and marketing plan for the organization outputs. |
| | Yes: There is a publication or outreach and marketing plan for the organization outputs. |
| **Source** | COBIT 4.1 – Page 21 [8] |

## A.3. Processes

This section details the questions used in the self-assessment to calculate the maturity levels for the processes dimension.

### A.3.1 Pre-Ingest

"The Pre-ingest process covers the Producer's and archivist's activities of creating Submission Information Packages (SIP)." [2]

| | |
|---|---|
| **ID** | P2.1 |
| **Title** | Deposit Terms Negotiation |
| **Question** | Is there a procedure to negotiate the terms of deposit between the Producer and the Archive? |
| **Purpose** | The purpose is to identify if the Archive can negotiate the terms of deposit with Producers. Terms of deposit might include the specification of the metadata that must be included at the time of deposit, the schedule and method of deposit, the responsibilities of the Producer and the Archive regarding the information being ingested, among other examples. |
| **Notes** | An example of evidence to demonstrate is the documentation of the procedure to negotiate the terms of deposit between the Producer and the Archive. |
| **Terms** | - |
| **Answers** | No: There is no procedure to negotiate the terms of deposit |
| | Yes: There is a procedure to negotiate the terms of deposit |
| **Source** | E-ARK Deliverable 2.1 – Page 19 of 41 [3] |

| | |
|---|---|
| **ID** | P3.1 |
| **Title** | Producer SIP Validation |
| **Question** | Does the Archive validate if the Producer SIP complies with the defined format and structure specifications? |
| **Purpose** | The purpose is to identify if the Archive validates the Producer SIP regarding format and structure. If the SIP has deviations the Archive might reject the SIP and request the Producer to deliver a corrected SIP. |
| **Notes** | Examples of evidence to demonstrate this can be the logs of the validation procedures; documentation of the validation procedures, among others. |
| **Terms** | Producer SIP (http://evoc.sysresearch.org/E-ARK/D7.2/Producer%20SIP) |
| **Answers** | No: The Producer SIP is not validated. |
| | Yes: The Producer SIP is validated. |
| **Source** | E-ARK Deliverable 2.1 – Page 19 of 41 [3] |

| | |
|---|---|
| **ID** | P3.2 |
| **Title** | Provenance verification procedures |
| **Question** | Are there procedures in place to verify the provenance of all deposited objects? |
| **Purpose** | The purpose is to identify if the organization has mechanisms to guarantee the provenance of the information to be Ingested. |
| **Notes** | Examples of procedures in place to verify this can be digital processing and data verification and validation, and through exchange of ownership evidences (e.g. submission agreements, deposit agreements, etc.). |
| **Terms** | - |
| **Answers** | No: There are no procedures in place to verify the provenance of all deposited objects. |
| | Yes: There are procedures in place which are or have been used to verify the provenance of some collections of deposited objects. |
| **Source** | TRAC – Criterion 4.1.4 [1] |

| | |
|---|---|
| **ID** | P3.3 |
| **Title** | Enhancement of the Producer SIP |
| **Question** | Is there a procedure to enhance a Producer SIP? |
| **Purpose** | The purpose is to identify if a Producer SIP is checked and completed. This can be done by adding further metadata, or restructure the SIP, among other procedures. |
| **Notes** | Examples of evidence to demonstrate this can be the outputs of the enhancement of the Producer SIP; documentation detailing the enhancement procedures in place; a comparison between the original producer SIP and the enhanced one, among others. |
| **Terms** | - |
| **Answers** | No: The Producer SIP is not enhanced. |
| | Yes: The Producer SIP is enhanced. |
| **Source** | E-ARK Deliverable 2.1 – Page 19 of 41 [3] |

### A.3.2 Ingest

"The Ingest process covers archival activities of creating the archival information package (AIP) from the submission information package (SIP)." [2]

| | |
|---|---|
| **ID** | P2.2 |
| **Title** | Ingest Producer/depositor responses |
| **Question** | Is there a procedure to provide appropriate responses to the Producer, at the agreed points, during the Ingest process? |
| **Purpose** | The purpose is to identify if the organization provides responses to the Producer at the agreed points to ensure that are no faults in communication that might lead to loss of a SIP. |
| **Notes** | Examples of evidence to demonstrate this can be submission or deposit agreements, process documentation, operating procedures, or evidence of responses such as reports, memos, or emails. |
| **Terms** | - |
| **Answers** | No: There is no procedure to provide appropriate responses to the Producer/depositor, at the agreed points, during the Ingest process |
| | Yes: There is a procedure to provide appropriate responses to the Producer/depositor, at the agreed points, during the Ingest process |
| **Source** | TRAC – Criterion 4.1.7 [1] |

| | |
|---|---|
| **ID** | P2.3 |
| **Title** | AIP generation procedure |
| **Question** | Is there a procedure to generate an AIP from a SIP? |
| **Purpose** | The purpose is to identify if the organization can generate and AIP from a SIP. The organization must ensure that the AIP correctly represents the SIP. |
| **Notes** | - |
| **Terms** | - |
| **Answers** | No: There is no procedure to generate an AIP from a SIP. |
| | Yes: There is a procedure to generate an AIP from a SIP. |
| **Source** | TRAC – Criterion 4.2.2 [1] |

| | |
|---|---|
| **ID** | P2.4 |
| **Title** | AIP unique identifiers convention |
| **Question** | Is there a procedure to generate and manage persistent and unique identifiers for an AIP? |
| **Purpose** | The purpose is to identify if the organization generates persistent, unique identifier for each AIP so that an IAP can be found in the future. This also ensures that an AIP can be distinguished from all other AIP in the repository. Understand if the organization has records that detail how changes to unique identifiers are to be performed so that AIP don't lose context, are not lost and can be distinguished from all other AIP in the repository. |
| **Notes** | Examples of evidence to demonstrate this can be documentation describing naming conventions and physical evidence of its application (e.g., logs). |
| **Terms** | - |
| **Answers** | No: There is no procedure to generate and manage persistent and unique identifiers for an AIP. |
| | Yes: There is a procedure to generate and manage persistent and unique identifiers for an AIP. |
| **Source** | TRAC – Criterion 4.2.4 [1] |

