



# Healthcare Learning Object Metadata Specifications and Description Document

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## Version History

Version No.	Date	Changed By	Changes Made
1.0	10 May 2008		
1.1	30 Sep 2009	Valerie Smothers	Corrected namespace prefix of keyword attributes in Appendix 3. Corrected healthcaremetadata.xsd file to reflect multiplicity of nonAccreditedProvider element.
1.2	1 August 2013	Valerie Smothers	Changed specialty to disciplineOrSpecialty; added source and id attributes to support referencing standardized vocabularies and update the recommended vocabulary of professions. Revise credit related elements to reflect changes in CE accreditation and update taking into account VA needs. Added element for link to license, repurposing elements, and bibliographic citation element.
1.31	12 Sep 2013	Valerie Smothers	Added quality and teachingAndLearningInstructions
1.32	25 Oct 2013	Valerie Smothers	Clarified section 7.10 placement, added originating system.

1.33	11 Aug 2014	Daniela Giordano	<p>Valerie updated the xsd file to reflect the following changes: 1) add id and source attributes to disciplineOrSpecialty; 2) Change activityFormat in healthcare lom to activityOrResourceFormat. Add source and id attributes to point to vocabularies; 3) Modify healthcare lom vocabulary for learningResourceType; 4) audienceCategory now has recommended values as opposed to restricted values. Student and trainee are added as recommended values.</p> <p>Figures on section 7.3 (Healthcare Education) and section 7.5 (Target Audience) updated accordingly.</p> <p>Changed activityFormat to activityOrResourceFormat and added source and id attributes to point to vocabularies; modified audienceCategory from restricted to recommended values</p>
1.34	8 Oct 2014	Daniela Giordano	<p>Updated the learningResourceType vocabulary in section 7.9</p> <p>Updated Documentation Conventions</p> <p>Updated common data types</p> <p>Updated Figure on section 7.3 (Healthcare Education) to reflect changes in the schema regarding the inclusion of competency element and of references element</p> <p>Added section 7.6 Competency</p> <p>Added section 7.8 References</p> <p>the xsd file has been updated by Valerie to include competency and references and to add a missing a value for learning resource type, immersive environment.</p>

1.35	25 Jan 2015	Daniela Giordano	Updated Figure on section 7.3 (Healthcare Education) to reflect changes in the schema regarding the inclusion of Consent  Added section 7.9 Consent  Updated Figure on section 7.10 (Healthcare Education) to reflect changes in the schema regarding the inclusion of Consent  Updated table of HealthcareAsset information
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This specification is an extension of 1484.12.3 standard XML binding for Learning Object Metadata data model, developed by the Institute of Electrical and Electronics Engineers (IEEE) Learning Technology Standards Committee. Specification authors also received technical guidance from members of the MedBiquitous Technical Steering Committee.

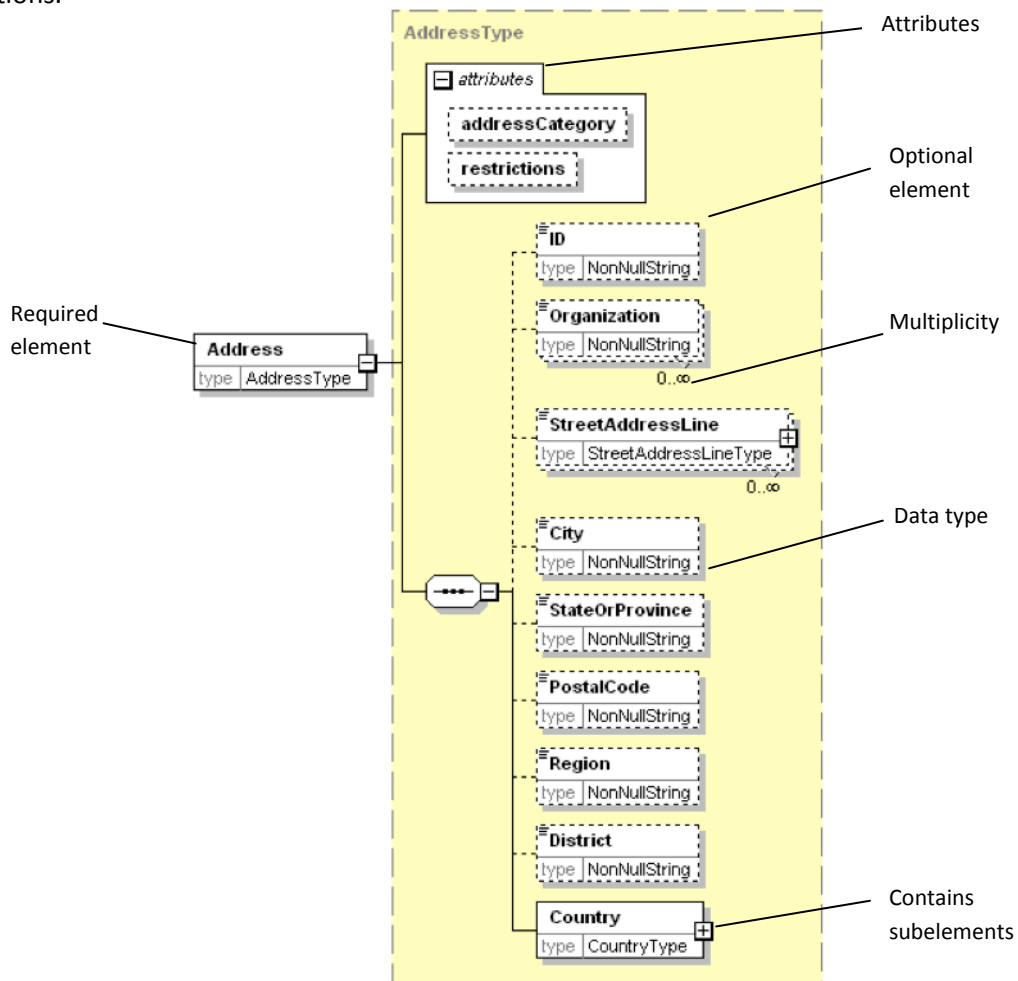
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## 2 Documentation Conventions

This document uses the following conventions:

Convention	Description
<b>Bold Text</b>	When used with an XML element name, indicates that the element contains sub-elements.
<i>Italics</i>	When used in an XML element description, an attribute of the XML element.
Monospaced type	Sample XML tags, code, schema, or portion thereof.

The document uses graphics generated by Altova XML Spy® software, which uses the following graphical conventions.



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### 3 Conformance

To be a conformant instance of Healthcare LOM, an XML document:

- Shall validate against the Healthcare LOM [LOM] XML schema available at <http://ns.medbiq.org/lom/extend/v1/healthcarelom.zip>
- Shall be a conforming XML instance of LOM as defined by IEEE Standard for Learning Technology-- Extensible Markup Language (XML) Schema Definition Language Binding for Learning Object Metadata [LOM XML]
- Shall conform to the Additional Requirements stated in this document
- May include elements not defined in this document or in the IEEE Standard for Learning Technology-- Extensible Markup Language Schema Definition Language Binding for Learning Object Metadata [LOM XML] by using the custom Elements container defined in the section Custom Elements.

The metadata document must indicate that it is conformant with the LOM version 1.0, SCORM Content Aggregation Model version 1.3 (if applicable), and Healthcare LOM version 1 standards. To indicate this conformance, include the following XML code in the metaMetadata section of the metadata record:

```
<metadataSchema>LOMv1.0</metadataSchema>
<metadataSchema>SCORM_CAM_v1.3</metadataSchema>
<metadataSchema>HEALTHCARE_LOMv1</metadataSchema>
```

### 4 Common Data Types

Most of the elements and attributes in MedBiquitous XML documents use the data types defined by the W3C XML schema definition [XML]. In some cases MedBiquitous creates its own datatypes as part of its best practices or to meet a specific requirement. Commonly used datatypes are defined in the common.xsd file. For more information about common datatypes, see: <http://www.medbiq.org/sites/default/files/CommonSpecifications.pdf>

#### 4.1 Character String Datatype

Many of the elements and attributes in Healthcare LOM use the CharacterString data type from the IEEE LOM standard. CharacterString indicates that the data value for the element or attribute is a character string but is NOT a word or phrase in a human language. For example, a name would be encoded using the CharacterString data type.

The characters represented by this data type are from the [ISO UCS] standard. This ISO standard, also known as UCS, attempts to include all characters used in all written languages in the world.

CharacterString uses the XML string data type.

## 4.2 LanguageString Datatype

Many of the elements in Healthcare LOM use the LanguageString datatype from the IEEE LOM standard. LanguageString provides a way for LOM document creators to specify a value for an element in multiple languages. For example, document creators can specify a single keyword term in both French and English. Within the healthcare extensions, the faculty disclosure description can be encoded multiple languages, too. This functionality is important for those creating educational resources for a multilingual population.

Elements using the LanguageString datatype have the sub element of string, which is described in the following table.

Element	Description	Required	Multiplicity	Datatype
string	<p>string is the sub element of any element using the LanguageString datatype. It provides a word or phrase in a human language. If the string element is repeated within a particular element, each value should be semantically equivalent, such as a translation or alternative description.</p> <p>String has the following attribute:</p> <p><i>language</i> language specifies the human language of the text string. If the language attribute is not present, the language will be determined by the value of the language element within the LOM metaMetadata container. Valid values are codes from the <a href="#">ISO UCS</a> standard. For example, en for English and fr for French.</p>	Optional	0 or more	CharacterString

In the following example, the word physician is expressed in three languages:

```
<targetAudience>
  <profession>
    <string language = "en">physician</string>
    <string language = "fr">médecin</string>
    <string language = "sp">médico</string>
  </profession>
</targetAudience>
```

## 5 Introduction

This document describes Healthcare Learning Object Metadata [Healthcare LOM] in detail. It is intended for use by anyone who wants to develop tools or implement electronic systems for managing and describing healthcare education and educational assets, such as images. The status of the document is indicated at the bottom of the page; draft documents are subject to review and approval through the MedBiquitous standards development process see:

[http://www.medbiq.org/std\\_specs/devprocess/MedBiquitousANSIPProcess.pdf](http://www.medbiq.org/std_specs/devprocess/MedBiquitousANSIPProcess.pdf)

Healthcare LOM is based on and is a profile of the IEEE Standard for Learning Object Metadata [LOM] and the [XML] developed by the IEEE Learning Technology Standards Committee.

LOM is one of the standards used by the SCORM reference model for interoperability of online learning content. LOM provides descriptive information about a learning object. Just as a label on a container provides information on what's inside, learning object metadata provides information on a learning module, including the title, author, description, keywords, educational objective, and other relevant information. This information helps learners and content developers to find just the right piece of instruction. Learners can use the learning object as a mini-course, and content developers can include the learning object in a new course.

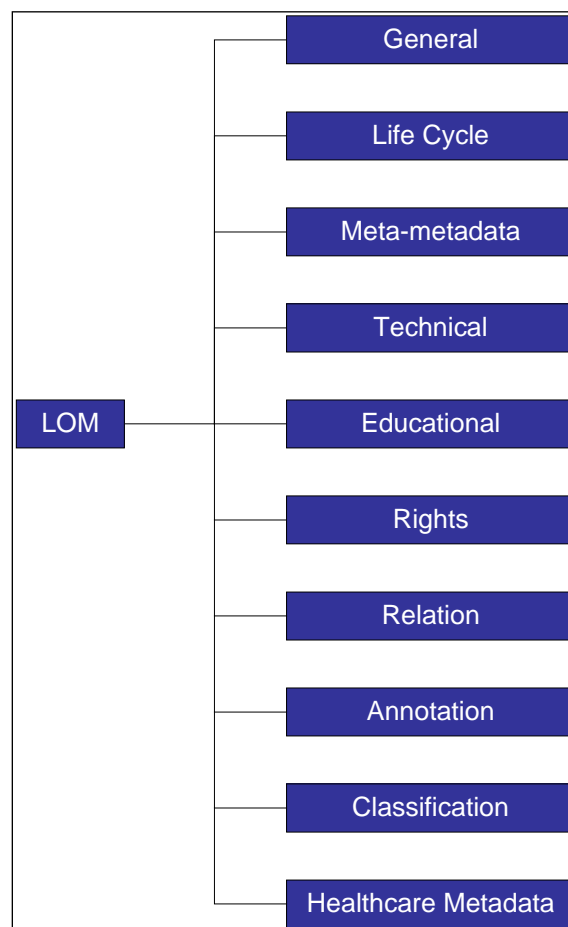
LOM does not address some of the special requirements for healthcare education, including disclosure of financial interests, implementation of medical taxonomies, and indication of continuing education



credits. Healthcare LOM addresses these special requirements and others. Healthcare LOM extends the LOM standard and provides custom vocabularies for some metadata elements.

