International Standard

ISO 26324

Third edition
2025-03

Information and documentation — Digital object identifier system

Information et documentation — Système d'identifiant numérique d'objet

Reference number
ISO 26324:2025(en)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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Foreword

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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 document 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 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 9, *Identification and description*.

This third edition cancels and replaces the second edition (ISO 26324:2022), which has been technically revised.

The main changes are as follows:

— case-sensitiveness of DOI names is clarified;

— the list of common representations of DOI names is updated;

— the specification of, and procedures associated with, the system metadata associated with each DOI Name (see Annex B) are revised to reflect current practice;

— Annex D is replaced with a summary of changes across editions of this document.

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.

Introduction

The digital object identifier (DOI®[1]) system, which was first deployed in 1998, provides an infrastructure for persistent unique identification of objects of any type.

DOI is an initialism for “digital object identifier”, meaning a “digital identifier of an object” rather than an “identifier of a digital object”: DOI is not limited to digital objects and can be used to identify any abstract, physical or non-physical object. In this document, the term “digital object identifier” refers to the system defined in this document, unless otherwise stated.

Objects within the DOI system, i.e. referents, are identified by their DOI names. A DOI name is an opaque string, which does not have a discernible meaning on its own and is for use by humans and machines alike. Each DOI name is registered by a registrant.

To support diverse applications worldwide, a DOI name uses characters from the Unicode character set. More specifically, it can use any Unicode character intended to be written, printed, or otherwise displayed in a form that can be read by humans – formally referred to as a Graphic character.

With this flexibility comes ambiguities when representing or exchanging DOI names. For example:

— the character "Á" (LATIN CAPITAL LETTER A WITH ACUTE) can be encoded either on its own or as the character "A" (LATIN CAPITAL LETTER A) followed by the combining character ◌́ (COMBINING ACUTE ACCENT);

— multiple schemes (UTF-8, UTF-16 or UTF-32) can be used when serializing a DOI name to bytes for interchange between machines;

— the glyph " Å " can either correspond to the ANGSTROM SIGN or the LATIN CAPITAL LETTER A WITH RING ABOVE.

To avoid these pitfalls, this document specifies the syntax of a DOI name as a sequence of Unicode code points, where each code point is an integer between 0 and 0x10FFFF, and the fundamental unit of encoding in Unicode; and describes several representations appropriate for interchange and visual representation.

The assignment and administration of DOI names is handled by the DOI system, which offers a useful set of functionalities, including:

— persistence, if material is moved, rearranged, or bookmarked,

— interoperability with other data from other sources,

— extensibility by adding new features and services through management of groups of DOI names,

— single management of data for multiple output formats (platform independence),

— class management of applications and services, and

— dynamic updating of metadata, applications and services.

The DOI system is designed to work over the Internet. A DOI name is permanently assigned to an object to provide a resolvable persistent network link to current information about that object, including where the object, or information about it, can be found on the Internet. While information about an object can change over time, its DOI name will not change. A DOI name can be resolved within the DOI system to information related to the identified object such as the location of metadata or a location of the object.

The DOI system enables the construction of automated services and transactions. Applications of the DOI system include, but are not limited to, managing information and documentation location and access;

1) DOI® is a registered trademark. The DOI Handbook published by the ISO 26324 Registration Authority (see Clause 8) contains information on trademark issues. The name and contact information of the Registration Authority for this document can be found at https://www.iso.org/maintenance_agencies.html.

managing metadata; facilitating electronic transactions; persistent unique identification of any form of any data; and commercial and non-commercial services.

An object associated with a DOI name is described unambiguously by system metadata, to support identification and description. The data model supports interoperability between applications.

The scope of the DOI system is not defined by reference to the type of content (format, etc.) of the referent, but by reference to the functionalities it provides and the context of use. The DOI system provides, within networks of DOI applications, for unique identification, persistence, resolution, metadata and interoperability with other identifier schemes.

Information and documentation — Digital object identifier system

1 Scope

This document specifies the syntax, description and resolution functional components of the digital object identifier system. It specifies the general principles for the creation, registration and administration of DOI names (where DOI is an initialism for "digital object identifier").

This document defines the syntax for a DOI name, which is used for the identification of an object of any material form (non-physical or physical) or an abstraction (such as a textual work) where there is a functional need to distinguish it from other objects.

