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Information and documentation — Digital records conversion and migration process

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National foreword

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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 46, *Information and documentation*, Subcommittee SC 11, *Archives/records management*.

This second edition cancels and replaces the first edition (ISO 13008:2012), which has been technically revised.

The main changes are as follows:

— the terms and definitions have been updated;

— additional drivers for conversion/migration have been added;

— conversion and migration requirements have been clarified;

— the Bibliography has been updated.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

This document provides guidance for the conversion of records from one format to another and the migration of records from one hardware or software configuration to another. It contains applicable records management requirements, the organizational and business framework for conducting the conversion and migration process, technology planning issues, and monitoring/controls for the process. It also identifies the steps, components and particular methodologies for each of these processes, covering such topics as workflow, testing, version control and validation.

Due to the rapid pace of technological change, and digital preservation requirements, many records in digital form will, at some point, need to be converted from one format to another, or migrated from one system to another to ensure their continued accessibility and processability.

This is not to suggest that conversion and migration are the only approaches to preserving digital records. Other methods, such as emulation, do exist or are under development. Conversion and migration are, however, two of the more prevalent methods of digital preservation. While this document does not address digital preservation per se, the conversion and migration processes can have an impact on a digital preservation strategy. How an organization chooses to set up the conversion and migration processes (which format to employ, the level of control needed and so on) largely influences its view of the record. There is no single, one-size-fits-all preservation method. However, institutions recognize the benefit of standardized procedures; many test beds and task forces have been established to explore and research conversion, migration, emulation and refreshment, among other preservation procedures, to determine what works best.

Conversion and migration represent separate approaches to preserving digital records. It is important to implement them in a managed way to prevent any degradation or loss in the authenticity, reliability, integrity and usability of the records, thus ensuring an "authoritative record" as described in ISO 15489-1:2016, 5.2.2. This document outlines the program components, planning issues, records management requirements and procedures for performing the conversion and migration of digital records so as to preserve their authenticity, reliability, integrity and usability so that they continue to act as evidence of business transactions. In cases where conversion and migration are carried out at the same time, all requirements and guidance in this document apply.

From the outset, note that it is not necessary to adopt all of the procedures recommended in this document to ensure that records management requirements are met. The decision regarding which procedures to adopt depends on such factors as the type of conversion or migration to be performed and the level of risk the organization is willing to accept. In addition, organizations would be well advised to incorporate future planning for further conversion and/or migration of records among requirements for electronic document and records management systems (EDRMS)".

Before starting a conversion or migration project, individuals designated as "key" to the process need to be aware of records management requirements. The term "records management criteria/requirements" in records and information management means an adherence to a set of principles that relate to record integrity, authenticity, reliability and usability and, where appropriate, compliance with relevant legal and regulatory requirements. Adherence to these principles ensures that record content, context and structure are maintained and that a given record's standing as evidence of business activity is not compromised. The principles apply regardless of how long the record is retained.

This document is applicable for both ad hoc conversion or migration projects as well as programs for regular and ongoing conversion or migration.

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Information and documentation — Digital records conversion and migration process

1 Scope

This document specifies the planning issues, requirements and procedures for the conversion and/or migration of digital records in order to preserve the authenticity, reliability, integrity and usability of such records as evidence of business functions, processes, activities and transactions.

These procedures do not comprehensively cover:

— backup systems;

— preservation of digital records;

— functionality of trusted digital repositories;

— the process of converting analogue formats to digital formats and vice versa.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 30300, *Information and documentation — Records management — Core concepts and vocabulary*

3 Terms and definition

For the purposes of this document, the terms and definitions given in ISO 30300 and the following apply.

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

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

— IEC Electropedia: available at https://www.electropedia.org'

3.1
access
right, opportunity, means of finding, using, or retrieving information

[SOURCE: ISO 5127: 2017, 3.11.1.01]

3.2
attribute
characteristic of an object or entity

Note 1 to entry: Adapted from ISO/IEC 11179-3:2003.

[SOURCE: ISO 23081-1:2017, 3.3]

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3.3
content information
set of information that is the original target of preservation or that includes part or all of that information

[SOURCE: ISO 19165-1:2018, 3.6]

3.4
data cleansing
process used to improve data quality by detecting and correcting (or removing) defects and errors in data

[SOURCE: ISO 5127:2017, 3.1.11.21]

3.5
data object
discrete data, considered as a unit, representing an instance of a data structure that is known or assumed to be known

[SOURCE: ISO/IEC 2382:2015, 2121425]

3.6
emulation
recreation of the functionality and behaviour of an obsolete digital system, using software (called emulator) on current computer systems

Note 1 to entry: Emulation is a key digital preservation strategy.