## 5.1 Learning Object Metadata (LOM)

Some familiarity with the LOM standard is essential to understand Healthcare LOM customizations. The figure below shows the nine categories LOM uses to organize its metadata elements plus the category used for healthcare extensions to LOM.



*Healthcare LOM Categories*

The elements within these categories provide general ways of describing aspects of a learning object. Some healthcare requirements for describing learning objects may be addressed by using elements

within LOM, but several others are not. The requirements that are not addressed by existing LOM elements have been addressed by creating extensions to the LOM standard in the HealthcareMetadata category and by using custom vocabularies.

## 5.2 Metadata Requirements for Healthcare

The following table outlines healthcare requirements for learning object metadata and corresponding elements in Healthcare LOM. Any elements within HealthCare Metadata are MedBiquitous extensions to the LOM standard.

Healthcare Requirements	Healthcare LOM Elements
Date released	lifecycle:contribute:date (use when describing the publishing organization's contributions)
Date reviewed	lifecycle:contribute:date (use when describing the individual reviewer's contributions)
Date of expiry	healthcareMetadata:healthcareEducation:expirationDate
Subject (from Medical Taxonomy)	general: keyword (Those wishing to include medical taxonomy references may do so using the MedBiquitous keyword attribute extensions)
Category	general: keyword
Intended audience (physician, patient, etc)	educational: context (using MedBiquitous defined vocabulary) and healthcareMetadata:healthcareEducation:targetAudience
Learner reading level	healthcareMetadata:healthcareEducation:targetAudience:readingLevel
Credits (accrediting body, credit types, units, provider, pacing, activity certification, accredited and non-accredited providers, and number of credits)	healthcareMetadata:healthcareEducation:credits
Date credit is released	healthcareMetadata:healthcareEducation:credits:releaseDate
Date credit expires	healthcareMetadata:healthcareEducation:credits:expirationDate

Healthcare Requirements	Healthcare LOM Elements
Activity location	healthcareMetadata:healthcareEducation:activityLocation
Start date and time	healthcareMetadata:healthcareEducation:startDateTime
End date and time	healthcareMetadata:healthcareEducation:endDateTime
Activity sponsorship	healthcareMetadata:healthcareEducation:activitySponsorship
Activity format	healthcareMetadata:healthcareEducation:activityFormat
Participation modality	healthcareMetadata:healthcareEducation:participationModality
Activity delivery	healthcareMetadata:healthcareEducation:activityDelivery
Curriculum classification	classification:taxonpath:source (using MedBiquitous defined vocabulary for classification purpose)
Educational Objectives	classification
Competencies, ACGME and others	classification
Learning outcomes	Classification (using MedBiquitous defined vocabulary for classification purpose)
Acknowledgement of commercial support	healthcareMetadata:healthcareEducation:CommercialSupport (yes/no) and healthcareMetadata:healthcareEducation:CommercialSupportAcknowledgement
Disclosure of relevant financial relationships	healthcareMetadata:healthcareEducation: relevantFinancialRelationship (yes/no) and healthcareMetadata:healthcareEducation: relevantfinancialRelationshipDisclosure
Disclosure of off label content	healthcareMetadata:healthcareEducation:offLabelUse (yes/no) and healthcareMetadata:healthcareEducation:offLableDescription
Mapping to guidelines	classification (using MedBiquitous defined vocabulary for purpose)
Mapping to formularies and drug lists	classification (using MedBiquitous defined vocabulary for purpose)
Level of Evidence	classification (using MedBiquitous defined vocabulary for purpose)

Healthcare Requirements	Healthcare LOM Elements
Resource Types Animation Audio Case Study Collaborative Forum Game Image Reference Tutorial Video Virtual Patient	educational: learningResourceType (using MedBiquitous defined vocabulary)
Image descriptors Annotated Clinical history Magnification Orientation Medical image Specimen type File height File width	healthcareMetadata:healthcareAsset

## 6 Other Standards, Specifications, or Schemas Referenced

This standard references the following standards, specifications, or schemas. The informative references here, which describe how these references are used, link to formal references appearing later in this document.

- ANSI /MEDBIQ PP.10.1-2008 Address Specifications and Description Document [Address]  
MedBiquitous Address specifications provide a common format for data related to an activity

location.

- **MedBiquitous Common Specifications [Common]**  
The MedBiquitous Common Specification defines datatypes commonly used across MedBiquitous specifications.
- **MedBiquitous Competency Framework [Competency Framework]**  
Competency Framework provides a way of specifying the hierarchical and non-hierarchical relationships among a set of related competencies, learning objectives, learning outcomes, etc. Healthcare LOM records may reference competencies in a competency framework.
- **MedBiquitous Competency Object [Competency Object]**  
Competency Object provides a common format for representing competencies, learning objectives, learning outcomes, etc. Healthcare LOM records may reference competencies in a competency framework.
- **DCMI Metadata terms [DCMI]**  
Healthcare LOM uses the DCMI license element to indicate the license of a resource.
- **IEEE Standard for Learning Object Metadata, 1484.12.1-2002 [LOM]**  
Healthcare LOM extends the IEEE LOM standard and provides a format for describing healthcare learning resources and activities.

## 7 HealthCare LOM

This section describes the customizations made to the LOM standard, including the files provided in Healthcare LOM, extensions, custom vocabularies, and additional requirements of the Healthcare LOM standard.

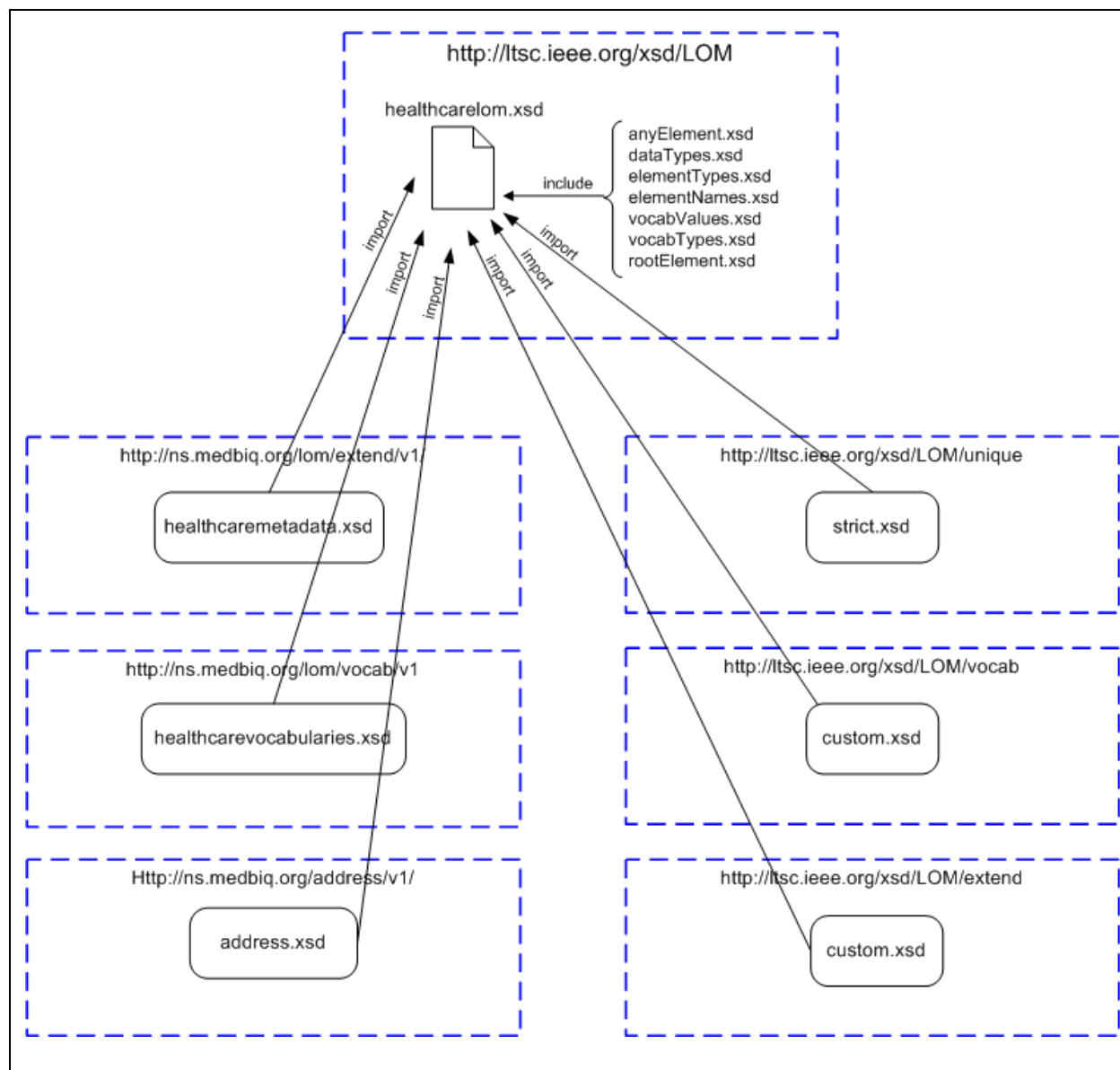
The Healthcare LOM specification is defined technically by XML Schema Definition files, also called XSDs. Many of the XSDs used in Healthcare LOM are from the IEEE XML binding for the LOM standard, one of the component standards of SCORM. To facilitate implementation of LOM and adherence to pre-existing descriptions of the LOM schema, the LOM standard separates definitions of data types, elements, and vocabularies into different XSDs. Healthcare LOM incorporates additional XSDs to customize LOM for

healthcare. The healthcarelom.xsd file imports the other XSDs that describe the lom data types, elements, vocabularies, and healthcare extensions.

The XSD files for Healthcare LOM are a part of this standard. The files are not included in the printed version of this standard but are available on the Internet at: <http://ns.medbiq.org/lom/extend/v1/>

XML namespaces serve as labels that distinguish elements contained in the XSDs. Healthcare extensions to LOM use a MedBiquitous namespace.

The following diagram shows how healthcarelom.xsd unifies LOM files and healthcare extensions.



*Healthcare LOM XML Schemas and Namespaces*

Healthcare LOM files are described in the following table.

## Healthcare LOM Files

File name	Description	Namespace	Dependencies
healthcarelom.xsd	The unifying schema file that provides a consistent structure for information describing healthcare and medical education.	http://ltsc.ieee.org/xsd/LOM	<u>Imports:</u> unique/strict.xsd vocab/custom.xsd extend/custom.xsd healthcare/ healthcaremetadata.xsd healthcare/ healthcarevocabularies.xsd <u>Includes:</u> common/anyElement.xsd common/dataTypes.xsd common/elementNames.xsd common/elementTypes.xsd common/rootElement common/vocabValues.xsd common/vocabTypes.xsd
unique/strict.xsd	Supports validating the uniqueness of LOM elements within their container elements.	http://ltsc.ieee.org/xsd/LOM/unique	—



File name	Description	Namespace	Dependencies
vocab/custom.xsd	Joins custom vocabulary values with LOM vocabulary values to enable use of custom vocabularies.	<a href="http://ltsc.ieee.org/xsd/LOM/vocab">http://ltsc.ieee.org/xsd/LOM/vocab</a>	<u>Imports:</u> healthcarelom.xsd healthcare/ healthcarevocabularies.xsd
extend/custom.xsd	Enables addition of custom elements to LOM.	<a href="http://ltsc.ieee.org/xsd/LOM/extend">http://ltsc.ieee.org/xsd/LOM/extend</a>	<u>Imports:</u> healthcarelom.xsd
healthcaremetadata.xsd	Provides a consistent structure for descriptive information unique to healthcare and medical education.	<a href="http://ns.medbiq.org/lom/extend/v1/">http://ns.medbiq.org/lom/extend/v1/</a>	<u>Imports:</u> healthcarelom.xsd
healthcarevocabularies.xsd	Provides a set of custom vocabularies specific to healthcare education.	<a href="http://ns.medbiq.org/lom/vocab/v1/">http://ns.medbiq.org/lom/vocab/v1/</a>	—
anyElement.xsd	Enables addition of custom elements to LOM.	<a href="http://ltsc.ieee.org/xsd/LOM">http://ltsc.ieee.org/xsd/LOM</a>	—
dataTypes.xsd	Defines data types used in defining several LOM elements.	<a href="http://ltsc.ieee.org/xsd/LOM">http://ltsc.ieee.org/xsd/LOM</a>	<u>Imports:</u> unique/strict.xsd extend/custom.xsd
elementTypes.xsd	Defines the content model and datatype of Healthcare LOM elements.	<a href="http://ltsc.ieee.org/xsd/LOM">http://ltsc.ieee.org/xsd/LOM</a>	<u>Imports:</u> extend/custom.xsd unique/strict.xsd healthcare/healthcaremetadata.xsd

File name	Description	Namespace	Dependencies
elementNames.xsd	Declares each of the LOM elements except for lom.	http://ltsc.ieee.org/xsd/LOM	—
rootElement.xsd	Declares the lom element, which is the root element.	http://ltsc.ieee.org/xsd/LOM	—
vocabTypes.xsd	Defines data types for those LOM elements whose values are taken from a defined vocabulary.	http://ltsc.ieee.org/xsd/LOM/	<u>Imports:</u> extend/custom.xsd vocab/custom.xsd unique/strict.xsd
vocabValues	Defines vocabularies for those LOM elements that require a defined vocabulary.	http://ltsc.ieee.org/xsd/LOM	—
address.xsd	Defines address fields for activity locations. This schema is part of the MedBiquitous Professional Profile.	http://ns.medbiq.org/address/v1/	

## 7.1 Metadata Extensions

The following sections explain the grammar for the healthcaremetadata schema, which holds extensions to the LOM metadata schema. Values in bold under XML Tags column indicate that the element has sub elements.

