MedBiquitous
Medical Education Metrics
Implementation Guidelines

Version 1.0

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MedBiquitous Metrics Working Group

Revision History

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MedBiquitous Activity Report Guidelines

1. Acknowledgements

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2. Overview

The objective of MedBiquitous Medical Education Metrics specification, or MEMS, is to provide a consistent format and data structure for representing metrics for health professions education, particularly continuing education activities. This structure then enables the exchange of education metrics between disparate systems and organizations over the Web. The data exchanged may differ on the evaluation methods and activity type.

As the Institute of Medicine and others call for reforms to Continuing Medical Education and other types of Continuing Education (CE) for the health professions, there has been an increasing focus on measuring the quality

of CE activities. Educators may use aggregate data on the reach and efficacy of CE activities to evaluate the effectiveness of their educational activities or of their overall educational program. Educators, accrediting bodies, CE supporters, and government agencies often collect educational outcomes data in order to gauge improvement and identify strong or weak activities. Certifiers, accrediting bodies, and supporters may use this data to monitor the success of multiple educational activities and programs as a whole. Industry groups may compile data to facilitate research and advancement across the industry.

Currently, the data collected comes in different formats and often measures different things, making it difficult to compare metrics within or across organizations. In addition, survey items can be difficult to validate with data collected form one survey or organization. Promoting consistent evaluation measurements will enable many educators to look at measurements across activities within their own organization or across the industry. This in turn could help educators identify ways to improve their activities and programs.

MEMS is designed to be used in conjunction with the Survey items specification (http://medbiq.org/working_groups/metrics/SurveyItemsSpecification.pdf). Using the two specifications together allows data in different surveys to be associated with an identified survey item, facilitating the collection of data for item validation or research. It also facilitates the posting of survey items and related data to central repositories like CMExchange (http://www.cmexchange.org/).

This implementation guide provides general guidance for common implementations of MEMS version 1.0. Specific adaptations for your environment may be necessary.

3. General Guidelines for Producing Medical Education Metrics XML

MEMS is used for reporting evaluation metrics for live CE events and enduring materials (not live). The recommended elements for each of these uses are described in the sections that follow. Activities may be a blend of both or may be a combination of several activities.

3.1 Leveraging the Survey Items Specification

The Survey Items specification provides a format for describing and uniquely identifying survey items and their possible responses. This is helpful when many organizations are using a standardized survey. The following types of questions can be represented using the Survey Items specification:

- Yes/No
- Scale (such as Likert scale)
- Multiple choice select one
- Multiple choice select many
- Free test

Each question and possible response has a source attribute and an id attribute. The source should indicate the publisher of the survey item or the organization that is uniquely identifying the survey item. The id should indicate the unique identifier for the survey item or response as indicated by the publisher or source organization. The source could also be a central system tracking survey items and tagging them with unique identifiers.

Example:

```
<SurveyItem source="medbiq.org" id="123">
    <SurveyQuestion>The course achieved its educational
objectives.</SurveyQuestion>
    <Responses>
```

```xml
            <Scale type="likert" points="5">
                <One label="Strongly agree" source="medbiq.org" id="234"/>
                <Two label="Agree" source="medbiq.org" id="345"/>
                <Three label="Neutral" source="medbiq.org" id="456"/>
                <Four label="Disagree" source="medbiq.org" id="567"/>
                <Five label="Strongly disagree" source="medbiq.org" id="678"/>
            </Scale>
        </Responses>
    </SurveyItem>
```

Once survey items have been designated a unique identifier by a publisher or system, MEMS can reference the item or specific responses to that item using the source and id pair.

```xml
    <SurveyItemData source="medbiq.org" id="123">
        <SurveyQuestion>The course achieved its educational
objectives.</SurveyQuestion>
        <ResponseData>
            <ScaleData type="likert" points="5">
                <One label="Strongly agree" source="medbiq.org"
id="234">100</One>
                <Two label="Agree" source="medbiq.org" id="345">40</Two>
                <Three label="Neutral" source="medbiq.org" id="456">10</Three>
                <Four label="Disagree" source="medbiq.org" id="567">0</Four>
                <Five label="Strongly disagree" source="medbiq.org"
id="678">0</Five>
            </ScaleData>
        </ResponseData>
    </SurveyItemData>
```

In the examples above, medbiq.org has published a survey item with the identifier 123. This survey item is related to learner perception of the course achieving educational objective. The response Strongly agree is also published by medbiq.org and has an identifier of 234.