[SOURCE: ISO 5127:2017, 3.12.1.20]

3.7
encryption
(reversible) transformation of data by a cryptographic algorithm to produce ciphertext, i.e. to hide the information content of the data

[SOURCE: ISO/IEC 18033-6:2019, 3.8]

3.8
file format
encoding of a file type that can be rendered or interpreted in a consistent, expected and meaningful way through the intervention of a particular piece of software or hardware which has been designed to handle that format

Note 1 to entry: A file may (or may not) be a container containing zero or more files of various formats. File formats may be defined by a specification, or by a reference software system. Many file formats exist in forms with minor variations and many also in more than one version. Typing of file formats should be interpreted generously rather than strictly, but sufficiently precisely to distinguish versions where such distinctions have significant interpretive consequences.

[SOURCE: PRONOM Vocabulary Specification, The National Archives UK, 2011]

3.9
migration
process of moving records from one hardware or software configuration to another without changing the format

3.10
originating
initial manifestation of something

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3.11
preservation
measures taken to maintain the useability, authenticity, reliability and integrity of records over time

Note 1 to entry: Measures include principles, policies, rules, strategies, processes and operations.

[SOURCE: ISO 30300:2020, 3.4.11]

3.12
refreshment
digital migration where the effect is to replace a media instance with a copy that is sufficiently exact that all archival storage hardware and software continues to run as before

[SOURCE: ISO 19165-1:2018, 3.31]

3.13
replication
digital migration where there is no change to the packaging information, the content information, and the preservation description information

Note 1 to entry: The bits used to represent these information objects are preserved in the transfer to the same or new media instance.

Note 2 to entry: Adapted from ISO 14721:2012.

3.14
representation information
information that maps a data object into more meaningful concepts

[SOURCE: ISO 19165-1:2018, 3.34, modified — Examples have been omitted.]

3.15
source record
document or record that has been copied, converted or migrated or will be the input for such a process

Note 1 to entry: Adapted from ISO/TR 13028:2010, 3.8

3.16
validation
process of evaluating a system or component to ensure compliance with the functional, performance and interface requirements

[SOURCE: ISO/IEC 14776-121:2010, 3.1.108]

4 Organizational and business framework

4.1 General

This clause addresses the drivers that often prompt the need for the conversion or migration of digital records, the issues that organizations should consider when evaluating the need for conversion or migration of their records, and the steps taken in developing a conversion and migration program. It discusses the decision making and resource allocation associated with the conversion or migration within the organizational framework, as well as the technical infrastructure that supports the conversion and migration processes and which should be used to ensure the records' authenticity and integrity for as long as they are needed.

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4.2 Conversion and migration drivers

4.2.1 General

A variety of drivers can compel an organization to convert or migrate its digital records. Some records have longer retention requirements than a software application or storage medium can sustain, prompting organizations to convert or migrate their records while supporting systems are still viable. Some records might need to be converted or migrated because the corresponding media becomes contaminated. Organizations might also choose to convert or migrate records proactively on the basis of operational factors relating to record volume, access, storage efficiency, business and technology cycles, or organizational change (such as outsourcing, mergers or acquisitions). In addition, organizations might be compelled to convert or migrate records in response to regulatory or legal actions.

4.2.2 Conversion drivers

Conversion is defined as the process of changing records from one format to another. Examples of drivers that can require digital conversion include the following.

a) Format change: records stored in a proprietary format are converted to an open file format, such as a conversion of a Word.doc file to PDF/A.

b) Format obsolescence: for example, records stored in an obsolete but still readable word processing format are converted to a current word processing format.

c) Interoperability: records are converted to a format that ensures seamless interoperability with certain IT infrastructure

d) Legal issues: records are converted according to existing explicit legal or regulatory requirements concerning formats or service providers

4.2.3 Migration drivers

Migration is defined as the process of moving records from one hardware or software configuration to another without changing the format. Some examples of drivers that can require digital migration include the following.

a) There can be a need to migrate records from one structure to another. For example, records existing in several legacy databases might be restructured into a new consolidated database (e.g. from Oracle to SQL Server).

b) The platform in which the records were created is changing and the records need to be migrated to the new platform. For example, records might need to be moved from a Microsoft Windows platform to a UNIX platform.

c) A migration is prudent from a business perspective (e.g. to introduce a new system with improved functionality). For example, a migration of records might be needed to support a change from a physical business presence to a web-based storefront or to move records from a shared drive to an electronic document and records management system (EDRMS). Migration also takes place when an organization moves its records to external service provider/cloud environment, or from one service provider to another.

Organizations should assess, document and manage their records. Ongoing accessibility of digital records in the context of changing technical environment and compliance with dynamic legal and regulatory requirements demand rigorous, coordinated efforts and sustained funding. Decisions related to conversion and migration should be based on analysis of the value of the organization's digital records and the impact of technology infrastructure and investments during the records' existence, as well as on knowledge about standards and best practices relating to conversion and migration of digital records.

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