The DOI name does not replace, nor is it an alternative for, an identifier used in another scheme, such as the schemes defined by ISO/TC 46/SC 9. This document describes how the DOI system can be used in conjunction with another identifier scheme (for example, to provide additional functionality, such as resolution, where this is not already available), and how the character string of that other scheme can be integrated into the DOI system through system metadata or the DOI syntax or both.

This document does not specify particular technologies to implement the syntax, description and resolution functional components of the digital object identifier system.

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/IEC 10646, *Information technology — Universal coded character set (UCS)*

Namespace Registration for Digital Object Identifier (DOI), IANA Registry of URN Namespaces, https://www.iana.org/assignments/urn-formal/doi

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 https://www.iso.org/obp

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

3.1
DOI system
social and technical infrastructure for the assignment and administration of *DOI names* (3.3) as identifiers in computer-readable form through assignment, resolution, referent description, administration, etc.

3.2
code point
any value in the Unicode codespace

Note 1 to entry: In running text, an individual Unicode code point is expressed as U+n, where n is four to six hexadecimal digits, using the digits 0–9 and uppercase letters A–F (for 10 through 15, respectively); and a formal Unicode name is shown in small capitals.

[SOURCE: ISO/IEC 10646:2020, 3.9]

3.3
DOI name
opaque string (3.9) that specifies a unique object within the *DOI system* (3.1)

Note 1 to entry: A DOI name consists of a sequence of code points specified by the *DOI syntax* (3.5).

Note 2 to entry: The terms "identifier" and "number" are sometimes but not always used in the same sense and are to be avoided where ambiguity can arise. The unqualified use of "DOI" alone can also be ambiguous. Therefore "DOI" is always used in conjunction with a specific noun such as DOI name or *DOI system* (3.1) unless the meaning is sufficiently clear from an earlier mention or the specific context.

3.4
object
entity that can become a referent in the scope of the *DOI system* (3.1), including, but not limited to, digital, non-physical, physical, and abstract entities

Note 1 to entry: Digital, physical or abstract forms of an entity can be of relevance in information and documentation (e.g. resources, people or agreements).

Note 2 to entry: A particular object identified by a specific DOI name is the referent of that *DOI name* (3.3).

Note 3 to entry: Examples of objects include, but are not limited to: a novel as an abstract work, a specific version of a television episode, a specific scene within a version of a movie, a ceremonial robe in a museum collection, a product offering such as building insulation, a batch of manufactured products, an instance of a product, a person, a source file, a binary software package, a scientific journal, a research grant, a project, etc.

3.5
DOI syntax
rules for the form and sequence of *code points* (3.2) comprising any *DOI name* (3.3), specifically the form and sequence of *code points* (3.2) of a prefix element, separator and suffix element

3.6
directory indicator
unique *opaque string* (3.9) allocated to a *registrant* (3.10) for the purpose of assignment of *DOI names* (3.3), forming part of the prefix element of the *DOI syntax* (3.5) but having no other implied meaning

3.7
registrant code
unique *opaque string* (3.9) forming part of the prefix element of the *DOI syntax* (3.5) but having no other implied meaning

3.8
system metadata
specific data associated with the referent of a *DOI name* (3.3), based on a data model that enables the *referent* (3.15) to be associated with data of any desired degree of precision and granularity to support identification and description

Note 1 to entry: system metadata is specified in Annex B.

3.9
opaque string
sequence of *code points* (3.2) that has no meaning discernible by simple inspection

Note 1 to entry: To discover meaning, there is a need to refer to metadata.

3.10
registrant
person or organization that has requested and received the registration of a particular *DOI name* (3.3)

3.11
interoperability
ability of independent systems to exchange meaningful information and initiate actions from each other, in order to operate together to mutual benefit

Note 1 to entry: In particular, interoperability constitutes the ability for loosely-coupled independent systems to be able to collaborate and communicate. See Paskin (2006) for further information about interoperability.

3.12
resolution
process of submitting a *DOI name* (3.3) to a service and receiving in return a *resolution record* (3.13)

Note 1 to entry: This can involve one or more intermediate mapping operations. The resolution might or might not return an instance of the *referent* (3.15). Multiple resolution is the simultaneous return as output of several pieces of current information related to the referent.

