



IEEE Standard for Learning Technology—Extensible Markup Language (XML) Schema Binding for Data Model for Content Object Communication

IEEE Computer Society

Sponsored by the
Learning Technology Standards Committee

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**Learning Technology Standards Committee
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IEEE Computer Society**

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Abstract: This Standard specifies a World Wide Web Consortium (W3C) Extensible Markup Language (XML) binding of the data model defined in IEEE Std 1484.11.1™-2004. The purpose of this Standard is to allow for the creation of IEEE Std 1484.11.1-2004 data-model instances in XML. This Standard uses the W3C XML Schema definition language as the encoding, which allows for interoperability and the exchange of data-model instances between various systems.

Keywords: content object, Content Object Communication Data Model, Extensible Markup Language (XML), IEEE Std 1484.11.1-2004, W3C XML Schema definition language, XML, XML binding, XML data instance, XML Schema definition

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Introduction

This introduction is not part of IEEE Std 1484.11.3-2005, IEEE Standard for Learning Technology—Extensible Markup Language (XML) Schema Binding for Data Model for Content Object Communication.

This Standard specifies a World Wide Web Consortium (W3C) Extensible Markup Language (XML) Schema binding of the data model defined in IEEE Std 1484.11.1™-2004. The purpose of this Standard is to allow the creation of IEEE 1484.11.1-2004 data-model instances in XML. This Standard uses the W3C XML Schema definition language as the encoding, which allows for interoperability and the exchange of data-model instances between various systems.

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Contents

1.	Overview.....	1
1.1	Scope.....	1
1.2	Purpose.....	1
2.	Normative references.....	1
3.	Definitions, acronyms, and abbreviations.....	2
3.1	Definitions	2
3.2	Acronyms and abbreviations	2
4.	Conformance.....	2
5.	XML binding	3
	Annex A (informative) Bibliography	4
	Annex B (normative) Normative XSD	5
	Annex C (informative) An example COCD XML instance	26
	Annex D (informative) Explanatory XSD notes.....	33
	Annex E (informative) Internet availability of the XSD file and example instance.....	62

IEEE Standard for Learning Technology—Extensible Markup Language (XML) Schema Binding for Data Model for Content Object Communication

1. Overview

1.1 Scope

This Standard specifies a World Wide Web Consortium (W3C) Extensible Markup Language (XML) Schema binding of the data model defined in IEEE Std 1484.11.1TM-2004.¹ An implementation that conforms to this Standard shall conform to IEEE Std 1484.11.1-2004.

1.2 Purpose

The purpose of this Standard is to allow the creation of IEEE Std 1484.11.1-2004 data-model instances in XML. This Standard uses the W3C XML Schema definition language to specify the encoding of these data-model instances (see XML Schema Parts 1 and 2), which allows for interoperability and the exchange of data-model instances between various systems.

2. Normative references

The following referenced documents are indispensable for the application of this Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

IEEE Std 1484.11.1-2004, IEEE Standard for Learning Technology—Data Model for Content Object Communication.²

¹For information on references, see Clause 2.

²IEEE publications are available from the Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Lane, Piscataway, NJ 08854, USA (<http://standards.ieee.org/>).

W3C Recommendation (28 October 2004), XML Schema Part 1: Structures, Second Edition.³

W3C Recommendation (28 October 2004), XML Schema Part 2: Datatypes, Second Edition.

3. Definitions, acronyms, and abbreviations

3.1 Definitions

For purposes of this Standard, the following terms and definitions apply. *The Authoritative Dictionary of IEEE Standards Terms* [B1]⁴ should be referenced for terms not defined in this Clause.

3.1.1 content object: A collection of digital content that is intended for presentation to a learner by a learning technology system. A content object may include learning material and processing code. Example: A content object might be an interactive HTML page with an embedded video clip and an ECMAScript.

3.1.2 content object communication data Extensible Markup Language instance (COCD XML instance): A particular XML representation of the data model defined in IEEE Std 1484.11.1-2004 that adheres to the requirements and constraints of an XML binding of the data model.

3.1.3 Extensible Markup Language binding (XML binding): The method of encoding the behaviors, attributes, and value spaces of data-model elements in W3C Extensible Markup Language. This method is specified using the W3C XML Schema definition language.

