

NAS9300-020

Long Term Archiving and Retrieval
of digital technical product documentation
such as 3D, CAD and PDM data

PART 020: Governance and Preservation Planning

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Foreword

1. This standard was prepared jointly by AIA, ASD-STAN, PDES, Inc., and the PROSTEP iViP Association.
2. The PROSTEP iViP Association is an international non-profit association in Europe. For establishing leadership in IT-based engineering it offers a moderated platform to its nearly 200 members from leading industries, system vendors and research institutions. Its product and process data standardization activities at European and worldwide levels are well known and accepted. The PROSTEP iViP Association sees this standard and the related parts as a milestone of product data technology.
3. PDES Inc. is an international non-profit association in USA. The mission of PDES Inc. is to accelerate the development and implementation of ISO 10303, enabling enterprise integration and PLM interoperability for member companies. PDES, Inc. gathers members from leading manufacturers, national government agencies, PLM vendors and research organizations. PDES Inc. supports this standard as an industry resource to sustain the interoperability of digital product information, ensuring and maintaining authentic longevity throughout their product lifecycle.
4. Readers of this standard should note that all standards undergo periodic revisions and that any reference made herein to any other standard implies its latest edition, unless otherwise stated.
5. The Standards will be published under two different standards organizations using different prefixes. ASD-STAN will publish the standard under the number EN9300-020. AIA will publish the standard under the number NAS9300-020. The content in the EN9300 and NAS9300 documents will be the same. The differences will be noted in the reference documentation (i.e. for EN9300 Geometric Dimensioning & Tolerancing will be referenced in ISO 1101 and ISO 16792, and for NAS9300 the same information will be referenced in ASME Y14.5 and Y14.41). The document formatting will follow that of the respective editorial rules of ASD-STAN and AIA.

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1 Introduction

The Aerospace and Defense industries are notable for engineering complex, high valued products such as airplanes and ships, which typically have a service life that exceed 50 years, a period to be extended by ten to twenty years for the design and disposal phases. The aircraft industry in particular requires rigorous certification, and loss of design information could result in loss of airworthiness certification for a fleet of aircraft, which may in turn lead to business failure. Consequently, the evolution to fully digital design must be accompanied by development of detailed guidelines on the retention of product data.

Information and documentation - Records Management (ISO 15489) provides a general framework for records management, including retention, however it does not provide detailed guidance on the issues which arise in long term data retention, particularly the issues of loss of knowledge about the relationships between the information content, the representation of that content, and the way that representation is present in the repository. For example, historically the shape of a physical part - such as a wing rib or a turbine blade - has been represented by a dimensioned drawing, held as a full scale Mylar sheet or as microfilm in an aperture card, whereas more recently it was represented by a Computer Aided Design (CAD) drawing held on CD as a computer file in IGES format, which in turn has been superseded by a CAD model held as a STEP file.

The Open Archival Information System (OAIS) reference standard (ISO) 14721:2012) focuses exactly on the long term retention issues, and provides a functional reference model of an information archive, including the need to record and retain the links between content, representation and presentation through submission agreements and supporting metadata. A subsequent standard, the Trustworthy Repositories Audit and Certification (TRAC), provides a model in which information retention is provided through a repository service, and describes how to assess whether a repository service provider can be verified as trustworthy from the standpoint of long term archiving.

The LOTAR series of standards provide additional guidance on the application of these standards for the Aerospace and Defense industries. The LOTAR Domain specific parts (parts numbered 100 and over) provide detailed guidance on how to retain complex, high value information such as CAD models, where the lifecycle of the information is much longer than that of the software tools that create and read the information. The focus in these parts is on assuring the integrity of the information as it is used by successive generations of software, and the specific parts provide criteria for data quality and validation. The LOTAR general parts (parts in the range 1 to 99) provide guidance on how processes, procedures etc. should support the application of the specific parts, for example, by specifying the process for quality checks on the ingest of data into the repository (NAS9300-011).

This part, Governance and Preservation Planning, is a general part, which describes how the functional responsibilities of the OAIS are applied in the organizational and business structures of the Aerospace and Defense Industries. The OAIS standard views the archive as a unity, with a predefined mission to retain information, whereas a typical aircraft project is a cooperation between a prime contractor and a very large supply chain to produce a product, and for whom data retention is a secondary activity. Consequently, care is needed to ensure the organizations who have responsibility for retention are identified, both for certification and business continuity.

In OAIS, preservation planning covers "the services and functions for monitoring the environment on the OAIS and providing recommendations to ensure that the information stored in the OAIS remains accessible." According to OAIS, Preservation Planning:

- Identifies the preservation requirements;
- Monitors changes in the actual environment (including changes to the preservation requirements);
- Identifies any differences between the original environment and the actual environment;
- Assesses the risk that the preserved information will no longer meet the preservation requirements;
- Initiates any risk mitigation necessary.