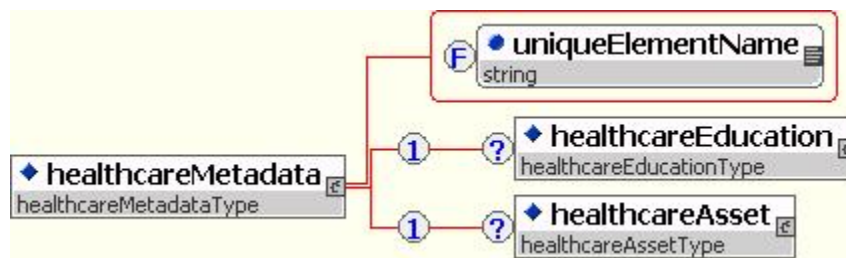
Data types not otherwise defined in the document, such as date, refer to data types defined within the XML 1.0 technical specification. For information on these data types, see the W3C Extensible Markup Language [XML] 1.0 (Fourth Edition).

All the elements having sub elements will be defined in separate sections. All elements without sub elements will be defined within the appropriate element sections that use them.

## 7.2 HealthcareMetadata

healthcareMetadata is the root element. It contains metadata specific to healthcare education. healthcareMetadata must occur once if Healthcare LOM is being used.

healthcareMetadata has the sub elements healthcareEducation, which describes healthcare metadata for educational offerings, and healthcareAsset, which describes healthcare specific metadata for images, multimedia files, and other types of assets. The uniqueElementName attribute ensures that only one instance of healthcareMetadata occurs in a Healthcare LOM document.

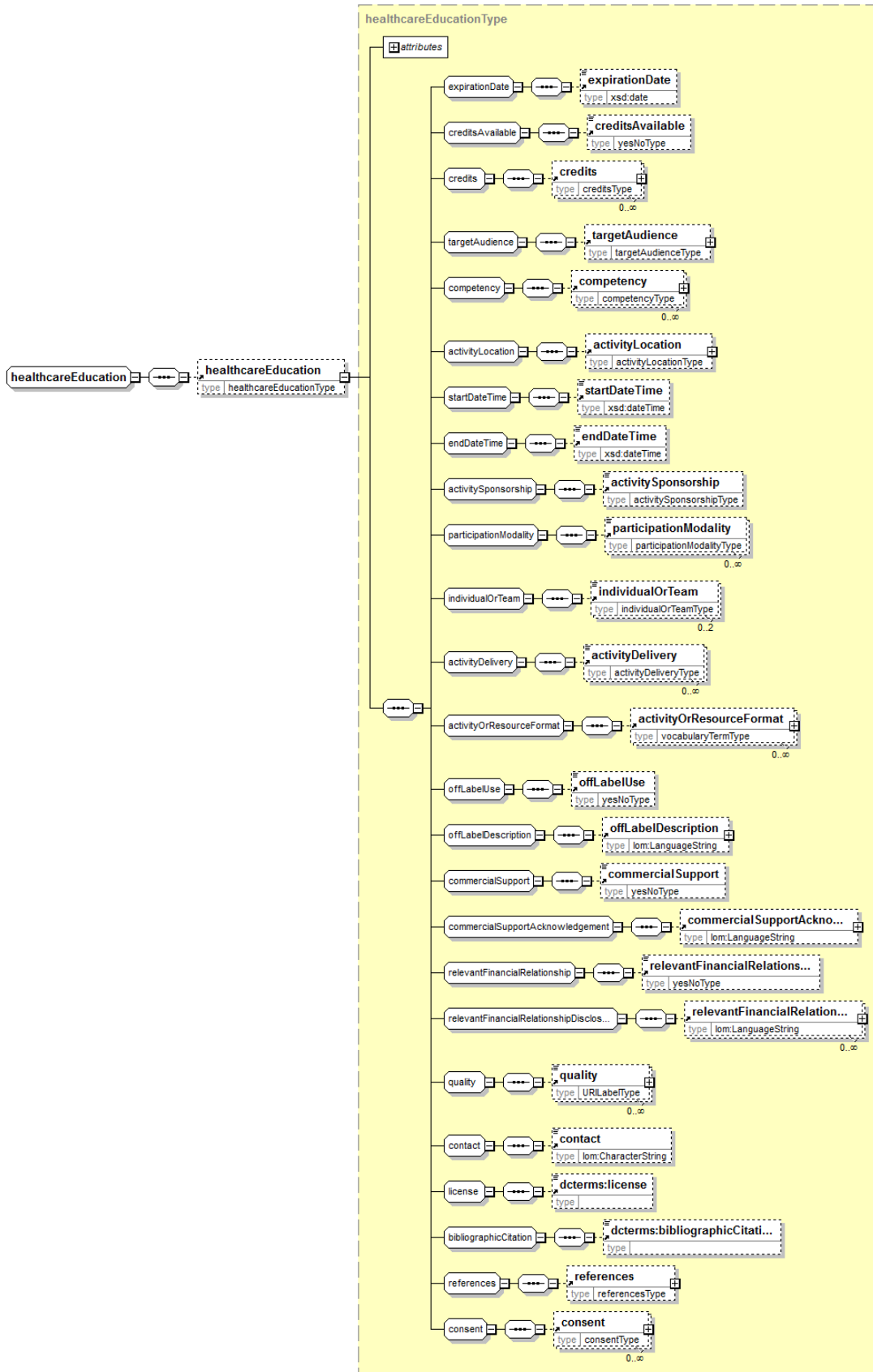


Example:

```
<healthcareMetadata>  
  <healthcareEducation>  
    ...  
  </healthcareEducation>  
  <healthcareAsset>  
    ...  
  </healthcareAsset>  
</healthcareMetadata>
```

### 7.3 HealthcareEducation

healthcareEducation is the sub element of healthcareMetadata that contains healthcare specific metadata for educational offerings. healthcareEducation is optional within a healthcareMetadata record.



Generated by XML Spy [www.altova.com](http://www.altova.com)

healthcareEducation has several sub elements.

## HealthcareEducation Information

Element	Description	Required	Multiplicity	Datatype
<b>healthcareEducation</b>	healthcareEducation is the sub element of healthcareMetadata and defines healthcare specific metadata for educational offerings.	Optional	0 or 1	Container
expirationDate	expirationDate indicates the date after which this educational offering is no longer considered valid.	Optional	0 or 1	Date
creditsAvailable	creditsAvailable indicates whether or not credits are offered for the educational offering. Valid values are yes and no.	Optional	0 or 1	Restricted
credits	credits defines the credits that may be awarded for this educational offering. For more information, see section credits.	Optional	0 or more	Container
targetAudience	targetAudience contains sub elements that describe the target audience for this educational offering. For more information, see section targetAudience.	Optional	0 or 1	Container
competency	competency contains subelements that reference a competency in a competency framework. The competency is addressed by this educational offering. For more information, see section competency.	Optional	0 or more	Container
activityLocation	activityLocation indicates the geographical location in which an in person activity takes place. For more information, see section activityLocation.	Optional	0 or 1	Container



Element	Description	Required	Multiplicity	Datatype
startTime	startTime indicates the date and time that a live activity begins.	Optional	0 or 1	Date time
endTime	endTime indicates the date and time that a live activity ends.	Optional	0 or 1	Date time
activitySponsorship	activitySponsorship indicates the accredited provider's role in planning and presenting the activity. Valid values are direct and joint. Direct indicates that the accredited provider planned and presented the activity directly. Joint indicates that the accredited provider planned and presented the activity together with a non-accredited provider.	Optional	0 or 1	Restricted
participationModality	participationModality defines the learner's mode of participation, dictated by the activity medium. Valid values are conference/workshop, technology based, on the job, print.	Optional	0 or more	Restricted
individualOrTeam	individualOrTeam indicates whether the activity is designed for the individual or the team, or both. Valid values are individual, team	Optional	0 to 2	Restricted
activityDelivery	activityDelivery indicates the temporal nature of the activity. Valid values are live and not live.	Optional	0 or more	Restricted
activityOrResourceFormat	activityOrResourceFormat describes the type of learning activity described. A recommended list is available as part of the Curriculum Inventory Standardized Instructional and Assessment Methods and Resources <a href="#">[Vocabularies]</a> .	Optional	0 or more	Language String (see section Language String datatype for more information)

Element	Description	Required	Multiplicity	Datatype
commercial Support	commercial Support indicates the existence of any commercial support, from a manufacturer of a commercial product. Valid values are yes and no.	Optional	0 or 1	Restricted
commercialSupportAcknowledgement	commercialSupportAcknowledgement describes the commercial support provided from a manufacturer of a commercial product.	Optional	0 or 1	Language String (see section Language String datatype for more information)
offLabelUse	offLabelUse indicates whether or not this educational offering references off label usage of a drug. Valid values are yes and no.	Optional	0 or 1	Restricted
offLabelDescription	offLabelDescription describes any off label drug use referenced in this educational offering.	Optional	0 or 1	Language String (see section Language String datatype for more information)
relevantFinancialRelationship	relevantFinancialRelationship indicates the existence of any relevant financial interest or other relationship of a faculty member or other person in a position to influence the activity content with the manufacturer of any commercial product referenced in this activity. Valid values are yes and no.	Optional	0 or 1	Restricted

Element	Description	Required	Multiplicity	Datatype
relevantFinancialRelationshipDisclosure	relevantFinancialRelationshipDisclosure describes any relevant financial interest or other relationship of a faculty member or other person in a position to influence the activity content with the manufacturer of any commercial product referenced in this activity.	Optional	0 or more	Language String (see section Language String datatype for more information)
quality	quality provides the URI for a page describing a quality assurance process for this activity. It has the following attribute:  <i>label</i> a human readable label for the quality improvement process. For example, MedEdPORTAL Peer Review.	Optional	0 or more	anyURI
contact	Contact identifies the person or organization that serves as the main point of contact for questions about the learning content.	Optional	0 or 1	Character String (see section Character String datatype for more information)

Element	Description	Required	Multiplicity	Datatype
Dcterms:license	The URI for the license associated with this educational offering.  MedBiquitous uses the license element defined by the Dublin Core Metadata Initiative.	Optional	0 or 1	anyURI  For more information, see DCMI Metadata Terms <a href="#">[DCMI]</a>
Dcterms:bibliographicCitation	A formal citation for this resource.  MedBiquitous uses the bibliographicCitation element defined by the Dublin Core Metadata Initiative.	Optional	0 or 1	Any  For more information, see DCMI Metadata Terms <a href="#">[DCMI]</a>
references	references contains subelements that refer to a broad range of external documents. For more information, see section references.	Optional	0 or more	Container
consent	consent contains subelements that provide information to locate the consent forms related to this educational offering. For more information, see section consent.	Optional	0 or more	Container