A system collecting evaluation metrics from multiple sources would be able to query for medbiq.org 234 to determine how many learners across multiple organizations and surveys strongly agreed that the course met its educational objectives. Such queries may be useful for research purposes.

MedBiquitous recommends using the source and id attributed for all survey items and responses.

3.2 Reporting CE Data
Use the following table as guidelines on using MEMS to report CE data.

No.	Element	Description	Guidance
-	MedicalEducationMetrics	Container element	
1	ReportDescription	Container element	

No.	Element	Description	Guidance
1.2	RespondentCategory	A category of respondent. This may be based on profession, such as physician, nurse, etc, or any other categorization.	Use the respondent category if you report data by professional category. For example, if it is important to separate evaluation data for the physician learners from evaluation data for the non-physician learners, create two reports: one for physician data and one for non-physician data. Use the respondent category to indicate the learner category that applies to the entire report.
1.3	ReportingStartDate	The first day of the reporting period for the metrics described for this educational activity.	If you are reporting data for a live activity, ReportingStartDate is the first day of the live activity. If you are reporting data for an online activity or enduring material, indicate the timeframe for which the data applies. For example, if you are reporting evaluation data for July 2009, the ReportingStartDate is 2009-07-01.
1.4	ReportingEndDate	The last day of the reporting period for the metrics described for this educational activity.	If you are reporting data for a live activity, ReportingEndDate is the last day of the live activity. If you are reporting data for an online activity or enduring material, indicate the timeframe for which the data applies. For example, if you are reporting evaluation data for July 2009, the ReportingEndDate is 2009-07-31.
2	ActivityDescription	Container element	

2.1	lom:lom	Learning object metadata. Lom describes the activity, including its title, publisher, credits available, etc.	Refer to the *Guidelines for Describing Educational Resources and Activities Using Healthcare Learning Object Metadata*: http://medbiq.org/working_groups/learning_objects/ DescribingEducationalResourcesGuidelines_04.pdf
			
			 To uniquely identify an educational activity, use the identifier entry element within Healthcare LOM. URLs are one type of identifier that may be used. For example:
			
			 `<identifier>`
			   `<catalog>`URL`</catalog>`
			   `<entry>`
			`http://www.medbiq.org/course16355`
			   `</entry>`
			`</identifier>`

No.	Element	Description	Guidance
	Other Activity Description Elements		MEMS includes a wide variety of activity descriptors related to financial support, activity design, and measurement. If data is being collected from several organizations for a central repository, the central repository should develop guidelines on the use of these subelements, indicating which are to be used and under what circumstances.
3	ParticipantActivityEvaluation	Container element	See Reporting Survey Data.
4	KnowledgeAssessment	Container element	See Reporting Knowledge Assessment Data.
5	ParticipationMetrics	Container element	
5.1	TargetedAudience	The number of clinicians targeted to participate in this activity.	Usually this is the number of clinicians receiving promotional materials.
5.2	RegsiteredParticipants	How many clinicians registered to participate in the educational activity.	
5.3	NumberOfParticipants ReceivingCredit	The number of participants that received continuing education credits for participating in this activity.	
5.4	CreditsAwarded	Container element	CreditsAwarded builds on the credit datatype in Healthcare LOM and the CreditReceived datatype in ActivityReport. Repeat the CreditsAwarded element for each type of credit that was awarded. Be as detailed as you need to be for tracking purposes. At a minimum include creditType and numberOfCredits. See *Learning Object Metadata Specifications* and *Description Document and Activity Report Specifications and Description Document* for more information on other subelements describing credit.
5.5	ParticpantsByCategory	The number of participants in a particular category.	If your organization categorized participants using custom categories, use the category attribute to indicate the category. The value of the element should be the number of participants that were in that category.