3.13
resolution record
data that is the response to a *resolution* (3.12) request providing information related to the *referent* (3.15)

Note 1 to entry: A resolution record does not necessarily include the referent or associated system metadata, but instead can include the location of such information.

3.14
resolution service
capability provided by the *DOI system* (3.1) that performs *resolution* (3.12)

3.15
referent
particular object identified by a *DOI name* (3.3)

3.16
unique identification
specification by a *DOI name* (3.3) of one and only one *referent* (3.15)

3.17
persistent
existence, and ability to be used in services outside the direct control of the issuing assigner, without a stated time limit

3.18
first class
having an identity of itself, not as some attribute of an object

Note 1 to entry: An address is an attribute of something, whereas the thing that has this attribute is a first class object. A *DOI name* (3.3) references an entity as a first-class object, not simply the place where the object is located. It may then resolve to a location.

4 DOI name

4.1 Syntax

4.1.1 General characteristics

A DOI name shall consist of an ordered sequence of code points of the Graphic type, as specified in ISO/IEC 10646.

NOTE 1 The Unicode Graphic type includes all code points that are letter, mark, number, punctuation, symbol and spaces. It excludes, for example, control code points such as U+0009 HORIZONTAL TABULATION.

NOTE 2 The term code point is used instead of the term character, which is ambiguous in the context of Unicode where a given abstract character can be encoded in multiple ways (see Example 3).

The code points are arranged in a DOI prefix and a DOI suffix separated by U+002F SOLIDUS.

NOTE 3 U+002F SOLIDUS is also referred to as forward slash ("/").

There is no defined limit on the length of the DOI name, or of the DOI prefix or DOI suffix.

Further constraints on code points (e.g. use of language-specific alphanumeric characters) can be defined for an application by the ISO 26324 Registration Authority.

The combination of a unique DOI prefix (assigned to a particular DOI registrant) and a unique DOI suffix (provided by that registrant for a specific object) shall be unique. This allows the de-centralized allocation of DOI names. The registration of the combination of the prefix and suffix in the DOI system also serves to validate the DOI syntax for a given DOI name.

The DOI name shall be regarded as an opaque string by users of the DOI system. No definitive information shall be inferred from the specific sequence of code points that make up a DOI name. In particular, the inclusion in a DOI name of any DOI prefix allocated to a specific registrant does not provide evidence of the ownership of rights or current management responsibility of any intellectual property in the referent. The mere assignment of a DOI name to an object shall not imply endorsement of the object by any party.

When comparing two DOI names for equivalence, no normalization, as defined in ISO/IEC 10646, shall be performed and the DOI names are equivalent if, and only if, their code point sequences are identical, except that a code point in the range U+0041..U+005A (corresponding to LATIN CAPITAL LETTER A to LATIN CAPITAL LETTER Z) is considered identical to the corresponding code point in the range U+0061..U+007A (corresponding to characters LATIN SMALL LETTER A to LATIN SMALL LETTER Z).

NOTE 4 The rule above has the effect of making DOI names case-insensitive only when testing for equivalence and only with respect to the Basic Latin Unicode block. It does not restrict DOI names to containing only uppercase or lowercase letters.

EXAMPLE 1 The following DOI names are equivalent because U+0053 LATIN CAPITAL LETTER S and U+0073 LATIN SMALL LETTER S are considered identical:

10.5594/SMPTE.ST2067-21.2020

10.5594/sMPTE.sT2067-21.2020

EXAMPLE 2 The following DOI names are not equivalent because U+00C1 LATIN CAPITAL LETTER A WITH ACUTE and U+00E1 LATIN SMALL LETTER A WITH ACUTE are not considered identical:

10.26321/Á.GUTIÉRREZ.ZARZA.02.2018.03

10.26321/á.gutiérrez.zarza.02.2018.03

EXAMPLE 3 The code point sequences <U+00C1> and <U+0041, U+0301> are not identical even though they are both rendered identically as the abstract character "Á". As a result, the following DOI names, expressed as a sequence of Unicode code points, are not equivalent, even though they are both rendered as "10.26321/Á.GUTIÉRREZ.ZARZA.02.2018.03":

