D.7.2 An Information Governance Maturity Model Assessment of the E-ARK Pilots

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STATEMENT OF ORIGINALITY

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This deliverable contains original unpublished work except where clearly indicated otherwise.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 will be 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.

In this deliverable, the initial assessment and evaluation of the pilots of the project is provided. Later, deliverable 7.6 will provide the final assessment and evaluation of the pilots, when the results of the project are already applied to these pilots. The purpose of this two stage assessments and evaluation is to show that the E-ARK resulting artefacts enhance the maturity level of the pilots and contribute to the archival practice improvement.

The assessment presented here is based on the Information Governance Maturity Model described in deliverable 7.1. 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). Furthermore, the assessment took into consideration deliverable 2.1 of the E-ARK project, which details the general pilot model and the project pilots. This deliverable was analyzed in order to identify what should be assessed and measured in the pilots. This was done through the identification of 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. In the archival context of E-ARK, five top-level capabilities were defined:

- Pre-Ingest,
- Ingest,
- Archival Storage Preservation,
- Data Management and
- Access.

The assessment of a particular capability will then evaluate the degree of realization and performance of the people, processes, and technology that comprise that capability.

In summary, the methodology to assess the E-ARK pilots is supported by the definition of a capability model that takes into account the processes and use cases to be supported by the pilots (see deliverable 2.1. for more information about the pilot’s processes and use cases).

The capability model ensures that the assessment focuses on the capabilities the pilots want to achieve, and allows to carry out a comparison of the results presented here with the results of the final assessment (to be performed at the end of project).

The assessment 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 five sections, one for each of the capabilities identified. In each section a short description of the capability was presented followed by the questions.

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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. Each aspect can have its own Maturity Model, which expresses quantitatively the maturity level of an organization regarding a certain aspect. A Maturity Model provides also 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 D7.1. where a state of the art on maturity models was performed. We have also noted existing work in the area of a Digital Preservation Maturity Models undertaken by Adrian Brown where the author examines the notion of “trusted” digital repositories and proposes a maturity model for digital preservation, which goal is to enable organizations to assess their capabilities and create a roadmap for developing them to the required maturity level [8], and of Charles Dollar that proposes a Capability Maturity Model to assess digital preservations requirements [9] according to the Open Archival Information System (OAIS) Reference Model (ISO14721 [2]) and Trustworthy Repository Assessment Criteria (TRAC) Standard (ISO16363 [1]). Those maturity models will be analyzed in detail in D7.5.

This deliverable builds on the knowledge from the maturity models that have been documented in detail in deliverable 7.1, 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).

This deliverable is a continuation of the maturity development method presented in D7.1, and focuses on the three final steps of the development method which are detailed in Section 3. In Section 4 the self-assessment questionnaire used to perform the assessment is detailed. Then, in Section 5, the results of the assessment are detailed and analysed.

Section 6 details the post-assessment feedback questionnaire analysis and conclusions. Finally, Section 7 presents the conclusions of this deliverable.

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 AIP class is an aggregation of AIPs that store the same type of information. The 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 behavior 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 in the Pre-Ingest process. It can be transformed by the Archive into the E-ARK SIP. *Note: Definition based on [3]*

Representation Information: "The information that maps a Data Object into 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. Assessment Process

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 D7.1 (and reproduced on Figure 1) and focuses on the application of the maturity model on the use cases before the project pilot, i.e. the three last stages of the method. Deliverable 7.5 will use the results presented here to further develop and extend the maturity model. Finally, deliverable 7.6 will use the final maturity model to perform a final assessment of the project pilots.

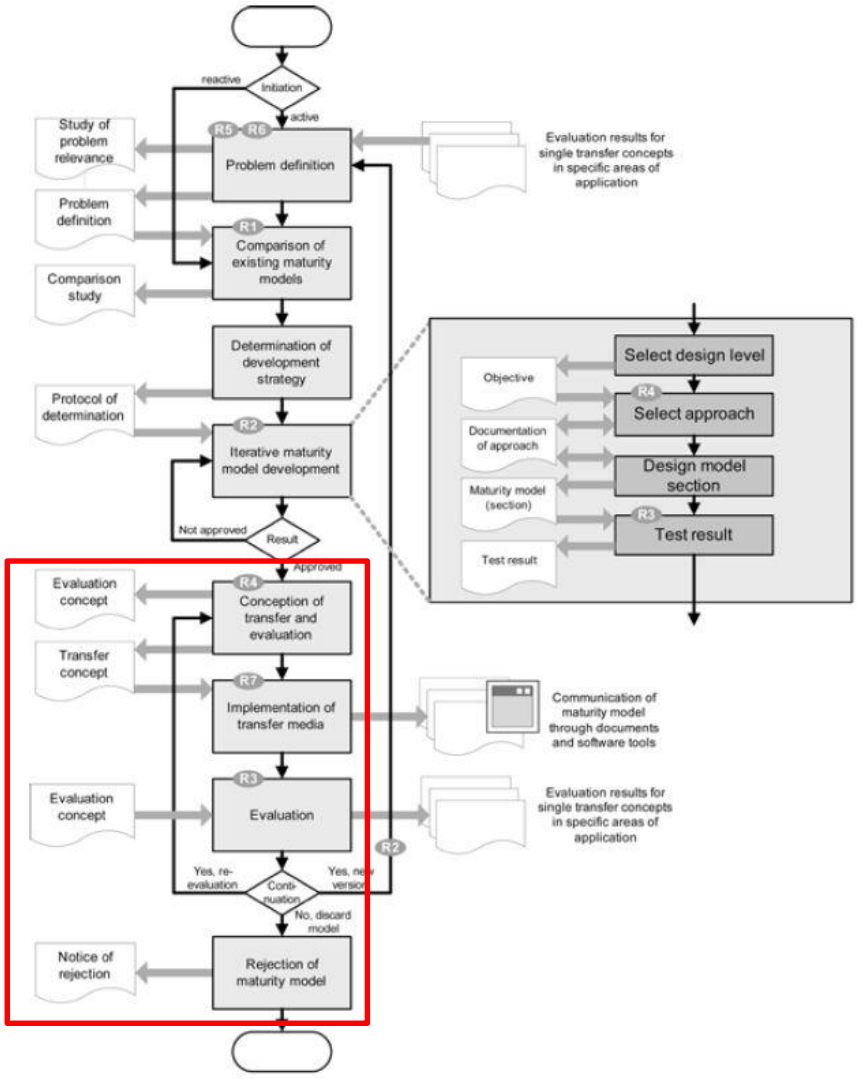

Figure 1. Maturity Model Design Procedure [7]

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.

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. 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	Ability	Pilots						
		1	2	3	4	5	6	7
Pre-Ingest	a) SIP Content Definition b) Transformation of the Producer SIP to E-ARK SIP c) Local SIP Validation d) Enhancement of the local SIP e) Creation of the E-ARK SIP	F	F	F	F	F	F	F
Ingest	f) Creation of fonds g) Creation of the E-ARK AIP h) Validation of the E-ARK SIP i) Validation of the E-ARK AIP	F	F	F	F	T	F	F
Archival Storage and Preservation	j) Store E-ARK AIP		T	T	T	T	F	T
Data Management	k) Export E-ARK AIP and Descriptive metadata l) Enhance E-ARK AIP and Descriptive metadata			T	F	T	T	
Access	m)Search Data n) Provide Access to Ad-Hoc DIP o) Creation of a Local DIP p) Creation of a E-ARK DIP q) Creation of a Requested Local DIP r) Creation of a Requested E-ARK DIP	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. An aspect to take into consideration, is that even though the pilots focus on a certain capability there might be abilities - a) to r) – that are not relevant in the context of a certain pilot and as result are no piloted.

Based on the capabilities definition the questionnaire was divided into five sections, that identify each capability,

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

Using the defined capability model the assessment questionnaire was built by, for each ability,

(1) define one or more questions to assess the selected ability then
(2) using the maturity model defined in deliverable 7.1, define the possible answers of the question(s).

The assessment of a particular capability will then evaluate the degree of realization and performance of the people, processes, and technology that comprise that capability. 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 section 4.

4. Self-assessment questionnaire

This section details the self-assessment questionnaire used to assess the E-ARK pilots. The questionnaire is comprised of five capabilities which are detailed in the previous section, then each capability contains a set of questions. Each question is detailed in a table with the following fields:

1. **ID:** Which identifies the number of the question in the overall questionnaire;
2. **Title:** Which depicts the main topic the question refers to;
3. **Question:** Which details the question itself;
4. **Objective:** Which details the objective of that question, what knowledge the question intends to capture;
5. **Notes:** Which either clarifies some aspects and/or terms of the question or details examples of evidence to substantiate the answer for the question;
6. **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;
7. **Answers:** Which depicts the five possible answers to the question;
8. **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 4.1 to 4.6 detail the questionnaire that was presented to the respondents.

4.1. Introduction

This questionnaire consists of a set of questions that will be used to determine the maturity level of the E-ARK pilots for each of the five capabilities of the E-ARK General Model. All questions are mandatory.

The answers provided will then be analysed by the Information Governance Maturity Model development team and a report will be issued detailing all the findings of the assessment. The set of assessment reports will be part of deliverable D7.2.

The questionnaire uses the following definitions of measurement:

- **No** indicates that there is no procedure or mechanism in place;
- **Ad-hoc** refers to actions performed but not being repeatable in the future, which can be due to the lack, outdate or no use of proper documentation, procedures or mechanisms, and thus leading to different people performing different tasks to achieve the same outcome;
- **Defined** refers the ways to achieve an outcome are supported by defined procedures or mechanisms, and thus leading to the actions performed being capable of being repeated in the future. This level does not give an assurance that the defined procedures or mechanisms are being consistently complied with or assessed;
- **Ad-hoc assessed** means that there is a concern with the assessment of some specific aspects, but that is not performed under a defined process but ad-hoc and when the need arises**;**
- **Consistently assessed** means that there is a concern with the assessment of some specific aspects, and that such is performed continuously, under a defined process, with alerts triggered by a defined set of indicators considering these dimensions, for example:
    - **Completeness**, which focuses on assessing if a procedure performs all relevant steps, aligned with the most recent documented requirements for that;
    - **Effectiveness**, which focus on assessing if the results of a procedure are free of errors and do not require further handling;

- **Efficiency**, which focus on assessing if a procedure executes with the optimal efforts (for example, if automation is used instead of human effort), in an agreed time period as to avoid bottlenecks on the infrastructure and to minimize the time spent on executing it;
- **Relevance**, which focus on assessing if the implemented requirements are still relevant for the intended purpose (as legislation change, for example, there is the need to assess if implemented requirements are still relevant).

These are just examples of aspects that need to be measured at higher levels of maturity, there might be further aspects to measure depending on the specific requirements of the pilot.

For each question there is a field 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.

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 five tabs, one for each of the capabilities identified. Then in each tab a short description of the capability is presented followed by the questions, objective, notes, terms, answers and a field for comments (shown in Figure 2).

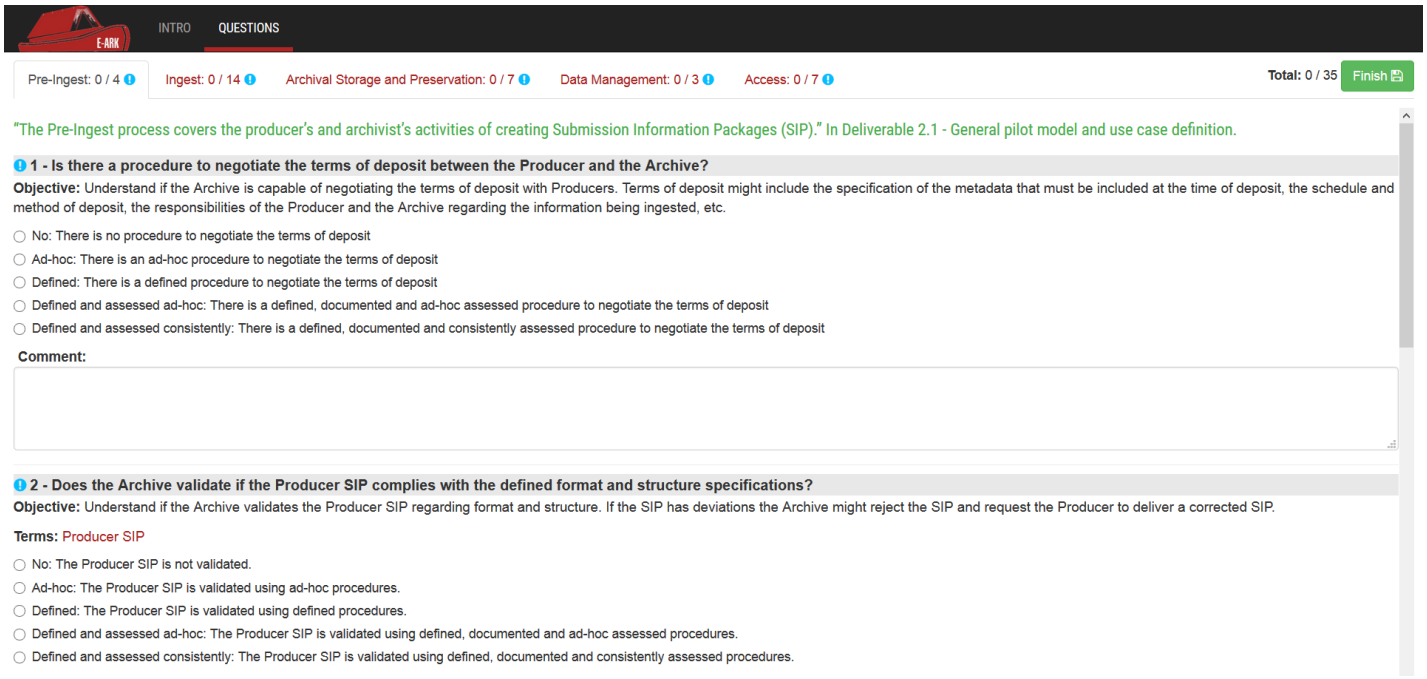

Figure 2 - On-line Self-Assessment Questionaire

4.2. Pre-Ingest

"The Pre-ingest process covers the Producer's and archivist's activities of creating Submission Information Packages (SIP)." In Deliverable 2.1 - General pilot model and use case definition.

