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Part 4: Technical elements

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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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This document was prepared by Technical Committee ISO/IEC JTC *1*, *Information technology*, Subcommittee SC 36, *Information technology for learning, education and training*.

This second edition cancels and replaces the first edition (ISO/IEC 19788-4:2014), which has been technically revised.

The main changes are as follows: based on the second edition of ISO/IEC 19788-1 Metadata for learning resource (MLR) – Part 1: Framework:

— the term ”property” (P) is used instead of “data element specification” (DES) which becomes deprecated;

— new domain and property attributes, such as Label and Canonical Identifier, are introduced.

A list of all parts in the ISO/IEC 19788 series can be found on the ISO website.

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

The increasing reliance on digital learning environments and advanced technologies, including artificial intelligence (AI), cloud computing, learning analytics, and immersive learning tools, necessitates an updated approach to metadata for learning resources. ISO/IEC 19788-4:2025 builds upon the framework published in ISO/IEC 19788-1:2024 to specify technical metadata elements that enhance interoperability, discoverability, and usability of learning resources across diverse digital ecosystems.

This second edition introduces several key updates:

— The adoption of "property" (P) terminology, replacing the deprecated "data element specification" (DES), aligning with the updated framework in ISO/IEC 19788-1:2024.

— The refinement of resource classes, including newly defined AI-Enabled Learning Resource, Interactive Learning Resource, Immersive Technology Supported Learning Resource, and Cloud-Based Learning Resource. These classifications support more granular metadata descriptions tailored to emerging educational technologies.

— The introduction of structured technical attributes, ensuring that properties such as Cloud Deployment Model, AI Algorithm Used, and Interactivity Type follow controlled vocabularies while allowing for detailed descriptions of their implementation.

To address the evolving role of AI in education, this edition introduces AI-specific metadata attributes, such as AI Algorithm Used and Personalization Capability. These properties ensure transparency in AI-driven learning systems, improving accountability and enabling meaningful comparisons between AI-enhanced educational resources. Similarly, the introduction of Cloud-Based Learning Resource properties, including Cloud Deployment Model and API Support Type, facilitates the integration of cloud-hosted learning environments with other educational platforms.

Furthermore, this edition enhances technical metadata precision by ensuring properties like Learning Analytics Features, Data Privacy Compliance, and Immersive Technology Type align with modern regulatory and technological requirements. These improvements promote standardized metadata practices, some compatibility with external metadata frameworks such as IEEE 1484.12.1-2002 Learning Object Metadata (LOM) and the Dublin Core Metadata Initiative (DCMI).

ISO/IEC 19788-4:2025 ensures that technical metadata elements are adaptable to future advancements in educational technology while maintaining robust compliance with international interoperability standards. By refining metadata structures and aligning them with contemporary digital learning environments, this standard strengthens the foundation for more efficient, scalable, and user-centric metadata management in the evolving landscape of digital education.

In order to promote the dissemination of this document and not overload it with the ontology, classes and properties defined in this document are available at https://standards.iso.org/iso-iec/19788/-4/ed-2/en. The files contain the ontology corresponding to this document, as well as JSON-LD files containing the linguistic equivalents of labels and names. Language equivalents for names and labels of generic resource classes, generic properties and generic content value rule sets should be used in conformance with Annex B. A README.md file containing the list of available files and the choices made is available at https://standards.iso.org/iso-iec/19788/-4/ed-2/en/README.md.

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Information technology for learning, education and training — Metadata for learning resources —

Part 4: Technical elements

1 Scope

The ISO/IEC 19788 series specifies, in a rule-based manner, properties and their attributes for the description of learning resources. This includes the rules governing the identification of properties and the specification of their attributes.

This Part of ISO/IEC 19788 specifies, using the ISO/IEC 19788-1 Framework, technical aspects of learning resources, i.e., requirements for use, location, size, etc.

These elements can later be combined with other descriptive elements including those from other parts of the ISO/IEC 19788 series or other standards, including Dublin Core refinements and IEEE 1484.12.1-2002 [1] to address more specific topics such as technical or educational information.

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 PRF 4932, *Information Technology - Learning, education and training — Access for All (AfA) Metadata for Accessibility Core Properties*

ISO 15836-1:2017, *Information and documentation — The Dublin Core metadata element set — Part 1: Core elements*

ISO 15836-2:2019, *Information and documentation — The Dublin Core metadata element set — Part 2: DCMI Properties and classes*

ISO/IEC 19788-1:2024, *Information technology for learning, education and training — Metadata for learning resources — Part 1: Framework*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 19788-1:2025 apply.

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

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

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

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