<U+0031, U+0030, U+002E, U+0032, U+0036, U+0033, U+0032, U+0031, U+002F, U+00C1, U+002E, U+0047. U+0055, U+0054, U+0049, U+00C9, U+0052, U+0052, U+0045, U+005A, U+002E, U+005A, U+0041, U+0052, U+005A, U+0041, U+002E, U+0030, U+0032, U+002E, U+0032, U+0030, U+0031, U+0038, U+002E, U+0030, U+0033>

<U+0031, U+0030, U+002E, U+0032, U+0036, U+0033, U+0032, U+0031, U+002F, U+0041, U+0301, U+002E, U+0047, U+0055, U+0054, U+0049, U+0045, U+0301, U+0052, U+0052, U+0045, U+005A, U+002E, U+005A, U+0041, U+0052, U+005A, U+0041, U+002E, U+0030, U+0032, U+002E, U+0032, U+0030, U+0031, U+0038, U+002E, U+0030, U+0033>

4.1.2 DOI prefix

4.1.2.1 General

The DOI prefix shall be composed of a directory indicator optionally followed by a registrant code. Where a registrant code is present, the two components shall be separated by a U+002E FULL STOP.

The DOI prefix is a unique string allocated to a registrant.

NOTE A DOI name, including its DOI prefix, does not change, even where the original registrant no longer has a role in maintaining that DOI name (see 5.5).

A user of the DOI system can determine whether a DOI prefix is valid for use in DOI names by consulting the register managed by the ISO 26324 Registration Authority in accordance with the requirement in C.2.

4.1.2.2 Directory indicator

The directory indicator shall be allocated, optionally with a registrant code, to a registrant by the ISO 26324 Registration Authority for the purpose of the assignment of DOI names.

NOTE 1 “10” is the only directory indicator allocated at the time of publication of this document.

NOTE 2 Earlier editions of this document constrained the directory indicator to "10" (see Annex D).

The directory indicator shall not contain any U+002E FULL STOP or U+002F SOLIDUS.

4.1.2.3 Registrant code

Where present, the second element of the DOI prefix shall be the registrant code allocated by the ISO 26324 Registration Authority. A registrant code shall always be used with the directory indicator with which it is allocated.

EXAMPLE 1

10.1000 DOI prefix comprising a directory indicator “10” followed by registrant code “1000”.

The registrant code may be further divided into sub-elements for administrative convenience if desired. Each sub-element of the registrant code shall be preceded by a U+002E FULL STOP and shall not contain any U+002E FULL STOP or U+002F SOLIDUS. Such subdivision implies no hierarchical relationship; each registrant code, whether subdivided or not, has equal status in the DOI system. However, a subdivided registrant code can have technical resolution implications. It is recommended that registrants consult the ISO 26324 Registration Authority for further information about assignment of registrant codes.

EXAMPLE 2

10.1000.11 DOI prefix in which the registrant code (“1000.11”) has a subdivision “11”.

The registrant code shall be omitted where a directory indicator has been assigned without one.

EXAMPLE 3

15434 DOI prefix consisting of only a directory indicator where no registrant code has been assigned.

4.1.3 DOI suffix

The DOI suffix shall consist of a sequence of Unicode code points of any length chosen by the registrant. Each suffix shall be unique to the prefix element that precedes it. The unique suffix can be a sequential number, or it might incorporate an identifier generated from or based on another system used by the registrant, such as ISAN (ISO 15706-1 and ISO 15706-2), ISRC (ISO 3901), ISSN (ISO 3297), ISNI (ISO 27729); in such cases, a preferred construction for such a suffix may be specified by the ISO 26324 Registration Authority as in Example 2. When constructing DOI names from other identifier systems, including schemes where the DOI prefix is affected, the procedures in Annex A shall be followed.

EXAMPLE 1

10.1000/123456 DOI name with the DOI prefix “10.1000” and the DOI suffix “123456”.

EXAMPLE 2

10.1038/issn.1476-4687 DOI name whose DOI suffix contains an ISSN. According to the construction used here, the DOI suffix is assembled using an ISSN by preceding the ISSN (including the hyphen) with the lowercase letters “issn” and a period. This hypothetical example is a DOI for the electronic version of Nature.

