IEEE SA
STANDARDS ASSOCIATION

# IEEE Standard for Learning Object Metadata

IEEE Computer Society

Developed by the
Learning Technology Standards Committee

**IEEE Std 1484.12.1™-2020**
(Revision of IEEE Std 1484.12.1-2002)

IEEE

STANDARDS

**IEEE Std 1484.12.1™-2020**
(Revision of IEEE Std 1484.12.1-2002)

# IEEE Standard for Learning Object Metadata

Developed by the

**Learning Technology Standards Committee**
of the
**IEEE Computer Society**

Approved 24 September 2020

**IEEE SA Standards Board**

**Abstract:** A conceptual data schema that defines the structure of a metadata instance for a learning object is specified in this standard. For this standard, a learning object is defined as any entity, digital or non-digital, that is used for learning, education, or training; a metadata instance for a learning object describes relevant characteristics of the learning object to which it applies. Such characteristics can be regrouped in general, life cycle, meta-metadata, educational, technical, educational, rights, relation, annotation, and classification categories. The conceptual data schema defined in this standard specifies the data elements of which a metadata instance for a learning object is composed and allows for linguistic diversity of both learning objects and the metadata instances that describe them. It is intended that this standard will be referenced by other standards that will define the implementation descriptions of the data schema, so that a metadata instance for a learning object can be used by a learning technology system to manage, locate, evaluate, or exchange learning objects.

**Keywords:** data elements, data schema, datatypes, data types, IEEE 1484.12.1™, learning objects, learning object metadata, LOM, metadata, schema, vocabulary

The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA



PDF: ISBN 978-1-5044-7059-9 STD24410
Print: ISBN 978-1-5044-7060-5 STDPD24410

## Important Notices and Disclaimers Concerning IEEE Standards Documents

IEEE Standards documents are made available for use subject to important notices and legal disclaimers. These notices and disclaimers, or a reference to this page (https://standards.ieee.org/ipr/disclaimers.html), appear in all standards and may be found under the heading "Important Notices and Disclaimers Concerning IEEE Standards Documents."

## Notice and Disclaimer of Liability Concerning the Use of IEEE Standards Documents

IEEE Standards documents are developed within the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (IEEE SA) Standards Board. IEEE develops its standards through an accredited consensus development process, which brings together volunteers representing varied viewpoints and interests to achieve the final product. IEEE Standards are documents developed by volunteers with scientific, academic, and industry-based expertise in technical working groups. Volunteers are not necessarily members of IEEE or IEEE SA, and participate without compensation from IEEE. While IEEE administers the process and establishes rules to promote fairness in the consensus development process, IEEE does not independently evaluate, test, or verify the accuracy of any of the information or the soundness of any judgments contained in its standards.

IEEE makes no warranties or representations concerning its standards, and expressly disclaims all warranties, express or implied, concerning this standard, including but not limited to the warranties of merchantability, fitness for a particular purpose and non-infringement. In addition, IEEE does not warrant or represent that the use of the material contained in its standards is free from patent infringement. IEEE standards documents are supplied "AS IS" and "WITH ALL FAULTS."

Use of an IEEE standard is wholly voluntary. The existence of an IEEE Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard.

In publishing and making its standards available, IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity, nor is IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing any IEEE Standards document, should rely upon his or her own independent judgment in the exercise of reasonable care in any given circumstances or, as appropriate, seek the advice of a competent professional in determining the appropriateness of a given IEEE standard.

IN NO EVENT SHALL IEEE BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO: THE NEED TO PROCURE SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE PUBLICATION, USE OF, OR RELIANCE UPON, ANY STANDARD, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE AND REGARDLESS OF WHETHER SUCH DAMAGE WAS FORESEEABLE.

## Translations

The IEEE consensus development process involves the review of documents in English only. In the event that an IEEE standard is translated, only the English version published by IEEE is the approved IEEE standard.

## Official statements

A statement, written or oral, that is not processed in accordance with the IEEE SA Standards Board Operations Manual shall not be considered or inferred to be the official position of IEEE or any of its committees and shall not be considered to be, nor be relied upon as, a formal position of IEEE. At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that the presenter's views should be considered the personal views of that individual rather than the formal position of IEEE, IEEE SA, the Standards Committee, or the Working Group.

## Comments on standards

Comments for revision of IEEE Standards documents are welcome from any interested party, regardless of membership affiliation with IEEE or IEEE SA. However, **IEEE does not provide interpretations, consulting information, or advice pertaining to IEEE Standards documents**.

Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Since IEEE standards represent a consensus of concerned interests, it is important that any responses to comments and questions also receive the concurrence of a balance of interests. For this reason, IEEE and the members of its Societies and Standards Coordinating Committees are not able to provide an instant response to comments, or questions except in those cases where the matter has previously been addressed. For the same reason, IEEE does not respond to interpretation requests. Any person who would like to participate in evaluating comments or in revisions to an IEEE standard is welcome to join the relevant IEEE working group. You can indicate interest in a working group using the Interests tab in the Manage Profile and Interests area of the IEEE SA myProject system. An IEEE Account is needed to access the application.

