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Information and documentation — Data exchange protocol for interoperability and preservation

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National foreword

This British Standard is the UK implementation of ISO 20614:2017.

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INTERNATIONAL STANDARD

ISO 20614

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Information and documentation — Data exchange protocol for interoperability and preservation

Information et documentation — Protocole d'échange de données pour l'interopérabilité et la préservation

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 46, *Information and documentation*, Subcommittee SC 4, *Technical interoperability*.

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Introduction

The Data Exchange Protocol for Interoperability and Preservation (DEPIP) aims at facilitating interoperability between a digital archive and information systems of its partners: producers who have created the documents themselves (Originating Agency), intermediaries who are acting on behalf of producers and are not responsible for the intellectual content per se (Transferring Agency), consumers (Consumer) and control authorities (Control Authority). This document provides a framework for data exchange between systems. It is based on the OAIS Reference model. It is generic and may be adapted to all types of information, whether printed or in a born-digital format.

DEPIP is intended for:

— commercial software vendors, in order to complete and/or improve their applications;

— archives, in order to standardize ingest of data destined for preservation; to provide access to archived data; and to facilitate the exchange of data between archives;

— application programmers, in order to enable interoperable data transactions between Archives and the information systems they are developing;

— third parties responsible for transferring documents to Archives;

— data storage service suppliers.

The parties to data exchange may rely on this document to:

— define their archiving/preservation processes or harmonize their existing processes with the best practices;

— organize the management of the archiving/preservation processes; and

— control the creation and management of metadata, whatever descriptive models are used.

Note that DEPIP may be implemented either in its entirety or only partially. However, it is impossible to foresee what the implementations will be like in different domains such as libraries, archives or museums. Domain-specific or generic International Standardized Profiles specifying different levels of interoperability may be developed in the future to support the implementers of this document. The minimum implementation, or level 0, is: Transfer and Delivery, including at least mandatory metadata. Note that in level 0, existing metadata is not redefined and that the initial request and the final reply are required.

Note that DEPIP is a conceptual standard to be considered as a data dictionary. The model defined in DEPIP is independent of implementation issues. In different implementations, DEPIP can be supplemented by relevant technical protocols (like HTTP) allowing implementers to handle technical exchanges between systems.

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Information and documentation — Data exchange protocol for interoperability and preservation

1 Scope

DEPIP specifies a standardized framework for the various data (including both data and related metadata) exchange transactions between an archive and its producers and consumers. Interchanges between archives (including archives integrated in organizations, public archives, storage service suppliers) are also considered. This document defines five transactions (Transfer, Deliver, Dispose, Modify and Restitute), which the partners can use to exchange Data Objects. It also specifies the syntax and semantics of the messages that are exchanged during these transactions.

Internal organization of the information systems of the partners is excluded. Information received in conformance with the data exchange model is intended to be handled by various software components. These applications, however, are not the object of this document. The impacts of major risks (for instance, disappearance or incapacitation of the producer of the data) are also excluded.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
Access
transmission of information by an *Archive* (3.2) to a *Consumer* (3.5), with the authorization, if required, of the *Originating Agency* (3.11) and of the relevant *Control Authority* (3.6)

3.2
Archive
organization that intends to preserve information for *Access* (3.1) and use by a designated community in accordance with the current legal, regulatory or contractual conditions

Note 1 to entry: The DEPIP Archive is not fully equivalent to the OAIS Archive as the latter does not check the compliance with the contractual conditions.

Note 2 to entry: The DEPIP Archive is not necessarily the same as an archive in a traditional sense in which legal custody is permanently transferred. It may temporarily offer preservation services for content, in accordance with a legal agreement that has a set time frame. At the end of that time frame, or in accordance with some other stipulation of the legal agreement that would permit it, the *Data Objects* (3.7) that had been transferred to the archive could be returned to the *Originating Agency* (3.11) or a third party appointed by it.

3.3
Binary Data Object
digital item which contains information, for instance, an electronic file, i.e. a named and ordered sequence of bytes that the file system of an operating system may handle as a unit

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3.4
Business Identifier
identifier used to identify the *Archive* (3.2) and its partners, messages, *Submission Agreements* (3.18), etc.