4.2 Representation of DOI names

4.2.1 General

A DOI name shall be represented using one of the following forms, or any the forms specified by the ISO 26324 Registration Authority.

4.2.2 Visual media

Where a DOI name is presented visually, it shall be presented by rendering its sequence of Unicode code points to glyphs (as defined in ISO/IEC 10646), optionally preceded by lowercase "doi:" when the context does not clearly imply that a DOI name is specified.

EXAMPLE The DOI name "10.1006/jmbi.1998.2354" can be presented as "doi: 10.1006/jmbi.1998.2354".

NOTE 1 This presentation can be ambiguous since multiple code points or sequences of code points can result in similar presentations. For example, U+002D HYPHEN-MINUS, U+2212 MINUS SIGN and U+2013 EN DASH are rendered as similar glyphs. As another example, the abstract character "á" can be represented by either the code point U+00E1 or the sequence of code points <U+0061, U+0301>. The URI, URN and HTTP Proxy forms resolve these ambiguities.

NOTE 2 When prepended with "doi:", the visual form can be equivalent to the URI form (see 4.2.3) if the DOI name consists solely of unreserved characters as defined in IETF RFC 3986.

NOTE 3 To avoid ambiguity, this document uses U+0022 QUOTATION MARK characters to delimit DOI names.

4.2.3 URI form

Where a DOI name is expressed as a URI (as specified in IETF RFC 3986), it shall use the "doi" scheme.

EXAMPLE The DOI name "10.26321/á.gutiérrez.zarza.02.2018.03" can be presented in the URI form "doi:10.1006/%C3%A1.guti%C3%A9rrez.zarza.02.2018.03".

4.2.4 URN form

Where a DOI name is expressed as a URN (as specified in IETF RFC 8141), it shall use the "doi" namespace, as specified in the Namespace Registration for Digital Object Identifier (DOI).

EXAMPLE The DOI name "10.26321/á.gutiérrez.zarza.02.2018.03" can be presented in the URN form "urn:doi:10.1006/%C3%A1.guti%C3%A9rrez.zarza.02.2018.03".

4.2.5 HTTP proxy form

Where a DOI name is expressed as a URL (as specified in IETF RFC 3986), and unless specified otherwise by the ISO 26324 Registration Authority, the URL shall be created by percent-encoding the result of concatenating the string "https://doi.org/" with the DOI name, where the percent-encoding mechanism is as defined in IETF RFC 3986. Using a web service operated by the ISO 26324 Registration Authority, issuing an HTTP GET request at that URL resolves the DOI name.

NOTE Other HTTP proxy forms starting with the strings "https://dx.doi.org"_and "https://dx.doi.org" are deprecated.

EXAMPLE The DOI name "10.1006/jmbi.1998.2354" can be resolved by issuing an HTTP GET request to the URI "https://doi.org/10.1006/jmbi.1998.2354".

5 Assignment of DOI name

5.1 Principles of assignment

A DOI name shall not be used as a replacement for other ISO identifier schemes such as ISAN (ISO 15706-1 and ISO 15706-2), ISBN (ISO 2108), ISRC (ISO 3901), ISSN (ISO 3297), ISNI (ISO 27729), ISWC (ISO 15707), ISCI (ISO 27730), ISMN (ISO 10957), RAiD (ISO 23527) and other commonly recognized identifiers.

Annex A specifies requirements for the incorporation of identifiers from other systems in a DOI name. It also contains requirements for an alternative approach where the identifier from another system is indicated in system metadata.

A DOI name may be assigned to any object whenever there is a functional need to distinguish it from other objects.

“DOI” shall be construed as “digital identifier of an object” (not “identifier of a digital object”).

Rules for assignment of DOI names can include a functional definition of scope based on appropriate DOI metadata.

5.2 Granularity

A DOI name may be assigned to any object, regardless of the extent to which that object might be a component part of some larger entity. DOI names may be assigned at any desired degree of precision and granularity that a registrant deems to be appropriate.

EXAMPLE For granularity in textual materials, separate DOI names can be assigned to:

— a novel as an abstract work,

— a specific edition of that novel,

— a specific chapter within that edition of the novel,

— a single paragraph,

— a specific image, or

— a quotation,

as well as to each specific manifestation in which any of those entities are published or otherwise made available.

