

The Open Archival Information System (OAIS) Reference Model

The Open Archival Information System (OAIS) reference model provides a conceptual framework and common terminology for the preservation and dissemination of digital assets. It defines a set of roles, processes, and functions relevant to long-term preservation. Thus the OAIS model provides us with a common understanding of what it is that archives do when they preserve digital information objects. At the same time, it has also given important impulses to move towards greater standardization in the field of digital preservation, including the development of criteria and procedures to analyze and assess archival preservation and dissemination practice.

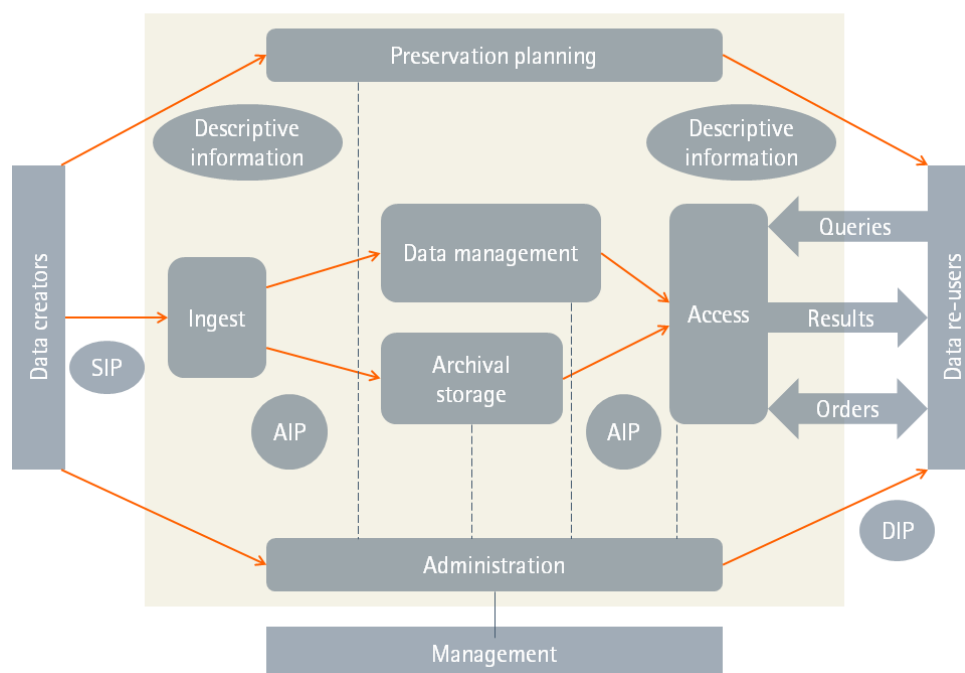
Where to start?

OAIS purposely uses “terms that are not already overloaded with meaning so as to reduce conveying unintended meanings” (CCSDS, 2012, p. 1-8). As a result, OAIS language is not always intuitively understood and it is recommended that you study the **Terminology** section (1-7) before diving into the standard.

The centerpiece of the OAIS standard are two models: the functional model, which defines archival tasks, functions, and information flows; and the information model. The **information model** (Section 4.2) defines the different components of the objects that an archive receives, curates, and disseminates. Specifically, it takes a closer look at the types of information required for long-term preservation and dissemination, including the metadata necessary to access and understand an archived object. The model also specifies how the different types of information relate to each other and how they are structured by way of the concept of information packages. These combinations of content and metadata come in different forms (and are accordingly named differently) depending on the phase of the archiving process in which they occur: there are submission information packages, archival information packages, and dissemination information packages.

The **functional model** (Section 4.1; see figure) defines six “functional entities”: Ingest, Data Management, Archival Storage, Access, which roughly describe the path that information packages take through the archive, and Preservation Planning and Administration, which comprise planning, management, and administrative tasks that take place in the archive across the information lifecycle. Each functional entity is a bundle of “functions” – tasks and activities that can be fulfilled either by human staff or by machines such as computer systems. Thus for example, the function that allows users to query an archive’s collection could be fulfilled by a staff member, an old-fashioned card catalog, or an online search interface.

Figure 1: OAIS functional model



Recommended introductory resources

Lavoie, B. (2014). The Open Archival Information System (OAIS) Reference Model: Introductory Guide (2nd Edition) (No. 14-02). York. doi:10.7207/twr14-02

Lee, C. A. (2010). Open Archival Information System (OAIS) Reference Model. In M. J. Bates & M. N. Maack (Eds.), *Encyclopedia of Library and Information Sciences*. (3rd Ed., pp. 4020–4030). Taylor & Francis. doi:10.1081/E-ELIS3-120044377

Paradigm Project. (2008). Introduction to OAIS. Retrieved July 19, 2012, from <http://www.paradigm.ac.uk/workbook/introduction/oais.html>

What is it for?