| | |
|---|---|
| **ID** | P3.4 |
| **Title** | Management of units of description |
| **Question** | Is there a procedure to create and manage units of description based on the Producer SIP? |
| **Purpose** | The purpose is to identify if the Archive can manage units of description based on the Producer SIP information, or if reuses existing ones for scoping the new SIP. |
| **Notes** | An example of evidence to demonstrate this can be the documentation detailing how units of description are managed. |
| **Terms** | - |
| **Answers** | No: There is no procedure to manage units of description. |
| | Yes: There is a procedure to manage units of description based on the Producer SIP. |
| **Source** | E-ARK Deliverable 2.1 – Page 19 of 41 [3] |

| | |
|---|---|
| **ID** | P3.5 |
| **Title** | Ingest SIP verification mechanisms |
| **Question** | During the Ingest process, are there mechanisms to verify that each SIP is complete and correct? |
| **Purpose** | The purpose is to identify if the organization has mechanisms to detect and correct errors during the creation of a SIP or of transmission errors during an Ingest session. |
| **Notes** | SIP completeness and correctness depends on what was agreed between the Producer and the Archive during the submission agreement negotiations. A SIP is correct if it complies with the schema that was defined. A SIP is complete if all information deemed mandatory in the submission agreement is present in it.<br>Examples of mechanisms in place to verify this can be system log files from systems performing the transfer an Ingest procedures. |
| **Terms** | - |
| **Answers** | No: There are no mechanisms in place to verify that each SIP is complete and correct. |
| | Yes: There are mechanisms in place to verify that each SIP is complete and correct. |
| **Source** | TRAC – Criterion 4.1.5 [1] |

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|---|---|
| **ID** | P3.6 |
| **Title** | Ingest actions and administration processes records |
| **Question** | Does the Archive produce records of the Ingest transactions between Producer and Archive to serve as evidence of the transaction according to its legal and regulatory environment? |
| **Purpose** | The purpose is to identify if the organization has the updated records of all documentation relevant for the Ingest process which may be solicited during an audit. |
| **Notes** | Examples of evidence to demonstrate this can be written documentation of decisions and/or action taken, preservation metadata logged, stored, and linked to pertinent digital objects, and confirmation receipts sent back to Producers. |
| **Terms** | - |
| **Answers** | No: There are no records to serve as evidence of the Ingest transactions between Producer and Archive. |
| | Yes: There are records to serve as evidence of the Ingest transactions between Producer and Archive. |
| **Source** | TRAC – Criterion 4.1.8 [1] |

| | |
|---|---|
| **ID** | P3.7 |
| **Title** | Legal Rights |
| **Question** | Is there a procedure to manage legal rights during Ingest? |
| **Purpose** | The purpose is to identify if the Archive can manage the legal rights (copyright, data protection, and ownership) of objects during Ingest into the Archive. In this sense managing legal rights involves checking if the content being ingested has legal rights associated; check if the content is not duplicated from previous ingests or even plagiarized from other Producers. It also includes creating access restrictions to certain objects when the producer requests it. |
| **Notes** | Examples of evidence to demonstrate this can be Legally binding submission agreements/deposit agreements/deeds of gift, evidence of appropriate technological measures; logs from procedures and authentications, among others. |
| **Terms** | - |
| **Answers** | No: There is no procedure to manage legal rights during Ingest. |
| | Yes: There is a procedure to manage legal rights during Ingest. |
| **Source** | Based on TRAC - Criteria 4.1.2, 4.1.4 and 4.1.6 [1] |

| | |
|---|---|
| **ID** | P3.8 |
| **Title** | SIP final disposition documentation |
| **Question** | Are there procedures capable of demonstrating the final disposition of a SIP? |
| **Purpose** | The purpose is to identify if the organization has defined procedures to demonstrate that a specific SIP has either accepted, incorporated as part of an AIP, or been rejected and disposed. |
| **Notes** | Examples of evidence to demonstrate this can be system processing files, disposal records, deposit agreements, provenance tracking system, system log files, process description documents, and documentation of how an AIP is derived from a SIP. |
| **Terms** | - |
| **Answers** | No: There is no procedure capable of demonstrating the final disposition of a SIP. |
| | Yes: There are procedures capable of demonstrating the final disposition of a SIP. |
| **Source** | TRAC – Criterion 4.2.3 [1] |

| | |
|---|---|
| **ID** | P3.9 |
| **Title** | AIP parsing |
| **Question** | Is there a procedure to create and manage AIP Classes? |
| **Purpose** | The purpose is to identify if the organization can store a wide variety of information types and create AIP classes to describe AIPs that store the same type of information. The AIP classes are important to understand the variety of information that is stored and to enable correct parsing of all information stored in the Archive. |
| **Notes** | Examples of evidence to demonstrate this can be documentation clearly linking each AIP, or class of AIP, to its definition. |
| **Terms** | AIP Class (http://evoc.sysresearch.org/E-ARK/D7.2/AIP%20Class) |
| **Answers** | No: There is no procedure to create and manage AIP Classes. |
| | Yes: There is a procedure to create and manage AIP Classes. |
| **Source** | TRAC – Criterion 4.2.1 [1] |

| | |
|---|---|
| **ID** | P3.10 |
| **Title** | Preservation Description Information (PDI) acquiring procedures (from a SIP) |
| **Question** | Are there procedures for acquiring Preservation Description Information (PDI), from the SIP? |
| **Purpose** | The purpose is to identify if the organization has defined procedures to ensure that the PDI is associated with the relevant content information. This will support authenticity of the preserved objects and enable the detection of unauthorized changes. |