NOTE The degree of granularity with which a DOI name is assigned determines which changes to a referent generally require a new DOI name to be assigned [see also C.4 k)]. For example, if a first object is defined to include its ownership, then a change of ownership results in a different second object for which a different DOI name is assigned. The DOI name associated with the first object persists (see 5.5).

5.3 Description

As specified in Annex B, each DOI name shall be associated with system metadata that describes the referent to which the DOI name is assigned.

5.4 Uniqueness

Each DOI name shall specify one and only one referent in the DOI system. While a referent can be specified by more than one DOI name, it is recommended that each referent have only one DOI name.

5.5 Persistence

No time limit for the existence of a DOI name shall be assumed in any assignment, service or application.

A DOI name shall never change or be deleted, including if (a) the rights associated with, or the management responsibility of, the referent change, (b) a mistake is made in the string making up the DOI name or (c) the responsibility to manage it is transferred from the original registrant to another registrant. It is appropriate to allocate a new DOI name in some of these cases.

The DOI system provides a means to continue interoperability through exchange of information about identified entities (at a minimum, the DOI name and a description of the referent).

6 Resolution of DOI name

6.1 General

Resolution of a DOI name can return data such as a location of the referent, metadata about the referent, or another DOI name. The referent can be of various types (e.g. abstract "works", physical "manifestations", or performances) and are not always directly accessible in the form of a digital file or other manifestation, i.e. resolution might or might not return an instance of the referent. Resolution can also involve one or more intermediate mapping operations.

6.2 Functionality

The technology deployed to manage the resolution of the DOI name shall support the following functions:

a) Internet compatible — Transmission via the global information system that is logically linked by a globally unique address space and communications.

b) First class naming — Identifiers resolved by the system shall have an identity independent of any other object.

c) Unique identification — The specification by an identifier string of one and only one referent.

d) Functional granularity — It shall be possible to separately resolve a referent whenever it needs to be distinguished.

e) Data typing — The extensible definition of constraints placed upon the interpretation of certain data entries in a resolution record, such that data values with similar constraints can be grouped and treated in the same way.

f) Resolution services — The resolution record contains information indicating how to access services relating to the DOI name. Resolution requests should be capable of returning resolution records with all associated values of current information, individual values or all values of one data type.

g) Designated authority — The administrator of an identifier shall be securely identified and capable of transfer.

h) Appropriate access to resolution records — Changes to a resolution record shall be recorded and shall be capable of providing access to the data on which the administrator depends and privacy and confidentiality from those who are not dependent on it.

i) DNS independent but compatible — Not reliant on the Domain Name System (DNS), but capable of working with DNS domain naming and resolution services.

j) Granularity of administration — DOI names can be administered individually or in groups.

k) Scalability:

   1) efficient and infinitely scalable protocol;

   2) no limitations on absolute number of identifiers assigned or length of identifier string.

l) Unicode compliant.

7 System metadata

7.1 General

The referent shall be described unambiguously and precisely by system metadata that enables unique identification and description of a referent. This is designed to do the following.

a) Promote interoperability within networks of DOI users by enabling applications to exchange information involving DOI names.

b) Ensure minimum standards of quality of administration of DOI names by registrants and facilitate the administration of the DOI system as a whole.

7.2 Functionality

System metadata should support the following functions.

a) Generic mechanism for defining metadata for all different types of referent.

   EXAMPLE Instead of treating sound carriers, books, videos, and photographs as fundamentally different things with different (if similar) characteristics, they are all recognized as creations with different values of the same higher-level attributes, whose metadata can be supported in a common environment.

b) Interoperability of metadata across applications, with reference to:

   1) media (e.g. books, serials, audio, audiovisual, software, abstract works, visual material),

   2) levels of metadata (from simple to complex), and

   3) linguistic barriers.

c) Functional granularity, making it possible to uniquely identify an object whenever it needs to be distinguished.

7.3 Registration of system metadata

System metadata describing and identifying the referent, as specified in Annex B, shall be registered promptly and accurately.

8 Administration of the DOI system

The DOI system shall be administered by the ISO registration authority for this document (i.e. ISO 26324), hereafter referred to as the ISO 26324 Registration Authority, as specified in Annex C.

