BSI Standards Publication

Aerospace series — LOTAR LOng Term Archiving and Retrieval of digital technical product documentation such as 3D, CAD and PDM data

Part 013: Reference process description ''Archival Storage''

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National foreword

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Foreword

This document (EN 9300-013:2013) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2013, and conflicting national standards shall be withdrawn at the latest by July 2013.

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Introduction

This European Standard was prepared jointly by ASD-STAN and the PROSTEP iViP Association.

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.

Users should note that all standards undergo revision from time to time and that any reference made herein to any other standard implies its latest edition, unless otherwise stated.

1 Scope

This European Standard provides a detailed description for the recommended process of the Archival Information Package within the archive as overviewed in EN 9300-010. The main focus lies in the secure process, which implies the setting of digital signatures, disaster recovery and update of archive meta database.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 9300-003, *Aerospace series — LOTAR — LOng Term Archiving and Retrieval of digital technical product documentation such as 3D, CAD and PDM data — Part 003: Fundamentals and concepts*

EN 9300-007, *Aerospace series — LOTAR — LOng Term Archiving and Retrieval of digital technical product documentation such as 3D, CAD and PDM data — Part 007: Terms and References* [1]

EN 9300-010, *Aerospace series — LOTAR — LOng Term Archiving and Retrieval of digital technical product documentation such as 3D, CAD and PDM data — Part 010: Overview Data Flow* [1]

ISO 14721:2003, *Space data and information transfer systems — Open archival information system — Reference model [OAIS]*

3 Terms, definitions and abbreviations

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

4 Applicability

This EN 9300-013 is applicable to new 3-D product data records and may be applicable to existing 3D product data records, on current and earlier products, produced using previous regulations, standards and procedures. The current version is focused on product data as defined in the domain specific parts.

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[1] Published as ASD-STAN Prestandard at the date of publication of this standard (www.asd-stan.org).
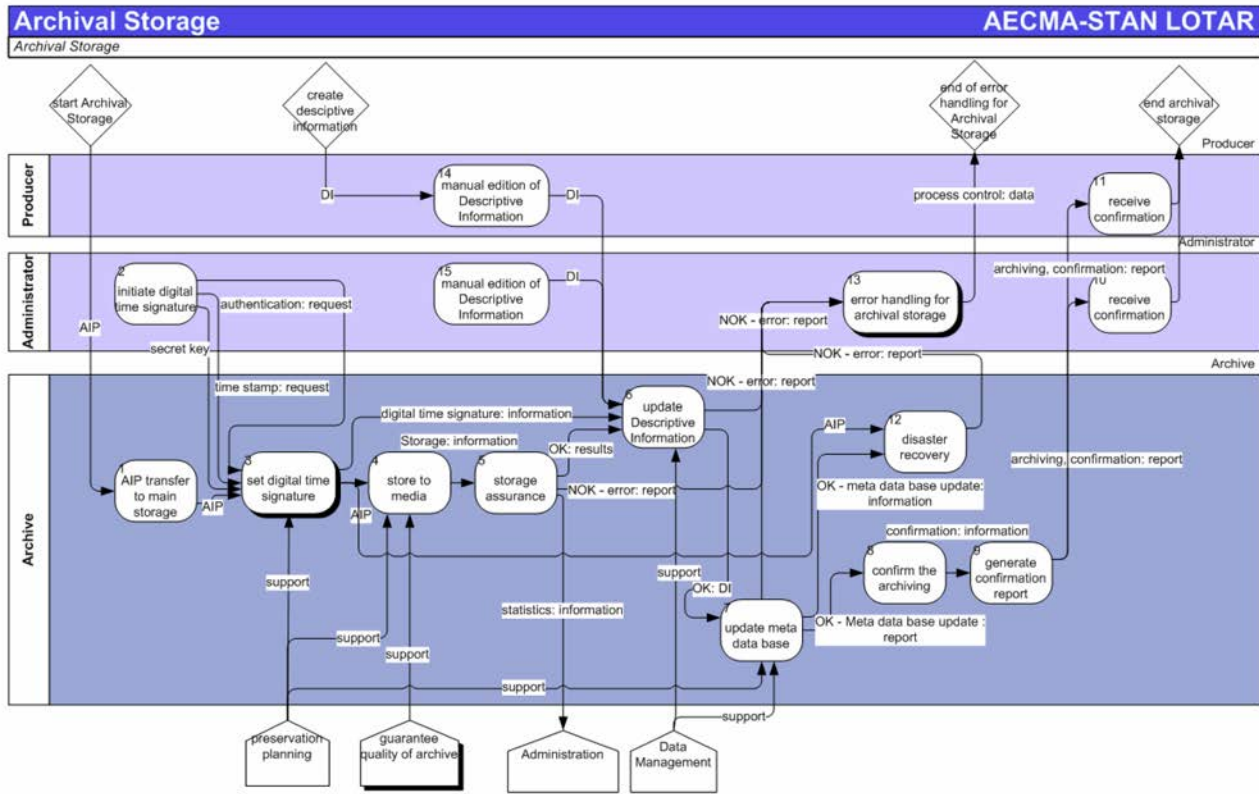
5   Archival storage