No.	Element	Description	Guidance
5.6	ParticipantsByProfession	The number of participants in a particular profession.	If you categorize participants based on profession, use the profession attribute to indicate the profession. The value of the element should be the number of participants that were in that profession. MedBiquitous recommends using the list of professions in the *Healthcare Learning Object Metadata Specifications and Description Document*.
5.7	ParticipantsBySpecialty	The number of participants in a particular specialty.	If you categorize participants based on specialty, use the specialty attribute to indicate the specialty. The value of the element should be the number of participants that were in that specialty. MedBiquitous recommends using the list of specialties in the *Healthcare Learning Object Metadata Specifications and Description Document*.
5.8	Comments	Comments explaining participation metrics.	Do your participation metrics require further explanation? Put those comments in this field.

3.3   ReportingSurveyData

Use the following table as guidance for reporting survey data using the MEMS ParticipantActivityEvaluation element. MedBiquitous recommends using the source and id attributed for all survey items and responses.

No.	Element	Description	Guidance
3	ParticipantActivityEvaluation	Container element	
3.1	SurveyItemData	Container element	Each SurveyItemData element contains response data for one survey question or item. Use the source and id attributes to reference a specific survey item within a standardized survey.
3.1.1	SurveyQuestion	The text of the survey question.	
3.1.2	ResponseData	Container element	Use the subelement of ResponseData that corresponds with the question type: Yes/No, scale, multiple choice select one, multiple choice select many, or free text.
3.1.2.1	YesNoData	Container element	Use the subelements to indicate how many people responded Yes and how many people responded No.

No.	Element	Description	Guidance
3.1.2.2	ScaleData	Container element	Scales are intended to measure an individual's opinion or perception using a numeric or graduated scale. Use the type attribute to indicate the type of scale, such as likert, and use the points attribute to indicate the number of points in the scale. The nu,mber of points should correspond with the subelements used. For example, a five point scale would use subelements one through five but not subelements six through ten.
3.1.2.2.1	One (and other subelements)	The number of individuals selecting this point on the scale.	If no one selects a particular point on the scale, such as strongly disagree, that element may be omitted. If there are labels used on the scale, or words rather than numbers, use the label attribute to indicate the words used.
3.1.2.3	MultipleChoiceSelectOneData	Container element	Use MultipleChoiceSelectOneData if the learner can select one and only one answer to the question.
3.1.2.3.1	ResponseItemData	Container element	Use source and id to uniquely identify the response. See Leveraging the Survey Items Specification for more information.
3.1.2.3.1.1	ResponseText	The text of the response option	
3.1.2.3.1.2	TotalRespondents	The number of respondents that selected this response item.	
3.1.2.3.1.2	FreeTextData	Container element	See 3.1.2.5
3.1.2.4	MultipleChoiceSelectManyData	Container element	Use MultipleChoiceSelectManyData if the learner can select multiple answers to the question. Subelements are identical to MultipleChoiceSelectOneData.
3.1.2.5	FreeTextData	Container element	Use FreeTextData when a question gives respondents the option to enter their own words in response. Repeat FreeTextData to encode multiple responses. If 5 learners submitted comments, you would repeat FreeTextData 5 times.
3.1.2.5.1	TextResponse	The text of the individual's response.	

No.	Element	Description	Guidance
3.1.2.5.2	AnalysisCategory	A category assigned to the free text response as a result of content analysis	MedBiquitous recommends performing a content analysis of all free text responses. We also recommend using or developing a vocabulary of terms for describing the different types of free text response appropriate to the question. For example, analysis of the question "What was the biggest strength of the program" may use the following vocabulary for content analysis: faculty, content, discussion, interactive exercises, logistics. If you are using a structured vocabulary that uniquely identifies terms (such as SNOMED or MeSH), you may include the source and unique id for the term using the source and id attributes.
3.2	ComparisonData	Container element	You may ask parallel survey questions before, immediately after, and months after a learning event in order to evaluate changes in learner attitude, knowledge, or competence. Use ComparisonData to group data related to those questions together.
3.2.1	SurveyItemDataForComparison	Container element	Each SurveyItemDataForComparison element contains response data for one survey question or item. Use the source and id attributes to reference a specific survey item within a standardized survey.
3.2.1.1	SurveyQuestion	The text of the survey question.	
3.2.1.2	ResponseData	Container element	See 3.1.2
3.2.1.3	Timing	What time in relation to the learning event this survey item was presented to the learner.	Valid values are: Before, During, After. Use the duration attribute to indicate the amount of time between the learning event and the timing of the survey question. The duration attribute uses the XML schema duration datatype.