ID	1
Title	Deposit Terms Negotiation
Question	Is there a procedure to negotiate the terms of deposit between the Producer and the Archive?
Objective	Understand if the Archive is capable of negotiating 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, etc.
Notes	-
Terms	-
Answers	No: There is no procedure to negotiate the terms of deposit
	Ad-hoc: There is an ad-hoc procedure to negotiate the terms of deposit
	Defined: There is a defined procedure to negotiate the terms of deposit
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed procedure to negotiate the terms of deposit
	Defined and assessed consistently: There is a defined, documented and consistently assessed procedure to negotiate the terms of deposit
Source	E-ARK Deliverable 2.1 – Page 19 of 41 [3]

ID	2
Title	Producer SIP Validation
Question	Does the Archive validate if the Producer SIP complies with the defined format and structure specifications?
Objective	Understand 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	-
Terms	Producer SIP
Answers	No: The Producer SIP is not validated.
	Ad-hoc: The Producer SIP is validated using ad-hoc procedures.
	Defined: The Producer SIP is validated using defined procedures.
	Defined and assessed ad-hoc: The Producer SIP is validated using defined, documented and ad-hoc assessed procedures.
	Defined and assessed consistently: The Producer SIP is validated using defined, documented and consistently assessed procedures.
Source	E-ARK Deliverable 2.1 – Page 19 of 41 [3]

ID	3
Title	Provenance verification mechanisms
Question	Are there mechanisms in place to verify the provenance of all deposited objects?
Objective	Understand if the organization has mechanisms to guarantee the provenance of the information to be Ingested.
Notes	Examples of mechanisms 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 mechanisms in place to verify the provenance of all deposited objects.

	Ad-hoc: There are ad-hoc mechanisms in place which are or have been used to verify the provenance of some collections of deposited objects.
	Defined: There are defined mechanisms in place to verify the provenance of all deposited objects.
	Defined and assessed ad-hoc: There are defined, documented and ad-hoc assessed mechanisms in place to verify the provenance of all deposited objects.
	Defined and assessed consistently: There are defined, documented and consistently assessed mechanisms in place to verify the provenance of all deposited.
Source	TRAC – Criterion 4.1.4 [1]

ID	4
Title	Enhancement of the Producer SIP
Question	Is there a procedure to enhance a Producer SIP?
Objective	Understand how a Producer SIP is checked and completed. This can be done by adding further metadata, or restructure the SIP, among other procedures.
Notes	-
Terms	-
Answers	No: The Producer SIP is not enhanced.
	Ad-hoc: The Producer SIP is enhanced on a case per case basis, using ad-hoc procedures.
	Defined: The Producer SIP is enhanced using defined procedures.
	Defined and assessed ad-hoc: The Producer SIP is enhanced using defined, documented and ad-hoc assessed procedures.
	Defined and assessed consistently: The Producer SIP is enhanced using defined, documented and consistently assessed procedures.
Source	E-ARK Deliverable 2.1 – Page 19 of 41 [3]

4.3. Ingest

"The Ingest process covers archival activities of creating the archival information package (AIP) from the submission information package (SIP)." In Deliverable 2.1 - General pilot model and use case definition.

ID	5
Title	Creation of fonds
Question	Is there a procedure to create and manage fonds based on the Producer SIP?
Objective	Understand if the Archive is able to create fonds, collections or series based on the Producer SIP information, or if reuses existing ones for scoping the new SIP.
Notes	-
Terms	-
Answers	No: There is no procedure to create fonds.
	Ad-hoc: There is an ad-hoc procedure to create and manage fonds based on the Producer SIP.
	Defined: There is a defined procedure to create and manage fonds based on the Producer SIP.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed procedure to create and manage fonds based on the Producer SIP
	Defined and assessed consistently: There is a defined, documented and consistently assessed procedure to create and manage fonds based on the Producer SIP
Source	E-ARK Deliverable 2.1 – Page 19 of 41 [3]

ID	6
Title	Ingest SIP verification mechanisms
Question	During the Ingest process, are there mechanisms to verify that each SIP is complete and correct?

Objective	Understand 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. 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.
	Ad-hoc: There are ad-hoc mechanisms in place to verify that each SIP is complete and correct.
	Defined: There are defined mechanisms in place to verify that each SIP is complete and correct.
	Defined and assessed ad-hoc: There are defined, documented and ad-hoc assessed mechanisms in place to verify that each SIP is complete and correct.
	Defined and assessed consistently: There are defined, documented and consistently assessed mechanisms in place to verify that each SIP is complete and correct.
Source	TRAC – Criterion 4.1.5 [1]

ID	7
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?
Objective	Understand if the organization provides responses to the Producer at the agreed points in order 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
	Ad-hoc: There is an ad-hoc procedure to provide appropriate responses to the Producer/depositor, at the agreed points, during the Ingest process
	Defined: There is a defined procedure to provide appropriate responses to the Producer/depositor, at the agreed points, during the Ingest process
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed procedure to provide appropriate responses to the Producer/depositor, at the agreed points, during the Ingest process
	Defined and assessed consistently: There is a defined, documented and consistently assessed 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	8
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?
Objective	Understand 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.
	Ad-hoc: There are ad-hoc records to serve as evidence of the Ingest transactions between Producer and Archive.
	Defined: There are defined records to serve as evidence of the Ingest transactions between Producer and Archive.
	Defined and assessed ad-hoc: There are defined, documented and ad-hoc assessed records to serve as evidence of the Ingest transactions between Producer and Archive.
	Defined and assessed consistently: There are defined, documented and consistently assessed records to serve as evidence of the Ingest transactions between Producer and Archive.
Source	TRAC – Criterion 4.1.8 [1]

ID	9
Title	Legal Rights
Question	Is there a procedure to manage legal rights during Ingest?
Objective	Understand if the Archive is capable of managing 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	-
Terms	-
Answers	No: There is no procedure to manage legal rights during Ingest.
	Ad-hoc: There is an ad-hoc procedure to manage legal rights during Ingest.
	Defined: There is a defined procedure to manage legal rights during Ingest.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed procedure to manage legal rights during Ingest.
	Defined and assessed consistently: There is a defined, documented and consistently assessed procedure to manage legal rights during Ingest.
Source	Based on TRAC - Criteria 4.1.2, 4.1.4 and 4.1.6 [1]

ID	10
Title	AIP generation procedure
Question	Is there a procedure to generate an AIP from a SIP?
Objective	Understand if the organization is capable of generating 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.
	Ad-hoc: There is an ad-hoc procedure to generate an AIP from a SIP.
	Defined: There is a defined procedure to generate an AIP from a SIP.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed procedure to generate an AIP from a SIP.
	Defined and assessed consistently: There is a defined, documented and consistently assessed procedure to generate an AIP from a SIP.
Source	TRAC – Criterion 4.2.2 [1]

ID	11
Title	SIP final disposition documentation
Question	Are there procedures capable of demonstrating the final disposition of a SIP?
Objective	Understand if the organization has defined procedures to demonstrate that a specific SIP has either accepted, incorporated as part of an AIP, or 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.
	Ad-hoc: There are ad-hoc procedures capable of demonstrating the final disposition of a SIP.
	Defined: There are defined procedures capable of demonstrating the final disposition of a SIP.
	Defined and assessed ad-hoc: There are defined, documented and ad-hoc assessed procedures capable of demonstrating the final disposition of a SIP.
	Defined and assessed consistently: There are defined, documented and consistently assessed procedures capable of demonstrating the final disposition of a SIP.
Source	TRAC – Criterion 4.2.3 [1]

ID	12
Title	AIP parsing
Question	Is there a procedure to create and manage AIP Classes?
Objective	Archives that store a wide variety of information types can 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 also 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.
	Ad-hoc: There is an ad-hoc procedure to create and manage AIP Classes.
	Defined: There is a defined procedure to create and manage AIP Classes.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed procedure to create and manage AIP Classes.
	Defined and assessed consistently: There is a defined, documented and consistently assessed procedure to create and manage AIP Classes.
Source	TRAC – Criterion 4.2.1 [1]

ID	13
Title	AIP unique identifiers convention
Question	Is there a procedure to generate and manage persistent and unique identifiers for an AIP?
Objective	Understand 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.
	Ad-hoc: There is an ad-hoc procedure to generate and manage persistent and unique identifiers for an AIP.
	Defined: There is a defined procedure to generate and manage persistent and unique identifiers for an AIP.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed procedure to generate and manage persistent and unique identifiers for an AIP.
	Defined and assessed consistently: There is a defined, documented and consistently assessed procedure to generate and manage persistent and unique identifiers for an AIP.
Source	TRAC – Criterion 4.2.4 [1]

ID	14
Title	Preservation Description Information (PDI) acquiring procedures (from a SIP)
Question	Are there procedures for acquiring Preservation Description Information (PDI), from the SIP?
Objective	Understand 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.
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) 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.
	Ad-hoc: There are ad-hoc procedures for acquiring Preservation Description Information (PDI), from the SIP.
	Defined: There are defined procedures for acquiring Preservation Description Information (PDI), from the SIP.
	Defined and assessed ad-hoc: There are defined, documented and ad-hoc assessed procedures for acquiring Preservation Description Information (PDI), from the SIP.
	Defined and assessed consistently: There are defined, documented and consistently assessed procedures for acquiring Preservation Description Information (PDI), from the SIP.
Source	TRAC – Criterion 4.2.6 [1]

ID	15
Title	Preservation Description Information (PDI) maintaining procedures
Question	Are there procedures for maintaining Preservation Description Information (PDI) in the Archive?
Objective	Understand 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) 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.

	Ad-hoc: There are ad-hoc procedures maintaining Preservation Description Information (PDI) in the Archive.
	Defined: There are defined procedures for maintaining Preservation Description Information (PDI) in the Archive.
	Defined and assessed ad-hoc: There are defined, documented and ad-hoc assessed procedures for maintaining Preservation Description Information (PDI) in the Archive.
	Defined and assessed consistently: There are defined, documented and consistently assessed procedures for maintaining Preservation Description Information (PDI) in the Archive.
Source	Based on TRAC – Criterion 4.2.6.2 [1]

ID	16
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?
Objective	Understand 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.
	Ad-hoc: There is an ad-hoc procedure for testing if the content information of the AIP at its creation is understandable by the designated communities.
	Defined: There is a defined procedure for testing if the content information of the AIP at its creation is understandable by the designated communities.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed procedure for testing if the content information of the AIP at its creation is understandable by the designated communities.
	Defined and assessed consistently: There is a defined, documented and consistently assessed 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	17
Title	AIP completeness and correctness
Question	Is each AIP verified for completeness and correctness at the point it is created?
Objective	Understand 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. 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.

	Ad-hoc: There is an ad-hoc procedure to verify each AIP for completeness and correctness at the point they are created.
	Defined: There is a defined procedure to verify each AIP for completeness and correctness at the point they are created.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed procedure to verify each AIP for completeness and correctness at the point they are created.
	Defined and assessed consistently: There is a defined, documented and consistently assessed procedure to verify each AIP for completeness and correctness at the point they are created.
Source	TRAC – Criterion 4.2.8 [1]

ID	18
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?
Objective	Understand 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.
	Ad-hoc: There are ad-hoc records, according to their legal and regulatory environment, to serve as evidence of the actions performed to create an AIP.
	Defined: There are defined records, according to their legal and regulatory environment, to serve as evidence of the actions performed to create an AIP.
	Defined and assessed ad-hoc: There are defined, documented and ad-hoc assessed records, according to their legal and regulatory environment, to serve as evidence of the actions performed to create an AIP.
	Defined and assessed consistently: There are defined, documented and consistently assessed 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]

4.4. Archival Storage and Preservation

"The Archival Storage Functional Entity contains the services and functions used for the storage and retrieval of Archival Information Packages." In the Open Archival Information System recommended practice (CCSDS 650.0-M-2).

ID	19
Title	AIP Storage Procedures
Question	Are there procedures to define how the AIP is stored down to the bit level?
Objective	Understand 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.