See Figure 1.

Figure 1 — Archival Storage

The process includes the setting of digital time signatures, generation of additional Descriptive Information (DI) for AIP´s (meta data for the archive), the physical storage of the data within the archive and error checking as well as the steps needed disaster recovery of the stored data. Each company should meet the general recommendations for an archive system and its security, as for example described in ISO 14721:2003 (OAIS). These general recommendations are out of scope. The sub process shall be certified.

Process Steps Store to Media, Storage assurance, Update meta-database and Disaster Recovery cover administrative aspects of the archive and its software. The steps are out of scope for the process description and this standard. They are shown for completeness.

If needed by the community, the preservation of the Descriptive Information of the Archive will be described in the recommended practices of the part 13.

Input data:

⎯ AIP

⎯ DI

Output data:

⎯ Process control data

6 Detailed process steps description

6.1 General

Input and output data described in this standard represent the minimal requirements for the fulfilment of the process steps. Additional data may be added, but must match at a minimum the requirements for the information package. (See EN 9300-003, Section 5.3.2.1 "Definition of the core model").

6.2 AIP transfer to main storage

The Archive transfers the AIP from the working environment to the physical storage environment.

Input data:

— AIP

Output data:

— AIP

6.3 Initiate digital time signature process

The administrator initiates the digital time signature process.

Output data:

— Request for authentication
— Request for time stamp
— Secret key

6.4 Set digital time signature

The archive sets a digital (time) signature according to the applicable digital signature law. This assures the data integrity, readability and exchangeability during the retention period, and may be used as evidence when identifying the provenance of the information.

NOTE   A digital time signature is any unique set of letters, characters, symbols or code attached to a digital document with the intention of identifying the sender. At the lower end of the e-signature security scale are formats such as email signatures and the simple attachment of signature images. Higher up the scale we find more secure formats such as pin numbers. At the upper end of the scale are formats using more complex technologies combining mathematical processes, encryption and controlled systems.

Input data:

— Request for authentication
— Request for time stamp
— Secret key
— AIP
— Support information

Output data:

— AIP
— Digital signature information

6.5   Store to media

The Archive stores the AIP physically onto a medium according to meet the requirements of long term archiving and the availability of the stored data.

Input data:

— AIP

— Support information

Output data:

— Storage information

6.6   Storage assurance

The storage assurance function validates the successful transfer of the AIP to the staging area. For digital submissions, these mechanisms might include Cyclic Redundancy Checks (CRCs) or checksums associated with each data file, or the use of system log files to record and identify any file transfer or media read/write errors.

Input data:

— Storage information

Output data:

— In any case:

    — Statistics

— If assurance is successful:

    — Results

— If assurance fails:

    — Error report

6.7   Update Descriptive Information

The archive updates the set of descriptive information regarding the storage assurance and digital time signature information.

Input data:

— Results

— Digital time signature information

— DI

Output data:

— If update is successful:

    — DI

— If update fails:

    — Error report

6.8   Update meta database

The archive generates a new entry within the archives meta database. The new entry contains the descriptive information, in addition for example, the reference information, which defines the storage location.

Input data:

⎯ DI

⎯ Support information

Output data:

⎯ If update is successful:

⎯ Meta database update report

⎯ Meta database update information (Including the Descriptive Information)

⎯ If update fails:

⎯ Error report

6.9   Confirm the archiving

The archive confirms the archiving process after the update of the meta database.

Input data:

⎯ Meta database update report

Output data:

⎯ Confirmation information

6.10 Generate confirmation report

The archive generates a confirmation report which includes the feedback information for the consumer/ administrator according to the archiving/removal procedures.