3.2 Acronyms and abbreviations

COCD	content object communication data
SPM	smallest permitted maximum
W3C	World Wide Web Consortium
XML	Extensible Markup Language
XSD	XML Schema definition

4. Conformance

This Standard defines conforming IEEE Std 1484.11.1-2004 content object communication data (COCD) instances in an XML binding. Hereafter, such instances are referred to as “COCD XML instances.”

In this Standard, “shall” is to be interpreted as a requirement on an implementation; “shall not” is to be interpreted as a prohibition.

A conforming COCD XML instance

- Shall conform to the data-model requirements of IEEE Std 1484.11.1-2004.
- Shall not contain any extensions to the data model defined in IEEE Std 1484.11.1-2004.
- Shall be valid according to the XML Schema definition (XSD) specified in Annex B.
- Shall not contain any elements or attributes not defined in the XSD specified in Annex B.

³W3C publications are available from the World Wide Web Consortium, 32 Vassar Street, Room 32-G515, Cambridge, MA 02139, USA (<http://www.w3.org/>).

⁴The numbers in brackets correspond to those of the bibliography in Annex A.

- Shall consist of a single element and its descendants. The single element shall have the name “cocd” as defined in the XSD specified in Annex B. The single element shall reside within the scope of a namespace declaration using the namespace specified in Clause 5.

NOTE 1—This Standard does not require that the COCD XML instance be an XML document. The instance may be embedded at any depth in an XML data instance that includes elements from other name-spaces.⁵

NOTE 2—IEEE Std 1484.11.1-2004 defines smallest permitted maximum (SPM) values. If a COCD XML instance contains more than the SPM number of occurrences of a COCD element, implementers should be aware that it is not guaranteed that an application will process more than the SPM number of occurrences of the COCD element. If a COCD XML instance contains more than the SPM number of characters in a character string, implementers should be aware that it is not guaranteed that an application will process more than the SPM number of characters in the character string.

NOTE 3—The W3C XML Schema definition language cannot express and enforce all data-model requirements of IEEE Std 1484.11.1-2004 (e.g., the requirements for SPMs).

5. XML binding

The namespace for the XML binding is defined by the conforming XSD in Annex B and shall be

`http://ltsc.ieee.org/xsd/1484_11_3`

The XSD in Annex B conforms to *XML Schema Parts 1 and 2*, October, 2004.

An example COCD XML instance is given in Annex C.

NOTE—The recommended file name for the XSD is “ieee_1484_11_3_2005.xsd”. This file name should be treated as a reserved file name; it should not be used to name any file other than the conforming XSD defined in Annex B.

⁵Notes in text, tables, and figures are given for information only and do not contain requirements needed to implement the standard.

Annex A

(informative)

Bibliography

[B1] IEEE 100, *The Authoritative Dictionary of IEEE Standards Terms*, Seventh Edition.⁶

[B2] ISO/IEC 11404:1996, Information technology—Programming languages, their environments and system software interfaces—Language-independent datatypes.⁷

⁶IEEE publications are available from the Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Lane, Piscataway, NJ 08854, USA (<http://standards.ieee.org/>).

⁷ISO/IEC publications are available from the ISO Central Secretariat, Case Postale 56, 1 rue de Varembé, CH-1211, Genève 20, Switzerland/Suisse (<http://www.iso.ch/>). ISO/IEC publications are also available in the United States from Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112, USA (<http://global.ihs.com/>). Electronic copies are available in the United States from the American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036, USA (<http://www.ansi.org/>).

Annex B

(normative)

Normative XSD

Figure B.1 shows the conforming XSD for the data model defined by IEEE Std 1484.11.1-2004.

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns="http://ltsc.ieee.org/xsd/1484_11_3"
  xmlns:t="http://ltsc.ieee.org/xsd/1484_11_3"
  targetNamespace="http://ltsc.ieee.org/xsd/1484_11_3"
  elementFormDefault="qualified" version="1484.11.3-1.0">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      This schema is specified in IEEE 1484.11.3-2005, "IEEE Standard
      for Learning Technology - Extensible Markup Language (XML)
      Binding for Data Model for Content Object Communication."
      This schema is a World Wide Web Consortium (W3C) Extensible
      Markup Language (XML) binding of the data model defined in IEEE
      1484.11.1-2004, "IEEE Standard for Learning Technology - Data
      Model for Content Object Communication."
      The purpose of this schema is to allow the creation of IEEE
      1418.11.1-2004 data-model instances in XML. This schema uses the
      W3C XML Schema definition language as the encoding. This allows
      for interoperability and the exchange of data-model instances
      between various systems.
      This schema shall not be modified but may be included in
      derivative works.