	Ad-hoc: There are ad-hoc procedures to define how the AIP is stored down to the bit level.
	Defined: There are defined procedures to define how the AIP is stored down to the bit level.
	Defined and assessed ad-hoc: There are defined, documented and ad-hoc assessed procedures to define how the AIP is stored down to the bit level.
	Defined and assessed consistently: There are defined, documented and consistently assessed procedures to define how the AIP is stored down to the bit level.
Source	TRAC – Criterion 4.4.1 [1]

ID	20
Title	AIP integrity monitoring
Question	Is the integrity of an AIP monitored?
Objective	Understand 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.
	Ad-hoc: The integrity of an AIP is monitored through ad-hoc mechanisms.
	Defined: The integrity of an AIP is monitored through defined mechanisms.
	Defined and assessed ad-hoc: The integrity of an AIP is monitored through defined, documented and ad-hoc assessed mechanisms.
	Defined and assessed consistently: The integrity of an AIP is monitored through defined, documented and consistently assessed mechanisms.
Source	TRAC – Criterion 4.4.1.2 [1]

ID	21
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?
Objective	Understand 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 records.
	Ad-hoc: There are ad-hoc created records.
	Defined: There are defined records, created according to defined procedures.
	Defined and assessed ad-hoc: Defined and ah-hoc assessed: There are defined records, which are ad-hoc assessed.
	Defined and consistently assessed: There are defined and consistently assessed records.
Source	TRAC – Criterion 4.4.2 [1]

ID	22
Title	AIP Designated Community Requirements
Question	Is there a procedure to gather and review the AIP requirements from the designated community?
Objective	Understand 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.
	Ad-hoc: There is an ad-hoc procedure to gather and review the AIP requirements from the designated community.
	Defined: There is a defined procedure to gather and review the AIP requirements from the designated community.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed procedure to gather and review the AIP requirements from the designated community.
	Defined and assessed consistently: There is a defined, documented and consistently assessed 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	23
Title	Independent mechanism for content integrity checking
Question	Is there an independent mechanism for verifying the integrity of the Archives' content?
Objective	Understand 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.
	Ad-hoc: There is an ad-hoc independent mechanism for verifying the integrity of the Archives' content.
	Defined: There is a defined independent mechanism for verifying the integrity of the Archives' content.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed independent mechanism for verifying the integrity of the Archives' content.
	Defined and assessed consistently: There is a defined, documented and consistently assessed independent mechanism for verifying the integrity of the Archives' content.
Source	TRAC – Criterion 4.2.9 [1]

ID	24
Title	AIP Linking/resolution services
Question	Is there a system of reliable linking/resolution services in order to find a uniquely identified object, regardless of its physical location?
Objective	Understand if the organization has a system of reliable linking/resolution services in order 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	-
Notes	-
Answers	No: There is no system of reliable linking/resolution services in order to find a uniquely identified object, regardless of its physical location.
	Ad-hoc: There is an ad-hoc system of reliable linking/resolution services in order to find a uniquely identified object, regardless of its physical location.

	Defined: There is a defined system of reliable linking/resolution services in order to find a uniquely identified object, regardless of its physical location.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed system of reliable linking/resolution services in order to find a uniquely identified object, regardless of its physical location.
	Defined and assessed consistently: There is a defined, documented and consistently assessed system of reliable linking/resolution services in order to find a uniquely identified object, regardless of its physical location.
Source	TRAC – Criterion 4.2.4.2 [1]

ID	25
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?
Objective	Understand 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 of the digital objects in the Archive.
	Ad-hoc: There are ad-hoc tools or resources to provide Representation Information for all of the digital objects in the Archive.
	Defined: There are defined tools or resources to provide Representation Information for all of the digital objects in the Archive.
	Defined and assessed ad-hoc: There are defined, documented and ad-hoc assessed tools or resources to provide Representation Information for all of the digital objects in the Archive.
	Defined and assessed consistently: There are defined, documented and consistently assessed tools or resources to provide Representation Information for all of the digital objects in the Archive.
Source	Based on TRAC – Criterion 4.2.5.4 [1]

4.5. 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." In Deliverable 2.1 - General pilot model and use case definition.

ID	26
Title	Designated Community information requirements
Question	Are the minimum information requirements specified to enable the Designated Community to discover and identify material of interest?
Objective	Understand 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.
	Ad-hoc: The minimum information requirements are specified ad-hoc.
	Defined: The minimum information requirements are defined.
	Defined and assessed ad-hoc: The minimum information requirements are defined, documented and ad-hoc assessed.
	Defined and assessed consistently: The minimum information requirements are defined, documented and consistently assessed.
Source	TRAC – Criterion 4.5.1 [1]

ID	27
Title	Descriptive information association with the AIP
Question	Is the minimum descriptive information captured or created and associated with the AIP?
Objective	Understand 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.
	Ad-hoc: The minimum descriptive information is captured or created and associated with the AIP, however this procedure is ad-hoc.
	Defined: The minimum descriptive information is captured or created and associated with the AIP, the procedure is defined.
	Defined and assessed ad-hoc: The minimum descriptive information is captured or created and associated with the AIP; the procedure is defined, documented and ad-hoc assessed.
	Defined and assessed consistently: The minimum descriptive information is captured or created and associated with the AIP; the procedure is defined, documented and consistently assessed.
Source	TRAC – Criterion 4.5.2 [1]

ID	28
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?
Objective	Understand 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.

	Ad-hoc: There is an ad-hoc procedure to maintain bi-directional linkage between each AIP and its descriptive information.
	Defined: There is a defined procedure to maintain bi-directional linkage between each AIP and its descriptive information.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed procedure to maintain bi-directional linkage between each AIP and its descriptive information.
	Defined and assessed consistently: There is a defined, documented and consistently assessed procedure to maintain bi-directional linkage between each AIP and its descriptive information.
Source	TRAC – Criterion 4.5.3 [1]

4.6. Access

"According to the OAIS model the Access process covers the activities of requesting and creating the Dissemination Information Package (DIP) from the AIP." In Deliverable 2.1 - General pilot model and use case definition.

ID	29
Title	Creation of a DIP
Question	Is there a procedure to create a DIP from an AIP?
Objective	Understand if there is a procedure to create a DIP from an AIP.
Notes	-
Terms	-
Answers	No: There is no procedure to create a DIP from an AIP.
	Ad-hoc: There is an ad-hoc procedure to create a DIP from an AIP.
	Defined: There is a defined procedure to create a DIP from an AIP.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed procedure to create a DIP from an AIP.
	Defined and assessed consistently: There is a defined, documented and consistently assessed procedure to create a DIP from an AIP.
Source	E-ARK Deliverable 2.1 – Page 35 of 41 [3]

ID	30
Title	Access policies
Question	Are there access policies defined with the designated communities?
Objective	Understand 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.
	Ad-hoc: There are ad-hoc access policies defined with the designated communities.
	Defined: There are defined access policies defined with the designated communities.
	Defined and assessed ad-hoc: There are defined, documented and ad-hoc assessed access policies defined with the designated communities.
	Defined and assessed consistently: There are defined, documented and consistently assessed access policies defined with the designated communities.
Source	Based on TRAC – Criterion 4.6.1 [1]

ID	31
Title	Access policies compliance

Question	Are there procedures to verify if the organization complies with the access policies defined with the designated communities?
Objective	Understand 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 in reference to 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.
	Ad-hoc: There are ad-hoc procedures to verify if the organization complies with the access policies defined with the designated communities.
	Defined: There are defined procedures to verify if the organization complies with the access policies defined with the designated communities.
	Defined and assessed ad-hoc: There are defined, documented and ad-hoc assessed procedures to verify if the organization complies with the access policies defined with the designated communities.
	Defined and assessed consistently: There are defined, documented and consistently assessed procedures to verify if the organization complies with the access policies defined with the designated communities.
Source	TRAC – Criterion 4.6.1 [1]

ID	32
Title	Access failures and errors
Question	Is there a mechanism to log and review all access failures and errors?
Objective	Understand 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 as a result of reviews.
Terms	-
Answers	No: There is no mechanism to log and review access failures and errors.
	Ad-hoc: There is an ad-hoc mechanism to log and review all access failures and errors.
	Defined: There is a defined mechanism to log and review all access failures and errors.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed mechanism to log and review all access failures and errors.
	Defined and assessed consistently: There is a defined, documented and consistently assessed mechanism to log and review all access failures and errors.
Source	TRAC – Criterion 4.6.1.1 [1]

ID	33
Title	Access Data Reports
Question	Is there a mechanism to record the access to the contents?
Objective	Understand if the organization records access to the contents, as a measure to detect abuses or misuses.
Notes	An example of evidence about 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.
	Ad-hoc: There is an ad-hoc mechanism to record the access to the contents.
	Defined: There is a defined mechanism to record the access to the contents.

	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed mechanism to record the access to the contents.
	Defined and assessed consistently: There is a defined, documented and consistently assessed mechanism to record the access to the contents.
Source	Based on TRAC – Criterion 4.6.1.1 [1]

ID	34
Title	Access Data Problem/Error Reports
Question	Is there a mechanism to solve problem reports about errors in data or responses from Consumers?
Objective	Understand 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.
	Ad-hoc: There is an ad-hoc 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.
	Defined: There is a defined mechanism to solve both incident and problem reports about errors in data or responses from Consumers.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed mechanism to solve problem reports about errors in data or responses from Consumers.
	Defined and assessed consistently: There is a defined, documented and consistently assessed mechanism to solve problem reports about errors in data or responses from Consumers.
Source	TRAC – Criterion 4.6.2.1 [1]

ID	35
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?
Objective	Understand if the organization maintains an auditable chain of authenticity from the AIP to a DIP.
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.
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.
	Ad-hoc: There are ad-hoc records of policies and procedures that enable the dissemination of digital objects while maintaining traceability to the originals and evidence supporting their authenticity.
	Defined: There is a defined record of policies and procedures that enable the dissemination of digital objects while maintaining traceability to the originals and evidence supporting their authenticity.
	Defined and assessed ad-hoc: There is a defined, documented and ad-hoc assessed record of policies and procedures that enable the dissemination of digital objects while maintaining traceability to the originals and evidence supporting their authenticity.

	Defined and assessed consistently: There is a defined, documented and consistently assessed record 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]

5. Self-Assessment Result Analysis

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 capabilities of the questionnaire.

It is important to note that for the purpose of this deliverable we are only assessing the "Processes" dimension of the Information Governance Maturity Model. This is due to the fact that the E-ARK pilots do not have an organizational background which would allow assessing the other two dimensions. The results are calculated as an average of the maturity levels of the questions for each capability, this average was then rounded down.

In the conclusion of this section there is a comparison and analysis between the pilots, regarding the findings of the self-assessment. Table 2 details the maturity levels of answers provided to each question by each pilot, as well as, the calculated maturity level for each of the capabilities of the questionnaire. For the result of each capability of each pilot there is an associated colour. This colour is linked to Table 1, where blue represents a focus capability and red a capability to be explored. The lack of these two colours means that that capability is not part of the pilot.

Table 2 - Final Results of the Answers for All Pilots

Q	Capability / Question Title	P1	P2	P3	P4	P5	P6	P7
Pre-Ingest		**5**	**4**	**3**	**2**	**4**	**2**	**4**
1	Deposit Terms Negotiation	5	5	3	4	5	3	4
2	Producer SIP Validation	5	5	3	2	5	3	4
3	Provenance verification mechanisms	5	5	3	2	5	3	4
4	Enhancement of the Producer SIP	5	1	4	2	3	2	4
Ingest		**4**	**4**	**2**	**2**	**2**	**3**	**3**
5	Creation of fonds	5	1	3	3	-	3	2
6	Ingest SIP verification mechanisms	5	5	3	2	4	5	4
7	Ingest Producer/depositor responses	4	5	4	1	3	3	4
8	Ingest actions and administration processes records	5	5	3	3	5	3	2
9	Legal Rights	5	5	3	1	3	1	3
10	AIP generation procedure	4	4	3	4	1	4	4
11	SIP final disposition documentation	4	5	3	1	3	3	4
12	AIP parsing	1	5	1	1	3	3	4
13	AIP unique identifiers convention	3	5	3	3	3	3	4
14	Preservation Description Information (PDI) acquiring procedures (from a SIP)	5	2	3	2	3	3	4
15	Preservation Description Information (PDI) maintaining procedures	5	5	3	2	3	3	4
16	AIP content information testing procedure	5	2	2	1	-	3	2
17	AIP completeness and correctness	4	5	3	2	3	3	4
18	AIP creation records	4	5	3	3	3	3	4
Archival Storage and Preservation		**4**	**4**	**2**	**2**	**-**	**2**	**3**
19	AIP Storage Procedures	5	5	3	1	-	2	4
20	AIP integrity monitoring	5	5	3	5	-	3	4
21	AIP actions records	5	5	3	2	-	3	4
22	AIP Designated Community Requirements	2	1	1	1	-	1	2
23	Independent mechanism for content integrity checking	4	5	2	2	-	2	4
24	AIP Linking/resolution services	5	2	3	1	-	3	4
25	Tools and resources to provide representation information	5	5	3	2	-	2	4
Data Management		**4**	**3**	**3**	**2**	**2**	**3**	**4**
26	Designated Community information requirements	4	2	3	2	3	3	4

27	Descriptive information association with the AIP	4	5	3	3	3	3	4
28	Bi-directional linkage between the AIP and descriptive information	5	2	3	1	1	3	4
Access		**4**	**2**	**3**	**1**	**2**	**2**	**2**
29	Creation of a DIP	5	1	3	2	3	3	4
30	Access policies	4	1	3	3	3	3	4
31	Access policies compliance	4	1	3	1	2	1	2
32	Access failures and errors	4	5	3	1	1	1	1
33	Access Data Reports	4	-	3	1	3	3	1
34	Access Data Problem/Error Reports	3	1	3	1	2	2	2
35	Access Policies and Procedures	5	5	3	1	3	3	4

5.1. 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 capabilities of the questionnaire for pilot 1. The results of the assessment are depicted in Figure 3.