3.5
Consumer
individual or organization wishing to consult information kept by the *Archive* (3.2) in accordance with the current legal, regulatory or contractual conditions

3.6
Control Authority
internal or external individual or organization that, if applicable, may authorize the delivery or the disposal of information held by an *Archive* (3.2)

Note 1 to entry: Control Authority is partially equivalent to the OAIS management (like management, it may be external to the archive), but it has narrower role than management in that Control Authority is only interested in legal or regulatory compliance.

3.7
Data Object
either a digital (sequence of bits) or a physical object which is to be preserved, and technical metadata (representation information, integrity information and identification information)

3.8
Disposal notification
notification by an *Archive* (3.2) to an *Originating Agency* (3.11) of information disposal

3.9
Disposition rule
information required to manage the data lifecycle to indicate a retention period, beyond which *Data Objects* (3.7) shall be disposed or preserved

3.10
Modification notification
notification by an *Archive* (3.2) to an *Originating Agency* (3.11) of the modifications made to the submitted and/or archived *Data Objects* (3.7)

Note 1 to entry: These modifications may be necessary during the ingest or later to ensure proper storage of information (e.g. changing the file format, or adding, correcting or updating representation information or preservation description information).

3.11
Originating Agency
individual or organization that made or received the information within the context of its activities

Note 1 to entry: It is often the producer in the OAIS model.

Note 2 to entry: The Originating Agency may act as a *Transferring Agency* (3.20) or may use a Transferring Agency as an intermediary for sending data to the *Archive* (3.2).

3.12
Physical Data Object
physical item which contains information, for instance, a file, a box, a CD-ROM, etc.

3.13
Preservation
combination of policies, strategies and actions developed by the *Archive* (3.2) to ensure that digital information of continuing value remains accessible and usable

3.14
Preservation profile
adjustment of the descriptive model based on the types of exchanged *Data Objects* (3.7)

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3.15
Restitution
transfer of information by an *Archive* (3.2) to an *Originating Agency* (3.11) in order to shift back to the Originating Agency the responsibility for data retention

Note 1 to entry: This transaction is partially equivalent to the OAIS functional entities archival storage and access.

3.16
Rights metadata
metadata concerned with the limitations and restrictions regarding the access to and use of data commonly including elements such as copyright status, use restrictions and information about licensing agreements

3.17
Service Level
quality of the services provided by the *Archive* (3.2) to its partners and planned by the *Submission Agreement* (3.17), including secure preservation, guarantee of the integrity of the stored data, availability rate, etc.

3.18
Submission Agreement
agreement or regulation used as a framework for the relationships between the *Archive* (3.2) and its partners

Note 1 to entry: In order to facilitate DEPIP implementation, an agreement should describe at least the following:

— international standardized profile(s) supported (if any);

— the types of transactions (transfer, deliver, modify, dispose and restitute) supported, specifying, when necessary, whether a preliminary authorization of the Control Authority is required;

— the list of individuals or organizations involved, their roles and responsibilities in these transactions;

— the selected code lists and models to be used during these transactions;

— Preservation profiles (i.e. rules for creating descriptive metadata according to the type of documents or applications being preserved) including: Service Levels, access and Disposition rules and information about how the terms in the original agreement may have evolved.

Note 2 to entry: Details concerning data transactions may be incorporated in the Submission Agreement. It is also possible to create a separate agreement (complementing the Submission Agreement), which provides the required technical information. In DEPIP, it is assumed that everything is included in a Submission Agreement.

3.19
Transfer
submission of submission information packages or SIPs by a *Transferring Agency* (3.20) to an *Archive* (3.2) in order to hand over the responsibility for preservation

Note 1 to entry: This transaction is equivalent to the OAIS ingest functional entity.

3.20
Transferring Agency
individual or organization that submits submission information packages (SIPs) to an *Archive* (3.2) but does not own the Data Objects submitted

Note 1 to entry: In the OAIS model, the term “producers” has a narrower meaning (people, or more likely, the organizations, which provide the objects to be archived). From an OAIS point of view, a Transferring Agency is a kind of producer, who is acting on behalf of third parties and is not responsible for the content per se, but may have responsibility for creating the Submission Information Packages (SIPs).