Comments on standards should be submitted using the Contact Us form.

## Laws and regulations

Users of IEEE Standards documents should consult all applicable laws and regulations. Compliance with the provisions of any IEEE Standards document does not constitute compliance to any applicable regulatory requirements. Implementers of the standard are responsible for observing or referring to the applicable regulatory requirements. IEEE does not, by the publication of its standards, intend to urge action that is not in compliance with applicable laws, and these documents may not be construed as doing so.

## Data privacy

Users of IEEE Standards documents should evaluate the standards for considerations of data privacy and data ownership in the context of assessing and using the standards in compliance with applicable laws and regulations.

## Copyrights

IEEE draft and approved standards are copyrighted by IEEE under US and international copyright laws. They are made available by IEEE and are adopted for a wide variety of both public and private uses. These include both use, by reference, in laws and regulations, and use in private self-regulation, standardization, and the promotion of engineering practices and methods. By making these documents available for use and adoption by public authorities and private users, IEEE does not waive any rights in copyright to the documents.

## Photocopies

Subject to payment of the appropriate licensing fees, IEEE will grant users a limited, non-exclusive license to photocopy portions of any individual standard for company or organizational internal use or individual, non-commercial use only. To arrange for payment of licensing fees, please contact Copyright Clearance Center, Customer Service, 222 Rosewood Drive, Danvers, MA 01923 USA; +1 978 750 8400; https://www.copyright.com/. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

## Updating of IEEE Standards documents

Users of IEEE Standards documents should be aware that these documents may be superseded at any time by the issuance of new editions or may be amended from time to time through the issuance of amendments, corrigenda, or errata. An official IEEE document at any point in time consists of the current edition of the document together with any amendments, corrigenda, or errata then in effect.

Every IEEE standard is subjected to review at least every 10 years. When a document is more than 10 years old and has not undergone a revision process, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE standard.

In order to determine whether a given document is the current edition and whether it has been amended through the issuance of amendments, corrigenda, or errata, visit IEEE Xplore or contact IEEE. For more information about the IEEE SA or IEEE's standards development process, visit the IEEE SA Website.

## Errata

Errata, if any, for all IEEE standards can be accessed on the IEEE SA Website. Search for standard number and year of approval to access the web page of the published standard. Errata links are located under the Additional Resources Details section. Errata are also available in IEEE Xplore. Users are encouraged to periodically check for errata.

## Patents

IEEE Standards are developed in compliance with the IEEE SA Patent Policy.

Attention is called to the possibility that implementation of this standard may require use of subject matter covered by patent rights. By publication of this standard, no position is taken by the IEEE with respect to the existence or validity of any patent rights in connection therewith. If a patent holder or patent applicant has filed a statement of assurance via an Accepted Letter of Assurance, then the statement is listed on the IEEE SA Website at https://standards.ieee.org/about/sasb/patcom/patents.html. Letters of Assurance may indicate whether the Submitter is willing or unwilling to grant licenses under patent rights without compensation or under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination to applicants desiring to obtain such licenses.

Essential Patent Claims may exist for which a Letter of Assurance has not been received. The IEEE is not responsible for identifying Essential Patent Claims for which a license may be required, for conducting inquiries into the legal validity or scope of Patents Claims, or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this standard are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Further information may be obtained from the IEEE Standards Association.

## IMPORTANT NOTICE

IEEE Standards do not guarantee or ensure safety, security, health, or environmental protection, or ensure against interference with or from other devices or networks. IEEE Standards development activities consider research and information presented to the standards development group in developing any safety recommendations. Other information about safety practices, changes in technology or technology implementation, or impact by peripheral systems also may be pertinent to safety considerations during implementation of the standard. Implementers and users of IEEE Standards documents are responsible for determining and complying with all appropriate safety, security, environmental, health, and interference protection practices and all applicable laws and regulations.

## Acknowledgements

The IEEE Learning Technology Standards Committee (LTSC) P1484.12 Learning Object Metadata (LOM) working group wishes to thank Erik Duval, Tom Watson, and Wayne Hodgins for their tireless efforts and commitment to developing a high quality solution and document. This document has its origins in both the ARIADNE and IMS Projects, without which this document could not have been created. This document also builds on metadata work done by the Dublin Core group.