Example:

```
<healthcareEducation>
  <expirationDate>2005-08-01</expirationDate>
  <hx:creditsAvailable>yes</hx:creditsAvailable>
  <credits>
    ...
  </credits>
  <targetAudience>
    <profession>
      <string language = "en">health educator</string>
    </profession>
  </targetAudience>
  <hx:activitySponsorship>direct</hx:activitySponsorship>
  <hx:participationModality>
    technology based
  </hx:participationModality>
  <hx:activityDelivery>not live</hx:activityDelivery>
  <hx:activityFormat>
    <string language="en">course</string>
  </hx:activityFormat>
  <commercialSupport>yes</commercialSupport>
  <commercialSupportAcknowledgement>
    <string language = "en">MedBiquitous gratefully acknowledges a grant from the XYZ Foundation
to provide funding for this course.</string>
```

```

</commercialSupportAcknowledgement>

<relevantFinancialRelationship>

  no

</relevantFinancialRelationship>

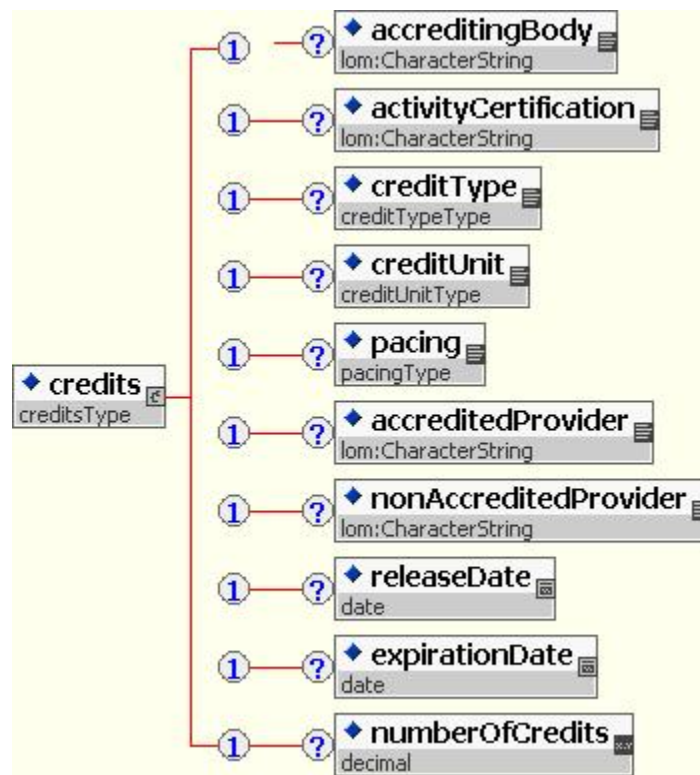
<contact>Edgar Allan Poe, eapoe@medbiq.org</contact>

</healthcareEducation>

```

## 7.4 Credits

credits is the sub element of healthcareEducation that describes the continuing education credits that may be awarded for this educational offering. Note that if an activity is certified to provide more than one type of continuing education credit (i.e. CME and CNE), the credits element should be repeated for each type of credit that may be awarded.



For a glossary of acronyms used to describe credit, see Appendix 1.

### *Credits Information*

Element	Description	Required	Multiplicity	Datatype
credits	credits is the sub element of healthcareEducation that describes continuing education credits that may be awarded for this activity.	Optional	0 or more	Container
accreditingBody	accreditingBody identifies the organization that sets the quality standards for continuing education and is the source of the accreditation or recognition process for the provider of this educational activity. Recommended values for accreditingBody include: AAA, AACN, AAPA, AANA, AANP, AARC, ACCME, ACHE, ACPE, ACSM, ADA CERP, AGD PACE, AHIMA, ANCC, AOTA, APA, ARRT RCEEM, ASCLS, ASHA, ASRT, AST, ASWB, BOC, CA BBS, CA BRN, CBSPD, CCME, CDR, CECBEMS, COPE, . EBAC, FCLB PACE, IACET, IAHCMM, NAADAC, NASW, NATCEP, NBCC, NCVACC, RCPATH, .	Optional	0 or 1	Character String (see section Character String datatype for more information)

Element	Description	Required	Multiplicity	Datatype
activityCertification	activityCertification identifies the category of credit awarded for the activity by the accredited medical education organization. Recommended values include: AAFP Prescribed, AAFP Elective, AAP, ACEP, ACOG, AMA PRA Category 1, AMA PRA Category 2, AOA Category 1-A, AOA Category I-B, AOA Category 2-A, AOA Category 2-B APA Category 1, CECBEMS First Responder, CECBEMS Basic, CECBEMS Advanced, CECBEMS Operational, CECBEMS Educator, CECBEMS Administrator, CPHQ, EBAC CE Credit Hours, Mainpro-M1, Mainpro-C, Mainpro-M2, Mainpro-C NCHEC Category 1, NCHEC Category 2, Synergy CERPS A, Synergy CERPS B, Synergy CERPS C, RCP.	Optional	0 or 1	Character String (see section Character String datatype for more information)
creditType	creditType indicates which type of credit is awarded for this educational activity. Valid values are: CME, CE, CNE, CPE, and CHES, CPD.	Optional	0 or 1	Restricted
creditUnit	creditUnit indicates the unit of credit for this credit definition. Valid values are: CECH, CEH, CEU, Cognate, Contact Hour, Credit, Hour, Unit, Credit Hour, and Point.	Optional	0 or 1	Restricted



Element	Description	Required	Multiplicity	Datatype
pacing	pacing indicates who controls the pacing of the activity. Valid values are learner paced and provider paced.	Optional	0 or 1	Restricted
accreditedProvider	accreditedProvider defines the entity serving as the accredited provider for this activity.	Optional	0 or 1	Character String (see section Character String datatype for more information)
nonAccreditedProvider	nonAccreditedProvider defines an educational provider for this activity that is not the accredited provider. Jointly sponsored activities have a non-accredited provider.	Optional	0 or more	Character String (see section Character String datatype for more information)
releaseDate	releaseDate identifies the date this activity becomes available for credit.	Optional	0 or 1	Date
expirationDate	expirationDate identifies the date that the activity ceases to be available for credit.	Optional	0 or 1	Date
numberOfCredits	numberOfCredits identifies the number of continuing education credits associated with this learning activity.	Optional	0 or 1	Decimal

## Example:

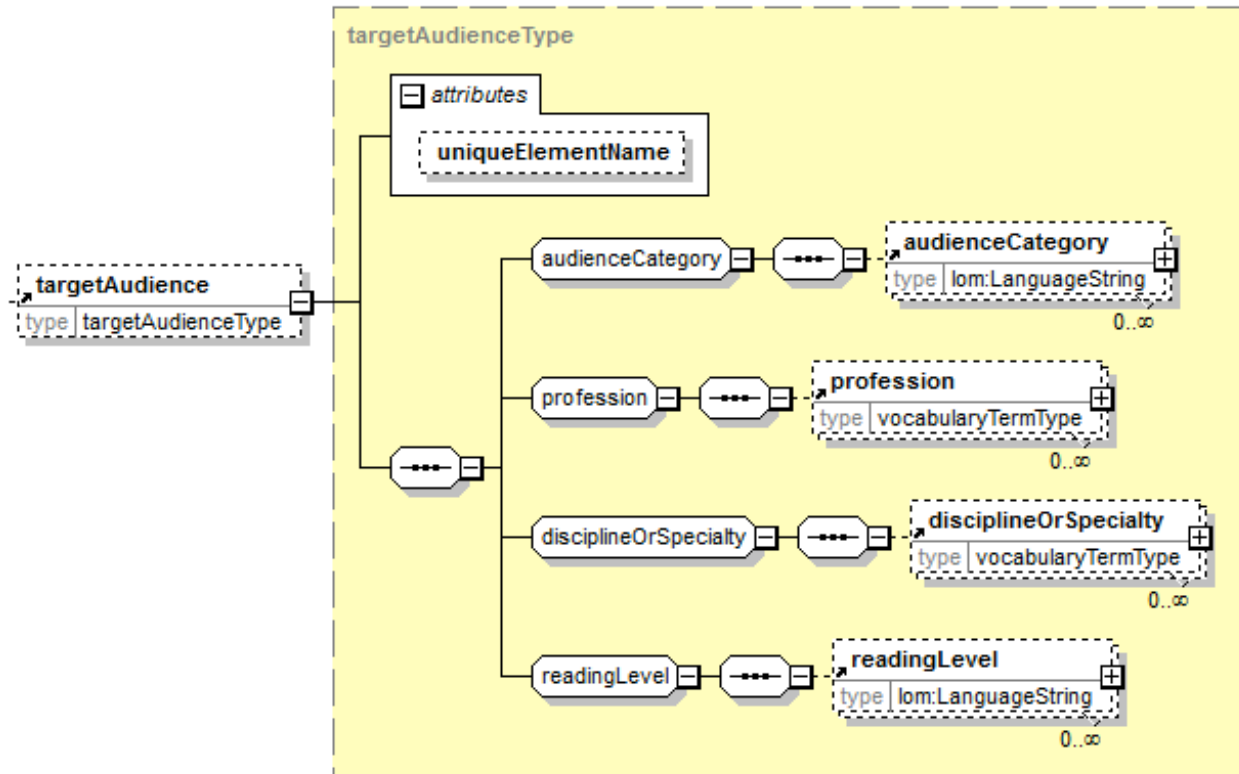
```
<hx:credits>
```

```
<hx:accreditingBody>ACCME</hx:accreditingBody>
```

```
<hx:activityCertification>
  AAFP Prescribed
</hx:activityCertification>
<hx:creditType>CME</hx:creditType>
<hx:creditUnit>Credits</hx:creditUnit>
<hx:pacing>learner paced</hx:pacing>
<hx:accreditedProvider>
  American Academy of Family Physicians
</hx:accreditedProvider>
<hx:releaseDate>2006-04-30</hx:releaseDate>
<hx:expirationDate>2007-04-30</hx:expirationDate>
<hx:numberOfCredits>1.5</hx:numberOfCredits>
</hx:credits>
```

## 7.5 Target Audience

targetAudience is the sub element of healthcareEducation that provides more information on the individuals for whom this learning content is intended.



**targetAudience Element Information**

Element	Description	Required	Multiplicity	Datatype
targetAudience	targetAudience is the sub element of healthcareEducation that provides more information on the learners for which this educational offering is intended.	Optional	0 or 1	Container
audienceCategory	audienceCategory is a sub element of targetAudience that describes the intended audience for the educational offering in broad terms. Recommended values are: general, patient, caregiver, professional, student, trainee.	Optional	0 or more	LanguageString (see section LanguageString datatype for more information)

Element	Description	Required	Multiplicity	Datatype
profession	<p>profession describes the health profession for which this educational offering is intended. For example, physician, registered nurse, etc. See Appendix 2 for a hierarchical list of recommended values.</p> <p>Profession has the following attributes:</p> <p><i>source</i> source specifies the terminology or vocabulary from which the keyword is taken. For example, UMLS, SNOMED, or MeSH.</p> <p><i>Id</i> id defines the unique identifier associated with this term in the structured terminology or vocabulary. For example, D009203.</p>	Optional	0 or more	LanguageString (see section LanguageString datatype for more information)
disciplineOrSpecialty	<p>DisciplineOrSpecialty describes healthcare discipline or specialty within a profession that compose part of the target audience for this educational offering. For example, cardiology. See <b>Appendix 2 for a list of recommended values.</b></p> <p>disciplineOrSpecialty has the following attributes:</p> <p><i>source</i> source specifies the terminology or vocabulary from which the keyword is taken. For example, UMLS, SNOMED, or MeSH.</p>	Optional	0 or more	LanguageString (see section LanguageString datatype for more information)

Element	Description	Required	Multiplicity	Datatype
	<p><i>Id</i></p> <p>id defines the unique identifier associated with this term in the structured terminology or vocabulary.  <b>For example, D009203.</b></p>			
readingLevel	<p>readingLevel is the subelement of targetAudience that describes the primary/secondary school grade reflecting the reading level of the target audience. This is normally used for non-professional education. Recommended values are: grade 1, grade 2, grade 3, grade 4, grade 5, grade 6, grade 7, grade 8, grade 9, grade 10, grade 11, grade 12, above grade 12.</p>	Optional	0 or 1	LanguageString (see section LanguageString datatype for more information)

Example:

```

<targetAudience>
  <audienceCategory>professional</audienceCategory>
  <profession>
    <string language = "en">physician</string>
  </profession>
  <specialty>
    <string language = "en">cardiology</string>
  </specialty>

```

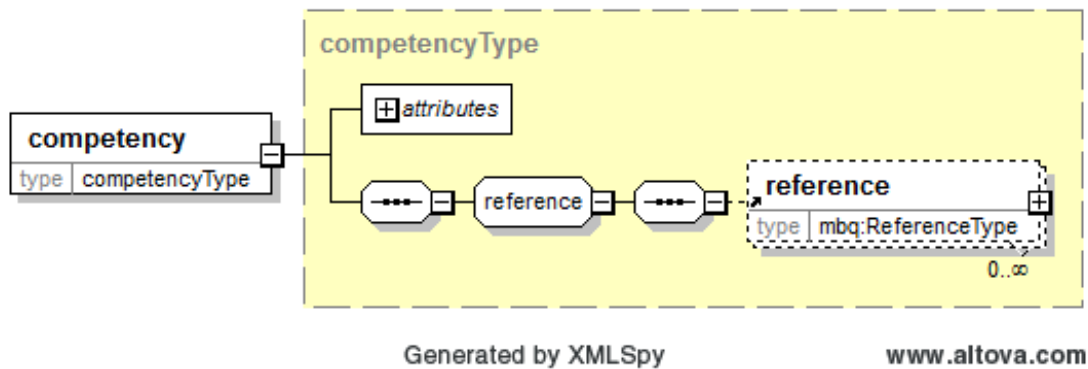
```

<readingLevel>
  <string language = "en">above grade 12</string>
</readingLevel>
</targetAudience>

```

## 7.6 Competency

competency is the subelement of healthcareEducation that provides detailed information on the competency that is being dealt with in the educational offering. A competency element refers to a competency object and to a competency framework, and uses the reference datatype. Two reference subelements are required: one for the competency object and one for the competency framework.