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| **Notes** | Examples of evidence to demonstrate this can be operating procedures, documentation of the Ingest process, and documentation on how the repository acquires and manages Preservation Description Information (PDI). |
| **Terms** | Preservation Description Information (http://evoc.sysresearch.org/E-ARK/OAIS/Preservation%20Description%20Information)<br>Content Information (http://evoc.sysresearch.org/E-ARK/OAIS/Content%20Information) |
| **Answers** | No: There are no procedures for acquiring Preservation Description Information (PDI), from the SIP. |
| | Yes: There are procedures for acquiring Preservation Description Information (PDI), from the SIP. |
| **Source** | TRAC – Criterion 4.2.6 [1] |

| | |
|---|---|
| **ID** | P3.11 |
| **Title** | Preservation Description Information (PDI) maintaining procedures |
| **Question** | Are there procedures for maintaining Preservation Description Information (PDI) in the Archive? |
| **Purpose** | The purpose is to identify if the organization has defined procedures to ensure that the PDI is maintained through its life cycle. This includes performing changes in the PDI as result from external requirements changes. |
| **Notes** | Examples of evidence to demonstrate this can be operating procedures, documentation of the Ingest process, and documentation on how the repository acquires and manages Preservation Description Information (PDI). |
| **Terms** | Preservation Description Information (http://evoc.sysresearch.org/E-ARK/OAIS/Preservation%20Description%20Information)<br>Content Information (http://evoc.sysresearch.org/E-ARK/OAIS/Content%20Information) |
| **Answers** | No: There are no procedures for maintaining Preservation Description Information (PDI) in the Archive. |
| | Yes: There are procedures maintaining Preservation Description Information (PDI) in the Archive. |
| **Source** | Based on TRAC – Criterion 4.2.6.2 [1] |

| | |
|---|---|
| **ID** | P3.12 |
| **Title** | AIP content information testing procedure |
| **Question** | Is there a procedure for testing if the content information of the AIP at its creation is understandable by the designated communities? |
| **Purpose** | The purpose is to identify if the organization has a procedure for testing if the content information of the AIP at its creation is understandable by the designated communities so that all Ingested objects are deemed relevant and usable by the designated community. |
| **Notes** | Examples of evidence to demonstrate this can be test procedures to be run against the digital holdings to ensure that they are understandable by the defined Designated Community, availability of staff with the discipline expertise. |
| **Terms** | Content Information (http://evoc.sysresearch.org/E-ARK/OAIS/Content%20Information) |
| **Notes** | - |
| **Answers** | No: There is no procedure for testing if the content information of the AIP at its creation is understandable by the designated communities. |
| | Yes: There is a procedure for testing if the content information of the AIP at its creation is understandable by the designated communities. |
| **Source** | TRAC – Criterion 4.2.7 [1] |

| | |
|---|---|
| **ID** | P3.13 |
| **Title** | AIP completeness and correctness |
| **Question** | Is each AIP verified for completeness and correctness at the point it is created? |
| **Purpose** | The purpose is to identify if the organization verifies the completeness and correctness of each AIP when it is created to ensure that all AIP can be traced back to the SIP provided by Producers. |
| **Notes** | AIP completeness and correctness is not universal and depends on what was agreed between the Producer and Archive during the submission agreement negotiations. An AIP is correct if it complies with the schema that was defined. A SIP is complete if all information necessary to understand, identify and retrieve the AIP is present.<br>Examples of evidence to demonstrate this can be a description of the procedure that verifies completeness and correctness of the AIP and logs of the procedure. |
| **Terms** | - |
| **Notes** | - |
| **Answers** | No: An AIP is not verified for completeness and correctness at the point it is created. |
| | Yes: There is a procedure to verify each AIP for completeness and correctness at the point they are created. |
| **Source** | TRAC – Criterion 4.2.8 [1] |

| | |
|---|---|
| **ID** | P3.14 |
| **Title** | AIP creation records |
| **Question** | Does the Ingest process produces records, according to their legal and regulatory environment, to serve as evidence of the actions performed to create an AIP? |
| **Purpose** | The purpose is to identify if the organization has records, according to their legal and regulatory environment, to serve as evidence of the actions performed to create an AIP, as to ensure that nothing is omitted from AIP records which might be needed to verify that all AIP have been properly created and in accordance with the documented procedures. |
| **Notes** | Examples of evidence to demonstrate this can be documentation of decisions and/or action taken with timestamps; preservation metadata logged, stored, and linked to relevant digital objects. |
| **Terms** | - |
| **Answers** | No: There are no records, according to their legal and regulatory environment, to serve as evidence of the actions performed to create an AIP. |
| | Yes: There are records, according to their legal and regulatory environment, to serve as evidence of the actions performed to create an AIP. |
| **Source** | TRAC – Criterion 4.2.10 [1] |

### A.3.3 Archival Storage and Preservation

"The Archival Storage Functional Entity contains the services and functions used for the storage and retrieval of Archival Information Packages." [2]

| | |
|---|---|
| **ID** | P2.5 |
| **Title** | AIP Storage Procedures |
| **Question** | Are there procedures to define how the AIP is stored down to the bit level? |
| **Purpose** | The purpose is to identify if there are procedures that define how the AIP is stored down to the bit level, that ensure that information can be extracted from an AIP. |
| **Notes** | Examples of evidence to demonstrate this can be documentation of the format of the AIP, Data Entity Dictionary Specification Language descriptions of the data components, number of copies, security measures, and technical documentation of the archival procedures. |
| **Terms** | - |
| **Answers** | No: There are no procedures to define how the AIP is stored down to the bit level. |

| | |
|---|---|
| | Yes: There are procedures to define how the AIP is stored down to the bit level. |
| **Source** | TRAC – Criterion 4.4.1 [1] |

| | |
|---|---|
| **ID** | P2.6 |
| **Title** | AIP actions records |
| **Question** | Does the archival process produces records, according to their legal and regulatory environment, to serve as evidence of the actions performed during storage and preservation of the AIP? |
| **Purpose** | The purpose is to identify if there are records, according to their legal and regulatory environment, to serve as evidence of the actions performed during storage and preservation of the AIP, to ensure that documentation is up to date, valid and authentic. |
| **Notes** | Examples of evidence to this can be documentation of decisions and actions taken, preservation metadata logged, stored, and linked to pertinent digital objects. |
| **Terms** | - |
| **Answers** | No: There are no AIP actions records. |
| | Yes: There are AIP actions records. |
| **Source** | TRAC – Criterion 4.4.2 [1] |

| | |
|---|---|
| **ID** | P2.7 |
| **Title** | AIP Linking/resolution services |
| **Question** | Is there a system of reliable linking/resolution services to find a uniquely identified object, regardless of its physical location? |
| **Purpose** | The purpose is to identify if the organization has a system of reliable linking/resolution services to find a uniquely identified object, regardless of its physical location so that all actions related to an AIP can be traced over time, system and storage changes. |
| **Notes** | Examples of evidence to demonstrate this can be documentation describing naming convention and physical evidence of its application (e.g., logs). |
| **Terms** | - |
| **Answers** | No: There is no system of reliable linking/resolution services to find a uniquely identified object, regardless of its physical location. |
| | Yes: There is a system of reliable linking/resolution services to find a uniquely identified object, regardless of its physical location. |
| **Source** | TRAC – Criterion 4.2.4.2 [1] |