3.4   Reporting Knowledge Assessment Data

Use the following guidelines for encoding detailed results of multiple choice questions or scores from other types of assessment.

No.	Element	Description	Guidance
4	KnowledgeAssessment	Container element	

No.	Element	Description	Guidance
4.1	MultipleChoiceAssessmentItemData	Container element	If you have uniquely identified assessment items, indicate the unique id using the source and id attributes. The source should indicate the organization or test bank assigning the identifiers.
4.1.1	Question	The question or prompt for the assessment item.	
4.1.2	AssessmentResponseData	Container element	
4.1.2.1	AssessmentResponseItemData	Container element	Use the correct attribute to indicate whether or not this is a correct response. Valid values are true and false. Use true for a correct response. If you have uniquely identified assessment responses, indicate the unique id using the source and id attributes. The source should indicate the organization or test bank assigning the identifiers.
4.1.2.1.1	ResponseText	The text of the response option.	
4.1.2.1.2	TotalRespondents	The number of respondents that selected this response item.	
4.1.2.1.3	FreeTextData	Container element	See 3.1.2.5 in section Reporting Survey Data. You can use the AnalysisCategory subelement to indicate an assessor's evaluation of a free text response, ie correct, incorrect
4.1.3	Timing	Time in relation to the learning event this assessment item was presented to the learner.	Valid values are: Before, During, After. Use the duration attribute to indicate the amount of time between the learning event and the timing of the assessment question. The duration attribute uses the XML schema duration datatype.

No.	Element	Description	Guidance
4.1.4	Classification	Container element	Refer to the *Guidelines for Describing Educational Resources and Activities Using Healthcare Learning Object Metadata*: http://medbiq.org/working_groups/learning_objects/DescribingEducationalResourcesGuidelines_04.pdf Classification can be used to tie assessment data to a particular competency or learning objective. The guidelines above provided detailed information on using the classification element to do just that.
4.2	AssessmentScoreData	Container element	If you have uniquely identified assessment instruments, indicate the unique id using the source and id attributes. The source should indicate the organization or catalogue assigning the identifiers. If the id points to a web address, use URI.
4.2.1	AssessmentName	The name of the assessment instrument.	
4.2.2	ScoreMethod	The score method used.	Valid values are: Scaled, Graded, Standard, Raw, Percent, Mastery, Adjective, Stanine, Percentile, NormalCurve, Equated, Local.
4.2.3	ScoreValue	One learner's score on the assessment.	Repeat ScoreValue to indicate all learner scores on the assessment. The score value should correspond to the score method indicated. If percent is the method, the value should be a number between 0 and 100.
4.2.4	Timing	Time in relation to the learning event this assessment was presented to the learner.	Valid values are: Before, During, After. Use the duration attribute to indicate the amount of time between the learning event and the timing of the assessment question. The duration attribute uses the XML schema duration datatype.

No.	Element	Description	Guidance
4.2.5	Classification	Container element	Refer to the *Guidelines for Describing Educational Resources and Activities Using Healthcare Learning Object Metadata*: http://medbiq.org/working_groups/learning_objects/DescribingEducationalResourcesGuidelines_04.pdf Classification can be used to tie assessment data to a particular competency or learning objective. The guidelines above provided detailed information on using the classification element to do just that.
4.2.6	Description	Information about the assessment	Any additional information about the assessment, including a local scoring method, can be included in this field.