Note 2 to entry: A Transferring Agency could sometimes also be the *Originating Agency* (3.11). In that scenario, it is the owner of the Data Objects it is transferring, and it also has the responsibility for creating the submission information packages (SIPs).

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4 Context

4.1 Roles played by individuals or organizations involved in transactions

The following are the principal roles in the DEPIP context (defined in Clause 3): Archive, Transferring Agency, Originating Agency, Control Authority and Consumer.

NOTE Three roles identified in DEPIP are not directly part of the basic OAIS model (Control Authority, Transferring Agency and Originating Agency) but may be seen as aspects of OAIS Producer and Management.

4.2 Types of transactions

The transactions described in detail in Clause 5 are:

— Transfer: Transfer of information by a Transferring Agency to an Archive in order to hand over the responsibility for preservation. The Transfer may be preceded by a Transfer Request for agreement;

— Deliver: Delivery of information by an Archive to a Consumer, with the authorization, if required, of the Originating Agency and/or of a Control Authority;

— Modify: Notification by an Archive to an Originating Agency to inform it that the transferred information has been modified. These modifications may be necessary in order to ensure proper storage of information (e.g. changing the file format). Note that the entire activity of modification as would be undertaken by an Archive would comprise many more steps than merely a notification being sent, but the scope of "Modify" as focused here is merely the notification;

— Dispose: Notification by an Archive to an Originating Agency to inform it that the requested information has been disposed of. The disposal may be preceded, if applicable, by a Disposal request to the Control Authority and by an Authorization request to the Originating Agency. Note that the entire activity of disposition as would be undertaken by an Archive would comprise many more steps than merely a notification being sent, but the scope of "Dispose" as focused here is merely the notification;

— Restitute: Transfer of information from an Archive to the Originating Agency for the purpose of returning the responsibility for preservation to the Originating Agency. Restitution should not be confused with data recovery, that is to say, the full Restitution of the relevant information in a reusable way and as contracted.

4.3 Exchanged objects

4.3.1 General

The objects exchanged during DEPIP transactions are Data Objects (including technical metadata) accompanied by descriptive and administrative metadata. Since DEPIP is based on OAIS, technical metadata relates to structural metadata (representation information) and is considered as part of the Data Object, while descriptive and administrative metadata is left open and is only accompanying information. The types of these objects (indicated in brackets) and the cardinality of their components are presented in class diagrams.

4.3.2 Exchanged Object packages (DataObjectPackageType)

4.3.2.1 General

A package of Data Objects (DataObjectPackageType) is composed of a set of Data Objects accompanied by descriptive and administrative metadata.

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4.3.2.2 Data Objects (BinaryDataObjectType and PhysicalDataObjectType)

A Data Object is either a digital (sequence of bits) or a physical object which is to be preserved, containing technical metadata, i.e. representation information (for instance, format), integrity information (for instance, hash code) and identification information (for instance, identifier).

This document makes a distinction between:

— Binary Data Objects (BinaryDataObjectType): for instance, an electronic file, i.e. a named and ordered sequence of bytes that the file system of an operating system may handle as a unit;

— Physical Data Objects (PhysicalDataObjectType): for instance, a file, a box, a CD-ROM, etc.

A Binary Data Object may be characterized by its format (e.g. "PDF 1.4"), its encoding (e.g. "UTF-8" for a text file) and its size (in bytes). The digital content may be physically included (encapsulated) within a message, or it may be bound by a reference (e.g. a file name).

The decision to either encapsulate digital content in the information package or to leave it outside of the package is implementation-specific. The decision may be based on criteria such as the size of the Data Object.

A Data Object on a physical medium (e.g. paper document or analogue recording) is characterized by specific technical metadata. The main related metadata elements are its size (number of folders, boxes, linear meters, etc.) and its medium or container using its technical identifier and/or its storage location.

4.3.3 Administrative metadata of exchanged Data Objects (AdministrativeMetadataType)

Administrative metadata applies to all the Data Objects in a SIP package and includes the following information:

— Submission Agreement;

— Preservation profile;

— Service Level;

— Rights metadata;

— Disposition rule.

NOTE Rights metadata is bound to the Data Object. It is controlled by the Control Authority, but it is not held by it.