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|---|---|
| **ID** | P3.15 |
| **Title** | AIP integrity monitoring |
| **Question** | Is the integrity of an AIP monitored? |
| **Purpose** | The purpose is to identify if AIP integrity is monitored, which is necessary to protect the integrity of an AIP over time. |
| **Notes** | Examples of evidence to this can be checksums for each Ingested AIP; logs of checksum checks, documentation of how AIP and integrity information are kept separate, documentation of how AIP and access registers are kept separate. |
| **Terms** | - |
| **Answers** | No: The integrity of an AIP is not monitored. |
| | Yes: The integrity of an AIP is monitored. |
| **Source** | TRAC – Criterion 4.4.1.2 [1] |

| | |
|---|---|
| **ID** | P3.16 |
| **Title** | AIP Designated Community Requirements |

| | |
|---|---|
| **Question** | Is there a procedure to gather and review the AIP requirements from the designated community? |
| **Purpose** | The purpose is to identify if there is a procedure to gather and review the AIP requirements from the designated community. |
| **Notes** | Examples of evidence to demonstrate this can be written documentation on how to engage with the designated community and extract new requirements. |
| **Terms** | - |
| **Answers** | No: There is no procedure to gather and review the AIP requirements from the designated community. |
| | Yes: There is a procedure to gather and review the AIP requirements from the designated community. |
| **Source** | Based on TRAC – Criterion 4.5.1 and OAIS – Page 4-14 [1] [2] |

| | |
|---|---|
| **ID** | P3.17 |
| **Title** | Independent mechanism for content integrity checking |
| **Question** | Is there an independent mechanism for verifying the integrity of the Archives' content? |
| **Purpose** | The purpose is to identify if the organization has mechanism for content integrity checking that enables independent audits. |
| **Notes** | Examples of evidence to demonstrate this can be logs of material received and associated action (e.g., receipt, action) dates, logs of periodic checks. |
| **Terms** | - |
| **Answers** | No: There is no independent mechanism for verifying the integrity of the Archives' content. |
| | Yes: There is an independent mechanism for verifying the integrity of the Archives' content. |
| **Source** | TRAC – Criterion 4.2.9 [1] |

| | |
|---|---|
| **ID** | P3.18 |
| **Title** | Tools and resources to provide representation information |
| **Question** | Are there tools and resources to generate Representation Information for the digital objects in the Archive? |
| **Purpose** | The purpose is to identify if the organization has tools or methods to identify the file type of all submitted objects, to determine what other more representation information is necessary to make each object understandable, and the ability to ensure that all that Representation information is associated with the relevant objects. |
| **Notes** | Examples of evidence to demonstrate this can be subscription or access to registries of representation information (e.g., format registries); records in local registries with links to digital objects, database records that include representation information and a link to relevant digital objects. |
| **Terms** | Representation Information (http://evoc.sysresearch.org/E-ARK/OAIS/Representation%20Information) |
| **Answers** | No: There are no tools or resources to provide Representation Information for all the digital objects in the Archive. |
| | Yes: There are tools or resources to provide Representation Information for all the digital objects in the Archive. |
| **Source** | Based on TRAC – Criterion 4.2.5.4 [1] |

### A.3.4 Data Management

"According to the OAIS model Data Management is a collection of independent processes that aim to manipulate the descriptive metadata (and, in some implementations, the inner structure of the AIP) theoretically resulting in a new manifestation or new version of the AIP." [2]

| | |
|---|---|
| **ID** | P3.19 |
| **Title** | Designated Community information requirements |
| **Question** | Are the minimum information requirements specified to enable the Designated Community to discover and identify material of interest? |
| **Purpose** | The purpose is to identify if the Archive enables discovery of its holdings. |
| **Notes** | Examples of evidence to demonstrate this can be retrieval and descriptive information, discovery metadata, such as Dublin Core, and other documentation describing the objects. |
| **Terms** | - |
| **Answers** | No: The minimum information requirements are not specified. |
| | Yes: The minimum information requirements are specified. |
| **Source** | TRAC – Criterion 4.5.1 [1] |

| | |
|---|---|
| **ID** | P3.20 |
| **Title** | Descriptive information association with the AIP |
| **Question** | Is the minimum descriptive information captured or created and associated with the AIP? |
| **Purpose** | The purpose is to identify if the Archive ensures that descriptive information is associated with the AIP. The archive must evidence that it associates with each AIP, the minimum descriptive information that was received from the producer or created by the archive. Associating the descriptive information with the AIP is important, although it does not require one-to-one correspondence, and may not necessarily be stored with the AIP. Hierarchical schemes can allow some descriptive information to be associated with many AIP. |
| **Notes** | Examples of evidence to demonstrate this can be descriptive metadata; internal or external persistent, unique identifier or locator that is associated with the AIP; system documentation and technical architecture; depositor agreements; metadata policy documentation; process workflow documentation. |
| **Terms** | Descriptive Information (http://evoc.sysresearch.org/E-ARK/OAIS/Descriptive%20Information) |
| **Answers** | No: The minimum descriptive information is neither captured or created nor associated with the AIP. |
| | Yes: The minimum descriptive information is captured or created and associated with the AIP. |
| **Source** | TRAC – Criterion 4.5.2 [1] |

| | |
|---|---|
| **ID** | P3.21 |
| **Title** | Bi-directional linkage between the AIP and descriptive information |
| **Question** | Is there a procedure to maintain bi-directional linkage between each AIP and its descriptive information? |
| **Purpose** | The purpose is to identify if the Archive ensures that all AIP can be located and retrieved. An archive must have procedures on how to establish and maintain relationships between the descriptive information and the AIP, and should ensure that every AIP has descriptive information associated with it and that all descriptive information must point to at least one AIP. |
| **Notes** | Examples of evidence to demonstrate this can be descriptive metadata; unique, persistent identifier or locator associated with the AIP; documented relationship between the AIP and its metadata; system documentation and technical architecture; process workflow documentation. |
| **Terms** | Descriptive Information (http://evoc.sysresearch.org/E-ARK/OAIS/Descriptive%20Information) |

| | |
|---|---|
| **Answers** | No: There is no procedure to maintain bi-directional linkage between each AIP and its descriptive information. |
| | Yes: There is a procedure to maintain bi-directional linkage between each AIP and its descriptive information. |
| **Source** | TRAC – Criterion 4.5.3 [1] |