Input data:

⎯ Confirmation information

Output data:

⎯ Archiving confirmation report

6.11 Receive confirmation (by the administrator)

The administrator receives the archives confirmation report.

Input data:

⎯ Confirmation report (for archiving)

Output data:

6.12 Receive confirmation (by the producer)

The producer receives the archives confirmation report.

Input data:

— Confirmation report (for archiving)

Output data:

6.13 Disaster Recovery

The archive duplicates the AIP´s and stores the duplicate in a physically separate facility.

Input data:

— If disaster recovery is successful:

    — AIP

    — Meta database update information

Output data:

— If disaster recovery fails

    — Error report

6.14 Error handling for archival storage

Within this process the Administrator has to perform error fixing procedures for the storage of archiving information packages, the update of meta database and the preparation for disaster recovery.

Input data:

— Error report

Output data:

— Process control data

6.15 Manual edition of Descriptive Information (by the producer)

The Producer shall have the ability to edit and attach several descriptions to the AIPs. The additional Descriptive Information could be, for example, the end of production date for a product - this is not known at the date the data is stored.

Input data:

— DI

Output data:

— DI (completed by the producer)

6.16 Manual edition of Descriptive Information (by the administrator)

The Administrator shall have the possibility to edit and attach several Descriptive Information to the AIPs. The additional Descriptive Information could be, e.g., the end of production date for a product, which is not known at the date of the archival storage.

Output data:

— DI (revised by the administrator)

7 Support process steps

7.1 Preservation Planning

The process provides services and functions for monitoring the environment of the archive and recommendations to ensure that the information stored in the archive remains accessible to the consumer over the long term, even if the original computing environment becomes obsolete. Preservation Planning functions include developing recommendations for archive standards and policies and monitoring changes in the technology environment, archiving format and the addressed consumer.

Output data:

— Support information

7.2 Guarantee quality of archive

The process describes the common administrative procedures, which are necessary for maintaining the archive. The process starts after the physical archiving, and ends with the retrieval of archived data, that is, it is valid for the archiving period.

Output data:

— Support information

7.3 Administration

This Support Process represents the procedures of the Administration. The Administration is the organisation, which is responsible for the management of the archive and its daily operation. The role performs high-level processes, which supports the management and communication with the Producer/Consumer and the Management.

Input data:

— Statistics

7.4 Data Management

The Data Management (according to ISO 14721 – OAIS) is responsible for maintaining the integrity of the Data Management database, which contains both Descriptive Information and system information. The Data Management is responsible for creating any schema or table definitions required to support Data Management functions; for providing the capability to create, maintain and access customised user views of the contents of this storage; and for providing internal validation (e.g., referential integrity) of the contents of the database. A log describing the history of activity in the repository shall be archived. The Data Management is carried out in accordance with policies received from Administration.

Output data:

— Support information

8 Data descriptions

8.1 General

The descriptions here are informative; the definitions are found in the part EN 9300-007.

8.2 Involved roles

8.2.1 Archive

The Archive is the archiving system, which usual supports at least the key functions of an archiving architecture according to ISO 14721:2003 (OAIS). Key functions are administration, data management, archival storage, access control, preservation planning).

8.2.2 Producer

The producer is an organisation, person, or client system, which provides the information to be preserved. This can include other archives or internal archive personnel or system components. Typical roles of type "producer" may be. System Designers, Design Engineers, Subcontractors, Manufactures or Test Engineers.

8.2.3 Administrator

The Administrator is the role (organisation or person), which is responsible for the management of the archive and daily operation. The role performs actions such as access control, monitoring and error handling. The role is not directly involved in the archiving and retrieval processes. The role may not be responsible for the administration of further external tools like quality agents, the evolved TDM, CAx, PDM or Data Exchange applications.

8.3 Involved data

8.3.1 Archival Information Package (AIP)

The AIP consists of the following elements:

— Content Information (CI) (archiving formatted and optionally native formatted)

— Packaging Information (PI)

— Preservation Description Information (PDI) (Validation Properties, context information for the Content Information)

— Digital Signature Information

The Content Information is the set of information that the producer requires to retain and has all the qualities needed for permanent storage. Packaging information is the information that is used to bind and identify the components of an Information Package. Preservation Description Information is the information which is necessary for adequate preservation of the Content Information and which can be categorised as Provenance, Reference, Fixity, and Context information. Digital Signature Information is the information about authenticity (identify the signature-key-owner), data integrity and time stamp.