One notable omission from this definition is the governance process for deciding what should be retained and initiating the actions to retain it. Both retaining data and sustaining it over the long term are business costs, and must be traded against risks and benefits. Consequently, governance (of retention) and preservation planning are treated here as aspects of a single process.

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Both regulatory approval and business governance require evidence that the retention process is both in place and auditable. This is complicated by business practice, where a complex product is the result of cooperation between many different groups representing both functional specializations (business, engineering, IT) and organizational divisions (prime contractor, product supply chain, business service providers). To enable traceability and auditability of the governance process, the process is described in terms of four sets of responsibilities:

- Business (why) - defines the business goals of retention
- End User (who, what, when, where,) - identifies and characterizes designated communities and ensure that data is retained to meet their needs;
- User Information Technology (how, from the perspective of the user in the business) - to identify the right information representation to minimize the costs and risks of retention;
- Information Technology (how, from the perspective of an IT service provider) - to minimize the costs and risks associated with the way the data is held in the repository.

Note 1: LOTAR talks about "data retention" and "repository" rather than "archive" or "preservation", since its emphasis is on the sustainment of current value, whereas "archive" has the connotation of historic value.

Note 2: In this LOTAR part, in keeping with the scope of the series, information is divided into *Product Information* - information relating to the engineering product definition, such as CAD, as distinct from *Non-Product Information* - that is, other business records, which are out of scope.

2 Scope

The scope of this part is the governance and preservation planning for long term retention of product information (engineering information used in the specification, design, manufacture and support of an engineering product), and in this context:

- A description of the relationship between the user organizations and each other and a repository service;
- The allocation of responsibility for product information retention between user organizations;
- The activities and responsibilities of the user organizations for planning and development of new retention requirements;
- The activities and responsibilities of the user organizations for preservation planning;
- The responsibilities of a repository service for retention and preservation planning;
- The allocation of OAIS identified responsibilities between the user organizations and the repository service supplier;

This part also provides recommendations on knowledge management and risk management.

Out of scope are:

- Retention of data not in electronic form (e.g. drawings, documents);
- The governance and planning of non-product information (business records, e-mail, etc.);
- The governance of short and medium term data retention;
- The verification by the user organizations that the repository service provider can meet the user requirements (see TRAC);
- The use of multiple repositories across the supply chain, where suppliers may have separate responsibilities to maintain the data they produce;

Note: It is a principle of long term data retention that supporting documentation and knowledge remain available for the lifetime of the data. This standard will itself be part of the supporting documentation. To retain the knowledge necessary to interpret this standard over the long term, the standard includes the supporting rationale. This rationale is not itself normative, but may be required when making normative interpretations of the standard. Normative text is indicated by

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text prefixed by a clause and sub-clause number, with the exception of examples within the text of the clause. Text that is not part of a numbered sub-clause, including the prefaces in each clause, notes, footnotes and examples, is not part of the normative text.

3 Normative references

This Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NAS9300 (All parts), *Aerospace series — LOTAR — Long Term Archiving and Retrieval of digital technical product documentation such as 3D, CAD and PDM data*

ISO 9001:2008, *Quality management systems — Requirements.*

ISO 14721:2012, *Space data and information transfer systems — Open archival information system (OAIS) — Reference model, second edition.*

ISO 17788:2014, *Information technology — Cloud computing — Overview and vocabulary.*

AS9100:2009, *Quality Management Systems - Requirements for Aviation, Space and Defense Organizations*

4 Terms, definitions and abbreviations

For the purposes of this standard, the terms, definitions and abbreviations given in NAS/EN 9300-007 shall apply.

4.1 Abbreviations

AIP - Archival Information Package

BPP - Business Preservation Planning

CAD - Computer Aided Design

DIP - Dissemination Information Package

EASA- European Aviation Safety Agency

FAA - Federal Aviation Agency

IT - Information Technology

OAIS - Open Archival Information System

PDM- Product Data Management

PUC - Preservation Use Case

RSP - Repository Service Provider

SIP - Submission Information Package (from OAIS)

SSP - Secondary Service Provider

STEP- Standard for the Exchange of Product data

TPP - Technical Preservation Planning

TRAC - Trustworthy Repositories Audit and Certification: Criteria and Checklist

UPP - User Preservation Planning

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4.2 Terms Defined In This Document

Repository Service Provider - the organization that provides a long term data retention service which conforms to the OAIS specification.

End Product - A product delivered by an organization to another organization, such as an aircraft or an aircraft engine. Products developed and delivered up the supply chain by a supplier are the end products of that organization.

Responsible Organization - the organization that has responsibility to retain product information.