### A.3.5 Access

"According to the OAIS model the Access process covers the activities of requesting and creating the Dissemination Information Package (DIP) from the AIP." [2]

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|---|---|
| **ID** | P2.8 |
| **Title** | Creation of a DIP |
| **Question** | Is there a procedure to create a DIP from an AIP? |
| **Purpose** | The purpose is to identify if there is a procedure to create a DIP from an AIP. |
| **Notes** | Examples of evidence to demonstrate this can be the outputs of the procedure to generate a DIP; documentation on the procedure to generate a DIP, among others. |
| **Terms** | - |
| **Answers** | No: There is no procedure to create a DIP from an AIP. |
| | Yes: There is a procedure to create a DIP from an AIP. |
| **Source** | E-ARK Deliverable 2.1 – Page 35 of 41 [3] |

| | |
|---|---|
| **ID** | P3.22 |
| **Title** | Access policies |
| **Question** | Are there access policies defined with the designated communities? |
| **Purpose** | The purpose is to identify if the organization has accesses policies defined with the designated communities. |
| **Notes** | An example of evidence to demonstrate this can be documentation of policies that are available to the user communities. |
| **Terms** | - |
| **Answers** | No: There are no access policies defined with the designated communities. |
| | Yes: There are access policies defined with the designated communities. |
| **Source** | Based on TRAC – Criterion 4.6.1 [1] |

| | |
|---|---|
| **ID** | P3.23 |
| **Title** | Access policies compliance |
| **Question** | Are there procedures to verify if the organization complies with the access policies defined with the designated communities? |
| **Purpose** | The purpose is to identify if the organization complies with accesses policies defined with the designated communities. Failure to comply might affect the trust that designated community has on the organization about the support of the user community. |
| **Notes** | Examples of evidence to demonstrate this can be documentation of policies that are available to the user communities, logs and audits of access requests. |
| **Terms** | - |
| **Answers** | No: There are no procedures to verify if the organization complies with the access policies defined with the designated communities. |
| | Yes: There are procedures to verify if the organization complies with the access policies defined with the designated communities. |
| **Source** | TRAC – Criterion 4.6.1 [1] |

| | |
|---|---|
| **ID** | P3.24 |
| **Title** | Access failures and errors |
| **Question** | Is there a mechanism to log and review all access failures and errors? |
| **Purpose** | The purpose is to identify if the organization maintains a log and reviews all access failures and errors, which can help identify security threats and access system failures. |
| **Notes** | Examples of evidence to demonstrate this can be access logs, capability of the system to use automated analysis/monitoring tools and generate problem/error messages; notes of reviews undertaken or action taken because of reviews. |
| **Terms** | - |
| **Answers** | No: There is no mechanism to log and review access failures and errors. |
| | Yes: There is a mechanism to log and review all access failures and errors. |
| **Source** | TRAC – Criterion 4.6.1.1 [1] |

| | |
|---|---|
| **ID** | P3.25 |
| **Title** | Access Data Reports |
| **Question** | Is there a mechanism to record the access to the contents? |
| **Purpose** | The purpose is to identify if the organization records access to the contents, as a measure to detect abuses or misuses. |
| **Notes** | An example of evidence to demonstrate this can be process definitions or logs of access orders. |
| **Terms** | Consumer (http://evoc.sysresearch.org/E-ARK/OAIS/Consumer) |
| **Answers** | No: There is no mechanism to record the access to the contents. |
| | Yes: There is a mechanism to record the access to the contents. |
| **Source** | Based on TRAC – Criterion 4.6.1.1 [1] |

| | |
|---|---|
| **ID** | P3.26 |
| **Title** | Access Data Problem/Error Reports |
| **Question** | Is there a mechanism to solve problem reports about errors in data or responses from Consumers? |
| **Purpose** | The purpose is to identify if the organization investigates and resolves both incident and problem reports about errors in data or responses from Consumers essential to become a trustworthy source of information. |
| **Notes** | Examples of evidence to demonstrate this can be system design documents, work instructions (if a DIP involves manual processing), process definitions, documentation of the actions taken. |
| **Terms** | Consumer (http://evoc.sysresearch.org/E-ARK/OAIS/Consumer) |
| **Answers** | No: There is no mechanism to solve problem reports about errors in data or responses from Consumers. |
| | Yes: There is a mechanism which focuses only on incident reports about errors in data or responses from Consumers but does not seek to identify and resolve underlying issues. |
| **Source** | TRAC – Criterion 4.6.2.1 [1] |

| | |
|---|---|
| **ID** | P3.27 |
| **Title** | Access Policies and Procedures |
| **Question** | Does the organization have records of policies and procedures that enable the dissemination of digital objects while maintaining traceability to the originals and evidence supporting their authenticity? |
| **Purpose** | The purpose is to identify if the organization maintains an auditable chain of authenticity from the AIP to a DIP. |

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| **Notes** | Examples of evidence to demonstrate this can be system design documents, work instructions (if a DIP involve manual processing), process definitions, production of a sample copy with evidence of authenticity, documentation of the designated community requirements for evidence of authenticity; PREMIS Events. |
| **Terms** | - |
| **Answers** | No: There are no records of policies and procedures that enable the dissemination of digital objects while maintaining traceability to the originals and evidence supporting their authenticity. |
| | Yes: There are records of policies and procedures that enable the dissemination of digital objects while maintaining traceability to the originals and evidence supporting their authenticity. |
| **Source** | TRAC – Criterion 4.6.2 [1] |

## A.4. Infrastructure

This section details the questions used in the self-assessment to calculate the maturity levels for the infrastructure dimension.