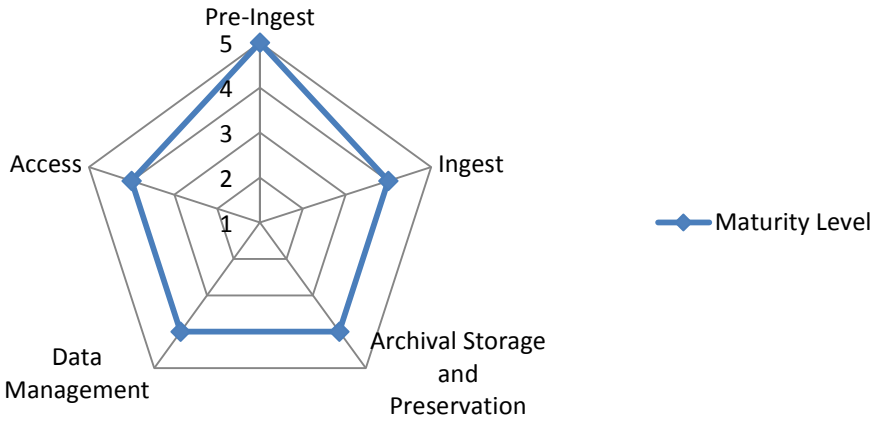

Figure 3- Pilot 1 Final Maturity Level Results

Figure 3 shows that the calculated maturity levels for this pilot range from 4 to 5. This demonstrates that all aspects of pre-ingest are defined and consistently assessed and there is still room for improvement in the other capabilities, which are already defined, documented and assessed using ad-hoc methods, as can be seen in Table 2.

Despite being at maturity level 4 in the ingest capability there are still aspects to enhance (as shown in Table 3), namely the aspects at maturity level 1 which represent 7% of the answers and also the aspects at maturity level 3 which represent another 7%. These should be enhanced to reach maturity level 4 and meet the calculated maturity level, this is important as this is one of the focus capabilities of the pilot.

There are also aspects to enhance in the archival storage and preservation capability, in regard to the 4% of questions at maturity level 2 which should also be enhanced to at least maturity level 4 to be in line with the calculated maturity level for that capability. However, this capability is not to be explored in this pilot.

The access capability has 14% of the questions at maturity level 3. As with the other capabilities these questions at maturity level 3 should be enhanced to maturity level 4 to meet the calculated maturity level for that capability. Despite not being one of the focus capabilities of this pilot, this is one of the capabilities to be explored.

Table 3 - Maturity Level Distribution for Each Capability of Pilot 1

Capability	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4	Maturity Level 5
Pre-Ingest					100%
Ingest	7%		7%	36%	50%
Archival Storage and Preservation		14%		14%	72%
Data Management				67%	33%
Access			14%	29%	57%

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 capability of the self-assessment.

- **Capability: Ingest / Question: 12 / Maturity Level: 1 -** This question is related with procedures to create and manage AIP classes. The answer provided shows that there is no procedure to create and manage AIP Classes. 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. Archives that store a wide variety of information types can create AIP classes to describe AIPs that store the same type of information. This is the only question at maturity level 1 in the ingest capability, one of the focus of the pilot and as such it should be addressed.
- **Capability: Ingest / Question: 13 / Maturity Level: 3 -** This question is related with the AIP unique identifiers convention. The answer provided shows that there is a defined procedure to generate and manage persistent and unique identifiers for an AIP. However this procedure is not assessed and documented. Unique identifiers ensure that an AIP can be distinguished from all other AIP in the repository. This is the only question at maturity level 3 in the ingest capability, together with question 12 these are the questions that are below the calculated maturity level.
- **Capability: Archival Storage and Preservation / Question: 22 / Maturity Level: 2 -** This question is related with the AIP Designated community requirements. The answer provided shows that there is an ad-hoc procedure to gather and review the AIP requirements from the designated community. This means that there is a procedure to collect new requirements from the designated community. However this procedure is not correctly defined, documented and assessed.
- **Capability: Access / Question: 34 / Maturity Level: 3 -** This question is related with Access Data Problem Reports. The answer provided shows that there is a defined mechanism to solve problem reports about errors in data or responses from Consumers. This means that there is a defined mechanism but it is not assessed and documented. Solving problem reports about errors in data or responses from Consumers is essential to become a trustworthy source of information. This is the only question at maturity level 3 and as such it should be enhanced to meet the calculated maturity level for the access capability. Despite this, access is not one of the focus capabilities of the pilot.

Table 4 details the comments provided by pilot 1 to the self-assessment questionnaire. It only presents comments that complement the answer provided.

Table 4 - Pilot 1 Comments

Pre-Ingest	
Question	**Comment**
3	Procedures for submission agreements, ongoing supervision of creators and their IT system as well as procedures of notification and approval of IT systems are in place. (Notification and approval: When commissioning an IT system creators are obliged by law to notify the DNA. The Archives subsequently analyses and assess the system to make sure that data will be documented adequately and that data can be extracted and submitted to the archives in a satisfying quality. Only when an IT system has been approved by the DNA can the creator/authority begin using the system)
4	There is no need for enhancing/amending SIPs at the DNA because of the Danish archives legislation. Producers are obliged by law to create SIPs that comply with the requirements and details set out by the DNA including (structure, metadata and description etc.) and thus all amendments are done by the producers themselves. The DNA make thorough quality assurance of SIPs and specify any enhancing/amendments needed, but the actual amendments are done by the producers. Submission of SIP is an iterative process that does not stop before the DNA is content with the SIP. This essentially means that the 'producer SIP' is the SIP used for AIP creation. Procedures for this are clearly defined, documented and constantly assessed.
Ingest	
6	Part of the quality assurance when SIPs are delivered to the archive
9	Part of the quality assurance when SIPs are delivered to the archive
16	Content information is tested/reviewed manually before AIP creation to ensure that it is understandable. It is part of the quality assurance process.
Archival Storage and Preservation	
22	Methods for gathering and review of AIP requirement form the designated community are described and documented and thus can be repeated in the future. The reason the 'ad-hoc' option is chosen is, that gathering of this information not necessarily is done on a e.g. monthly or yearly basis. It is done when the need arises. Each time such a consultation of the designated community takes place the method is reviewed and revised if necessary.

5.2. 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 capabilities of the questionnaire for pilot 2. The results of the assessment are depicted in Figure 4.

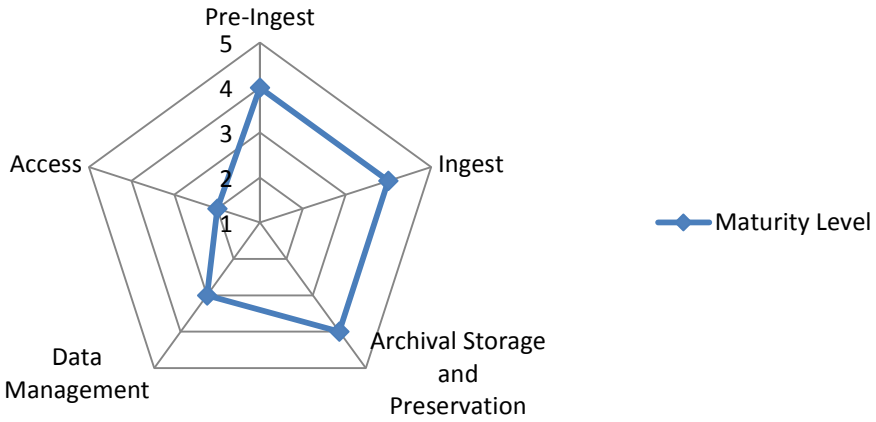

Figure 4- Pilot 2 Final Maturity Level Results

Table 2 shows that the calculated maturity levels for this pilot range from 2 to 4. The pilot has a high maturity level for the Pre-Ingest, Ingest, and Archival Storage and Preservation capabilities at maturity level 4. Then, maturity level 3 for Data Management and maturity level 2 for Access. The focus areas of the pilot shown in Table 1 – pre-ingest, ingest, and archival storage and preservation – are therefore rather well matured. However, there is still room for improvement in the capabilities that are the focus of the pilot, as shown in Table 5. Regarding the Pre-Ingest capability there is still 25% of the answers at maturity level 1 which hinder the achievement of maturity level 5. In the ingest capability there are several answers at maturity level 1 and 2 which should be enhanced to at least maturity level 4 to meet the calculated maturity level for this capability. Finally, the archival storage and preservation capability shows that there are 14% of the answers at maturity level 1 and 2, these should also be enhanced to maturity level 4 to meet the calculated maturity level for this capability.

Table 5 - Maturity Level Distribution for Each Capability of Pilot 2

Capability	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4	Maturity Level 5
Pre-Ingest	25%				75%
Ingest	7%	14%		7%	72%
Archival Storage and Preservation	14%	14%			72%
Data Management		67%			33%
Access	71%				29%

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 capability of the self-assessment.

- **Capability: Pre-Ingest / Question: 4 / Maturity Level: 1 –** This question is related to the enhancement of a producer SIP. The answer shows that the producer SIP is not enhanced. A producer SIP can be checked and completed by adding further metadata, or restructure the SIP, among other procedures. The answer provided to this aspect hinders the achievement of maturity level 5 for this capability.
- **Capability: Ingest / Question: 5 / Maturity Level: 1 –** This question is related with the creation of fonds. The answer shows that there is no procedure to create fonds, collections or series based on the Producer SIP information. This is the only aspect of the ingest capability that is at maturity level 1.
- **Capability: Ingest / Question: 14 / Maturity Level: 2 –** This question is related to the preservation description information acquisition procedures. The answer shows that there are ad-hoc procedures for acquiring Preservation Description Information (PDI), from the SIP. This means that there is a procedure in place but it is not defined, documented and assessed. This can lead to different people performing different tasks when acquiring PDI from a SIP. According to the comment provided for this question this is performed manually at the moment but there is a planned effort to automatize these procedures.
- **Capability: Ingest / Question: 16 / Maturity Level: 2 –** This question is related to the AIP content information testing procedures. The answer shows that there is an ad-hoc procedure for testing if the content information of the AIP at its creation is understandable by the designated communities. This means that there is a procedure in place but it is not defined, documented and assessed. According to the comment provided for this question during testing of the SIP, one of the criteria is to make sure the AIP is usable for access.
- **Capability: Archival Storage and Preservation / Question: 22 / Maturity Level: 1 –** This question is related to the AIP Designated community requirements. The answer shows that there is no procedure to gather and review the AIP requirements from the designated community. This means that the existing AIP requirements are not reviewed with the designated community and new AIP requirements are not collected. Maintaining the AIP requirements aligned with the designated community needs is important to guarantee that the archive holdings remain relevant to the designated community.
- **Capability: Archival Storage and Preservation / Question: 24 / Maturity Level: 2 – This question is related to SIP linking/resolution services. The answer shows that t**here is an ad-hoc system of reliable linking/resolution services in order to find a uniquely identified object, regardless of its physical location. This means that the system that provides reliable linking/resolution services in order 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 is not defined, documented and assessed.

Table 6 details the comments provided by the Pilot 2 to the self-assessment questionnaire. It only presents comments that complement the answer provided.

Table 6 - Pilot 2 Comments and Analysis

Pre-Ingest	
Question	**Comment**
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 format. The procedure includes specification of the metadata that must be included, their naming and structure.

4	Usually, the SIPs are not enhanced. If the SIP is not in accordance with the deposition agreement, it is rejected. Any changes to the SIP or additional information is added to the SIP and then stored as an AIP.
Ingest	
5	Fonds are created as an agreement is signed. When the SIP arrives the information in the fond are updated.
10	The processes are not ad-hoc. Every time a change is made a new AIP is generated from the previous one (defined and assessed consistently) updated with the changes and additions. SIP is regarded in this process as the very first AIP.
11	A system keeping tracks on every step in the process from awareness of a possible archive to it is stored for long-term preservation. The system needs manually updating-
12	In ingest there is always created an AIC to keep tracks of each generation of AIPs, including the SIP.
13	UUIDs are used to define a unique identifier for each SIP, AIP, AIC, DIP, AIU.
14	All IPs should contain all information about itself. It is defined transfer of this information from the SIP, but this is not yet implemented. Today this is done manually.
15	All changes are stored with the IPs.
16	During testing the SIP, one of the criteria are to make sure the AIP is usable for access.
Archival Storage and Preservation	
24	Since the automated process from ingest to the archival system is not in place yet, this is done manually. With the process implemented it would be defined and assessed consistently.
Data Management	
26	Since the automated process from ingest to the archival system is not in place yet, this is done manually. With the process implemented it would be defined and assessed consistently.
28	Since the automated process from ingest to the archival system is not in place yet, this is done manually. With the process implemented it would be defined and assessed consistently.
Access	
32	There is a log to log all types of access.
33	There is a defined and assessed consistently as long as the material are stored in the repository. In case of user handling onto the access system this is just defined. (On requests the requested material is accessed from the repository to a DIP. The DIP is then stored in the access system from where consumers can get access to the material.)

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

This section details the analysis of the results and weak points for the pilot 3. It also depicts the distribution of maturity levels for each of the capabilities of the questionnaire for pilot 3. No comments were provided for this pilot. The results of the assessment are depicted in Figure 5.