4.3.4 Descriptive metadata of the exchanged Data Objects (DescriptiveMetadataType)

Descriptive metadata includes information related to the Data Objects (data origin, description, date, keywords, etc.). Descriptive metadata should apply to all Data Objects in a SIP. Descriptive metadata may be based on different metadata formats, depending on the domain (e.g. MARC 21 in libraries, EAD in archives, ONIX for book trade, and so on).

5 Modelling

5.1 General

The model used for description of transactions is Unified Modeling Language (UML). Three types of diagrams are used.

— The use case diagrams provide an overview of the system by representing the individuals or organizations involved and their actions on the system.

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— The sequence diagrams include each use case and provide a temporal representation of the progress of each transaction. These diagrams represent the scenarios involving the Archive and its partners.

— The class diagrams are used to define the set of elements and their properties used in different transactions.

5.2 Use case diagrams

5.2.1 General

Five transactions may occur between the Archive and its partners: Transfer, Deliver, Modify, Dispose and Restitute. These transactions are shown in Figure 1.

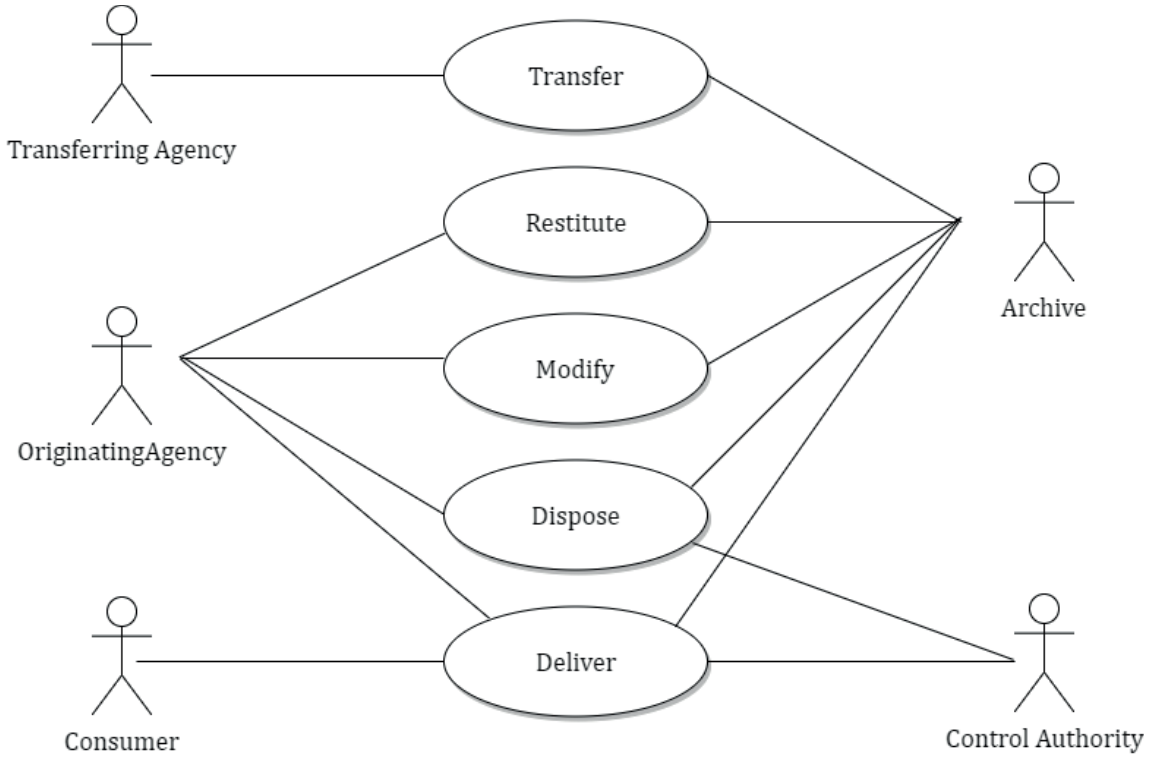

Figure 1 — General use case diagram

5.2.2 Transfer

During Transfer, the Transferring Agency should transmit to the Archive the following information:

— information concerning the transfer itself (identification of the Transferring Agency and of the Archive, date of sending the message);

— management information (identification of the Submission Agreement between these two parties);

— information on the Data Objects to be preserved (administrative and descriptive metadata).