3.5   Reporting Data for Multifaceted Activities

Many educators will offer different modalities to teach the same learning objective or will offer a multifaceted approach that combines print, live, and online activities around a single topic. In this case, the provider may need to report metrics for each individual activity (ie how many learners participated in the live event) as well as metrics relevant to the group of activities (how many learners received credit for the multifaceted activity).

It is possible to indicate that a multifaceted activity has component parts within the ActivityDescription section. The relation element within lom allows developers to indicate that an activity is part of a larger set of activities, or that a multifaceted activities has these specific activity components.

Example:

```
<ActivityDescription>
   <lom:lom>
      . . .
      <lom:relation>
         <lom:kind>
            <lom:source>LOMv1.0</lom:source>
            <lom:value>ispartof</lom:value>
         </lom:kind>
         <lom:resource>
            <lom:identifier>
               < lom:catalog>URI</lom:catalog>
               < lom:entry>http://www.medbiq.org/course9876</lom:entry>
            </lom:identifier>
            <lom:description>
               <lom:string language="en">Recognizing and Treating COPD
               </lom:string>
            </lom:description>
         </lom:resource>
      </lom:relation>
```

```
   . . .
   </lom:lom>
. . .
</ActivityDescription>
```

3.6   Schema Locations

In order to validate MEMS instance documents, you may wish to store all of the associated schemas on a local server and reference those local copies for validation. To use local copies, the schema locations of the other schemas referenced must be changed within the medicaleducationmetrics.xsd schema document. Change the schemaLocation attribute of the import element to change the location used for validation. The following example shows import statements that have been changed to use local versions of the schemas. In this example, the healthcarelom.xsd and member.xsd files are in the same directory as the activityreport.xsd. The file healthcaremetadata.xsd sits in a subdirectory called healthcare. The schemaLocation attribute may use relative referencing as in the example.

```
   <xsd:import namespace="http://ltsc.ieee.org/xsd/LOM" schemaLocation="
healthcarelom.xsd"/>
   <xsd:import namespace="http://ns.medbiq.org/lom/extend/v1/"
schemaLocation="healthcare/healthcaremetadata.xsd"/>
   <xsd:import namespace="http://ns.medbiq.org/activityreport/v1/"
schemaLocation="activityreport.xsd"/>
```

If you change the schema locations within activityreport.xsd, you must also change the schema locations in these schemas:

- activityreport.xsd
- healthcarelom.xsd
- healthcaremetadata.xsd
- member.xsd

XML MEMS instance documents may then reference the local copy of the medicaleducationmetrics.xsd schema in the schemaLocation attribute of the root element as in the example below. In this example, the medicaleducationmetrics.xsd schema is in the same directory as the instance document.

```
<MedicalEducationMetrics xmlns="http://ns.medbiq.org/metrics/v1/"
xmlns:lom="http://ltsc.ieee.org/xsd/LOM"
xmlns:a="http://ns.medbiq.org/address/v1/"
xmlns:hx="http://ns.medbiq.org/lom/extend/v1/"
xmlns:ar="http://ns.medbiq.org/activityreport/v1/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://ns.medbiq.org/metrics/v1/
medicaleducationmetrics.xsd">
```

Please note that changing the location of the schemas used for validation does not affect the conformance status of MEMS instance document.

3.7   Declaring Imported Schema

The medicaleducationmetrics.xsd schema imports – directly or indirectly - the following schemas containing or referencing data elements:

- activityreport.xsd
- address.xsd
- healthcarelom.xsd
- healthcaremetadata.xsd

MEMS instance documents must declare the namespaces of referenced schemas if elements from those schemas are included in the instance document. In the following example, the namespaces are declared in the root element and assigned prefixes according to the following table.

activityreport.xsd	ar
address.xsd	a
healthcarelom.xsd	lom
healthcaremetadata.xsd	hx