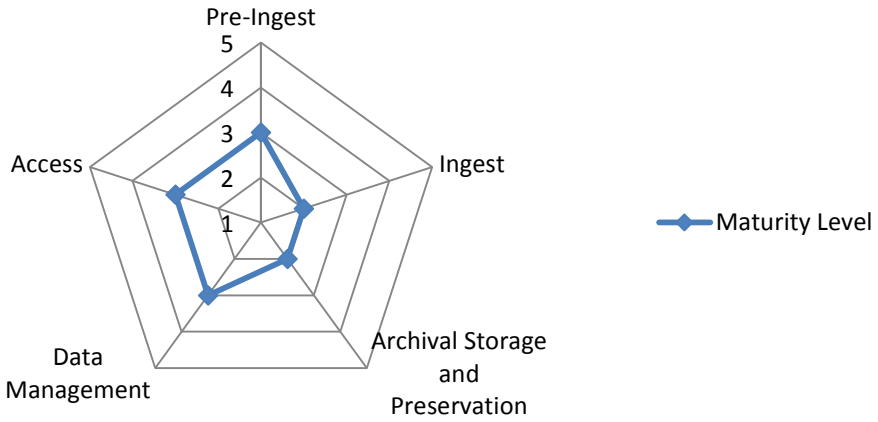

Figure 5- Pilot 3 Final Maturity Level Results

Table 2 shows that the calculated maturity levels for this pilot range from 2 to 3. The capabilities that are the focus of the pilot, according to Table 1, are Pre-Ingest which achieved maturity level 3, Ingest which achieved maturity level 2 and Access which achieved maturity level 3.

The results show that there are some important aspects to consider for maturity level enhancement, mainly in the ingest capability, which is one of the main focus of the pilot and achieved maturity level 2. The answers at maturity level 1 and 2 for the ingest capability should be enhanced to at least maturity level 3 to meet the calculated maturity level of the other capabilities that are the focus of the pilot. Also, maturity level 3 is considered one important achievement as it shows that procedures and mechanisms are properly defined.

The archival storage and preservation capability is one of the elements also used/tried within the pilot, and has 14% of the answers at maturity level 1 and another 14% of the answers at maturity level 2, as shown in Table 7. These should be enhanced to maturity level 3 to meet the previously mentioned maturity level 3 achievement.

Table 7 - Maturity Level Distribution for Each Capability of Pilot 3

Capability	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4	Maturity Level 5
Pre-Ingest			75%	25%	
Ingest	7%	7%	79%	7%	
Archival Storage and Preservation	14%	14%	72%		
Data Management			100%		
Access			100%		

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 capability of the self-assessment.

- **Capability: Ingest / Question: 12 / Maturity Level: 1 –** This question is related to AIP parsing. The answer shows that there is no procedure to create and manage AIP Classes. This means that AIPs that store the same type of information are not aggregated into classes. The 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.
- **Capability: Ingest / Question: 16 / Maturity Level: 2 –** This question is related with the AIP content information testing procedures. The answer shows that there is an ad-hoc procedure for testing if the content information of the AIP at its creation is understandable by the designated communities. This means that ingested objects are being tested using undefined and undocumented procedures which can limit the guarantee that ingested objects are understandable by the designated communities and are relevant and usable for them. This is important to guarantee that the ingest objects can be found, understood and used by the designated community.
- **Capability: Archival Storage and Preservation / Question: 22 / Maturity Level: 1 –** This question is related with AIP designated community requirements. The answer shows that there is no procedure to gather and review the AIP requirements from the designated community. This means that the existing AIP requirements are not reviewed with the designated community and new AIP requirements are not collected. Maintaining the AIP requirements aligned with the designated community needs is important to guarantee that the archive holdings remain relevant to the designated community.
- **Capability: Archival Storage and Preservation / Question: 23 / Maturity Level: 2 – This question is related with the independent mechanism for content integrity checking. The answer shows that t**here is an ad-hoc independent mechanism for verifying the integrity of the Archives' content. This means that the current mechanism for integrity checking is not properly defined, documented or assessed. An independent mechanism for content integrity checking is important as it enables independent and external audits.

5.4. 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. It also depicts the distribution of maturity levels for each of the capabilities of the questionnaire for pilot 4. The results of the assessment are depicted in Figure 6.

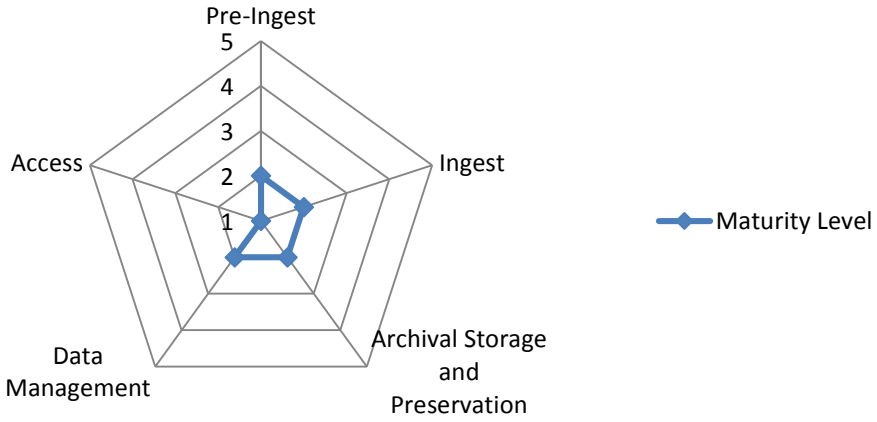

Figure 6- Pilot 4 Final Maturity Level Results

Table 2 shows that the calculated maturity levels for this pilot range from 1 to 2. According to Table 1, all capabilities are in the focus of this pilot, excluding archival storage and preservation which is only to be explored in the pilot and is not the focus.

This pilot shows that it still has a long way to go in order to achieve at least maturity level 3 in the capabilities that are the focus of the pilot. As shown in Table 8, in the Pre-ingest capability most of the answers provided are at maturity level 2 which shows that most procedures and mechanisms are performed ad-hoc and are not defined. In the ingest capability, most of the answers are at maturity level 1 which means that 36% of the ingest aspects are not performed and 28% are performed ad-hoc. For data management, most of the aspects are at maturity level 1 and 2 which means that most data management aspects, which are the focus of the pilot, are either not performed or performed ad-hoc. Finally, regarding access, 72% of the answers are at maturity level 1 which means that most of the access aspects not performed. In conclusion this is one pilot that can greatly benefit from results of the project as a way to enhance its maturity levels in the focus capabilities identified.

Table 8 - Maturity Level Distribution for Each Capability of Pilot 4

Capability	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4	Maturity Level 5
Pre-Ingest		75%		25%	
Ingest	36%	28%	29%	7%	
Archival Storage and Preservation	43%	43%			14%
Data Management	34%	33%	33%		
Access	72%	14%	14%		

There were four three 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 capability of the self-assessment.

- **Capability: Archival Storage and Preservation / Question: 19 / Maturity Level: 1 –** This question is related to the AIP Storage Procedures. The answer shows that there are no procedures to define how the AIP is stored down to the bit level. This aspect is important to ensure that information can be extracted from an AIP in the future. This question is part of the archival storage and preservation capability which is one of the capabilities to be explored the pilot. Together with question 22 and 25 these are the only aspects from that capability at maturity level 1 and require immediate attention.
- **Capability: Archival Storage and Preservation / Question: 22 / Maturity Level: 1 –** This question is related to the AIP Designated community requirements. The answer shows that there is no procedure to gather and review the AIP requirements from the designated community. This means that the existing AIP requirements are not reviewed with the designated community and new AIP requirements are not collected. Maintaining the AIP requirements aligned with the designated community needs is important to guarantee that the archive holdings remain relevant to the designated community. This question is part of the archival storage and preservation capability which is one of the capabilities to be explored the pilot. Together with question 19 and 25 these are the only aspects from that capability at maturity level 1 and require immediate attention.
- **Capability: Archival Storage and Preservation / Question: 25 / Maturity Level: 1 –** This question is related to tools and resources to provide representation information. The answer shows that there are no tools or resources to provide Representation Information for all of the digital objects in the Archive. This aspect is important as there must have 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 to ensure that all that Representation information is associated with the relevant objects. This question is part of the archival storage and preservation capability which is one of the capabilities to be explored the pilot. Together with question 19 and 22 these are the only aspects from that capability at maturity level 1 and require immediate attention.

Table 9 details the comments provided by the Pilot 4 to the self-assessment questionnaire. It only presents comments that complement the answer provided.

Table 9 - Pilot 4 Comments and Analysis

Pre-Ingest	
Question	**Comment**
1	It depends on the client. Sometimes the agreement is for fixed types of records and then there is no extra checking. Some other times the batch received from a client needs to be unpacked and checked thoroughly for what it contains.
Ingest	
14	The designated community is only the company/client that owns the records; no other users have the right to access the records.
Data Management	
27	Depends on the client's request. Usually the format in the AIP is sufficient but some ad hoc conversion is required.
28	The access policy is fixed in the contract with the client. The norm is that the client provides a list of their staff members who are authorised to make requests and access the archived records.

5.5. 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 capabilities of for pilot 5. The results of the assessment are depicted in Figure 7.

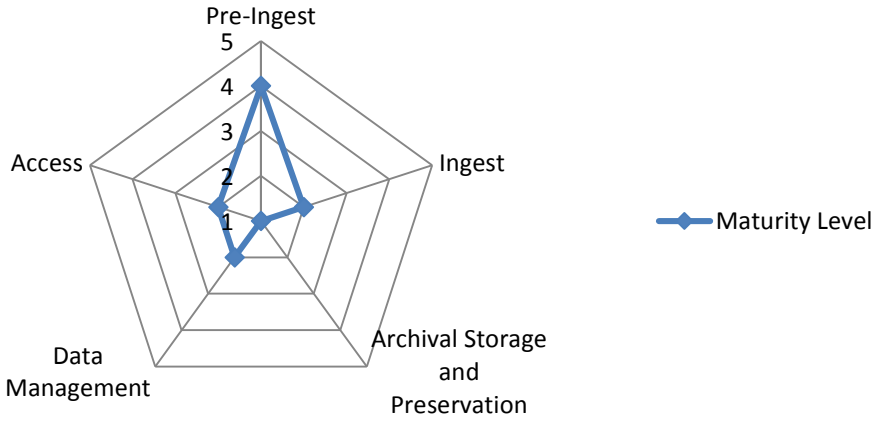

Figure 7- Pilot 5 Final Maturity Level Results

Table 2 shows that the calculated maturity levels for this pilot range from 1 to 5. According to Table 1, the focus of this pilot is in the pre-ingest and access capabilities. The other capabilities are to be explored in the pilot but are not the focus.

This pilot shows a great disparity in the calculated maturity levels. In its focus capabilities it achieved maturity level 4 for ingest and maturity level 2 for access. However, despite the pre-ingest capability achieving maturity level 4 it still has 25% of the answers at maturity level 3, which represents only one answer. If that answer is enhanced the pilot can easily achieve maturity level 5 for pre-ingest. The access capability has 14% of the answers at maturity level 1 and 29% at maturity level 2 these should be enhanced to maturity level 3 to achieved maturity level 3 for access.

Regarding the archival storage and preservation capability, no answers were provided; as such the maturity level was not calculated. Also, in the ingest capability two answers were not completed, for the purpose of calculating the ingest maturity level these answers were calculated as being maturity level 1.

Table 10 - Maturity Level Distribution for Each Capability of Pilot 5

Capability	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4	Maturity Level 5
Pre-Ingest			25%		75%
Ingest	22%		64%	7%	7%
Archival Storage and Preservation	-				
Data Management	33%		67%		
Access	14%	29%	57%		

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 capability of the self-assessment.

- **Capability: Pre-Ingest / Question: 4 / Maturity Level: 3 -** This question is related to the enhancement of a producer SIP. The answer shows that The Producer SIP is enhanced using defined procedures. A producer SIP can be checked and completed by adding further metadata, or restructure the SIP, among other procedures. The answer provided to this aspect hinders the achievement of maturity level 5 for this capability.
- **Capability: Data Management / Question: 28 / Maturity Level: 1 –** This question is related with the bi-directional linkage between the AIP and descriptive information. The answer shows that there is no procedure to maintain bi-directional linkage between each AIP and its descriptive information. This aspect is important as it ensures that all AIP can be located and retrieved. The pilot 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. The answer provided to this aspect hinders the achievement of maturity level 3 for this capability.
- **Capability: Access / Question: 32 / Maturity Level: 1 –** This question is related with access failures and errors. The answer shows that there is no mechanism to log and review access failures and errors. This aspect is important as it makes part of a capability that is the focus of the pilot and is the only aspect of this capability at maturity level 1. Maintaining a log and review all access failures and errors, can help identify security threats and access system failures.

Table 11 details the comments provided by pilot 5 to the self-assessment questionnaire. It only presents comments that complement the answer provided.