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      Engineers, Inc.

      USE AT YOUR OWN RISK

    </xs:documentation>
  </xs:annotation>
  <!-- -->
  <!-- The first half of this document follows the order of the
    Data Model document clauses. -->
  <!-- -->
  <xs:element name="cocd" type="cocdType"/>
  <xs:complexType name="cocdType">
    <xs:annotation>
      <xs:documentation xml:lang="en">
        Implements IEEE 1484.11.1-2004,
        Clause 6.1: Content object communication
      </xs:documentation>
    </xs:annotation>
  </xs:complexType>
  <xs:all>
    <xs:element ref="commentsFromLearner" minOccurs="0"/>
    <xs:element ref="commentsFromLMS" minOccurs="0"/>
    <xs:element ref="completionStatus" minOccurs="0"/>
    <xs:element ref="completionThreshold" minOccurs="0"/>
    <xs:element ref="credit" minOccurs="0"/>
  </xs:all>

```

```

<xs:element ref="dataModelVersion" minOccurs="0"/>
<xs:element ref="entry" minOccurs="0"/>
<xs:element ref="exit" minOccurs="0"/>
<xs:element ref="interactions" minOccurs="0"/>
<xs:element ref="launchData" minOccurs="0"/>
<xs:element ref="learnerId" minOccurs="0"/>
<xs:element ref="learnerName" minOccurs="0"/>
<xs:element ref="learnerPreferenceData" minOccurs="0"/>
<xs:element ref="lessonStatus" minOccurs="0"/>
<xs:element ref="location" minOccurs="0"/>
<xs:element ref="maxTimeAllowed" minOccurs="0"/>
<xs:element ref="mode" minOccurs="0"/>
<xs:element ref="objectives" minOccurs="0"/>
<xs:element ref="progressMeasure" minOccurs="0"/>
<xs:element ref="rawPassingScore" minOccurs="0"/>
<xs:element ref="scaledPassingScore" minOccurs="0"/>
<xs:element ref="score" minOccurs="0"/>
<xs:element ref="sessionTime" minOccurs="0"/>
<xs:element ref="successStatus" minOccurs="0"/>
<xs:element ref="suspendData" minOccurs="0"/>
<xs:element ref="timeLimitAction" minOccurs="0"/>
<xs:element ref="totalTime" minOccurs="0"/>
</xs:all>
</xs:complexType>
<xs:element name="commentsFromLearner">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.1: Comments from learner
    </xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element name="commentFromLearner" type="commentType"
        minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="collectionType" fixed="array"/>
    <xs:attribute name="spm" fixed="250"/>
  </xs:complexType>
</xs:element>
<xs:element name="commentsFromLMS">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.2: Comments from LMS
    </xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element name="commentFromLMS" type="commentType"
        minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="collectionType" fixed="array"/>
    <xs:attribute name="spm" fixed="100"/>
  </xs:complexType>
</xs:element>
<xs:element name="completionStatus" type="completionStatusType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.3: Completion status
    </xs:documentation>
  </xs:annotation>

```

```

</xs:element>
<xs:element name="completionThreshold" type="progressMeasureType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.4: Completion threshold
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="credit">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.5: Credit
    </xs:documentation>
  </xs:annotation>
  <xs:simpleType>
    <xs:restriction base="xs:token">
      <xs:enumeration value="credit"/>
      <xs:enumeration value="no_credit"/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>
<xs:element name="dataModelVersion" type="literalString250Type">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.6: Data model version
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="entry">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.7: Entry
    </xs:documentation>
  </xs:annotation>
  <xs:simpleType>
    <xs:restriction base="xs:token">
      <xs:enumeration value="ab_initio"/>
      <xs:enumeration value="resume"/>
      <xs:enumeration value=""/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>
<xs:element name="exit">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.8: Exit
    </xs:documentation>
  </xs:annotation>
  <xs:simpleType>
    <xs:restriction base="xs:token">
      <xs:enumeration value="logout"/>
      <xs:enumeration value="normal"/>
      <xs:enumeration value="suspend"/>
      <xs:enumeration value="timeout"/>
      <xs:enumeration value=""/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>
<xs:element name="interactions" type="interactionsType">
  <xs:annotation>

```