## Participants

At the time this IEEE standard was completed, the Renewing SCORM Standards Working Group had the following membership:

**Andy Johnson,** *Chair*
**Avron Barr,** *Vice Chair*

| | | |
|---|---|---|
| Mitchell Bonnett | James Goodell | Jonathan Poltrack |
| Ben Clark | Alan Mustafa | Robert Robson |
| Thomas Creighton | | George Vilches |

At the time the previous standard was completed and the SCORM Standards Working Group sought to [illegible] the working group had the following membership:

**Wayne Hodgins,** *Chair*

| | | |
|---|---|---|
| Carlos C. Amano | Jack Hyde | Tom P[illegible]bert |
| Thor Anderson | Chad Kainz | Roy Rada |
| Patricia Barkman | Ian Kegel | [illegible] |
| Bill Blackmon | Roger Lange | Tyde Richards |
| Kerry Blinco | John Manion | [illegible]vin Riley |
| Debbie Brown | Jon Mason | Robert Robson |
| Peter Brusilovsky | Ed Matlack | Randy Saunders |
| J.Richard Burke | Ralf Matlack | Jim Schoening |
| Mike Collett | Cindy Mazow | Kathy Sinitsa |
| Ben Copeland | William A. McDonal | Gayle Stroup |
| Philip Dodds | Bill Melton | Daniel Suthers |
| Erik Duval | Brandon Muram[illegible]tsu | Joshua Tonkel |
| Frank Farance | Yves Nicol | Brendon Towle |
| Mike Fore | Boyd Ni[illegible]lsen | John Tyler |
| Eddy Forte | Clau[illegible]Os[illegible]vn | Tom Wason |
| Paul Foster | Ba[illegible]e Peoples | Eamonn Webster |
| Vladimir Goodkovsky | M[illegible]e Pettit | Steve White |
| Martha Gray | | Ian Wright |

The following members of the individual Standards Association balloting group voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

| | | |
|---|---|---|
| Pradeep Balachandra | Daozhuang Lin | R.K. Rannow |
| Avron Barr | Brandon Muramatsu | Brandt Redd |
| Mitchell Bonnett | Alan Mustafa | Gerald Stueve |
| Lyle Bull[illegible] | Nick S.A. Nikjoo | Yu Yuan |
| David F[illegible]chi | Jonathan Poltrack | Oren Yuen |
| Werne[illegible]Hoelzl | | Janusz Zalewski |

When the IEEE SA Standards Board approved this standard on 24 September 2020, it had the following membership:

**Gary Hoffman,** *Chair*
**Jon Walter Rosdahl,** *Vice Chair*
**John D. Kulick,** *Past Chair*
**Konstantinos Karachalios,** *Secretary*

Ted Burse
Doug Edwards
J.Travis Griffith
Grace Gu
Guido R. Hiertz
Joseph L. Koepfinger*
David J. Law
Howard Li
Dong Liu
Kevin Lu
Paul Nikolich
Damir Novosel
Dorothy Stanley
Mehmet Ulema
Lei Wang
Sha Wei
Philip B. Winston
Daidi Zhong
Jingyi Zhou

*Member Emeritus

## Introduction

This introduction is not part of IEEE Std 1484.12.1-2020, IEEE Standard for Learning Object Metadata.

Metadata is information about an object, be it physical or digital. As the number of objects grows exponentially and our needs for learning expand equally dramatically, the lack of information or metadata about objects places a critical and fundamental constraint on the ability to discover, manage, and use objects.

This standard addresses this problem by defining a structure for interoperable descriptions of learning objects.

## Contents

# IEEE Standard for Learning Object Metadata

## 1. Overview

### 1.1 Scope

This standard specifies a conceptual data schema that defines the structure of a metadata instance for a learning object. For this standard, a learning object is defined as any entity, digital or non-digital, that is used for learning, education or training.

For this standard, a metadata instance for a learning object describes relevant characteristics of the learning object to which it applies. Such characteristics can be regrouped in general, life cycle, meta-metadata, educational, technical, educational, rights, relation, annotation, and classification categories.

The conceptual data schema specified in this standard will allow for linguistic diversity of learning objects and the metadata instances that describe them.

The conceptual data schema defined in this standard specifies the data elements of which a metadata instance for a learning object is composed.

This standard will be referenced by other standards that will define the implementation descriptions of the data schema so that a metadata instance for a learning object can be used by a learning technology system to manage, locate, evaluate, or exchange learning objects.

This standard does not define how a learning technology system will represent or use a metadata instance for a learning object.

### 1.2 Purpose

The purpose of this standard is to facilitate search, evaluation, acquisition, and use of learning objects, for instance, by learners, instructors, or automated software processes. The purpose is also to facilitate the sharing and exchange of learning objects by enabling the development of catalogs and inventories while taking into account the diversity of cultural and lingual contexts in which the learning objects and their metadata will be exploited.

By specifying a common conceptual data schema, this standard helps to ensure that bindings of Learning Object Metadata (LOM) will likely have a high degree of semantic interoperability. As a result, transformations between bindings will be straightforward.