### competency Element Information

Element	Description	Required	Multiplicity	Datatype
<b>competency</b>	competency contains the subelements that reference a competency in a competency framework.	Optional	0 or 1	Container

Element	Description	Required	Multiplicity	Datatype
7.6.1 reference	<p>A reference to a competency object or competency framework.</p> <p>References should occur twice: once to reference a competency object, once to reference the relevant competency framework including the referenced competency object.</p> <p>The Reference element uses the ReferenceType datatype from the MedBiquitous Common Specifications.</p>	Required	2	Container (see [Common] for more information)

Example:

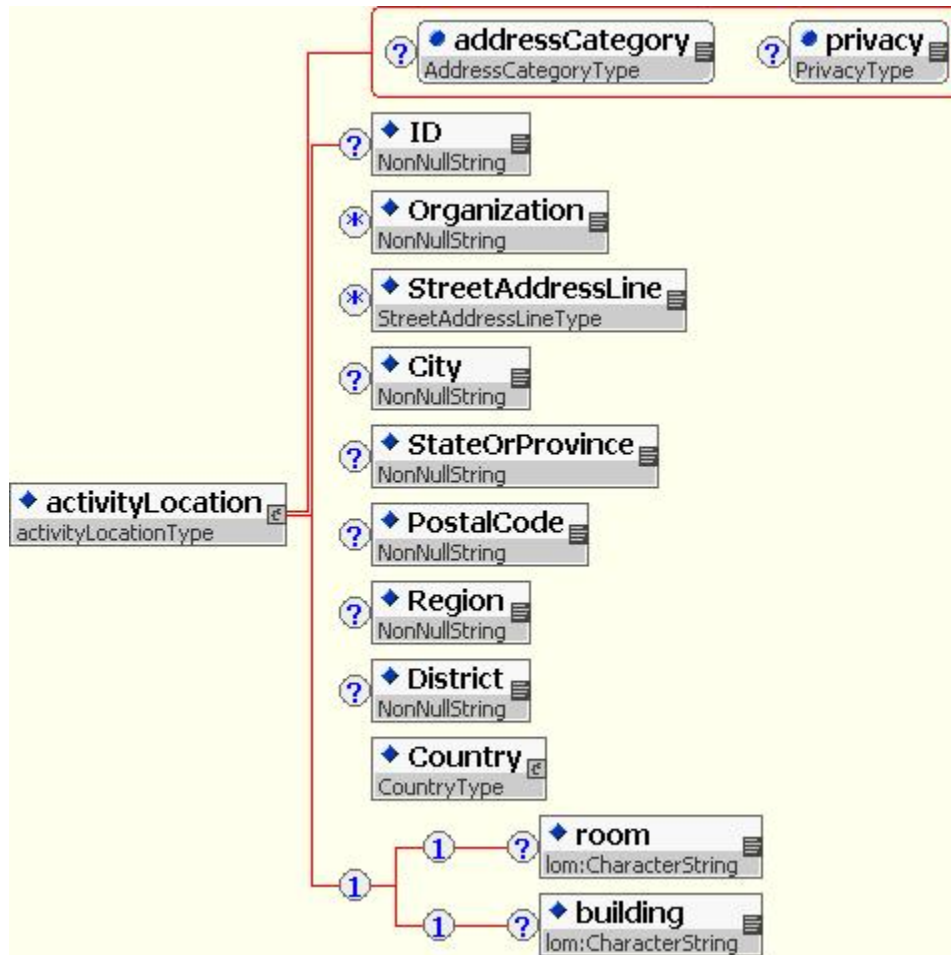
```

<Competency>
  <Reference>
    <rdf:description
about="http://www.example.org/milestone/SBP4.xml"/>
    <rdf:type
rdf:resource="http://ns.medbiq.org/competencyobject/v1/" />
  </Reference>
  <Reference>
    <rdf:description
about="http://www.example.org/im_milestones.xml"/>
    <rdf:type
rdf:resource="http://ns.medbiq.org/competencyframework/v1/" />
    <dcterms:format>application/xml</dcterms:format>
  </Reference>
</Competency>

```

### 7.7 ActivityLocation

activityLocation is the subelement of healthcareEducation that provides detailed information on the location of an in-person learning activity.





## activityLocation information

Element	Description	Required	Multiplicity	Datatype
<b>activityLocation</b>	<p>activityLocation indicates the geographical location in which an in person activity takes place.</p> <p>activityLocation extends the AddressType datatype within the MedBiquitous Professional Profile. For information on the attributes and subelements associated with an address, please see MedBiquitous Address Specifications and Description Document, ver. 1.0 [<a href="#">Address</a>]</p>	Optional	0 or 1	Container
room	Room is a subelement of activityLocation. It defines the room in which an activity takes place.	Optional	1	Character String (see section Character String datatype for more information)
building	Building is a subelement of activityLocation. It defines the building in which an activity takes place.	Optional	1	Character String (see section Character String datatype for more information)

## Example:

```
<healthcareMetadata>
```

```
  <healthcareEducation>
```

```
    <activityLocation>
```

```
      <a:Organization>Portland VA Medical Center</a:Organization>
```

```
      <a:StreetAddressLine>3710 SW US Veterans Hospital Road</a:StreetAddressLine>
```

---

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```

<a:City>Portland</a:City>

<a:StateOrProvince>Oregon</a:StateOrProvince>

<a:PostalCode>97201</a:PostalCode>

<a:Country>

  <a:CountryCode>US</a:CountryCode>

</a:Country>

<room>Schaffer Auditorium</room>

<building>Building 101</building>

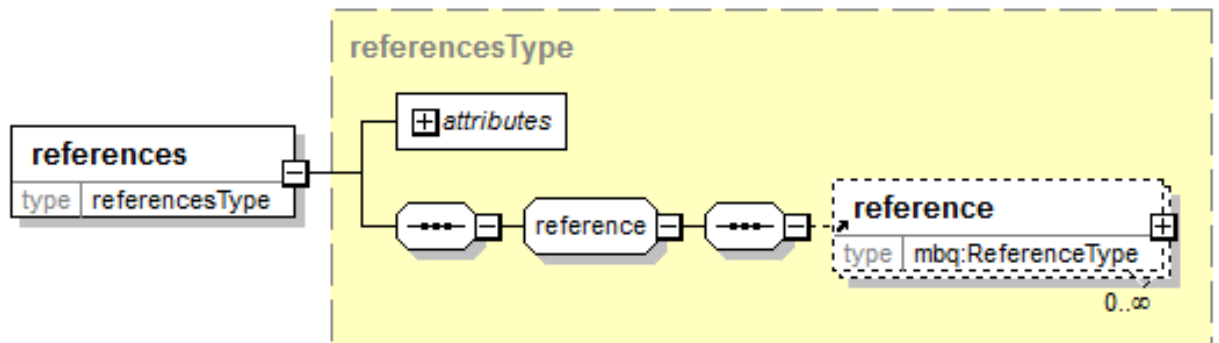
</activityLocation>

</healthcareEducation>

</healthcareMetadata>
    
```

### 7.8 References

references is the subelement of healthcareEducation that provides a way to reference a broad range of external documents related to the educational offering.



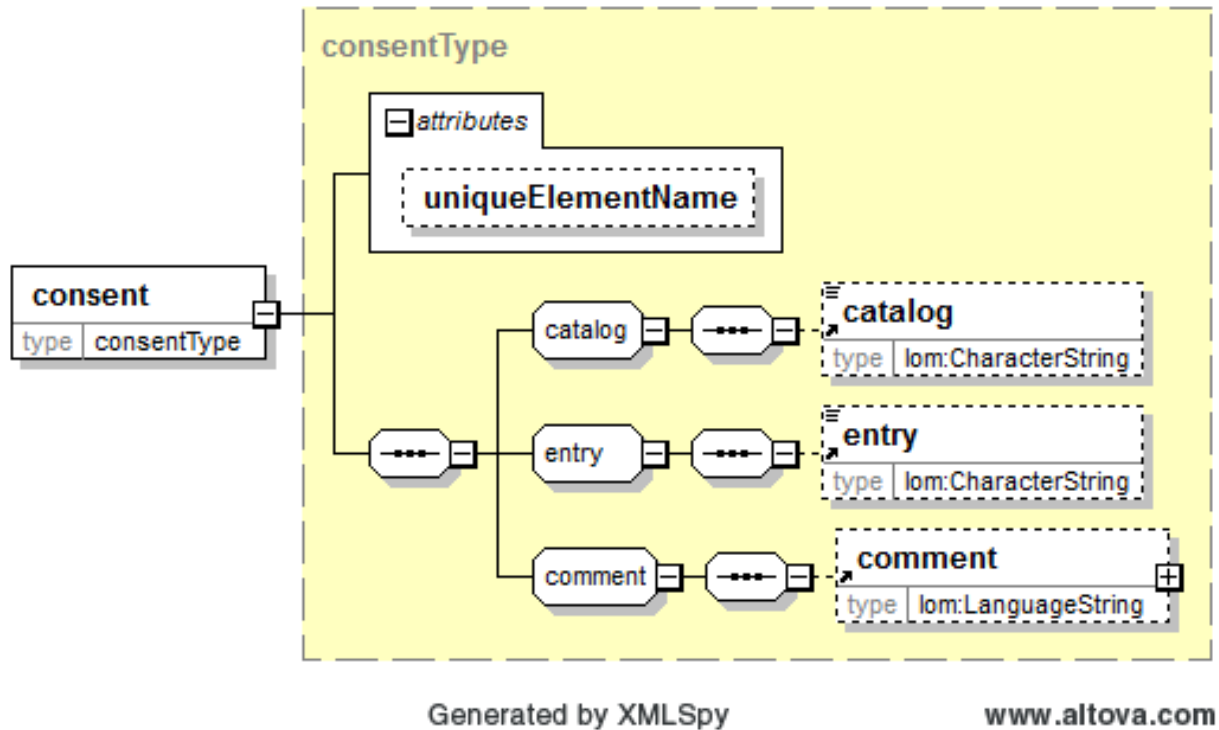
Generated by XMLSpy

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Element	Description	Required	Multiplicity	Datatype
reference	A reference to the supporting information.  The reference element uses the ReferenceType datatype from the MedBiquitous Common Specifications.	Optional	0 or 1	Container  For more information see [Common]

### 7.9 Consent

consent is the subelement of healthcareEducation that provides information to locate the consent forms related to this educational offering. Information can be provided by specifying a catalog and an entry within this catalogue, if a cataloguing system of the consent forms is in use. The comment subelement can provide any additional information useful to locate the catalogue or any other archiving system where the consent forms are stored.



#### consent Element Information

Element	Description	Required	Multiplicity	Datatype
<b>consent</b>	consent is the sub element of healthcareEducation that provides information useful to locate consent forms related this educational offering.	Optional	0 or more	Container
catalog	catalog specifies the catalogue, if any, used to catalogue the consent forms	Optional	0 or 1	CharacterString (see section CharacterString datatype for more)

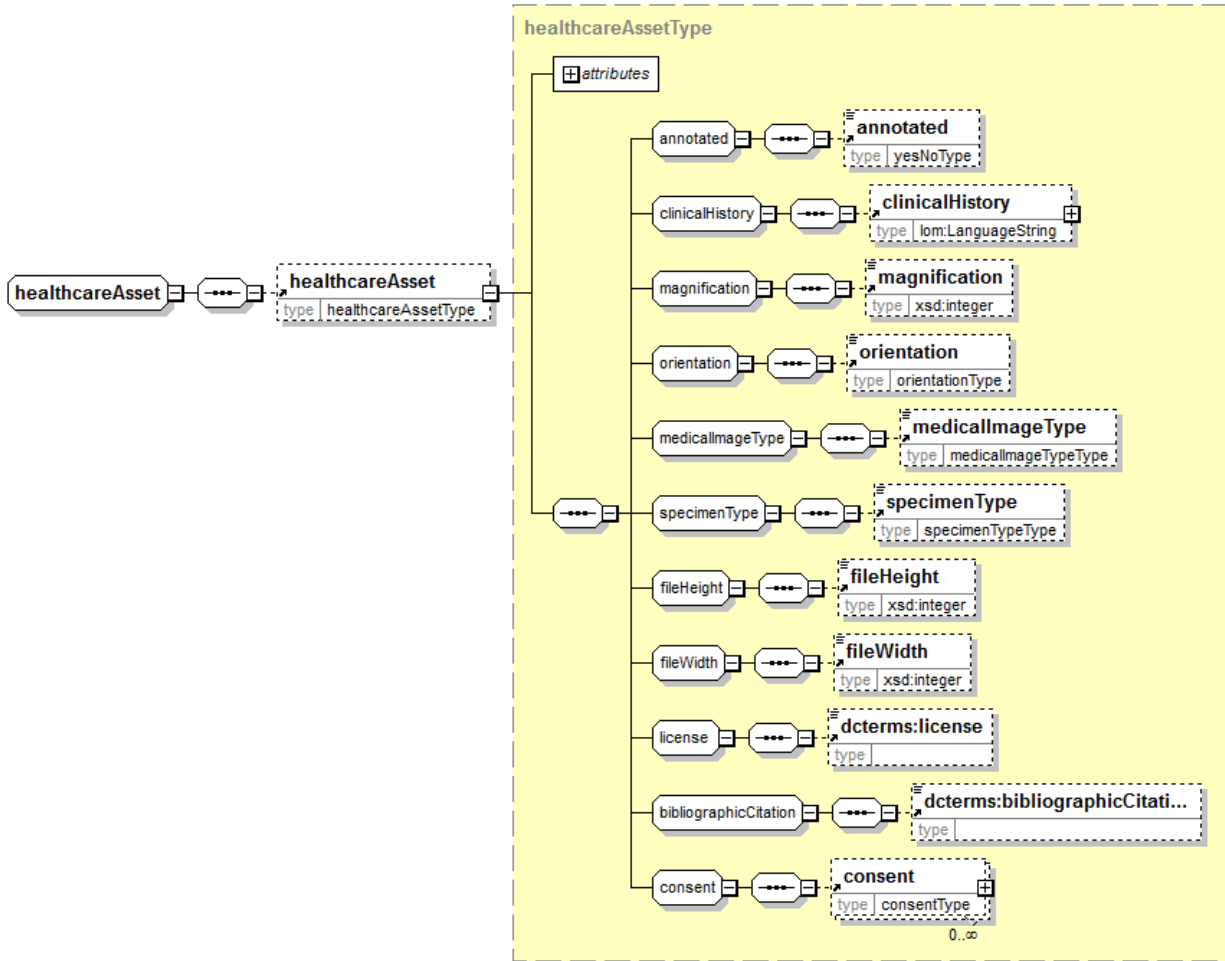
Element	Description	Required	Multiplicity	Datatype
entry	the entry or entries of the consent forms, if catalogued	Optional	0 or 1	information) CharacterString (see section CharacterString datatype for more information)
comment	additional information useful to locate the catalogue or any other system where consent forms are stored	Optional	0 or 1	LanguageString (see section LanguageString datatype for more information)

Example:

```
<consent>
  <catalog>Jagiellonian University Medical College ConsentForms</catalog>
  <entry>2010.13212 </entry>
  <comment>Completed consent forms are stored in the following secure location: \\jmds\consent\
</comment>
</consent>
```

## 7.10 healthcareAsset

healthcareAsset is the subelement of healthcareMetadata that contains healthcare specific metadata for images, text, multimedia files, and other files that contribute to the creation of an educational offering. healthcareAsset is optional.



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healthcareAsset Information

Element	Description	Required	Multiplicity	Datatype
---------	-------------	----------	--------------	----------

Element	Description	Required	Multiplicity	Datatype
<b>healthcareAsset</b>	healthcareAsset is the subelement of healthcareMetadata that provides more information about images and other files that contribute to the creation of an educational offering.	Optional	0 or 1	Container
annotated	annotated is a subelement of healthcareAsset that indicates whether or not this resource features an annotated or labeled image. Valid values are: yes, no.	Optional	0 or 1	Restricted
clinical History	clinical History is a subelement of healthcareAsset that describes the clinical history of the patient or subject described in this resource.	Optional	0 or 1	LanguageString (see section LanguageString datatype for more information)
magnification	magnification is a subelement of healthcareAsset that describes the magnification of microscopic image(s) found in this resource. For example, 100.	Optional	0 or 1	Integer

Element	Description	Required	Multiplicity	Datatype
orientation	orientation is a subelement of healthcareAsset that describes the orientation of image(s) found in this resource. Valid values are: axial, coronal, horizontal, longitudinal, sagittal, transverse.	Optional	0 or 1	Restricted
medicalImageType	medicalImageType is a subelement of healthcareAsset that describes the type of image, radiological or otherwise, featured in this resource. Valid values are: angiogram, computed axial tomography scan, electrocardiogram, endoscopic image, magnetic resonance image, mammogram, micrograph, nuclear medicine scan, photograph, radiograph, ultrasound.	Optional	0 or 1	Restricted
specimenType	specimenType is a subelement of healthcareAsset that describes the type of specimen featured in this resource. Valid values are: cell, organ, organ system, organelle, tissue.	Optional	0 or 1	Restricted
fileHeight	fileHeight is the subelement of healthcareAsset that describes the height of the image in pixels.	Optional	0 or 1	Integer

Element	Description	Required	Multiplicity	Datatype
fileWidth	fileWidth is the subelement of healthcareAsset that describes the width of the image in pixels.	Optional	0 or 1	Integer
Dcterms:license	The URI for the license associated with this educational offering.  MedBiquitous uses the license element defined by the Dublin Core Metadata Initiative.	Optional	0 or 1	anyURI  For more information, see DCMI Metadata Terms [DCMI]
Dcterms:bibliographicCitation	A formal citation for this resource.  MedBiquitous uses the bibliographicCitation element defined by the Dublin Core Metadata Initiative.	Optional	0 or 1	Any  For more information, see DCMI Metadata Terms [DCMI]
consent	consent is the sub element of healthcareEducation that provides information useful to locate consent forms related this educational offering.  <b>For more information see Section 7.9</b>	Optional	0 or more	Container

Example:

```
<healthcareMetadata>
  <healthcareAsset>
    <annotated>no</annotated>
    <clinicalHistory>
```



```

    <string language="en">50 year old female with Cryptococcal Pneumonia</string>

</clinicalHistory>

<medicalImageType> radiograph</medicalImageType>

<specimenType>organ</specimenType>

<fileHeight>500</fileHeight>

<fileWidth>600</fileWidth>

</healthcareAsset>

</healthcareMetadata>

```

## 7.11 Custom Attributes

Healthcare LOM provides attribute extensions to some LOM elements to facilitate the use of LOM in healthcare and to promote interoperability with non-healthcare systems when possible.

### Using Clinical Terminologies to Indicate Keyword

Medical terminologies such as MeSH, SNOMED, and UMLS provide a structure for describing healthcare topics and can facilitate indexing, cataloging and discovery of healthcare learning content. This indexing/cataloging can in turn facilitate integration of content with clinical systems and workflow.

LOM provides the keyword element to describe the important concepts or topics related to learning content. To use the keyword element with terms from medical terminologies, Healthcare LOM adds attribute extension. The syntax of the keyword element with healthcare-specific attribute extensions follows.

Element	Description	Required	Multiplicity	Datatype
keyword	keyword is the subelement of general. Its subelements provide common keywords (important concepts or topics) that describe the educational offering.	Optional	0 or 1	LanguageString (see section LanguageString datatype for more information)
<b>Healthcare LOM adds the</b>				

**following attributes to  
keyword:***source*

source specifies the terminology or vocabulary from which the keyword is taken. For example, UMLS, SNOMED, or MeSH.

*Id*

id defines the unique identifier associated with this term in the structured terminology or vocabulary. For example, D009203.

---

## Example:

```
<keyword hx:source = "MeSH" hx:id = "D009203">  
  <string language = "en">myocardial infarction</string>  
</keyword>
```

## 7.12 Custom Vocabularies

Healthcare LOM custom vocabularies supplement the LOM vocabularies to provide values useful for healthcare education. The table that follows describes the LOM elements for which custom vocabularies have been created, the LOM provided values for those elements, the Healthcare LOM vocabularies that serve as supplements, and the hierarchical path to the LOM element. **Values from both the LOM vocabularies or the Healthcare LOM vocabularies are considered valid values for these elements.**

Element	Description	LOM Vocabulary	Healthcare LOM Vocabulary	Path
source	An indication of the source or owner of the vocabulary values.	LOMv1.0	HEALTHCARE_LOMv1	Occurs with value within any element that has a defined vocabulary
role	Defines the type of contribution made by a contributor.	Author publisher unknown initiator terminator validator editor graphical designer technical implementer content provider technical validator educational validator script writer instructional designer subject matter expert	Other Reviewer Programmer Producer Director	lifecycle:contribute:role

Element	Description	LOM Vocabulary	Healthcare LOM Vocabulary	Path
learning Resource Type	Defines the type of educational content.	Exercise simulation questionnaire diagram figure graph index slide table narrative text exam experiment problem statement self assessment lecture	Primary media: Text Image Sketch/graphical annotation Animation Audio Video 3D Model  Multimedia: multimedia slide/Presentation eBook Virtual Patient Interactive Learning  Environment Immersive Environment Mobile Application  Web/Social Media: Website Blog Discussion forum Post Podcast Webinar Wiki Web feed	educational: learningResourceType

Element	Description	LOM Vocabulary	Healthcare LOM Vocabulary	Path
educational context	The educational environment for which the learning activity is intended.	School higher education training other	Patient education Caregiver education Primary education Secondary education Vocational training Undergraduate education Undergraduate professional education Graduate education Graduate professional education Continuing professional development	educational: context
purpose	Defines a purpose for classifying the learning activity.	Discipline idea prerequisite educational objective accessibility restrictions educational level skill level security level competency	clinical guideline drug list level of evidence learning outcome	classification: purpose

Custom Vocabularies

## 7.13 Metadata for inclusion in other parts of lom

MedBiquitous has created elements that may be included in other parts of the lom as well.

### 7.13.1 Technical Metadata

Healthcare LOM includes an element definitions for Originating system name and version. These metadata elements are intended to be included in the LOM technical element.

The originating system element and its subelements are based on work done by the eViP project, a European Commission funded programme to create a repository of repurposed and enriched virtual patients [[EVIP](#)].

Element	Description	Required	Multiplicity	Datatype
originatingSystem	originatingSystem contains subelements that provide details about the system used to create the educational offering.	Optional	0 or 1	Container
systemName	The name of the tool or system used to create the educational offering.	Required	1	CharacterString (see section CharacterString datatype for more information)
version	The version of the tool or system used to create the educational offering.	Optional	0 or 1	CharacterString (see section CharacterString datatype for more information)

### 7.13.2 Repurposing Metadata

Healthcare LOM includes element definitions for metadata related to the repurposing history and context of an educational resource. These metadata elements are intended to be included in the LOM relations element.

The repurposing elements are based on the work done by the mEducator project, a European Commission-funded Best Practice Network for the discovery, retrieval, and sharing of content across European higher academic institutions [[mEducator](#)].

Element	Description	Required	Multiplicity	Datatype
isRepurposedFrom	The URI of a resource used as the basis for this resource. See section isRepurposedFrom for more information.	Optional	0 or 1?	Container
repurposingContext	The way in which the resource was repurposed. Valid values are:  <a href="http://purl.org/meducator/repurposing#Different-Languages">http://purl.org/meducator/repurposing#Different-Languages</a>  <a href="http://purl.org/meducator/repurposing#Different-Cultures">http://purl.org/meducator/repurposing#Different-Cultures</a>  <a href="http://purl.org/meducator/repurposing#Different-Pedagogy">http://purl.org/meducator/repurposing#Different-Pedagogy</a>  <a href="http://purl.org/meducator/repurposing#Different-Educational-Level">http://purl.org/meducator/repurposing#Different-Educational-Level</a>  <a href="http://purl.org/meducator/repurposing#Different-Disciplines">http://purl.org/meducator/repurposing#Different-Disciplines</a>  <a href="http://purl.org/meducator/repurposing#Different-Content-Types">http://purl.org/meducator/repurposing#Different-Content-Types</a>  <a href="http://purl.org/meducator/repurposing#Different-Technology">http://purl.org/meducator/repurposing#Different-Technology</a>  <a href="http://purl.org/meducator/repurposing#Changes-">http://purl.org/meducator/repurposing#Changes-</a>	Optional	0 or more	Restricted See Description for details.

Element	Description	Required	Multiplicity	Datatype
	to-Content  <a href="http://purl.org/meducator/repurposing#Different-Technology">http://purl.org/meducator/repurposing#Different-Technology</a>			
repurposingDescription	A general description of how the resource was repurposed.	Optional	0 or 1	LanguageString (see section LanguageString datatype for more information)

### 7.13.3 Educational Metadata

Healthcare LOM includes element definitions for metadata related to the educational use of a resource. The metadata elements that follow are intended to be included in the LOM educational element.

Element	Description	Required	Multiplicity	Datatype
teachingLearningInstruction	Instructions of how to use this resource for teaching and/or learning.	Optional	0 or more	LanguageString (see section LanguageString datatype for more information)



## 7.14 Custom Elements

Healthcare LOM allows organizations to add new elements to those described in this document and in the IEEE LOM documentation. This allows organizations to further customize Healthcare LOM for their specific needs.

New elements can be added in the following ways.

### Adding Elements to Existing LOM Categories

Healthcare LOM allows extensions to general, lifecycle, metaMetadata, technical; educational, rights, relation, annotation, classification, and any of their sub-elements that are also container elements. For more information on adding new elements to existing LOM category elements and their sub-elements, see IEEE Standard for Learning Technology—Extensible Markup Language [\[LOM XML\]](#) Schema Definition Language Binding for Learning Object Metadata (IEEE 1484.12.3).

### Adding Elements to a New Category

Healthcare LOM defines a sub-element of lom called custom Elements. The custom Elements container may contain any new elements or new categories of elements as long as those elements are qualified by an XML namespace. Healthcare LOM does not permit extensions to healthcareMetadata or its subelements, so any new elements specific to healthcare should be placed in the custom Elements container.

Example:

```
<lom xmlns="http://ltsc.ieee.org/xsd/LOM" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:hx="http://ns.medbiq.org/lom/extend/v1/" xmlns:new="http://your.organization.org/lom/extend/v1/"
xsi:schemaLocation="http://ltsc.ieee.org/xsd/LOM healthcarelom.xsd">
```

```
  <general>
```

```
    ...
```

```
  </general>
```

```
  ...
```

```
  <hx:customElements>
```

```
    <new:curriculumPlacement>
```

```
<new:curriculumRequirementSatisfied>
  Pain Management
</new:curriculumRequirementSatisfied>

<new:medicalSchoolYear>1</new:medicalSchoolYear>

</new:curriculumPlacement>

</hx:customElements>
```

## 8 Sample XML Document

Healthcare LOM schema files are available for download from: <http://ns.medbiq.org/lom/extend/v1/>

## 9 References

### DCMI

DCMI Metadata Terms, October 11, 2010. Dublin Core Metadata Initiative Website.  
<http://dublincore.org/documents/2010/10/11/dcmi-terms/>. Accessed August 1, 2013.

### EVIP

eViP Technical Reference Group for the eViP Consortium, eViP report on metadata schemes for eViP virtual patients, January 22, 2010. [http://www.virtualpatients.eu/wp-content/uploads/2009/06/evip\\_deliverable\\_3.5.pdf](http://www.virtualpatients.eu/wp-content/uploads/2009/06/evip_deliverable_3.5.pdf)

### LOM

IEEE Standard for Learning Object Metadata, 1484.12.1-2002,  
<http://ieeexplore.ieee.org/servlet/opac?punumber=8032> Accessed January 11, 2013

### ISO UCS

International Organization for Standardization, 10646-1:2000 Information technology Universal Multiple Octet Coded Character Set (UCS) Part 1: Architecture and Basic Multilingual Plane  
[http://www.iso.org/iso/catalogue\\_detail.htm?csnumber=29819](http://www.iso.org/iso/catalogue_detail.htm?csnumber=29819) Accessed January 17, 2013

### LOM XML

IEEE Standard for Learning Technology-Extensible Markup Language (XML) Schema Definition Language Binding for Learning Object Metadata, 1484.12.3-2005,  
<http://ieeexplore.ieee.org/servlet/opac?punumber=10263> Accessed January 11, 2013

### mEducator

mEducator: Multi-type Content Repurposing and Sharing in Medical Education.  
<http://www.meducator.net/> Accessed August 1, 2013.

**ADDRESS**

MedBiquitous Address Specifications and Description Document v1.0,

[http://www.medbiq.org/working\\_groups/professional\\_profile/AddressSpecification.pdf](http://www.medbiq.org/working_groups/professional_profile/AddressSpecification.pdf)

Accessed January 21, 2013

**XML**

W3C Extensible Markup Language (XML) 1.0 (Fourth Edition),

<http://www.w3.org/TR/xml> Accessed January 17, 2013

**Vocabularies**

Curriculum Inventory Standardized Instructional and Assessment Methods and Resource Types.

<https://www.mededportal.org/icollaborative/resource/498> Accessed January 28, 2013

**HRSA**

US Department of Health and Human Services Health Resources and Services Administration

<http://hws.hrsa.gov/Default.aspx> Accessed January 23, 2013

**10 Appendix 1: Credit Related Acronyms**

## Credit-related Acronyms

---

AAA	American Academy of Audiology
AACN	American Association of Critical-Care Nurses
AAFP	American Academy of Family Physicians
AANA	American Association of Nurse Anesthetists
AANP	American Academy of Nurse Practitioners
AAP	American Academy of Pediatrics
AAPA	American Academy of Physician Assistants
AARC	American Association for Respiratory Care
ACCME	Accreditation Council of Continuing Medical Education
ACEP	American College of Emergency Physicians
ACHE	American College of Healthcare Executives
ACOG	American College of Obstetrics and Gynecology
ACPE	Accreditation Council for Pharmacy Education

---

---

ACSM	American College of Sports Medicine
ADA CERP	American Dental Association Continuing Education Recognition Program
AGD PACE	Academy of General Dentistry Program Approval for Continuing Education
AHIMA	American Health Information Management Association
AMA PRA	American Medical Association Physician Recognition Award
ANCC	American Nurses Credentialing Center
AOA	American Osteopathic Association
AOTA	American Occupational Therapy Association
APA	American Psychological Association
ARRT RCEEM	American Registry of Radiologic Technologists Recognized Continuing Education Evaluation Mechanism
ASCLS	American Society for Clinical Laboratory Science
ASHA	American Speech-Language-Hearing Association
ASRT	American Society of Radiologic Technologists
AST	Association of Surgical Technologists
ASWB	Association of Social Work Boards
BOC	Board of Certification (for athletic trainers)
CA BBS	California Board of Registered Nursing
CA BRN	California Board of Behavioral Sciences
CBSPD	Certification Board for Sterile Processing and Distribution
CCME	Council on Continuing Medical Education (for osteopathic professionals)
CDR	Commission on Dietetic Registration
CECBEMS	Continuing Education Coordinating Board for Emergency Medical Services
CE	Continuing Education
CECH	Continuing Education Contact Hour
CEH	Continuing Education Hours
CERP	Continuing Education Recognition Point (for critical-care nurses)
CEU	Continuing Education Units
CHES	Certified Health Education Specialists
CME	Continuing Medical Education
CNE	Continuing Nursing Education
COPE	Council on Optometric Practitioner Education

---

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CPD	Continuing Professional Development
CPE	Continuing Pharmacy Education
CPHQ	Certified Professional in Healthcare Quality
EBAC	European Board of Accreditation in Cardiology
FCLB PACE	Federation of Chiropractic Licensing Boards Providers of Approved Continuing Education
IACET	International Association for Continuing Education and Training
IAHCMM	International Association of Healthcare Central Service Material Management
NAADAC	National Association of Alcoholism and Drug Abuse Counselors
NASW	National Association of Social Workers
NATCEP	Nurse Aide Training and Competency Evaluation Program
NBCC	National Board for Certified Counselors
NCHEC	National Commission for Health Education Credentialing
NCVACC	Nation Conference of Veterans Affairs Catholic Chaplains
NDBACE	North Dakota Board of Addiction Counseling Examiners
RCPATH	Royal College of Pathologists

---

## 11 Appendix 2: Health Professions and Specialties

Following are recommended terms for health professions and health specialties that should capture the needs of most health professions educators. They are intended to provide guidance for those organizations seeking to describe the professional audience for an educational offering in a consistent manner. The list of professionals is adapted from a list created by the US Health Resources and Services Administration, [HRSA]. The list of health specialties is adapted from specialties and internal medicine/pediatric subspecialties as recognized by the Accreditation Council on Graduate Medical Education and the American Board of Medical Specialties. These lists may not be adequate to meet the needs of hospitals and large healthcare organizations requiring a highly detailed hierarchical list of professions. More detailed lists of healthcare professionals have been defined by HL7, SNOMED, the US Health Resources and Services Administration, the US Office of Program Management, and the National Center of Educational Statistics (Classification of Instructional Programs).

Either higher or lower level terms in the hierarchy may be used when describing health professions.

### Health Professions

---

allied health professional

Chiropractor  
Dietician  
Emergency Medical Services Professional  
Laboratory Professional  
Medical Assistant  
Medical Examiner/Coroner  
Medical Imaging Professional  
Mental Health Counselor  
Occupational Therapist  
Optician  
Optometrist  
Physician Assistant  
Cardiovascular Technologists and Technicians  
Dietitians and Nutritionists

---

---

Emergency Medical Technicians and Paramedics

Massage Therapists

Medical and Clinical Laboratory Technologists

Medical and Clinical Laboratory Technicians

Medical Transcriptionists

Medical Scientists, Except Epidemiologists

Occupational Therapists

Radiologic Technologists and Technicians

Respiratory Therapists

Speech-Language Pathologists

Surgical Technologists

---

Health Professions (continued)

---

dental professional

Dentist

Dental Assistants

Dental Hygienists

health administration

Medical and Health Services Managers

Medical Secretaries

Medical Records and Health Information Technicians

home health aids and support  
including Nursing

Home Health Aides

Nursing Aides, Orderlies, and Attendants

Personal Care Aides

medical professional

	physician
Mental Health	Clinical, Counseling, and School Psychologists
	Mental Health and Substance Abuse Social Workers
	Mental Health Counselors
	Psychiatric Aides
	Psychiatric Technicians
	Rehabilitation Counselors
	Substance Abuse and Behavioral Disorder Counselors
nursing professional	
	advanced practice nurse
	licensed practical nurse
	registered nurse
	Vocational Nurse
pharmacy professional	
	Pharmacists
	pharmacy aides
	pharmacy technicians
public health professional	
	environmental engineers
	environmental scientists and specialists including Health
	epidemiologist
	health educator
	healthcare social workers
	occupational health and safety specialists
veterinary professional	
	Veterinarians
Vision	
	Opticians, Dispensing



**Health Specialties**

- adolescent medicine
- allergy/immunology
- anesthesiology
- cardiology
- colon and rectal surgery
- critical care medicine
- dermatology
- developmental-behavioral
- emergency medicine
- endocrinology
- family practice
- gastroenterology
- geriatric medicine
- hematology and oncology
- infectious disease
- internal medicine
- medical genetics
- neonatal-perinatal medicine
- nephrology
- neurological surgery
- neurology
- nuclear medicine
- obstetrics and gynecology

- ophthalmology
- orthopedic surgery
- otolaryngology
- pathology-anatomic and clinical
- pediatrics
- physical medicine and rehabilitation
- plastic surgery
- preventive medicine
- psychiatry
- pulmonology
- radiation oncology
- radiology-diagnostic
- rheumatology
- sports medicine
- surgery-general
- thoracic surgery
- urology

## 12 Appendix 3: Sample XML Documents

### Sample XML for Describing a Learning Object or Course

```
<?xml version="1.0" encoding="UTF-8"?>

<lom xmlns="http://ltsc.ieee.org/xsd/LOM" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:hx="http://ns.medbiq.org/lom/extend/v1/" xsi:schemaLocation="http://ltsc.ieee.org/xsd/LOM
healthcarelom.xsd">

  <general>

    <identifier>

      <catalog>URL</catalog>

      <entry>http://www.aafp.org/x29766.xml</entry>

    </identifier>

    <title>

      <string language="en">Insulin Pump Therapy</string>

    </title>

    <description>

      <string language="en">Provides a general introduction to Continuous Subcutaneous Insulin Infusion
for the family practice physician.</string>

    </description>

    <keyword hx:source="MeSH" hx:id="D007332">

      <string language="en">insulin infusion systems</string>

    </keyword>

    <keyword hx:source="MeSH" hx:id="D003920">

      <string language="en">diabetes mellitus</string>

    </keyword>

  </general>
```

```
<lifeCycle>
  <version>
    <string language="en">1.0</string>
  </version>
  <status>
    <source>LOMv1.0</source>
    <value>final</value>
  </status>
  <contribute>
    <role>
      <source>LOMv1.0</source>
      <value>author</value>
    </role>
    <entity>BEGIN:VCARD\nFN:John DoeEND:VCARD</entity>
  </contribute>
  <contribute>
    <role>
      <source>LOMv1.0</source>
      <value>publisher</value>
    </role>
    <entity>BEGIN:VCARD\nFN:American Academy of Family PhysiciansEND:VCARD</entity>
  <date>
    <dateTime>2004-08-01</dateTime>
    <description>
      <string language="en">Publication date</string>
    </description>
  </date>
```