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|---|---|
| **ID** | I2.1 |
| **Title** | Archival infrastructure management |
| **Question** | Are there archival infrastructure management procedures in place? |
| **Purpose** | The purpose is to identify if the organization manages the infrastructure that supports its business. |
| **Notes** | Examples of evidence to demonstrate this can be a collection of all the infrastructure management procedures, documentation of the identified infrastructure management procedures, examples of application of the documented procedures. |
| **Terms** | - |
| **Answers** | No: The infrastructure is not managed. |
| | Yes: The infrastructure is managed using defined infrastructure management procedures. |
| **Source** | COBIT 4.1 – A12 - Pages 77-80 [8] |

| | |
|---|---|
| **ID** | I2.2 |
| **Title** | Information Objects Location and Quantity |
| **Question** | Are there procedures to manage the number and location of copies of all Information objects? |
| **Purpose** | The purpose is to identify if the organization can assert that it is providing an authentic copy of a particular information object. |
| **Notes** | Examples of evidence to demonstrate this can be Random retrieval tests; validation of object existence for each registered location; validation of a registered location for each object on storage systems; provenance and fixity checking information; location register/log of information objects compared to the expected number and location of copies of particular objects. |
| **Terms** | - |
| **Answers** | No: There are no procedures to manage the number and location of copies of all Information objects. |
| | Yes: There are procedures to manage the number and location of copies of all Information objects. |
| **Source** | TRAC – Criterion 5.1.2 [1] |

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|---|---|
| **ID** | I2.3 |
| **Title** | Synchronization Mechanisms |
| **Question** | Are there mechanisms in place to ensure any/multiple copies of information objects are synchronized? |

| | |
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| **Purpose** | The purpose is to identify if the organization can ensure that multiple copies of an information object remain identical, within a time established as acceptable by the organization, and that a copy can be used to replace a corrupted copy of the object. |
| **Notes** | Examples of evidence to demonstrate this can be Synchronization workflows; system analysis of how long it takes for copies to synchronize; procedures/documentation of synchronization processes. |
| **Terms** | - |
| **Answers** | No: There are no mechanisms in place to ensure any/multiple copies of information objects are synchronized. |
| | Yes: There are mechanisms in place to ensure any/multiple copies of information objects are synchronized. |
| **Source** | TRAC – Criterion 5.1.2.1 [1] |

| | |
|---|---|
| **ID** | I3.1 |
| **Title** | Infrastructure changes |
| **Question** | Are infrastructure changes addressed in the organization? |
| **Purpose** | The purpose is to identify how the infrastructure is upgraded and maintained so that it continues to remain operational and meet the customers' requirements. |
| **Notes** | Examples of evidence to demonstrate this can be documentation on the procedure to address infrastructure changes in the organization; documentation on infrastructure changes that resulted from the application of the procedure, among others. |
| **Terms** | - |
| **Answers** | No: There are no procedures to address infrastructure changes. |
| | Yes: There are procedures to address infrastructure changes. |
| **Source** | COBIT 4.1 – A12 - Pages 77-80 [8] |

| | |
|---|---|
| **ID** | I3.2 |
| **Title** | Infrastructure security procedures |
| **Question** | Are there infrastructure security procedures implemented in the organization? |
| **Purpose** | The purpose is to identify if the organization has security procedures for the infrastructure and how these procedures are implemented. |
| **Notes** | An example of evidence to demonstrate this can be a set of indicators defined that are used to measure the performance of the infrastructure security procedures in place. These indicators can then be measured through automatic means which works by defining a threshold value that when is reached automatically alerts for a security event. |
| **Terms** | - |
| **Answers** | No: There are no infrastructure security procedures in place. |
| | Yes: There are infrastructure security procedures in place. |
| **Source** | COBIT 4.1 – A12 - Pages 77-80 [8] |

| | |
|---|---|
| **ID** | I3.3 |
| **Title** | Technology watches/monitoring |
| **Question** | Are there technology watches/monitoring implemented in the organization? |
| **Purpose** | The purpose is to identify if the organization has mechanisms for technology watch/monitoring and how they are implemented in the organization. |
| **Notes** | Technology watches/monitoring works by identifying new technologies and technologies that are in risk of becoming obsolete. It also identifies conflicts between old and new version of a technology and advises possible courses of action to guarantee that the infrastructure remains available and relevant for the designated communities. Examples of evidence to demonstrate this |

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| | can be management of periodic technology assessment reports; comparison of existing technology to each new assessment, among others. |
| **Terms** | - |
| **Answers** | No: There are no technology watches/monitoring implemented in the organization. |
| | Yes: There are technology watches/monitoring implemented in the organization. |
| **Source** | TRAC – Criterion 5.1.1.1 [1] |

| | |
|---|---|
| **ID** | I3.4 |
| **Title** | Infrastructure risk management process |
| **Question** | Is there an infrastructure risk management process implemented? |
| **Purpose** | The purpose is to identify how risk management is performed in the organization. |
| **Notes** | A risk management process helps identifying and assessing risks, which in turn will help identifying controls to mitigate these risks. |
| **Terms** | - |
| **Answers** | No: There is no risk management process for the infrastructure of the organization. |
| | Yes: There is a risk management process for the infrastructure of the organization. |
| **Source** | COBIT 4.1 – PO9 - Pages 63-66 [8] |

| | |
|---|---|
| **ID** | I3.5 |
| **Title** | Disaster preparedness and recovery plan |
| **Question** | Is there a disaster preparedness and recovery plan? |
| **Purpose** | The purpose is to identify if the organization maintains a suitable disaster preparedness and recovery plan(s). |
| **Notes** | The disaster preparedness and recovery plan(s) should include at least one off-site backup of all information together with an offsite copy of the recovery plan(s). Examples of evidence to demonstrate this can be evidence that the organization employs the codes of practice found in the ISO 27000 series of standards; disaster and recovery plans; information about and proof of at least one off-site copy of preserved information; service continuity plan; documentation linking roles with activities; local geological, geographical, or meteorological data or threat assessments; ISO 17799 certification, among others. |
| **Terms** | - |
| **Answers** | No: There is no disaster preparedness and recovery plan. |
| | Yes: There is a disaster preparedness and recovery plan developed. |
| **Source** | TRAC – Criterion 5.2.4 [1] |