Elements are then referenced using the prefix label.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<MedicalEducationMetrics xmlns="http://ns.medbiq.org/metrics/v1/"
xmlns:lom="http://ltsc.ieee.org/xsd/LOM"
xmlns:a="http://ns.medbiq.org/address/v1/"
xmlns:hx="http://ns.medbiq.org/lom/extend/v1/"
xmlns:ar="http://ns.medbiq.org/activityreport/v1/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://ns.medbiq.org/metrics/v1/.xsd">
   <ReportDescription>
      <ReportingStartDate>2008-01-01</ReportingStartDate>
      <ReportingEndDate>2008-03-31</ReportingEndDate>
   </ReportDescription>
   <ActivityDescription>
      <lom:lom>
         <lom:general>
            <lom:identifier>
               <lom:catalog>URI</lom:catalog>
               <lom:entry>https://www2.nosuchsite.org/courseCOD77</lom:entry>
            </lom:identifier>
         <hx:healthcareMetadata>
            <hx:healthcareEducation>
               <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:numberOfCredits>1</hx:numberOfCredits>
               </hx:credits>
               <hx:activityLocation>
                  <a:City>Chicago</a:City>
                  <a:StateOrProvince>Illinois</a:StateOrProvince>
                  <a:Country>
                     <a:CountryName>United States</a:CountryName>
                  </a:Country>
```

```
                    </hx:activityLocation>
                </hx:healthcareEducation>
            </hx:healthcareMetadata>
        </lom:lom>
    </ActivityDescription>
    <ParticipantActivityEvaluation>
        <SurveyItemData source="medbiq.org" id="95452">
        <SurveyQuestion>The course achieved its educational
objectives.</SurveyQuestion>
            <ResponseData>
                <ScaleData type="likert" points="5">
                    <One label="Strongly Agree" source="medbiq.org"
id="85463">100</One>
                    <Two source="medbiq.org" id="45698">40</Two>
                    <Three source="medbiq.org" id="78512">10</Three>
                    <Four source="medbiq.org" id="23658">0</Four>
                    <Five label="Strongly Disagree" source="medbiq.org"
id="36547">0</Five>
                </ScaleData>
            </ResponseData>
        </SurveyItemData>
    </ParticipantActivityEvaluation>
    <ParticipationMetrics>
        <TargetedAudience>1000</TargetedAudience>
        <RegisteredParticipants>200</RegisteredParticipants>
        <NumberOfParticipantsReceivingCredit>150
        </NumberOfParticipantsReceivingCredit>
        <CreditsAwarded>
            <hx:creditType>CME</hx:creditType>
            <hx:numberOfCredits>150</hx:numberOfCredits>
            <ar:CreditFocus>
                <ar:Description>Breast</ar:Description>
                <ar:NumberOfCredits>150</ar:NumberOfCredits>
            </ar:CreditFocus>
        </CreditsAwarded>
        <NumberOfDistinctHostsOrVisitors>250</NumberOfDistinctHostsOrVisitors>
        <NumberOfSuccessfulPageRequests>500</NumberOfSuccessfulPageRequests>
        <NumberOfParticipantsCompletingActivity>150
        </NumberOfParticipantsCompletingActivity>
        <ParticipantsBySpecialty specialty="radiology-diagnostic">100
        </ParticipantsBySpecialty>
        <ParticipantsBySpecialty specialty="radiation oncology">50
        </ParticipantsBySpecialty>
    </ParticipationMetrics>
</MedicalEducationMetrics>
```

4. Adapt the Schema to Meet Your Requirements

If an analysis of the schema shows a gap between the data the schema addresses and the data required for exchange, the schema may be extended to incorporate new data. To extend MEMS, take the following steps.

1. **Write a new XML schema for new data elements and declare a targetNamespace.**
   Develop a new XSD schema that defines the data elements that are missing. All new elements must be associated with a namespace. This can be achieved by using the XSD targetNamespace attribute. The following example defines an element called RegisteredForFollowup that indicates how many individuals expressed interest in registering for a followup activity. The schema defines http://ns.myurl.com/registeredforfollowup/ as the targetNamespace, so the RegisteredForFollowup element is associated with that namespace.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="http://ns.myurl.com/registeredforfollowup/"
xmlns="http://ns.myurl.com/registeredforfollowup/"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
elementFormDefault="qualified" attributeFormDefault="unqualified">
    <xs:element name="RegisteredForFollowup" type="xs:integer"/>
</xs:schema>
```

2. **Place new namespace qualified elements in the XtensibleInfo element in the XML instance document.**
   The XtensibleInfo element of MEMS was designed to enable extensions. When creating an instance document of MEMS, declare the namespace of the schema with new data elements in the instance document. Usually this is done by declaring the namespace in the root element and assigning a prefix to the namespace. Then the prefix can be used when referencing the new elements. You may also declare a default namespace for an element and its subelements by declaring the namespace in the uppermost element belonging to that namespace.