Table 11 - Pilot 5 Comments and Analysis

Pre-Ingest	
Question	**Comment**
1	We use a checklist for each type of records; the checklist are updated based on experiences gathered during each takeover.
3	The producer will confirm for each set of data.
4	We will give feedback to the producer and they will enhance the SIP.
Ingest	
5	If we use scopeArchive for the cataloguing system: The Fonds level is created manually by the archivist, and the needed sublevels. We select the sublevel where the collection will be created from SIP contents (units of description). We do not have enough information regarding E-ARK AIP generation yet.
6	Manual verification - by creating a test DIP (in addition to automated schema validation) of SIP contents
7	Based on checklist; manual report to the creator. All communication with the producer is captured in the ERMS that we use in the archives.
8	Formal record and scopeArchive logs
9	included in metadata, for scopeArchive and in the formal record
10	This is not specified yet, since WP4 tools are not part of pilot 5. So the procedures are not specified yet. Integration with the existing archival information system (scope Archive) is needed.
12	It is managed in scopeArchive
13	It is managed in scopeArchive
14	It is managed in scopeArchive
15	It is managed in scopeArchive
16	We test this by creating a test DIP

17	It is managed in scopeArchive
18	It is managed in scopeArchive
Archival Storage and Preservation	
24	It is managed in scopeArchive
25	It is managed in scopeArchive
Data Management	
26	Based on ISAD/G (ED2)
27	It is managed in scopeArchive
Access	
29	It is managed in scopeArchive
33	It is managed in scopeArchive: loans statistics

5.6. 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 capabilities of the questionnaire for pilot 6. The results of the assessment are depicted in Figure 8.

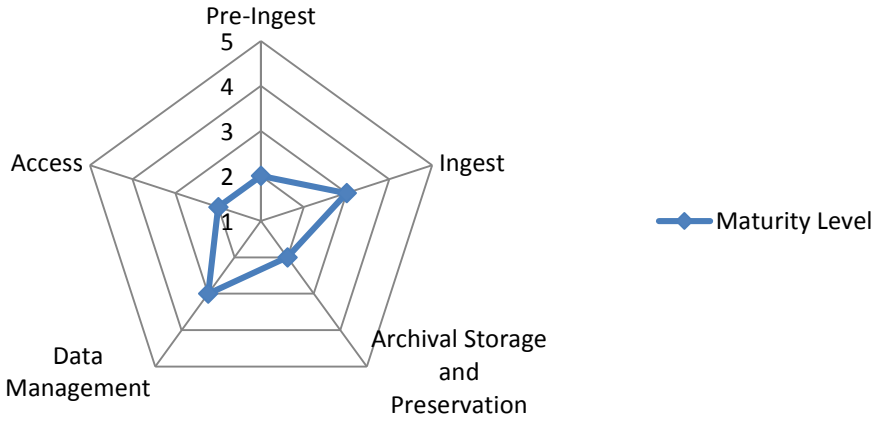

Figure 8- Pilot 6 Final Maturity Level Results

Table 2 shows that the calculated maturity levels for this pilot range from 2 to 3. According to Table 1, the focus of this pilot is in the pre-ingest, ingest, archival storage and preservation, and access capabilities. The data management capability while not being the focus is to be explored in the pilot.

This pilot shows that there are aspects that need immediate attention, the pre-ingest, archival storage and preservation and access capabilities make part of the focus of the pilot and are at maturity level 2. These should be enhanced to at least meet maturity level 3. According to Table 12, the pre-ingest capability has 25% of the answers at maturity level 2 which corresponds to one answer. If this aspect is enhanced to maturity level 3 the pre-ingest capability will reach maturity level 3. The archival storage and preservation capability has 28% of aspects at maturity level 1 and 29% at maturity level 2 these should be taken into consideration for improvement to maturity level 3. The same applies to the access capability where 29% of the aspects are at maturity level 1. The aspects at maturity level 1 must be improved first and then the aspects at maturity level 2. When the organization meets maturity level 3 in its focus capabilities then it can begin to plan to improve even further to maturity level 4 or 5.

Table 12 - Maturity Level Distribution for Each Capability of Pilot 6

Capability	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4	Maturity Level 5
Pre-Ingest		25%	75%		
Ingest	7%		79%	7%	7%
Archival Storage and Preservation	28%	29%	43%		
Data Management			100%		
Access	29%	14%	57%		

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 capability of the self-assessment.

- **Capability: Pre-Ingest / Question: 4 / Maturity Level: 3 -** This question is related to the enhancement of a producer SIP. The answer shows that The Producer SIP is enhanced using defined procedures. A producer SIP can be checked and completed by adding further metadata, or restructure the SIP, among other procedures. The answer provided to this aspect hinders the achievement of maturity level 3 for all question of this capability.
- **Capability: Ingest / Question: 9 / Maturity Level: 1 –** This question is related to legal rights. The answer shows that there is no procedure to manage legal rights during Ingest. This is the only aspect at maturity level 1 in the ingest capability, which is one of the focus capabilities of the pilot and requires immediate attention. This aspect is important to make sure that the pilot is capable of managing 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.
- **Capability: Archival Storage and Preservation / Question: 22 / Maturity Level: 1 -** This question is related with AIP designated community requirements. The answer shows that there is no procedure to gather and review the AIP requirements from the designated community. This means that the existing AIP requirements are not reviewed with the designated community and new AIP requirements are not collected. Maintaining the AIP requirements aligned with the designated community needs is important to guarantee that the archive holdings remain relevant to the designated community. This question is part of the archival storage and preservation capability which is part of the focus of the pilot. Together with question 25 these are the only aspects from that capability at maturity level 1 and require immediate attention.
- **Capability: Archival Storage and Preservation / Question: 25 / Maturity Level: 1 –** This question is related to tools and resources to provide representation information. The answer shows that there are no tools or resources to provide Representation Information for all of the digital objects in the Archive. This aspect is important as there must have 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 to ensure that all that Representation information is associated with the relevant objects. This question is part of the archival storage and preservation capability which is part of the focus of the pilot. Together with question 24 these are the only aspects from that capability at maturity level 1 and require immediate attention.
- **Capability: Access / Question: 31 / Maturity Level: 1 –** This question is related with the access policies compliance. The answer shows that there are no procedures to verify if the organization complies with the access policies defined with the designated communities. This aspect is important as it guarantees that the pilot complies with accesses policies defined with the designated communities. Failure to comply might affect the trust that designated community has on the organization in reference to the support of the user community. This question is part of the access capability which is part of the focus of the pilot. Together with question 32 these are the only aspects from that capability at maturity level 1 and require immediate attention.
- **Capability: Access / Question: 32 / Maturity Level: 1 -** This question is related with access failures and errors. The answer shows that there is no mechanism to log and review access failures and errors. This aspect is important as it makes part of a capability that is the focus of the pilot and is the only aspect of this capability at maturity level 1. Maintaining a log and review all access failures and errors, can help identify security threats and access system failures. This question is part of the access capability which is part of the focus of the pilot. Together with question 31 these are the only aspects from that capability at maturity level 1 and require immediate attention.

Table 13 details the comments provided by the Pilot 6 to the self-assessment questionnaire. It only presents comments that complement the answer provided.

Table 13 - Pilot 6 Comments and Analysis

Pre-Ingest	
Question	**Comment**
1	All producers in the repository must have a signed ingest pre-agreement signed with the repository. Only then an account will be created for them.
2	The repository system handles this automatically.
4	The enhancement of SIP metadata may be done by the repository, but not mandatory. The contents of the SIP may be normalised during ingest automatically by the repository system.
Ingest	
5	The repository is able to do both ways: 1. It's able to create fonds, collections or series based on the Producer SIP information, if this info comes within the SIP or 2. Reuses existing ones, if no other information is supplied.
6	The ingest process takes care of all validation procedures during ingest. There is a final manual task that allows the archivist to assess if the ingest process was carried out completely and correctly.
7	The producer is able to inspect the ingest process of all its SIP by accessing the repository system. All SIP ingest history and ongoing validations can be inspected by producers.
8	A record of all ingest actions, SIPs and in fact every action that takes place within the repository is logged for auditing purposes.
9	Current version of RODA does allow the configuration of access restrictions but this have to be managed manually. The new version will be able to set permissions automatically based on the metadata provided in the SIP. Other types of validations must be made manually.
10	Automatic procedure and manual validation using samples of ingested data.
11	Logs are available and can be inspected in the UI by producers and archivists.
12	AIP classes are currently supported by the repository system. However, on the new version we plan to make this more file centric and not so much AIP centric.
13	The handle system is currently used to support persistent IDs.
14	RODA supports PREMIS to record all actions done over a preserved object. The first of these actions is INGEST. RODA also generates PREMIS objects to store all technical metadata extracted from ingested files which can be used to assess its integrity in the future and plan future preservation actions.
15	PREMIS records are maintained close to the AIP and preserved as part of it.
16	A procedure for manual validation of AIPs right after ingest is documented and implemented. The procedure is done by sampling.
17	At the end of ingest the archivist can verify the completeness and correctness of the created AIP.
18	Handled by a combination of action logs and preservation metadata.
Archival Storage and Preservation	
19	There is documentation about the structure of the AIP; however, this does not go down to the bit level.
20	Yes. There is a scheduled checksum check. The results of this operation are stored in PREMIS events.
21	All actions performed on AIPs are stored as PREMIS events and can be inspected by all stakeholders.
22	Not really. AIPs are generated according to the best practice defined by the preservation expert.
24	The resolution service is supported by Fedora Commons. Given an object ID it responds with the data stream independently of its physical location.
25	File formats are identified and stored in PREMIS Objects. There are no direct links to external format registries.
Data Management	
26	The minimum set of metadata fields (in EAD format) is clearly set.
27	Metadata is stored together with the AIP and indexed for searching purposes.

28	The representations (AIP) are objects in Fedora Commons and they have a defined RDF relationship with the descriptive metadata, which is another Fedora Commons object. These relationships are processed by a triple storage engine which allows bi-directional querying of the relationships. The RDF relationships are stored in the file system close to the objects they belong and there is a documented process on how to re-index all relationships to allow the bi-directional linkage.
Access	
29	Yes. Smaller versions of AIP and specialised viewers are integrated with the repository.
30	All accesses to the repository are authenticated. Special collections are private to specific groups of users. The access policies are defined during the pre-ingest agreement.
32	All accesses are logged. Failed accesses are not currently being logged. There is not a procedure to access failed attempts.
33	Yes. All accesses to records are logged.
34	The repository will act if there is a complaint by a consumer.
35	DIPs can be inspected by consumers as well as their related AIPs. There are displayed together in the UI of the repository.

5.7. 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 capabilities of the questionnaire for pilot 7. The results of the assessment are depicted in Figure 9.

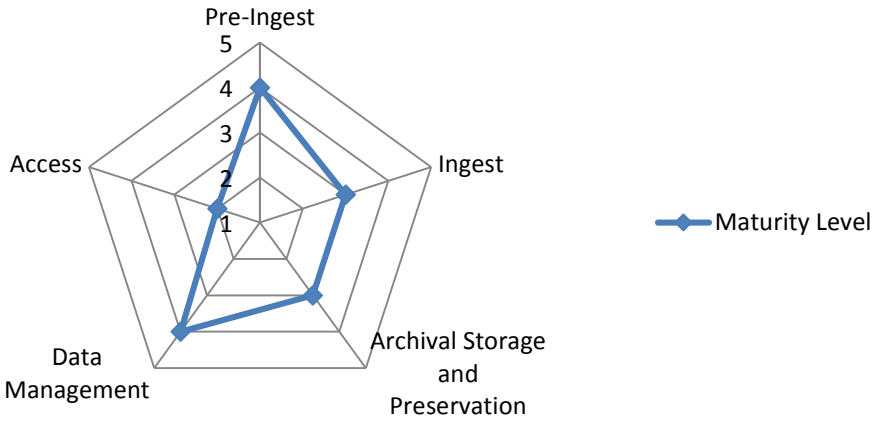

Figure 9- Pilot 7 Final Maturity Level Results

Table 2 shows that the calculated maturity levels for this pilot range from 2 to 4. According to Table 1, the focus of this pilot is in the pre-ingest, ingest, and access capabilities. The archival storage and preservation capability while not being the focus is to be explored in the pilot. The data management capability is not part of the pilot.

This pilot shows a disparity of maturity levels in the capabilities considered the focus of the pilot. According to Table 14, the pre-ingest capability is the one with higher maturity level of the three, with 100% of the answers at maturity level 4. The pre-ingest capability achieved maturity level 3. Despite this, 72% of the answers achieved maturity level 4. In regard to ingest there are still 21% of the answers at maturity level 2 and these need immediate attention to improve to at least maturity level 3, the calculated maturity level for this capability. Then, the pilot can begin its way to get all aspects of ingest to maturity level 4. Archival storage and preservation is not a focus of the pilot and achieved maturity level 3. While the majority of the answers are at maturity level 4, 21% of the answers are still at maturity level 2 and need also attention to reach at least maturity level 3. While data management is not part of this pilot, it reached maturity level 4, and as a result this capability does not need to be improved further. Finally, the access capability is one of the three focus capabilities of the pilot and reached only maturity level 2. There are 43% of the answers at maturity level 4 which is a strong point. However, 28% of the answers are at maturity level 1 and 29% at maturity level 2. As this is one of the focus capabilities action must be taken to improve those aspects at maturity level 1 and maturity level 2 so that all aspects reach at least maturity level 3.

Table 14 - Maturity Level Distribution for Each Capability of Pilot 7

Capability	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4	Maturity Level 5
Pre-Ingest				100%	
Ingest		21%	7%	72%	
Archival Storage and Preservation		14%		86%	
Data Management				100%	
Access	28%	29%		43%	

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 capability of the self-assessment.