| | |
|---|---|
| **ID** | I3.6 |
| **Title** | History of the Changes to Software and Hardware |
| **Question** | Is there a history of the changes to software and hardware of the organization? |
| **Purpose** | The purpose is to identify if the organization can provide an 'audit trail' through which stakeholders can identify and trace decisions. |
| **Notes** | Examples of evidence to demonstrate this can be capital equipment inventories; documentation of the acquisition, implementation, update, and retirement of critical software and hardware; minutes of meetings. |
| **Terms** | - |
| **Answers** | No: There is no history of the changes to software and hardware of the organization. |
| | Yes: There is a history of the changes to software and hardware of the organization. |
| **Source** | TRAC – Criterion 3.3.3 [1] |

| | |
|---|---|
| **ID** | I3.7 |
| **Title** | Preservation Policies |
| **Question** | Are there Preservation Policies in place to ensure the organization's Preservation Strategic Plan will be met? |
| **Purpose** | The purpose is to identify if the organization can fulfil the part of its mission related to preservation. |
| **Notes** | Examples of evidence to demonstrate this can be Preservation Policies; Mission Statement; Current and past written documentation in the form of Preservation Policies, Preservation Strategic Plans and Preservation Implementation Plans, procedures, protocols, and workflows; specifications of review cycles for documentation; documentation detailing reviews, surveys and feedback. If documentation is embedded in system logic, functionality should demonstrate the implementation of policies and procedures. |
| **Terms** | - |
| **Answers** | No: There are no Preservation Policies in place to ensure the organization's Preservation Strategic Plan will be met. |
| | Yes: There are Preservation Policies in place to ensure the organization's Preservation Strategic Plan will be met. |
| **Source** | TRAC – Criterion 3.3.2 and 3.3.2.1 [1] |

| | |
|---|---|
| **ID** | I3.8 |
| **Title** | Information Integrity Measurements |
| **Question** | Are there procedures to define, collect, track, and appropriately provide information integrity measurements? |
| **Purpose** | The purpose is to identify if the organization can provide documentation that it has developed or adapted appropriate measures for ensuring the integrity of its holdings. |
| **Notes** | Examples of evidence to demonstrate this can be written definition or specification of the organization's integrity measures (for example, computed checksum or hash value); documentation of the procedures and mechanisms for monitoring integrity measurements and for responding to results of integrity measurements that indicate digital content is at risk; an audit process for collecting, tracking, and presenting integrity measurements; Preservation Policy and workflow documentation. |
| **Terms** | - |
| **Answers** | No: There are no procedures to define, collect, track, and appropriately provide information integrity measurements. |
| | Yes: There are procedures to define, collect, track, and appropriately provide information integrity measurements. |
| **Source** | TRAC – Criterion 3.3.5 [1] |

| | |
|---|---|
| **ID** | I3.9 |
| **Title** | Intellectual Property Rights and Restrictions |
| **Question** | Are there procedures to track and manage intellectual property rights and restrictions on use of information? |
| **Purpose** | The purpose is to identify if the organization can track, act on, and verify rights and restrictions related to the use of the information within the organization, as required by deposit agreement, contract, or license. |
| **Notes** | Examples of evidence to demonstrate this can be Preservation Policy statement that defines and specifies the organization's requirements and process for managing intellectual property rights; depositor agreements; samples of agreements and other documents that specify and address intellectual property rights; documentation of monitoring by the organization over time of changes |

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| | in status and ownership of intellectual property in digital content held by the organization; results from monitoring, metadata that captures rights information. |
| **Terms** | - |
| **Answers** | No: There are no procedures to track and manage intellectual property rights and restrictions on use of information. |
| | Yes: There are procedures to track and manage intellectual property rights and restrictions on use of information. |
| **Source** | TRAC – Criterion 3.5.2 [1] |

| | |
|---|---|
| **ID** | I4.1 |
| **Title** | Infrastructure performance |
| **Question** | Is the infrastructure performance monitored in the organization? |
| **Purpose** | The purpose is to identify if the organization monitors the infrastructure performance. |
| **Notes** | Examples of evidence to demonstrate this can be a document detailing the collection of indicators used to measure infrastructure performance; examples of the application of these indicators to specific scenarios. |
| **Terms** | - |
| **Answers** | No: Infrastructure performance is not monitored in the organization. |
| | Yes: Infrastructure performance is monitored. |
| **Source** | COBIT 4.1 – A12 - Pages 77-80 [8] |

## A.5. General

This section details the general questions used to assess maturity levels 4 and 5 of A2MIGO. These questions are based on the process areas of CMMI [9] for maturity levels 4 and 5.

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|---|---|
| **ID** | G4.1 |
| **Title** | Process quality and performance objectives. |
| **Question** | Are process quality and process performance objectives established and maintained? |
| **Purpose** | The purpose is to identify if objectives for quality and process performance are established and negotiated at an appropriate level of detail to permit an overall evaluation of the objectives and risks at the process level. |
| **Notes** | Process quality and performance objectives can be updated as the processes actual performance becomes known and more predictable, and to reflect changing needs and priorities of relevant stakeholders. This includes quality and process performance objectives, and assessment of the risk of not achieving the organizations' objectives. |
| **Terms** | - |
| **Answers** | No: There are no established and maintained process quality and process performance objectives. |
| | Yes: There are established and maintained process quality and process performance objectives. |
| **Source** | CMMI for Development 1.3– Quantitative Project Management [9] |

| | |
|---|---|
| **ID** | G4.2 |
| **Title** | Measures and analytic techniques for quantitative management |
| **Question** | Is there a selection of measures and analytic techniques to be used in quantitative management? |
| **Purpose** | The purpose is to identify if the organization selects measures and analytic techniques to be used in quantitative management. |