The OAIS standard is not light background reading exactly, but it can be considered a “must-read” for (aspiring) digital preservation professionals for the following reasons:

- Much of the OAIS terminology has found its way into the language of the digital preservation community. Being familiar with the terminology facilitates communication about digital preservation strategies, processes, and workflows across archives and disciplines.
- The functional model gives a detailed break-down of digital preservation and dissemination workflows – in short, it explains how an (idealized) archive works. It therefore is a good starting point for anyone who seeks to obtain a systematic overview of these workflows or wants to analyze and understand workflows in an existing archive. The latter approach has been taken by the ICPSR and the UKDA/TNA, among others, who performed a mapping of OAIS and their archives to identify and close possible gaps (see Beedham, Missen, Palmer, & Ruusalepp, 2005; Vardigan & Whiteman, 2007).

- Similarly, the information model provides us with a means to better understand the objects of our preservation efforts – again in a very systematic fashion. Like the functional model it can serve as the basis for a mapping process in existing archives to support the identification of possible gaps.

Complying with OAIS

Ever since the standard was first published, archives have labeled themselves as “OAIS compliant” to emphasize their proficiency and trustworthiness. However, the standard itself makes only two, fairly general requirements, for compliance: Supporting the information model (Section 2.2) and fulfilling the set of mandatory responsibilities (Section 3.1; see table), which are themselves rather general.

When thinking about OAIS compliance it should be kept in mind that a reference model can – by definition – not be implemented directly. Thus, OAIS is an abstract and highly generic conceptualization of a preservation and dissemination environment, not so much a blueprint that we can use to build an actual archival information system (see Schumann & Recker, 2013). Thus, the abstract OAIS requirements need interpretation, translation, and concretization if they are to be used for evaluation purposes. This concretization has been undertaken by initiatives creating sets of concrete criteria to measure the trustworthiness of digital repositories, the outcome of which are audit and certification standards such as DIN 31646 and ISO 16363.

Overall, smaller archives will find it difficult to conform fully to the OAIS reference model, with its emphasis on administrative processes. However, it can be useful to undertake an OAIS mapping in order to understand – and make transparent – ways in which your archive preserves and disseminates its assets, and expose any gaps or vulnerabilities that place preservation at risk.

OAIS mandatory responsibilities (CCSDS 2012, p. 3-1)...	...and what they mean
Negotiate for and accept appropriate information from information Producers.	Decide what to archive. What is the scope of data collection? What is your universe? Is it, for example, discipline-specific, spatial, institutional, or format-based? A set of criteria should form the basis for negotiating with and accepting submissions from data producers.
Obtain sufficient control of the information provided to the level needed to ensure Long Term Preservation.	Establish the right to hold and preserve data. Legally, can you disseminate that data? Are any copy protections in place? Do you have the right to modify the data? For example, to migrate data into a different format in order to ensure its long-term preservation? These issues should be addressed in the deposit agreement / archival contract.
Determine, either by itself or in conjunction with other parties, which communities should become the Designated Community and, therefore, should be able to understand the information provided, thereby defining its Knowledge Base.	Define and serve your community. An archive must know the community it serves, and what its needs and requirements are. It is not enough to hold data for users; archives have a responsibility to make sure data they hold is comprehensible to those users.
Ensure that the information to be preserved is Independently Understandable to the Designated Community.	
Follow documented policies and procedures which ensure that the information is preserved against all reasonable contingencies, including the demise of the Archive, ensuring that it is never deleted unless allowed as part of an approved strategy. There should be no ad-hoc deletions.	Establish preservation policies and procedures. What is your plan for long-term preservation? Which strategies do you employ to back-up and preserve digital assets? Are succession plans in place, for example, to ensure that the archive’s holdings are not lost in case it can no longer operate?

Make the preserved information available to the Designated Community and enable the information to be disseminated as copies of, or as traceable to, the original submitted Data Objects with evidence supporting its Authenticity.

Service. How do you get data to people? What is your dissemination method?

References

Beedham, H., Missen, J., Palmer, M., & Ruusalepp, R. (2005). *Assessment of UKDA and TNA compliance with OAIS and METS Standards*. Colchester, Essex: UK Data Archive, University of Essex. Retrieved from <http://www.jisc.ac.uk/media/documents/programmes/preservation/oaismets.pdf>

CCSDS. (2012). *Reference Model for an Open Archival Information System (OAIS). Recommended Practice (No. CCSDS 650.0-M-2)*. Retrieved from <http://public.ccsds.org/publications/archive/650x0m2.pdf>

Schumann, N., & Recker, A. (2013). De-mystifying OAIS compliance: Benefits and challenges of mapping the OAIS reference model to the GESIS Data Archive. *IASSIST Quarterly*, 36(2). Retrieved from <http://iassistdata.org/iq/issue/36/2>

Vardigan, M., & Whiteman, C. (2007). ICPSR meets OAIS: applying the OAIS reference model to the social science archive context. *Archival Science*, 7(1), 73–87. doi:10.1007/s10502-006-9037-z



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