```

    <xs:documentation xml:lang="en">
      Implements Clause 6.1.9: Interactions
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="launchData" type="literalString4000Type">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.10: Launch data
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="learnerId" type="longIdentifierType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.11: Learner ID
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="learnerName" type="localizedString250Type">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.12: Learner name
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="learnerPreferenceData"
  type="learnerPreferenceType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.13: Learner preference data
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="lessonStatus" type="legacyStatusType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.14: Lesson status
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="location" type="literalString1000Type">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.15: Location
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="maxTimeAllowed" type="timeIntervalType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.16: Max time allowed
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="mode">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.17: Mode
    </xs:documentation>
  </xs:annotation>

```

```

</xs:annotation>
<xs:simpleType>
  <xs:restriction base="xs:token">
    <xs:enumeration value="browse"/>
    <xs:enumeration value="normal"/>
    <xs:enumeration value="review"/>
  </xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element name="objectives" type="objectivesType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.18: Objectives
    </xs:documentation>
  </xs:annotation>
  <xs:unique name="uniqueInSetOfObjectives">
    <xs:selector xpath="./t:objective"/>
    <xs:field xpath="t:identifier"/>
  </xs:unique>
</xs:element>
<xs:element name="progressMeasure" type="progressMeasureType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.19: Progress measure
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="rawPassingScore" type="real7Type">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.20: Raw passing score
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="scaledPassingScore" type="scaledScoreType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.21: Scaled passing score
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="score" type="scoreType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.22: Score
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="sessionTime" type="timeIntervalType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.23: Session time
    </xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="successStatus" type="successStatusType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.1.24: Success status
    </xs:documentation>
  </xs:annotation>
</xs:element>

```