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| **Notes** | Examples of evidence to demonstrate this can be definitions of measures and analytic techniques to be used in quantitative management; traceability of measures back to the organizations' quality and process performance objectives; Process performance baselines and models for use by the organization. |
| **Terms** | - |
| **Answers** | No: There is no selection of measures and analytic techniques to be used in quantitative management. |
| | Yes: There is a selection of measures and analytic techniques to be used in quantitative management. |
| **Source** | CMMI for Development 1.3 – Quantitative Project Management [9] |

| | |
|---|---|
| **ID** | G4.3 |
| **Title** | Process Performance Analysis |
| **Question** | Is Process Performance analysed? |
| **Purpose** | The purpose is to identify if the selected measures are analysed to characterize the performance of the organizations' processes. |
| **Notes** | Analyse the collected measures to establish a distribution or range of results that characterize the expected performance of the organizations' processes. This analysis should include the stability of the process, and the impacts of associated factors and context. Related factors include inputs to the process and other attributes that can affect the results obtained. The context includes the business context (e.g., domain). |
| **Terms** | - |
| **Answers** | No: Process Performance is not analysed. |
| | Yes: Process Performance is analysed. |
| **Source** | CMMI for Development 1.3 – Organizational Process Performance [9] |

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|---|---|
| **ID** | G4.4 |
| **Title** | Process Performance Baselines |
| **Question** | Are there Process Performance Baselines established? |
| **Purpose** | The purpose is to identify if process performance baselines are established and compared to the organization's quality and process performance objectives to determine if the quality and process performance objectives are being achieved. |
| **Notes** | The process performance baselines are a measurement of performance for the organization's set of standard processes at various levels of detail. The processes that the process performance baselines can address include the following: Sequence of connected processes; Processes that cover the entire lifecycle of information; Processes for developing specific outputs. |
| **Terms** | - |
| **Answers** | No: There are no Process Performance Baselines established. |
| | Yes: There are Process Performance Baselines established. |
| **Source** | CMMI for Development 1.3 – Organizational Process Performance [9] |

| | |
|---|---|
| **ID** | G5.1 |
| **Title** | Potential Areas for Improvement |
| **Question** | Are potential areas for improvements identified? |
| **Purpose** | The purpose is to identify if the organization identifies potential areas for improvement that could contribute to meeting business objectives. |
| **Notes** | Potential areas for improvement are identified through a proactive analysis to determine areas that could address process performance shortfalls. Causal Analysis and Resolution processes can be used to diagnose and resolve root causes. The output from this activity is used to evaluate and |

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| | prioritize potential improvements, and can result in either incremental or innovative improvement suggestions. |
| **Terms** | - |
| **Answers** | No: Potential areas for improvements are not identified. |
| | Yes: Potential areas for improvements are identified. |
| **Source** | CMMI for Development 1.3 – Organizational Performance Management [9] |

| | |
|---|---|
| **ID** | G5.2 |
| **Title** | Select and Implement Improvements |
| **Question** | Are there procedures in place to select and implement improvements for deployment in the organization? |
| **Purpose** | The purpose is to identify if there is a selection and implementation of improvements for deployment throughout the organization based on an evaluation of costs, benefits, and other factors. |
| **Notes** | Selection of suggested improvements for deployment is based on cost-to-benefit ratios with regard to quality and process performance objectives, available resources, and the results of improvement proposal evaluation and validation activities. Examples of evidence to demonstrate this can be a list of improvements selected for deployment, and updated process documentation and training. |
| **Terms** | - |
| **Answers** | No: There are no procedures in place to select and implement improvements for deployment in the organization. |
| | Yes: There are procedures in place to select and implement improvements for deployment in the organization. |
| **Source** | CMMI for Development 1.3 – Organizational Performance Management [9] |

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| **ID** | G5.3 |
| **Title** | Improvement Effects Evaluation |
| **Question** | Are there procedures to evaluate the effects of improvements on quality and process performance? |
| **Purpose** | The purpose is to identify if the organization evaluates the effects of deployed improvements on quality and process performance using statistical and other quantitative techniques. |
| **Notes** | An example of evidence to demonstrate this can be the existence of documented measures of the effects resulting from deployed improvements. |
| **Terms** | - |
| **Answers** | No: There are no procedures to evaluate the effects of improvements on quality and process performance. |
| | Yes: There are procedures to evaluate the effects of improvements on quality and process performance. |
| **Source** | CMMI for Development 1.3 – Organizational Performance Management [9] |

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| **ID** | G5.4 |
| **Title** | Determine Causes of Selected Outcomes |
| **Question** | Is there a selection and analysis of outcomes to determine root causes? |
| **Purpose** | The purpose is to identify if the organization systematically determines the root causes of selected and analysed outcomes. |
| **Notes** | A root cause is an initiating element in a causal chain which leads to an outcome of interest. The selection of outcomes could be triggered by an event (reactive) or could be planned periodically, such as at the beginning of a new phase or task (proactive). The purpose of outcome analysis is to |

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| | define actions that will address selected outcomes by analysing relevant outcome data and producing action proposals for implementation. |
| **Terms** | - |
| **Answers** | No: There is no selection and analysis of outcomes to determine root causes. |
| | Yes: There is selection and analysis of outcomes to determine root causes. |
| **Source** | CMMI for Development 1.3 – Causal Analysis and Resolution [9] |

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| **ID** | G5.5 |
| **Title** | Address Causes of Selected Outcomes |
| **Question** | Are action proposals implemented and its effects evaluated? |
| **Purpose** | The purpose is to identify if the organization implements and evaluates selected action proposals developed in causal analysis. |
| **Notes** | Action proposals describe tasks necessary to address root causes of analysed outcomes to prevent or reduce the occurrence or recurrence of negative outcomes, or incorporate realized successes. Action plans are developed and implemented for selected action proposals. Only changes that prove to be of value should be considered for broad implementation. Once the changed process is deployed, the effect of changes is evaluated to verify that the process change has improved process performance. |
| **Terms** | - |
| **Answers** | No: Action proposals are not implemented and its effects are not evaluated. |
| | Yes: Action proposals are implemented and its effects are evaluated. |
| **Source** | CMMI for Development 1.3 – Causal Analysis and Resolution [9] |