8.3.2 Content Information (CI)

The Content Information includes the set of information that is the original target of preservation.

8.3.3 Descriptive information (DI)

The set of information, consisting primarily of Package Descriptions, which is provided to Data Management to support the finding, ordering, and retrieving by Consumers of archived information holdings. The descriptive information will be extended with the storage information and additionally with reference information for the CAD model.

8.3.4 Digital time signature information

Information about authenticity (identify the signature-key-owner) and data integrity time stamp information. A digital signature is a sort of seal of digital data. It is produced by using mathematical algorithm with the help of a private cryptographic key. With the help of the associated public key the signature can be checked at any time to identify the signature-key-owner and to prove the integrity of the data. In addition, a time stamp is added to the digital signature and is stored within the signature.

8.3.5 Error report

Represents error information showing the kind of error occurring during relevant process steps.

8.3.6 Meta database update information

Meta database update information e.g. for new entries (AIP´s) within the archive or remove information for deleted Content Information.

8.3.7 Meta database update report

Report information about changed meta database update information.

8.3.8 Process control data

Control data for the relevant process steps, depends on the implemented system.

8.3.9 Request for authentication

Information for an inquiry within the set digital signature process, will be validated by the checker tool.

8.3.10 Request for time stamp

Information for an automatic inquiry within the set digital time signature process, which will be validated by the signature system.

8.3.11 Results

Information resulting from, for example, an analysis or check process.

8.3.12 Secret key

Provided by a trust centre. Represents one part of the Authentication information for the digital signature.

8.3.13 Storage information

Contains the information where at which place (e.g. onto which WORM or DVD) the AIP is stored physically.

8.3.14 Support information

General support information from, e.g., data management, this means additional rules and constrains for the process.

8.3.15 Confirmation Information

Contains the information that the relevant process was performed.

8.3.16 Confirmation Report

Gives the role the information that the relevant process was performed successfully.

8.3.17 Statistics Information

The Statistics includes information, which are necessary for a statistical analysis. Statistics include, for example, the amount of transferred data, number of archived AIP, number of accesses done by the consumer, etc. Statistics, where require, shall be recorded.

Bibliography

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[2]   P.P.S. Chen — *The Entity Relationship model - toward a unified view of data,* ACM Transactions on Database Systems 1, (March 1976)

[3]   VDA Recommendation 4956, *Product Data Exchange — Part 1: Assembly Data Exchange* (November 2002)

[4]   *Reference Model for an Open Archival Information System* (OAIS): *Foreword,* CCSDS 650.0-B-1, BLUE BOOK, January 2002

[5]   *STEP — Towards open systems,* STEP Fundamentals & Business Benefits, Dr. Kais Al- Timini, John Mac Krell, 1999, CIMdata

[6]   [BooRumJac99] — Booch, G. Rumbaugh, J. Jacobson, I. *The Unified Modeling Language, User Guide*, Addison-Wesley, 1999

[7]   **BGB:** Bürgerliches Gesetz Buch — German civil code

[8]   **European Union Directive 99/93/EG:** The directive is a common and comparable pan-European standard for offering and using <u>electronic</u> signature proceedings shall be established.

[9]   **European Union Directive 98/37/EC:** The directive is a common and comparable pan-European standard which means that no machine can be placed on the EU single market or installed if it does not bear the CE Marking.

[10]   **IDEF0:** is a method designed to model the decisions, actions, and activities of an organisation or system. IDEF0 was derived from a well-established graphical language, the Structured Analysis and Design Technique (SADT), introduced by Douglas T. Ross in the early 1970s. — (David A. Marca and Clement L. McGowan, SADT: *Structured Analysis and Design Techniques.* McGraw-Hill, New York, NY, 1988.)

[11]   JAR 21, *Certification procedures for aircraft and related products and parts*

[12]   **Unified Modelling Language, v1.4:** UML (Unified Modeling Language) represents an OMG (Object Management Group) standard for visual object oriented modeling. Introduced 1997 it became the standard modeling language for software development. UML consists of different diagram types (Class-, Object-, Statechart-, Activity-, Sequence-, Collaboration-, Use-Case-, and Component Diagram), and each diagram shows a specific static or dynamic aspect of a system [BooRumJac99].

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