- **Capability: Ingest / Question: 5 / Maturity Level: 2 -** This question is related with the creation of fonds. The answer shows that there is an ad-hoc procedure to create and manage fonds based on the Producer SIP. This means that there might be fonds created following different procedures resulting in collection being incomplete or complied incorrectly. This aspect is important as there should be able to create fonds, collections or series based on the Producer SIP information, or if reuses existing ones for scoping the new SIP. This question is part of the ingest capability which is part of the focus of the pilot. Together with question 8 and 16 these are the only aspects from that capability at maturity level 2 and require immediate attention.
- **Capability: Ingest / Question: 8 / Maturity Level: 2 –** This question is related to the Ingest actions and administration processes records. The answer shows that there are ad-hoc records to serve as evidence of the Ingest transactions between Producer and Archive. This means that each record might be have its own documentation and as such there might be different version of the same documentation in use which can raise issues in case of an audit. This aspect is important as the pilot must have updated records of all documentation relevant for the Ingest process which may be solicited during an audit. This question is part of the ingest capability which is part of the focus of the pilot. Together with question 5 and 16 these are the only aspects from that capability at maturity level 2 and require immediate attention.
- **Capability: Ingest / Question: 16 / Maturity Level: 2 -** This question is related with the AIP content information testing procedures. The answer shows that there is an ad-hoc procedure for testing if the content information of the AIP at its creation is understandable by the designated communities. This means that ingested objects are being tested using undefined and undocumented procedures which can limit the guarantee that ingested objects are understandable by the designated communities and are relevant and usable for them. This is important to guarantee that the ingest objects can be found, understood and used by the designated community. This question is part of the ingest capability which is part of the focus of the pilot. Together with question 5 and 8 these are the only aspects from that capability at maturity level 2 and require immediate attention.
- **Capability: Archival Storage and Preservation / Question: 22 / Maturity Level: 2 –** This question is related with the AIP Designated community requirements. The answer provided shows that there is an ad-hoc procedure to gather and review the AIP requirements from the designated community. This means that there is a procedure to collect new requirements from the designated community. However this procedure is not correctly defined, documented and assessed. Maintaining the AIP requirements aligned with the designated community needs is important to guarantee that the archive holdings remain relevant to the designated community. This is the only aspect from the archival storage and preservation capability at maturity level 2, and hinders the achievement of maturity level 4 for this capability.
- **Capability: Access / Question: 32 / Maturity Level: 1 -** This question is related with access failures and errors. The answer shows that there is no mechanism to log and review access failures and errors. This aspect is important as it makes part of a capability that is the focus of the pilot and is the only aspect of this capability at maturity level 1. Maintaining a log and review all access failures and errors, can help identify security threats and access system failures. This question is part of the access capability which is part of the focus of the pilot. Together with question 33 these are the only aspects from that capability at maturity level 1 and require immediate attention.
- **Capability: Access / Question: 33 / Maturity Level: 1 – This question is related with** Access Data Reports. The answer shows that there is no mechanism to record the access to the contents. This means that if there an

access by a user which does not explicit permission to access an object that access is not recorded. This aspect is very important as a measure to detect abuses or misuses of the holdings of the archive. This question is part of the access capability which is part of the focus of the pilot. Together with question 32 these are the only aspects from that capability at maturity level 1 and require immediate attention.

Table 15 details the comment provided by the Pilot 7 to the self-assessment questionnaire. It only presents comments that complement the answer provided.

Table 15 - Pilot 7 Comments and Analysis

Ingest	
Question	**Comment**
13	The identifiers of the AIPs are given by SDB/Preservica

6. Post-Assessment Feedback Questionnaire

After analyzing and reporting the results of the initial assessment and evaluation, a post assessment questionnaire was developed. This questionnaire allowed pilots to provide feedback to the Information Governance Maturity Model Development Team to promote continuous improvement of the assessment process and the questionnaire used to assess the IGMM.

For each question there was a three point answer scale, with possible answers of (1) Yes, (2) Partially and (3) No. For each question comments could be provided to detail the answers.

This questionnaire was divided into six parts, the first five containing related questions about the different capabilities being assessed. The final part is about overall questionnaire satisfaction. The estimated time require to fill in this questionnaire was 30-40 minutes.

The post-assessment feedback process consists of a set of feedback cycles where in each cycle a limited number of pilots are required to provide feedback. This process allows: (1) to incrementally improve the assessment process, and (2) to manage the pilots' efforts consistently across the last project year. The feedback received from the different pilots was: Pilot 3: Ingest from government agencies (National Archives of Estonia), Pilot 5: Preservation and access to records with geodata (National Archives of Slovenia), and Pilot 6: Seamless integration between a live document management system and a long-term digital archiving and preservation service (KEEP SOLUTIONS).

After analyzing the results of the post-assessment questionnaire the information governance maturity model development team met with the pilots to go over the results of the analysis and address the issues that were detected.

6.1. Overall Satisfaction with the assessment

Table 16 details the results of the post-assessment questionnaire questions, related to overall satisfaction with the initial assessment and evaluation. The results are shown for each of the pilots selected to answer the questionnaire.

The results obtained from the analysis of the overall satisfaction with the assessment show that pilots found the assessment a positive experience. However, there are still some aspects to improve, such as the space provided for comments, assessment coverage of information governance and the usefulness of the assessment to plan for improvement. Regarding the comment space, there are already plans to improve this aspect by allowing pilots to include images, and upload documents as a means of providing evidence for the answers given to the questions. Regarding assessment coverage, in the next version of the Information Governance Maturity Model there will new sources of documentation to be analyzed with the purpose of expanding the current coverage of the maturity model. Finally, regarding the improvement plan, we are planning to have the maturity assessment tool provide an improvement plan alongside the maturity assessment results.

Table 16 - Overall Results of the Post-Assessment Questionnaire

Aspect	Pilot	Yes	Partially	No
Were the instructions clear and specific?	2	X		
	5	X		
	6	X		
Was the comment box for each question appropriate to complement the answer provided to the question?	2			X
	5	X		
	6			X
Did the assessment cover all the aspects you think that are relevant for Archival Management Practice?	2	X		
	5	X		
	6		X	
Could you relate the aspects being assessed to your pilot context?	2		X	
	5		X	
	6	X		
Did the results of the assessment reflect the current state of affairs in your pilot?	2	X		
	5	X		
	6		X	
Were the assessment results useful as means to check the current state and plan for improvement?	2		X	
	5	X		
	6	X		
Was the assessment a positive experience?	2	X		
	5	X		
	6	X		

6.2. Pre-ingest

Table 17 details the results of post-assessment questionnaire questions that related to the assessment of the pre-ingest capability of the initial assessment and evaluation. The results are shown for each of the pilots that were selected to answer the questionnaire. There were four questions for this capability in the initial assessment and evaluation questionnaire. For each of these questions there were five questions in the post-assessment questionnaire as detailed in Table 17.

Table 17 - Pre-Ingest Capability Results of the Post-Assessment Questionnaire

Aspect	Pilot	Yes	Partially	No
Is the question clear and specific?	2	4	0	0
	5	4	0	0
	6	3	1	0
Is the domain terminology clear and specific?	2	1	3	0
	5	4	0	0
	6	2	2	0
Is the objective of the question clear?	2	4	0	0
	5	4	0	0
	6	3	1	0
Were the possible answers for the question clear and understandable from your pilot viewpoint?	2	4	0	0
	5	3	1	0
	6	2	2	0
Is the question relevant from your pilot perspective?	2	2	1	1
	5	4	0	0
	6	2	1	1

In the pre-ingest post-assessment results there were two questions (IDs 3 and 4) identified as targets for improvement due to the results achieved. Question ID 3 is related to provenance verification mechanisms: the main aspects to improve as reported by the pilots is the terminology used and the notes for the question. It was agreed that the notes will be improved and that the word “mechanisms” should be revised as it was deemed too technical.

ID	3
Title	Provenance verification mechanisms
Question	Are there mechanisms in place to verify the provenance of all deposited objects?
Objective	Understand if the organization has mechanisms to guarantee the provenance of the information to be Ingested.
Notes	Examples of mechanisms in place to verify this can be digital processing and data verification and validation, and through exchange of ownership evidence (e.g. submission agreements, deposit agreements, etc.).

As a result of the comments for this question the following changes were made.

ID	3
Title	Provenance verification procedures
Question	Are there procedures in place to verify the provenance of all deposited objects?
Objective	Understand if the organization has procedures 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 evidence (e.g. submission agreements, deposit agreements, etc.).

Question ID 4 is related to the enhancement of the Producer SIP, in this question pilots suggested that the terminology should also be revised, largely due to the fact that if a SIP is enhanced it would no longer be the SIP that was originally submitted by the producer.

ID	4
Title	Enhancement of the Producer SIP
Question	Is there a procedure to enhance a Producer SIP?
Objective	Understand how a Producer SIP is checked and completed. This can be done by adding further metadata, or restructuring the SIP, among other procedures.

6.3. Ingest

Table 18 details the results of post-assessment questionnaire questions that related to the assessment of the ingest capability of the initial assessment and evaluation. The results are shown for each of the pilots that were selected to answer the questionnaire. There were 14 questions for this capability in the initial assessment and evaluation questionnaire. For each of these questions there were five questions in the post-assessment questionnaire as detailed in Table 18.

Table 18 - Ingest Capability Results of the Post-Assessment Questionnaire

Aspect	Pilot	Yes	Partially	No
Is the question clear and specific?	2	12	0	2
	5	12	1	1
	6	8	5	1
Is the domain terminology clear and specific?	2	9	3	2
	5	14	0	0
	6	9	5	0
Is the objective of the question clear?	2	11	2	1
	5	13	1	0
	6	7	6	1
Were the possible answers for the question clear and understandable from your pilot viewpoint?	2	14	0	0
	5	13	1	0
	6	11	1	2
Is the question relevant from your pilot perspective?	2	5	7	2
	5	6	2	6
	6	7	5	2

In the ingest post-assessment results there were five questions (IDs 5, 7, 8, 11 and 12) identified as targets for improvement due to the results achieved. Question ID 5 is related to the creation of fonds, pilots suggested that the terminology should be revised with “creation of fonds” being replaced by “manage units of description”.

ID	5
Title	Creation of fonds
Question	Is there a procedure to create and manage fonds based on the Producer SIP?
Objective	Understand if the Archive is able to create fonds, collections or series based on the Producer SIP information, or if reuses existing ones for scoping the new SIP.

As a result of the comments for this question the following changes were made to the question.

ID	5
Title	Manage units of description
Question	Is there a procedure to manage units of description based on the Producer SIP?
Objective	Understand if the Archive is able to manage units of description based on the Producer SIP information, or if reuses existing ones for scoping the new SIP.

Question ID 7 is related to the ingest producer/depositor responses, pilots suggested that although the question is clear, the question objective does not fully relate to the question and that the objective should focus more on the ingest aspect and not so much on the transfer aspect. Additionally, there should be additional examples of evidence for this question, such as mechanisms to check for transfers periodically.

ID	7
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?
Objective	Understand if the organization provides responses to the Producer at the agreed points in order 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.

Question ID 8 is related to records of ingest actions and administration processes, pilots suggested the question objective is not clear and should be revised. They also realized that this question might not be relevant from the pilots' perspective as most are national archives. Despite this aspect, this question can be relevant to small archives.

ID	8
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?
Objective	Understand 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.

Question ID 11 is related to the SIP final disposition documentation, pilots suggested that the term "final disposition" is not clear as most people would relate it with disposal instead of disposition.

ID	11
Title	SIP final disposition documentation
Question	Are there procedures capable of demonstrating the final disposition of a SIP?
Objective	Understand if the organization has defined procedures to demonstrate that a specific SIP has either accepted, incorporated as part of an AIP, or 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.

Finally, question ID 12 is related to AIP parsing, pilots suggested that although the definition for the term "AIP Class" is available as a link to the EVOC vocabulary manager, most people would not access and read the definition. To solve this issue it was suggested that there could be examples of what an AIP class is directly in the question and not through a link.

ID	12
Title	AIP parsing
Question	Is there a procedure to create and manage AIP Classes?
Objective	Archives that store a wide variety of information types can 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 also 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)

6.4. Archival Storage and Preservation

Table 19 details the results of post-assessment questionnaire questions that related to the assessment of the archival storage and preservation capability of the initial assessment and evaluation. The results are shown for each of the pilots that were selected to answer the questionnaire. There were seven questions for this capability in the initial assessment and evaluation questionnaire. For each of these questions there were five questions in the post-assessment questionnaire as detailed in Table 19.

Table 19 - Archival Storage and Preservation Capability Results of the Post-Assessment Questionnaire

Aspect	Pilot	Yes	Partially	No
Is the question clear and specific?	2	6	1	0
	5	6	1	0
	6	6	0	1
Is the domain terminology clear and specific?	2	6	1	0
	5	7	0	0
	6	6	1	0
Is the objective of the question clear?	2	7	0	0
	5	7	0	0
	6	6	0	1
Were the possible answers for the question clear and understandable from your pilot viewpoint?	2	7	0	0
	5	7	0	0
	6	6	0	1
Is the question relevant from your pilot perspective?	2	4	3	0
	5	1	0	6
	6	5	1	1

In the archival storage and preservation post-assessment results there was one question (ID 23) identified as a target for improvement due to the results achieved. Question ID 23 is related to the independent mechanism for content integrity checking, pilots suggested that the question notes are not clear and also suggested that the term “Content integrity checking” should be revised as it was not clear what was being asked.