The name and contact information of the registration authority for this document can be found at https://www.iso.org/maintenance_agencies.html.

Annex A
(normative)

Relationship between the DOI system and other identifier schemes

A.1 Principles

A DOI name shall not be used as a replacement for other identifier schemes (see 5.1), but when used with them it can enhance the identification functionality provided by those systems with additional DOI system functionality.

The guiding principles for referencing other identifier schemes within the DOI system are to maximize utility to potential users and to maximize its internal management efficiency.

A.2 Expression of the relationship within the DOI system of DOI names to other identifier schemes

A.2.1 Referent of a DOI name having an existing identifier within other identifier schemes

Where the referent of a DOI name also has an existing identifier within a commonly recognized identifier scheme or schemes, at least one of the following methods shall be used to express the relationship.

a) The other existing identifier(s) is(are) indicated in the system metadata field “Referent Identifier(s),” denoting other identifier(s) commonly referencing the same referent, irrespective of whether the identifier(s) is(are) incorporated into the syntax of the DOI name.

b) An existing identifier can be incorporated as an explicit part of the DOI name for the referent.

Examples 1 and 2 show the incorporation of an ISBN and an ISSN into a DOI name. Other agreed syntaxes for integration are also possible. Example 3 shows that the DOI name is not a replacement for the other identifier scheme.

EXAMPLE 1

10.978.8612/345672 shows a possible incorporation of an ISBN (978-86-12-34567-2) into a DOI prefix and suffix.

EXAMPLE 2

10.1038/issn.1476-4687 shows a DOI suffix using an ISSN.

EXAMPLE 3

10.978.1234/599997 is a DOI name; it cannot be validly submitted to an ISBN point-of-sale ordering system or converted to a GS1 bar code for use as an ISBN bar code; it does not conform to the ISBN syntax.

978-1-234-59999-7 is an ISBN. It cannot be validly submitted to a DOI resolution service; it does not conform to the DOI syntax.

However, both identifier strings have the same referent.

A.2.2 Incorporation of an existing identifier into a DOI name

Where syntax rules permit the incorporation of an existing identifier from another scheme as part of the DOI name, such rules do not form part of this document. In such cases, attention is drawn to the following points.

a) The same referent shall be denoted by both the DOI name and the included identifier string, to the degree that is necessary to distinguish it as a separate entity within each identifier scheme.

b) To users of the DOI system, the DOI name shall be regarded as an opaque string. No definitive information relating to the other identifier scheme shall be inferred from the specific sequence of codepoints used for a DOI name and the DOI name is not guaranteed to be usable in any non-DOI applications designed for the other identifier scheme (see Example 3 in A.2.1).

c) The existence of multiple (third, fourth, etc.) identifiers should be recognized in the system metadata field “Referent Identifier(s),” denoting other identifier(s) commonly referencing the same referent by multiple values, rather than by incorporation in the DOI name.

d) Specific syntax rules for the incorporation of an existing identifier from another scheme shall be maintained by the ISO 26324 Registration Authority.

A.3 Additional functionality

The DOI system functionality can be offered to complement other identifier services which are available through other parties, e.g. for the resolution of identifiers in a variety of contexts. Services using an identifier can be offered by multiple providers. Rules of certain identifier systems can necessitate the use of only specified preferred service providers; in such cases, the application of the identifier shall follow the rules of the relevant registration authority. Each registration authority for an identifier scheme shall retain autonomy in determining rules for usage within its own scheme or community.

Annex B
(normative)

System metadata

This Annex specifies system metadata, which consists of reference elements (listed in Table B.1) and administrative elements (listed in Table B.2).

Table B.1 — Reference elements of the system metadata

Element	Description
DOI Name	Specific DOI name allocated to the identified referent.
Referent Type	The general type of the referent.
Referent Sub-Type	Specific type of entity for the referent if defined.
Referent Name(s)	Name(s) by which the referent is usually known (e.g. title).
Basic Metadata	Metadata sufficient to define what the referent is. Fields necessary will depend on the Referent Type and Sub-Type.
Referent Identifier(s)	Other identifiers referencing the same referent if available.

Table B.2 — Administrative elements of the system metadata

Element	Description
Registration Authority	Identifier of party that makes metadata available.
Created Date	Timestamp when the DOI record was created