   In the example below, the prefix r is declared for the http://ns.myurl.com/registeredforfollowup/ namespace within the MedicalEducationMetrics root element. The r prefix is then used to label the RegsiteredFprFollowup element, which is referenced within XtensibleInfo.

```xml
<MedicalEducationMetrics xmlns="http://ns.medbiq.org/metrics/v1/"
xmlns:lom="http://ltsc.ieee.org/xsd/LOM"
xmlns:a="http://ns.medbiq.org/address/v1/"
xmlns:hx="http://ns.medbiq.org/lom/extend/v1/"
xmlns:ar="http://ns.medbiq.org/activityreport/v1/"
xmlns:r="http://ns.myurl.com/registeredforfollowup/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://ns.medbiq.org/metrics/v1/.xsd">
   <ReportDescription>
      <ReportingStartDate>2008-01-01</ReportingStartDate>
      <ReportingEndDate>2008-03-31</ReportingEndDate>
   </ReportDescription>
   <ActivityDescription>
      <lom:lom>
         <lom:general>
            <lom:identifier>
                <lom:catalog>URI</lom:catalog>
                <lom:entry>https://www2.nosuchsite.org/courseCOD77</lom:entry>
            </lom:identifier>
```

```
            </lom:general>
        </lom:lom>
    </ActivityDescription>
    <ParticipationMetrics>
        <TargetedAudience>1000</TargetedAudience>
        <RegisteredParticipants>200</RegisteredParticipants>
        <NumberOfParticipantsReceivingCredit>150
        </NumberOfParticipantsReceivingCredit>
        <CreditsAwarded>
            <hx:creditType>CME</hx:creditType>
            <hx:numberOfCredits>150</hx:numberOfCredits>
            <ar:CreditFocus>
                <ar:Description>Breast</ar:Description>
                <ar:NumberOfCredits>150</ar:NumberOfCredits>
            </ar:CreditFocus>
        </CreditsAwarded>
    </ParticipationMetrics>
    <XtensibleInfo>
        <r:RegisteredForFollowup>35</r:RegisteredForFollowup>
    </XtensibleInfo>
</MedicalEducationMetrics>
```

5.   References

Healthcare Learning Object Metadata Specifications and Descriptions Document, version 1.0. Available at:
http://medbiq.org/working_groups/learning_objects/HealthcareLOMSpecification.pdf

MedBiquitous Healthcare Professional Profile Specifications Document, version 1.0. Available at:
http://www.medbiq.org/working_groups/professional_profile/ProfessionalProfileSpecifications.pdf