If they are digital, the Data Objects themselves may be joined to the message. After the transfer, in case of an acceptance by the Archive, it is its responsibility to retain the transferred information. The Submission Agreement shall specify whether there is also a transfer of responsibility.

The Transfer may be preceded by a Transfer request for agreement that allows the Transferring Agency to check with the Archive that the planned transfer is acceptable by sending, for instance, only the metadata for authorization. Figure 2 shows the Transfer preceded by a Transfer request.

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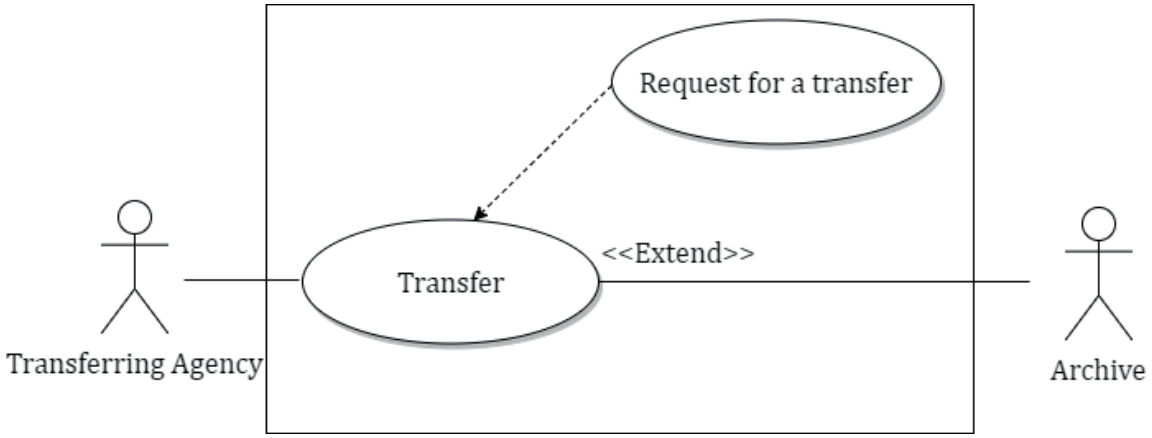

Figure 2 — Use case diagram: Transfer

5.2.3 Deliver

A request to deliver a preserved Data Object may be sent by the Originating Agency or, more indirectly, from any person with an interest in consulting the Data Object (i.e. a Consumer) for administrative, legal, litigious or historical reasons. The Originating Agency may always access the Data Objects it has submitted and which have been archived unless legal, regulatory or contractual exceptions requiring authorization of the Control Authority exist.

NOTE 1 Authorization from the Control Authority shall be requested for the delivery of personal data. Once the retention periods defined for the initial purpose of the processing have expired, they are no longer of use for their initial purpose. The Authorization request also applies to the Originating Agency.

NOTE 2 If the Consumer is the Originating Agency, the authorization from the Originating Agency is considered tacit.

Consumers may need an authorization from the Originating Agency, the Archive and/or from the Control Authority because of legal, regulatory or contractual conditions.

Figure 3 shows the Delivery preceded by authorization requests sent to the Originating Agency or to the Control Authority.