```

    </xs:annotation>
  </xs:element>
  <xs:element name="suspendData" type="literalString4000Type">
    <xs:annotation>
      <xs:documentation xml:lang="en">
        Implements Clause 6.1.25: Suspend data
      </xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="timeLimitAction">
    <xs:annotation>
      <xs:documentation xml:lang="en">
        Implements Clause 6.1.26: Time limit action
      </xs:documentation>
    </xs:annotation>
    <xs:simpleType>
      <xs:restriction base="xs:token">
        <xs:enumeration value="continue_message"/>
        <xs:enumeration value="continue_no_message"/>
        <xs:enumeration value="exit_message"/>
        <xs:enumeration value="exit_no_message"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:element>
  <xs:element name="totalTime" type="timeIntervalType">
    <xs:annotation>
      <xs:documentation xml:lang="en">
        Implements Clause 6.1.27: Total time
      </xs:documentation>
    </xs:annotation>
  </xs:element>
<!-- -->
<!-- Global type declarations defined by numbered clauses in
IEEE 1484.11.1 -->
<!-- -->
<xs:complexType name="commentType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.2.1: Comment type
    </xs:documentation>
  </xs:annotation>
  <xs:all>
    <xs:element name="comment" type="localizedString4000Type"/>
    <xs:element name="location" type="literalString1000Type"
      minOccurs="0"/>
    <xs:element name="timeStamp" type="dateTimeType" minOccurs="0"/>
  </xs:all>
</xs:complexType>
<xs:simpleType name="completionStatusType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.2.2: Completion status type
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:token">
    <xs:enumeration value="completed"/>
    <xs:enumeration value="incomplete"/>
    <xs:enumeration value="not_attempted"/>
    <xs:enumeration value="unknown"/>
  </xs:restriction>

```

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</xs:simpleType>
<xs:simpleType name="dateTimeType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.2.3: Date time type
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:dateTime"/>
</xs:simpleType>
<xs:simpleType name="languageType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.2.4: Language type. Must remain simpleType
      because it is used as value for attributes
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:language">
    <xs:annotation>
      <xs:appinfo>
        <!-- <spm>250</spm> -->
      </xs:appinfo>
    </xs:annotation>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="localizedStringType" abstract="true">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.2.5: Localized string type.
      The Localized String Type is implemented as several
      variations with embedded SPM information.
      The SPM is not enforced by XML validators but may
      be useful for applications.
    </xs:documentation>
  </xs:annotation>
  <xs:simpleContent>
    <xs:extension base="literalStringType">
      <xs:attribute name="lang" type="languageType"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>
<xs:complexType name="localizedString250Type">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.2.5: Localized string type with SPM=250
    </xs:documentation>
  </xs:annotation>
  <xs:simpleContent>
    <xs:extension base="localizedStringType">
      <xs:attribute name="spm" fixed="250"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>
<xs:complexType name="localizedString4000Type">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Implements Clause 6.2.5: Localized string type with SPM=4000
    </xs:documentation>
  </xs:annotation>
  <xs:simpleContent>
    <xs:extension base="localizedStringType">

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        <xs:attribute name="spm" fixed="4000"/>
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>
  <xs:complexType name="longIdentifierType">
    <xs:annotation>
      <xs:documentation xml:lang="en">
        Implements Clause 6.2.6: Long identifier type
      </xs:documentation>
    </xs:annotation>
    <xs:simpleContent>
      <xs:extension base="xs:anyURI">
        <xs:attribute name="spm" fixed="4000"/>
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>
  <xs:simpleType name="progressMeasureType">
    <xs:annotation>
      <xs:documentation xml:lang="en">
        Implements Clause 6.2.7: Progress measure type
      </xs:documentation>
    </xs:annotation>
    <xs:restriction base="real7Type">
      <xs:minInclusive value="0"/>
      <xs:maxInclusive value="1"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="scoreType">
    <xs:annotation>
      <xs:documentation xml:lang="en">
        Implements Clause 6.2.8: Score type
      </xs:documentation>
    </xs:annotation>
    <xs:all>
      <xs:element name="scaled" type="scaledScoreType" minOccurs="0"/>
      <xs:element name="max" type="real7Type" minOccurs="0"/>
      <xs:element name="min" type="real7Type" minOccurs="0"/>
      <xs:element name="raw" type="real7Type" minOccurs="0"/>
    </xs:all>
  </xs:complexType>
  <xs:complexType name="shortIdentifierType">
    <xs:annotation>
      <xs:documentation xml:lang="en">
        Implements Clause 6.2.9: Short identifier type
      </xs:documentation>
    </xs:annotation>
    <xs:simpleContent>
      <xs:extension base="xs:anyURI">
        <xs:attribute name="spm" fixed="250"/>
      </xs:extension>
    </xs:simpleContent>
  </xs:complexType>
  <xs:simpleType name="successStatusType">
    <xs:annotation>
      <xs:documentation xml:lang="en">
        Implements Clause 6.2.10: Success status type
      </xs:documentation>
    </xs:annotation>
    <xs:restriction base="xs:token">
      <xs:enumeration value="failed"/>
    </xs:restriction>
  </xs:simpleType>

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    <xs:enumeration value="passed"/>
    <xs:enumeration value="unknown"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="real7Type">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      As explained in IEEE 1484.11.1-2004, Annex B.1 Real data type
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:decimal"/>
</xs:simpleType>
<xs:simpleType name="timeIntervalType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      As explained in IEEE 1484.11.1-2004, Annex B.2 Time interval
      Data type
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:duration"/>
</xs:simpleType>
<!-- -->
<!-- Above this, things follow the order of the Data Model
      document clauses. -->
<!-- ===== -->
<!-- Below this are things that did not fit neatly above. They are
      organized as elements, attributes, groups, simple types, complex
      types and alphabetically by name within each of those
      categories. -->
<!-- -->
<!-- === ELEMENTS === -->
<!-- Organized in alphabetic order by element name -->
<!-- -->
<xs:element name="choices" type="setOfChoicesType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Set of short identifiers for interaction type "multiple
      choice" as specified in 6.1.9.5: Correct response and 6.1.9.7:
      Learner response.
    </xs:documentation>
  </xs:annotation>
  <xs:unique name="uniqueInChoicesIds">
    <xs:selector xpath="./t:choice"/>
    <xs:field xpath="."/>
  </xs:unique>
</xs:element>
<!-- -->
<!-- === ATTRIBUTES === -->
<!-- Organized in alphabetic order by attribute name -->
<!-- -->
<xs:attribute name="collectionType">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      The collectionType attribute is used to inject Data Model
      information about aggregation that cannot be expressed in XML
      schema. When defined for an element or type in this schema,
      this attribute is given a fixed values. Even if the attribute
      and value are not specified in an XML instance, the XML schema
      processor makes them available to the processing application.
    </xs:documentation>
  </xs:annotation>

```