```
</contribute>
</lifeCycle>
<metaMetadata>
  <identifier>
    <catalog>URL</catalog>
    <entry>http://www.aafp.org/metadata/001</entry>
  </identifier>
  <contribute>
    <role>
      <source>LOMv1.0</source>
      <value>creator</value>
    </role>
    <entity>American Academy of Family Physicians</entity>
    <date>
      <dateTime>2004-08-01</dateTime>
    </date>
  </contribute>
  <metadataSchema>LOMv1.0</metadataSchema>
  <metadataSchema>SCORM_CAM_v1.3</metadataSchema>
  <metadataSchema>HEALTHCARE_LOMv1</metadataSchema>
</metaMetadata>
<technical>
  <format>application/http</format>
</technical>
<educational>
  <context>
    <source>HEALTHCARE_LOMv1</source>
```

```
<value>continuing professional development</value>
</context>
</educational>
<rights>
  <cost>
    <source>LOMv1.0</source>
    <value>yes</value>
  </cost>
  <copyrightAndOtherRestrictions>
    <source>LOMv1.0</source>
    <value>yes</value>
  </copyrightAndOtherRestrictions>
  <description>
    <string language="en">Copyright American Academy of Family Physicians, 2004. All Rights
Reserved.</string>
  </description>
</rights>
<classification>
  <purpose>
    <source>LOMv1.0</source>
    <value>educational objective</value>
  </purpose>
  <description>
    <string language="en">List the indications and advantages of Continuous Subcutaneous Insulin
therapy.</string>
  </description>
</classification>
<classification>
```

```
<purpose>
  <source>LOMv1.0</source>
  <value>educational objective</value>
</purpose>
<description>
  <string language="en">Manage the programming of the insulin pump and recognize problems when
they occur.</string>
</description>
</classification>
<classification>
  <purpose>
    <source>LOMv1.0</source>
    <value>competency</value>
  </purpose>
  <taxonPath>
    <source>
      <string language="en">ACGME Core Competencies</string>
    </source>
    <taxon>
      <id>b</id>
      <entry>
        <string language="en">Medical Knowledge</string>
      </entry>
    </taxon>
  </taxonPath>
</classification>
<hx:healthcareMetadata>
```

```
<hx:healthcareEducation>
  <hx:expirationDate>2007-04-30</hx:expirationDate>
  <hx:creditsAvailable>yes</hx:creditsAvailable>
  <hx:credits>
    <hx:accreditingBody>ACCME</hx:accreditingBody>
    <hx:activityCertification>AAFP Prescribed</hx:activityCertification>
    <hx:creditType>CME</hx:creditType>
    <hx:creditUnit>Credits</hx:creditUnit>
    <hx:pacing>learner paced</hx:pacing>
    <hx:accreditedProvider>
      American Academy of Family Physicians
    </hx:accreditedProvider>
    <hx:releaseDate>2006-04-30</hx:releaseDate>
    <hx:expirationDate>2007-04-30</hx:expirationDate>
    <hx:numberOfCredits>1.5</hx:numberOfCredits>
  </hx:credits>
  <hx:targetAudience>
    <hx:audienceCategory>professional</hx:audienceCategory>
    <hx:profession>
      <string language="en">physician</string>
    </hx:profession>
    <hx:specialty>
      <string language="en">family practice</string>
    </hx:specialty>
    <hx:readingLevel>
      <string language="en">above grade 12</string>
    </hx:readingLevel>
  </hx:targetAudience>
</hx:healthcareEducation>
```



```
</hx:targetAudience>
<hx:activitySponsorship>direct</hx:activitySponsorship>
<hx:participationModality>
  technology based
</hx:participationModality>
<hx:activityDelivery>not live</hx:activityDelivery>
<hx:activityFormat>
  <string language="en">course</string>
</hx:activityFormat>
<hx:commercialSupport>yes</hx:commercialSupport>
<hx:commercialSupportAcknowledgement>
  <string language="en">The Academy gratefully acknowledges a grant from the XYZ Foundation
to provide funding for this course.</string>
</hx:commercialSupportAcknowledgement>
<hx:relevantFinancialRelationship>
  no
</hx:relevantFinancialRelationship>
<hx:contact>John Doe, jdoe@aafp.org</hx:contact>
</hx:healthcareEducation>
</hx:healthcareMetadata>
</lom>
```

**Sample XML for Describing a Learning Object or Course with Multiple Types of Credit**

```
<?xml version="1.0" encoding="UTF-8"?>

<lom xmlns="http://ltsc.ieee.org/xsd/LOM" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:hx="http://ns.medbiq.org/lom/extend/v1/" xsi:schemaLocation="http://ltsc.ieee.org/xsd/LOM
healthcarelom.xsd">

  <general>

    <identifier>

      <catalog>URL</catalog>

      <entry>http://www.atsdr.cdc.gov/HEC/CSEM/arsenic/index.html</entry>

    </identifier>

    <title>

      <string language="en">Arsenic Toxicity</string>

    </title>

    <language>en</language>

    <description>

      <string language="en">Provides a general introduction to arsenic toxicity in the
environment.</string>

    </description>

    <keyword hx:source="MeSH" hx:id="D001151">

      <string language="en">arsenic</string>

    </keyword>

    <keyword hx:source="MeSH" hx:id="D019550">

      <string language="en">environmental medicine</string>

    </keyword>

  </general>

  <lifeCycle>

    <version>
```

```
<string language="en">1.0</string>

</version>

<status>

  <source>LOMv1.0</source>

  <value>final</value>

</status>

<contribute>

  <role>

    <source>LOMv1.0</source>

    <value>author</value>

  </role>

  <entity>BEGIN:VCARD\nFN:John DoeEND:VCARD</entity>

</contribute>

<contribute>

  <role>

    <source>LOMv1.0</source>

    <value>publisher</value>

  </role>

  <entity>BEGIN:VCARD\nFN:Centers for Disease Control and PreventionEND:VCARD</entity>

  <date>

    <dateTime>2005-10-30</dateTime>

    <description>

      <string language="en">Publication date</string>

    </description>

  </date>

</contribute>

</lifeCycle>
```

```
<metaMetadata>
  <identifier>
    <catalog>URL</catalog>
    <entry>http://www.cd.gov/metadata/001</entry>
  </identifier>
  <contribute>
    <role>
      <source>LOMv1.0</source>
      <value>creator</value>
    </role>
    <entity>Centers for Disease Control and Prevention</entity>
    <date>
      <dateTime>2005-10-30</dateTime>
    </date>
  </contribute>
  <metadataSchema>LOMv1.0</metadataSchema>
  <metadataSchema>SCORM_CAM_v1.3</metadataSchema>
  <metadataSchema>HEALTHCARE_LOMv1</metadataSchema>
</metaMetadata>
<technical>
  <format>application/http</format>
  <location>http://www.atsdr.cdc.gov/HEC/CSEM/arsenic/index.html
</location>
</technical>
<educational>
  <context>
    <source>HEALTHCARE_LOMv1</source>
```

```
        <value>continuing professional development</value>
    </context>
</educational>
<rights>
    <cost>
        <source>LOMv1.0</source>
        <value>no</value>
    </cost>
    <copyrightAndOtherRestrictions>
        <source>LOMv1.0</source>
        <value>no</value>
    </copyrightAndOtherRestrictions>
</rights>
<classification>
    <purpose>
        <source>LOMv1.0</source>
        <value>educational objective</value>
    </purpose>
    <description>
        <string language="en">Discuss the major exposure route for arsenic</string>
    </description>
</classification>
<classification>
    <purpose>
        <source>LOMv1.0</source>
        <value>educational objective</value>
    </purpose>
```

```
<description>
  <string language="en">Describe two potential environmental and occupational sources of arsenic
exposure</string>
</description>
</classification>
<classification>
  <purpose>
    <source>LOMv1.0</source>
    <value>educational objective</value>
  </purpose>
  <description>
    <string language="en">Identify evaluation and treatment protocols for persons exposed to
arsenic</string>
  </description>
</classification>
<classification>
  <purpose>
    <source>LOMv1.0</source>
    <value>competency</value>
  </purpose>
  <taxonPath>
    <source>
      <string language="en">ACGME Core Competencies</string>
    </source>
    <taxon>
      <id>b</id>
    <entry>
      <string language="en">Medical Knowledge</string>
```

```
</entry>

</taxon>

</taxonPath>

</classification>

<hx:healthcareMetadata>

  <hx:healthcareEducation>

    <hx:expirationDate>2006-10-30</hx:expirationDate>

    <hx:creditsAvailable>yes</hx:creditsAvailable>

    <hx:credits>

      <hx:accreditingBody>ACCME</hx:accreditingBody>

      <hx:activityCertification>AMA PRA category 1</hx:activityCertification>

      <hx:creditType>CME</hx:creditType>

      <hx:creditUnit>Credit</hx:creditUnit>

      <hx:accreditedProvider>Centers for Disease Control and Prevention</hx:accreditedProvider>

      <hx:releaseDate>2005-10-30</hx:releaseDate>

      <hx:expirationDate>2006-10-30</hx:expirationDate>

      <hx:numberOfCredits>1.5</hx:numberOfCredits>

    </hx:credits>

    <hx:credits>

      <hx:accreditingBody>ANCC</hx:accreditingBody>

      <hx:creditType>CNE</hx:creditType>

      <hx:creditUnit>Contact Hour</hx:creditUnit>

      <hx:pacing>learner paced</hx:pacing>

      <hx:accreditedProvider>Centers for Disease Control and Prevention</hx:accreditedProvider>

      <hx:releaseDate>2005-10-30</hx:releaseDate>

      <hx:expirationDate>2006-10-30</hx:expirationDate>

      <hx:numberOfCredits>1.7</hx:numberOfCredits>

    </hx:credits>

  </hx:healthcareEducation>

</hx:healthcareMetadata>
```

```
</hx:credits>

<hx:targetAudience>
  <hx:audienceCategory>professional</hx:audienceCategory>
  <hx:profession>
    <string language="en">physician</string>
  </hx:profession>
  <hx:profession>
    <string language="en">registered nurse</string>
  </hx:profession>
  <hx:specialty>
    <string language="en">family practice</string>
  </hx:specialty>
  <hx:readingLevel>
    <string language="en">above grade 12</string>
  </hx:readingLevel>
</hx:targetAudience>

<hx:activitySponsorship>direct</hx:activitySponsorship>

<hx:participationModality>technology based</hx:participationModality>

<hx:activityDelivery>not live</hx:activityDelivery>

<hx:activityFormat>
  <string language="en">course</string>
</hx:activityFormat>

<hx:commercialSupport>no</hx:commercialSupport>

<hx:relevantFinancialRelationship>
  no
</hx:relevantFinancialRelationship>

<hx:contact>John Doe, jdoe@cdc.gov</hx:contact>
```



```
</hx:healthcareEducation>  
</hx:healthcareMetadata>  
</lom>
```

## Sample XML for Describing an Asset

```
<?xml version="1.0" encoding="UTF-8"?>

<lom xmlns="http://ltsc.ieee.org/xsd/LOM" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:hx="http://ns.medbiq.org/lom/extend/v1/" xsi:schemaLocation="http://ltsc.ieee.org/xsd/LOM
healthcarelom.xsd ">

  <general>

    <identifier>

      <catalog>URL</catalog>

      <entry>

        http://www.medicalschool.edu/images/dialysisdrainage.jpg

      </entry>

    </identifier>

    <title>

      <string language="en">Drainage of Dialysis Fluid from Peritoneal Cavity</string>

    </title>

    <description>

      <string language="en">Drainage of dialysis fluid in peritoneal cavity with catheter in pouch of
Douglas.</string>

    </description>

    <keyword hx:source="MeSH" hx:id="D002404">

      <string language="en">Catheterization</string>

    </keyword>

    <keyword hx:source="MeSH" hx:id="D015314">

      <string language="en">Dialysis Solutions</string>

    </keyword>

  </general>

  <lifeCycle>
```

```
<contribute>
  <role>
    <source>LOMv1.0</source>
    <value>publisher</value>
  </role>
  <entity>BEGIN:VCARD\nFN:Anystate Medical SchoolEND:VCARD</entity>
</contribute>
</lifeCycle>
<metaMetadata>
  <identifier>
    <catalog>URL</catalog>
    <entry>http://www.medicalschool.edu/metadata/metadata010</entry>
  </identifier>
  <metadataSchema>LOMv1.0</metadataSchema>
  <metadataSchema>HEALTHCARE_LOMv1</metadataSchema>
</metaMetadata>
<technical>
  <format>image/jpg</format>
  <size>135090</size>
</technical>
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  Joe Shmoe at jshmoe@medicalschool.edu for more information.</string>
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