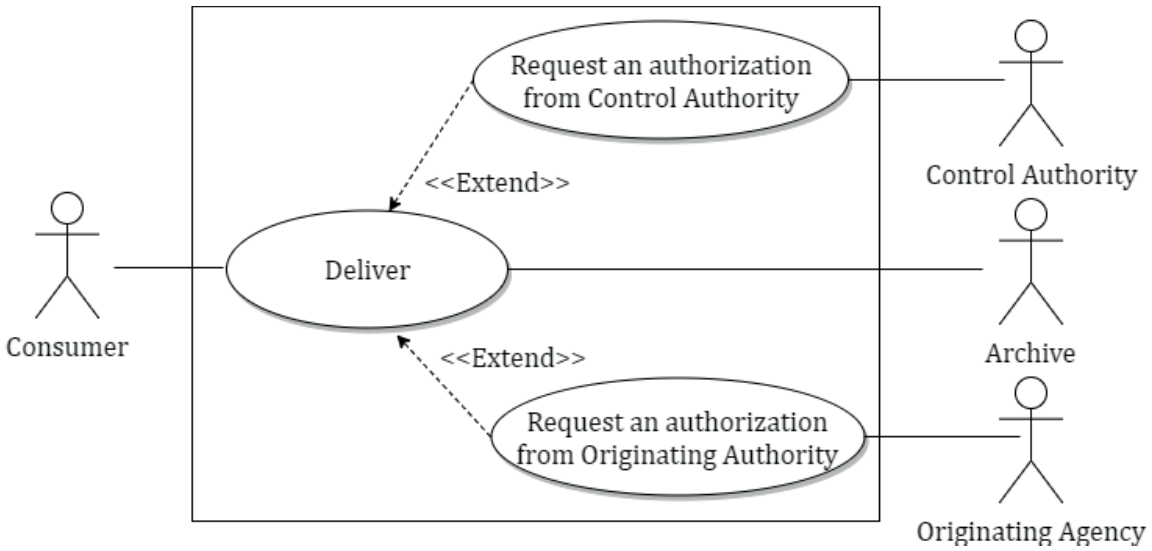

Figure 3 — Use case diagram: Deliver

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5.2.4 Modify

The Archive shall maintain, in accordance with the Submission Agreement, a list of authorized modification operations, such as:

— modification of metadata;

— migration of Data Objects (format conversion in case of obsolescence of the format in which the data has been submitted);

— notification [this transaction allows the Archive to send a Dissemination Information Package (DIP) containing the migrated Data Objects and modified metadata to the Originating Agency].

When the Archive has migrated the preserved Data Objects, or modified the associated metadata, the Archive shall inform the Originating Agency about the changes. Figure 4 shows the notification of the modification operations.

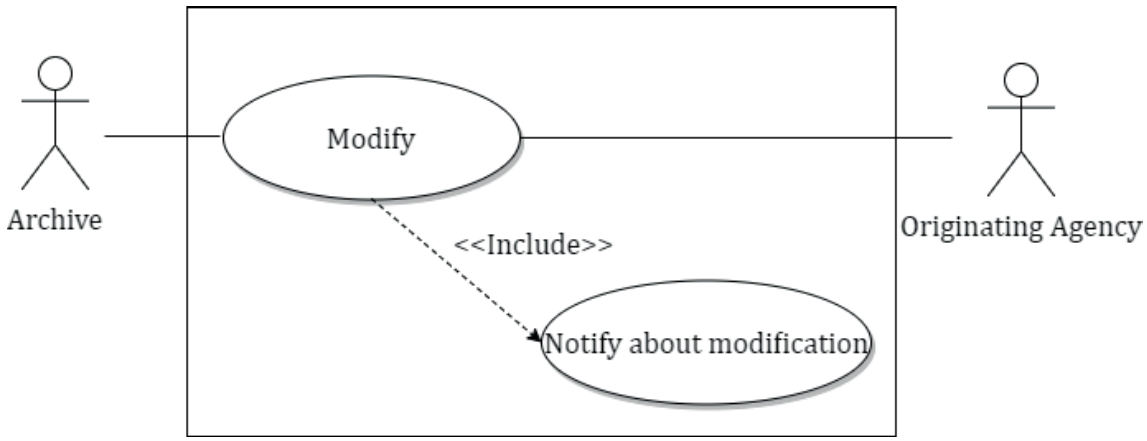

Figure 4 — Use case diagram: Modify

5.2.5 Dispose

The Disposal procedure applies when an Archive disposes of Data Objects whose retention period has expired. Disposal is usually based either on the Submission Agreement or a separate transaction process agreement. The Archive may still check if the Originating Agency wants the data to be deleted before proceeding with the disposal[1)] . An authorization from the Control Authority may also, according to the current legal, regulatory or contractual framework, be required.

Figure 5 shows the Disposal notification, preceded by the Authorization request sent to the Originating Agency and eventually to the Control Authority.

1) See ISO 14641-1 for instance.

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