4.3 Terms Defined Elsewhere

Archival Information Package (AIP): An Information Package, consisting of the Content Information and the associated Preservation Description Information (PDI), which is preserved within an OAIS. (from OAIS)

Consumer: The role played by those persons or client systems, which interact with OAIS services to find preserved information of interest and to access that information in detail. This can include other OAISs, as well as internal OAIS persons or systems. (from OAIS)

Designated community: An identified group of potential Consumers who should be able to understand a particular set of information. The Designated Community may be composed of multiple user communities. (from OAIS)

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. (from OAIS)

Dissemination Information Package (DIP): The Information Package, derived from one or more AIPs, received by the Consumer in response to a request to the OAIS. (from OAIS)

Ingest: The OAIS entity that contains the services and functions that accept Submission Information Packages from Producers, prepares Archival Information Packages for storage, and ensures that Archival Information Packages and their supporting Descriptive Information become established within the OAIS. (from OAIS)

Key Characteristic: (from AS 9100 which in turn are based on ISO 9001:1994). The features of a material or part whose variation has a significant influence on product fit, performance, service life or manufacturability.

Producer: The role played by those persons or client systems, which provide the information to be preserved. This can include other OAISs or internal OAIS persons or systems. (from OAIS)

Retrieval: the process of accessing information in an OAIS archive (NAS9300-007).

Submission Agreement: The agreement reached between an OAIS and the Producer that specifies a data model for the Data Submission Session. This data model identifies format/contents and the logical constructs used by the Producer and how they are represented on each media delivery or in a telecommunication session. (from OAIS)

5 Applicability

Refer to applicability of NAS9300-001, paragraph 4.

6 Responsibility Model

6.1 Responsible Organization

The Aerospace manufacturing sector may be characterized as having a relatively small number of prime contractors together with a large number of subcontractors and suppliers. The situation is complicated by the prime contractors working in partnerships, by companies having the role of prime contractor for one product and sub-contractor for others, and by the prime contractors being subsidiaries of larger companies, which may have other aerospace companies as semi-autonomous subsidiaries. Further, although the responsibility for aircraft type certification lies with the prime contractor, other companies may have particular certification responsibilities, particularly the engine makers. Consequently, this LOTAR part is framed in terms of a Responsible Organization rather than any specific company structure.

The responsibility to retain aircraft product model data may be driven by various legal and commercial requirements, such as the legal responsibility to ensure product safety, the responsibility to provide aircraft product model data to aircraft

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certification authorities, or the need to prove ownership of intellectual property. In addition, in some countries, the design data may be viewed as part of the assets of a company, which may entail a legal responsibility to maintain the value of such assets.

The intent of the following clause is to ensure that where retention is required, an organization knows who is responsible for retaining it, and knows if that responsibility changes.

6.1.1 Responsible Organization

An organization is responsible for long term product information retention if there is some legal, regulatory or contractual requirement on that organization for that information to be retained. The requirement to retain information may arise directly from the design, manufacture or disposal of the product, or from its usage (Notes 1 & 4).

6.1.2 Primary Responsibility

A responsible organization has a primary responsibility for product information retention if it is the organization which has control of the information, in the sense that it creates the information, initiates the approval process, initiates the submission process (to the repository), maintains the preservation plan for the information, and initiates the removal process (from the repository). In this sub-clause, initiating a process is its first stage during which requests and triggers, including those from other organizations, are assessed to see whether the process should start. (See also Note 7 under sub-clause 6.1.6)

6.1.3 Transfer of Primary Responsibility

An organization with primary responsibility (6.1.2) may, at any stage in the information lifecycle, transfer that responsibility to another organization (e.g. partner, customer, etc.) subject to the agreement of that organization and any relevant legal or regulatory, and provided that:

- The transferring organization confirms that the accepting organization has the ability to retain the information required by the designated communities;
- The transferring organization grants appropriate access and intellectual property rights to the information and any supporting information required to support its comprehension;
- The accepting organization agrees to provide the product information to an agreed set of designated communities, respecting any usage constraints that are place on the information. This agreed set of designated communities shall include all those communities foreseen as requiring access under the laws, regulations or contracts which created the retention obligation in the first place.

Note: Such transfers of responsibility may not in themselves relieve the organization of any legal or regulatory responsibility for data retention. See also Notes 6 and 8.

6.1.4 Secondary Responsibility

A responsible organization has secondary responsibility for all that product information which it has a legal, regulatory or contractual reason to ensure the retention of the information but for which it does not have primary responsibility.

For example, where an aircraft manufacturer applies for a type certificate, the manufacturer may have an obligation to ensure all the design data is preserved, including that for parts supplied by subcontractors. In practice, there will be an information supply chain which creates a chain of secondary responsibility from the prime contractor back to the organization with primary responsibility.

In creating a relationship with a supplier, the prime (the organization supplied) should identify the chain of responsibility and either:

- Ensure that the supplier is aware of and accepts primary responsibility for retention of the relevant product information, is competent to retain the product information, and that this is recorded by the prime, or
- Accepts and ensures transfer of primary responsibility for retention of relevant product information to itself (Note 5), or
- Ensures the transfer of primary responsibility for retention of relevant product information to an agreed third party.

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