ID	23
Title	Independent mechanism for content integrity checking
Question	Is there an independent mechanism for verifying the integrity of the Archives’ content?
Objective	Understand 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 actions (e.g., receipt, action) dates, logs of periodic checks.

6.5. Data Management

Table 20 details the results of post-assessment questionnaire questions that related to the assessment of the data management capability of the initial assessment and evaluation. The results are shown for each of the pilots that were selected to answer the questionnaire. There were three questions for this capability in the initial assessment and evaluation questionnaire. For each of these questions there were five questions in the post-assessment questionnaire as detailed in Table 20.

Table 20 - Data Management Capability Results of the Post-Assessment Questionnaire

Aspect	Pilot	Yes	Partially	No
Is the question clear and specific?	2	3	0	0
	5	3	0	0
	6	2	0	1
Is the domain terminology clear and specific?	2	3	0	0
	5	3	0	0
	6	3	0	0
Is the objective of the question clear?	2	3	0	0
	5	3	0	0
	6	3	0	0
Were the possible answers for the question clear and understandable from your pilot viewpoint?	2	3	0	0
	5	3	0	0
	6	3	0	0
Is the question relevant from your pilot perspective?	2	2	0	1
	5	2	1	0
	6	3	0	0

In the data management post-assessment results there was one question (ID 26) identified as a target for improvement due to the results achieved. Question ID 26 is related to the designated community information requirements, but after meeting with the pilots there was no issue identified with this question, however it was agreed that a revision of the objective and notes would make the question clearer to the respondents.

ID	26
Title	Designated Community information requirements
Question	Are the minimum information requirements specified to enable the Designated Community to discover and identify material of interest?
Objective	Understand 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.

6.6. Access

Table 21 details the results of post-assessment questionnaire questions that related to the assessment of the access capability of the initial assessment and evaluation. The results are shown for each of the pilots that were selected to answer the questionnaire. There were seven questions for this capability in the initial assessment and evaluation questionnaire. For each of these questions there were five questions in the post-assessment questionnaire as detailed in Table 21.

Table 21 - Access Capability Results of the Post-Assessment Questionnaire

Aspect	Pilot	Yes	Partially	No
Is the question clear and specific?	2	7	0	0
	5	7	0	0
	6	5	1	1
Is the domain terminology clear and specific?	2	7	0	0
	5	7	0	0
	6	5	1	1
Is the objective of the question clear?	2	7	0	0
	5	7	0	0
	6	6	0	1
Were the possible answers for the question clear and understandable from your pilot viewpoint?	2	7	0	0
	5	7	0	0
	6	6	0	1
Is the question relevant from your pilot perspective?	2	0	2	5
	5	7	0	0
	6	5	1	1

In the access post-assessment results there were two questions (IDs 34 and 35) identified as targets for improvement due to the results achieved. Question ID 34 is related to the access data problem/error reports, pilots suggested that the examples provided in the question notes are not that useful as sometimes a link to the email for feedback reporting on the repository website might be enough evidence that reports are being issued.

ID	34
Title	Access Data Problem/Error Reports
Question	Is there a mechanism to solve problem reports about errors in data or responses from Consumers?
Objective	Understand 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.

Question ID 35 is related to access policies and procedures, pilots suggested that the question is too extensive making it difficult to understand, it was then suggested to change the question with an objective which would make the question

clearer and easier to answer. Additionally, the notes should be revised as the examples are not clear, another example of possible evidence that was suggested are PREMIS events.

ID	35
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?
Objective	Understand if the organization maintains an auditable chain of authenticity from the AIP to a DIP.
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.

6.7. Conclusions

After analyzing the results of the post assessment questionnaire and meeting with the pilots to address all the issues found during the analysis, it was concluded that the current maturity model development method being used proved very useful to develop and enhance the maturity model. It was also concluded that the current means of communication between the maturity model development team and pilots is appropriate and useful. As a result, the maturity model development team agreed to continue the application of the maturity model development method for deliverables 7.5 and 7.6. In the development method for the maturity model there are two paths that can be taken after the development of the first iteration of the maturity model, based on the results obtained it was realized that during the evaluation of the maturity model there are new aspects of the problem definition that should be taken into consideration and as a result the path depicted in Figure 10 was chosen.

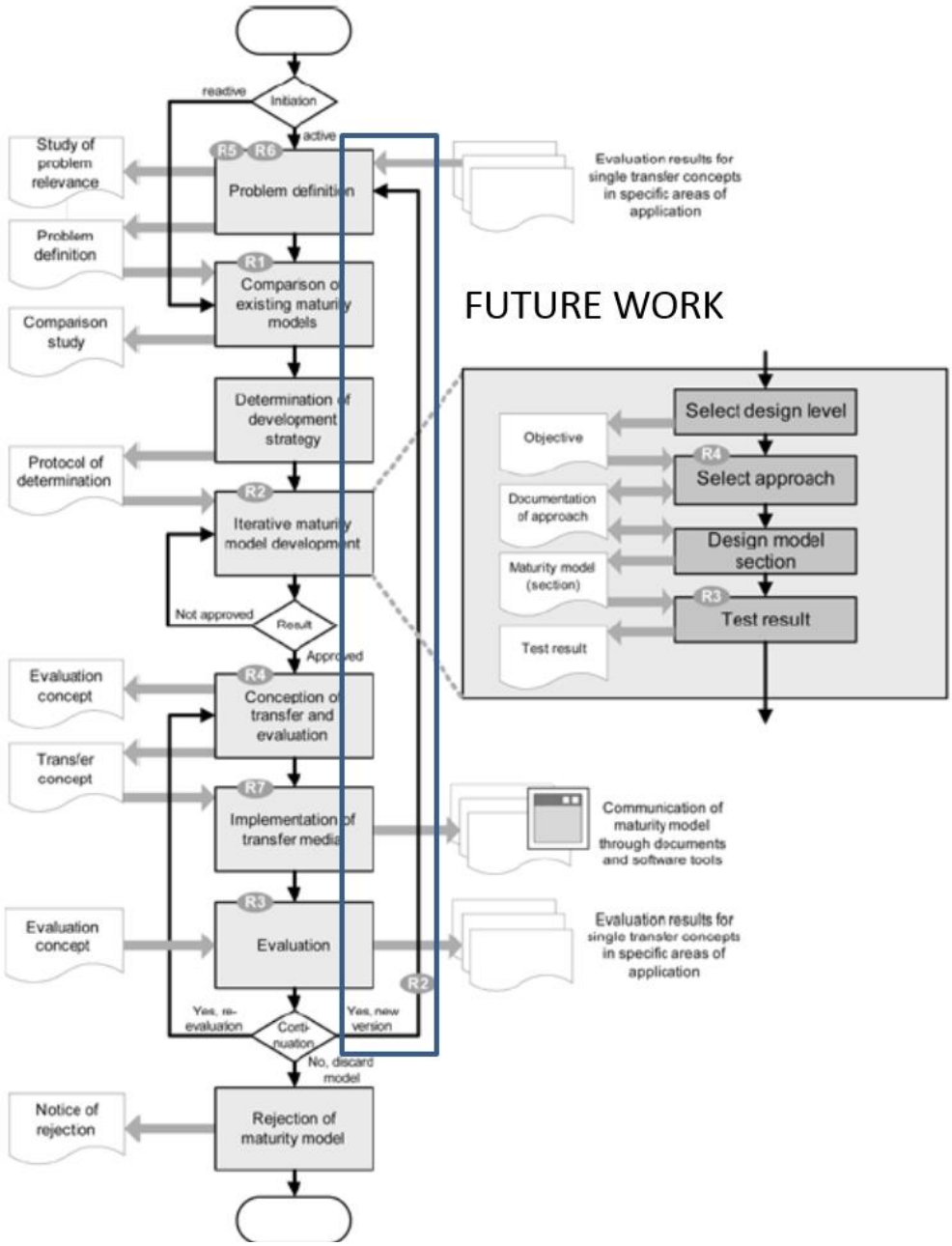

Figure 10 - Information Governance Maturity Model Future Work [7]

7. Conclusions

Figure 11 depicts a comparison between the pilots. Pilot 1 is the one which achieved the best overall results, especially in pre-ingest and access it achieved the best results. Pilot 2 achieved the second best results. However there are still some enhancements to perform in the access capability where it achieved maturity level 2. Despite this fact, the access capability is not the focus in pilot 2. Pilot 7 also shows a high level maturity across the capabilities measured in the assessment. However, as in pilot 2, there are still some important enhancements to perform to the access capability. In pilot 7, the importance of the access capability is considerable due to it being one of the focuses of the pilot.

The other four pilots showed similar results among the capabilities. With some exceptions for pilot 3, where it shows higher maturity levels for pre-ingest and the access capabilities. Another exception is pilot 6 which shows higher maturity levels for ingest and data management capabilities. Pilot 5 did not answer to the questions for the archival storage and preservation and as the result no maturity level was calculated. As this is not the focus capability of the pilot there is no major problem with this fact.

There are still several capabilities at maturity level 1 or 2 for all pilots except pilot 1. These should be addressed as soon as possible to reach at least maturity level 3 for the focus capabilities. This is due to the fact that maturity level 3 is considered an intermediate level between lack of definition of consistency of mechanism and procedures typical of maturity level 1 and 2; and the documentation and assessment of mechanism and procedures typical of maturity level 4 and 5. Maturity level 3 depicts aspects that are consistent and defined throughout the organizational or pilot context and shows a state of change in this context from no definition to improvement. The results of the E-ARK project will help the pilots to reach this maturity level and will also assist other organizations to reach higher levels of maturity and as result improve archival practice.

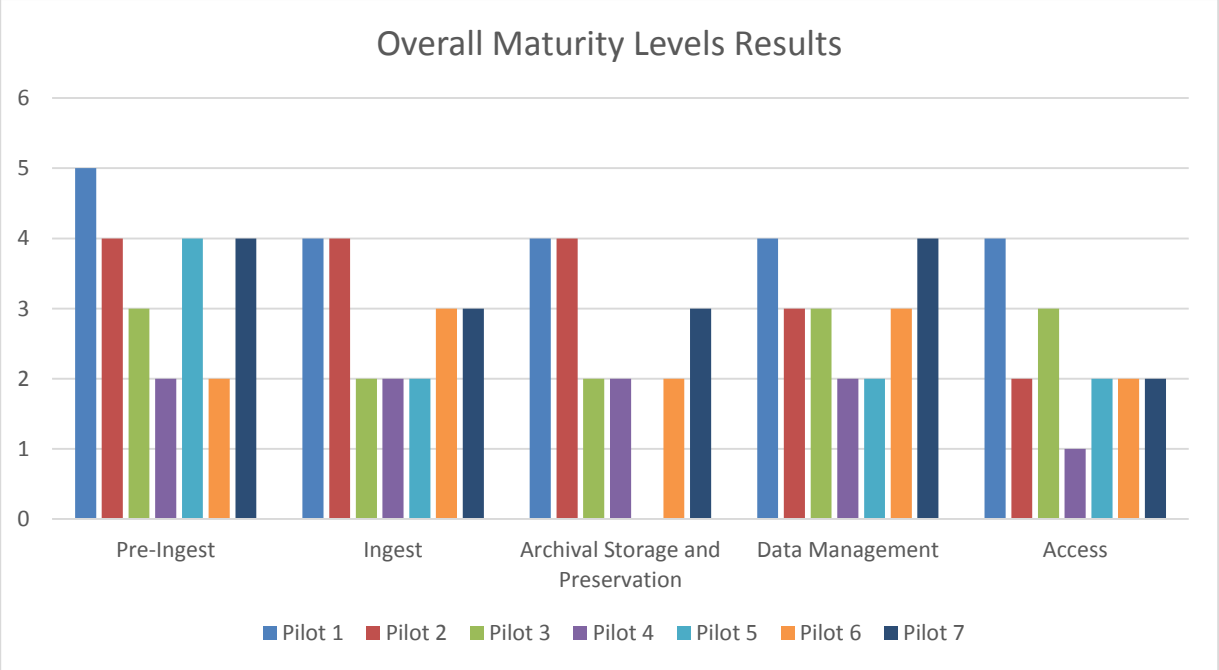

Figure 11 - Final Results of the Maturity Levels for All Pilots

This deliverable presents the method to perform the assessment of the E-ARK pilots, as well as, the questionnaire itself and the analysis of the results for the pilots. The questionnaire was developed based on a self-assessment questionnaire. The self-assessment consists of following a series of predetermined steps in which the pilot owners answer a series of questions that will result in the determination of a maturity level. As can be seen by going through section 5, 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 for the pilots. Despite this there is still room for improvement of the questionnaire, there were some comments left by the pilot owners regarding the difficulty of answering some questions. These comments will be taken into consideration in the next revision of the maturity model (in D7.5) and in the final assessment (in D7.6). One other aspect to take into consideration is that only one of the maturity model dimensions was assessed in this deliverable as the E-ARK pilots don't have an organizational context supporting them. However, in D7.6 the questions to assess the other two dimensions will be included so that all organizations can use the Information Governance Maturity Model and enhance their current practice.

This deliverable focuses on the last three stages of the maturity model development method (see section 2 of D7.1) that concentrate on the transfer and evaluation of the maturity model. Deliverable 7.5 will iterate the development of the maturity model based on the application results to improve and extend the maturity model. Finally, deliverable 7.6 will conduct a new self-assessment using the final version of the maturity model after the project pilot. Table 22 defines the focus of each deliverable based on the development method and represents the maturity model roadmap.

Table 22 - 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

8. References

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