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Space data and information transfer systems — Producer-Archive Interface Specification (PAIS)

Systèmes de transfert des informations et données spatiales — Spécification de l'interface entre producteur et archives (PAIS)

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The Consultative Committee for Space Data Systems

Recommendation for Space Data System Standards

PRODUCER-ARCHIVE INTERFACE SPECIFICATION (PAIS)

RECOMMENDED STANDARD

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FOREWORD

This Recommended Standard is a technical Recommendation providing the abstract syntax and an XML implementation of descriptions of data to be sent to an archive. These descriptions are negotiated agreements between the data Producer and the Archive that facilitate production of agreed data by the Producer and validation of received data by the Archive. This Recommended Standard includes an abstract syntax for describing how these data will be aggregated into packages for transmission and one concrete implementation for the packages based on the XML Formatted Data Unit (XFDU) standard (see reference [1]). This will fulfill parts of the process defined in the *Producer Archive Ingest Methodology Abstract Standard (PAIMAS)* (see reference [2]).

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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this Recommended Standard is to provide a standard method for formally defining the digital information objects to be transferred by an information Producer to an Archive and for effectively packaging these objects in the form of **Submission Information Packages (SIPs).** This supports effective transfer and validation of SIP data.

This Recommended Standard fits into the context defined by:

– The *Reference Model for an Open Archival Information System (OAIS)* Recommended Standard (see reference [3]).

– The *Producer-Archive Interface Methodology Abstract Standard* (PAIMAS) Recommended Standard (see reference [2]).

– The *XML Formatted Data Unit (XFDU) Structure and Construction Rules* Recommended Standard (see reference [1]).

The PAIMAS Recommended Standard (see reference [2]) defines a methodology based on the four following phases: Preliminary, Formal Definition, Transfer, Validation.

This Recommended Standard applies specifically to the implementation of the main part of the Formal Definition Phase and the Transfer Phase, taking into account part of the Validation Phase.

The proposed implementation should help in the automation and management of the Transfer and Validation Phases.

The proposed implementation may also be used, to some extent, for the Preliminary Phase.

This Recommended Standard does not exclude other PAIMAS implementation Recommended Standards.

1.2 APPLICABILITY

The implementation defined in this document applies to any **Producer-Archive Project**. It is specifically applicable to those organizations and individuals who create information that may need Long-Term Preservation and to organizations making information available for the Long Term.

This application is relevant only if both partners in the Producer-Archive Project agree with a shared implementation as defined in this document.

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1.3 RATIONALE

This Recommended Standard aims at overcoming significant difficulties encountered during transactions between information Producers and the Archives.

Regarding the Formal Definition Phase, this Recommended Standard should enable:

– the Producer to share with the Archive a sufficiently precise, unambiguous definition of the different Digital Objects to be produced and transferred, including possibly the order in which they should be transferred;

– the Archive to ensure there is sufficient information to process the Digital Objects which will be received.

Regarding the Transfer Phase, this Recommended Standard should enable a precise definition of the SIPs to be exchanged.

Regarding the Validation Phase, this Recommended Standard should enable the use of tools for systematically validating that the Digital Objects received are those expected, and that they conform to the level of detail previously agreed.

1.4 CONFORMANCE

An xml implementation is considered ‘Description Conformant’ if it conforms to the corresponding semantics and implementation specifications defined in sections 3 and 4.

A concrete SIP implementation is considered ‘Abstract SIP Conformant’ if it conforms to the semantic specification of section 5.

A concrete SIP implementation is considered ‘XFDU PAIS SIP Conformant’ if it conforms to the semantic specification of section 5 and the implementation specification of section 6.

Concrete SIP implementations in formats other than XFDU are allowed. They will not be considered ‘XFDU PAIS SIP Conformant’, but they could be ‘Abstract SIP Conformant’. It is possible that additional concrete PAIS SIP implementations may be standardized in the future.

1.5 DOCUMENT STRUCTURE

1.5.1 HOW TO READ THIS DOCUMENT

All readers should study subsections 1.1 (Purpose and Scope), 1.2 (Applicability), and 1.4 (Conformance) in order to understand the objectives and applicability of this Recommended Standard.

Readers seeking an overview of the specification should also read section 2 (Overview).

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Those who will implement the specification should read the entire document.

NOTE – A working knowledge of the concepts defined in the PAIMAS (reference [2]), and of the XFDU structure and construction rules (reference [1]) may be helpful in order to understand this Recommended Standard.

1.5.2 ORGANIZATION BY SECTION

Section 0 defines the purpose, scope, applicability, rationale and definitions for terminology used in this Recommended Standard. It also specifies what is required for conformance to this standard.

Section 2 contains a general overview of the specification. This overview describes the general framework of the PAIS using terms and concepts from reference [2]. It addresses a formal description of the Data Objects for transfer and the creation and validation of the SIPs containing those Data Objects.

Section 3 analyzes in detail the model of the Data Objects to be transferred by the Producer to the Archive. These Data Objects are organized into collections and Transfer Objects that are described in detail. Each description is divided into an abstract view, followed by the implementation view (partial schemas).

Section 4 describes the two different constraints that apply to the SIPs. The first one specifies the content authorized for each type of SIP. The second one specifies, if necessary, in which order the SIPs must be delivered. Each part is divided into an abstract view, followed by the implementation view (partial schemas).

Section 5 describes in detail the different SIP organizing entities, called containers.

Section 6 specifies a concrete SIP implementation using the XFDU (reference [1], partial schemas), and explains how it maps to the XFDU XML schema.

The annexes listed here are normative or informative:

- Annex A contains the full XML schemas for this specification and is normative. XML schema diagrams are presented throughout other sections of the book. If an XML schema diagram differs from the schema, the schema is considered to be the ruling entity.
- Annex B is a legend for symbols for the XML Authority Diagrams that appears in sections 3 to 6 of this document and is informative.
- Annex C contains the informative references.
- Annex D provides a table showing the management of the different identifiers defined in this document and is informative.

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– Annex E discusses Security, Space Assigned Numbers Authority (SANA), and Patent Considerations and is informative.

– Annex F provides an example SIP, with Descriptors, and the mapping of the SIP to the XFDU, and is informative.

1.6 DEFINITIONS

1.6.1 ACRONYMS AND ABBREVIATIONS

This subsection defines the acronyms and abbreviations which are used throughout this Recommended Standard:

AIP	Archival Information Package
CCSDS	Consultative Committee for Space Data Systems
CCSDS CA	CCSDS Control Authority
CRC	Cyclic Redundancy Check
DED	Data Entity Dictionary
DTD	Document Type Definition
FTP	File Transfer Protocol
GB	Gigabyte
ID	Identifier
IETF	Internet Engineering Task Force
ISO	International Organization for Standardization
KB	Kilobyte
MB	Megabyte
MIME	Multipurpose Internet Mail Extensions
MOT	Model of Objects for Transfer
OAIS	Open Archival Information System
PAIMAS	Producer Archive Interface Methodology Abstract Standard
PAIS	Producer-Archive Interface Specification
PB	Petabyte
SIP	Submission Information Package
TB	Terabyte
TOTD	Transfer Object Type Descriptor
URL	Universal Resource Locator
XFDU	XML Formatted Data Unit
XML	eXtensible Markup Language

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