6.   Appendix 2: Sample Medical Education Metrics Reports

For In Person Activity (minimal dataset)

```
<?xml version="1.0" encoding="UTF-8"?>
<MedicalEducationMetrics xmlns="http://ns.medbiq.org/metrics/v1/"
xmlns:lom="http://ltsc.ieee.org/xsd/LOM"
xmlns:ar="http://ns.medbiq.org/activityreport/v1/"
xmlns:hx="http://ns.medbiq.org/lom/extend/v1/"
xmlns:hv="http://ns.medbiq.org/lom/vocab/v1/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://ns.medbiq.org/metrics/v1/://ns.medbiq.org/metrics/
v1/medicaleducationmetrics.xsd">
    <ReportDescription>
        <ReportingStartDate>2009-08-08</ReportingStartDate>
        <ReportingEndDate>2009-08-08</ReportingEndDate>
    </ReportDescription>
    <ActivityDescription>
        <lom:lom>
```

```
    <lom:general>
        <lom:identifier>
            <lom:catalog>NoSuchOrg</lom:catalog>
            <lom:entry>23456</lom:entry>
        </lom:identifier>
        <lom:title>
            <lom:string>Experimental Imaging Workshop</lom:string>
        </lom:title>
        <lom:language>en</lom:language>
        <lom:description>
            <lom:string>A hand-on introduction to experimental breast
imaging tehniques. </lom:string>
        </lom:description>
        <lom:keyword id="D001940" source="MeSH">
            <lom:string>breast</lom:string>
        </lom:keyword>
        <lom:keyword id="D003952" source="MeSH">
            <lom:string>diagnostic imaging</lom:string>
        </lom:keyword>
    </lom:general>
    <hx:healthcareMetadata>
        <hx:healthcareEducation>
            <hx:expirationDate>2010-07-19</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:numberOfCredits>1</hx:numberOfCredits>
            </hx:credits>

    <hx:participationModality>conference/workshop</hx:participationModality>
        </hx:healthcareEducation>
    </hx:healthcareMetadata>
</lom:lom>
</ActivityDescription>
<ParticipationMetrics>
    <RegisteredParticipants>220</RegisteredParticipants>
    <NumberOfParticipantsReceivingCredit>200
    </NumberOfParticipantsReceivingCredit>
    <CreditsAwarded>
        <hx:creditType>CME</hx:creditType>
        <hx:numberOfCredits>150</hx:numberOfCredits>
    </CreditsAwarded>
    <CreditsAwarded>
        <hx:creditType>CNE</hx:creditType>
        <hx:numberOfCredits>50</hx:numberOfCredits>
    </CreditsAwarded>
    <NumberOfParticipantsCompletingActivity>200
    </NumberOfParticipantsCompletingActivity>
```

```
      </ParticipationMetrics>
</MedicalEducationMetrics>
```

For Online Activity
```xml
<?xml version="1.0" encoding="UTF-8"?>
<MedicalEducationMetrics xmlns="http://ns.medbiq.org/metrics/v1/"
xmlns:lom="http://ltsc.ieee.org/xsd/LOM"
xmlns:a="http://ns.medbiq.org/address/v1/"
xmlns:hx="http://ns.medbiq.org/lom/extend/v1/"
xmlns:hv="http://ns.medbiq.org/lom/vocab/v1/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://ns.medbiq.org/metrics/v1/://ns.medbiq.org/metrics/
v1/medicaleducationmetrics.xsd">
    <ReportDescription>
        <ReportingStartDate>2009-08-01</ReportingStartDate>
        <ReportingEndDate>2009-09-30</ReportingEndDate>
    </ReportDescription>
    <ActivityDescription>
        <lom:lom>
            <lom:general>
                <lom:identifier>
                    <lom:catalog>URI</lom:catalog>
                    <lom:entry>https://www2.nosuchsite.org/courseCOD77</lom:entry>
                </lom:identifier>
                <lom:title>
                    <lom:string>Case of the Day, May 2007</lom:string>
                </lom:title>
                <lom:language>en</lom:language>
                <lom:description>
                    <lom:string>An introduction to breast imaging. Learning
Objectives: 1) Identify, characterize, and analyze abnormal findings on
multimodality breast imaging studies. </lom:string>
                </lom:description>
                <lom:keyword id="D001940" source="MeSH">
                    <lom:string>breast</lom:string>
                </lom:keyword>
                <lom:keyword id="D003952" source="MeSH" >
                    <lom:string>diagnostic imaging</lom:string>
                </lom:keyword>
            </lom:general>
            <hx:healthcareMetadata>
                <hx:healthcareEducation>
                    <hx:expirationDate>2010-07-19</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:numberOfCredits>1</hx:numberOfCredits>
              </hx:credits>
              <hx:participationModality>technology
based</hx:participationModality>
          </hx:healthcareEducation>
        </hx:healthcareMetadata>
      </lom:lom>
      <CommercialSupportAmount currency="USD" supportSource="SeeRite Imaging
Company">5000</CommercialSupportAmount>
      <AdvertisingAndExhibitIncome>0</AdvertisingAndExhibitIncome>
      <OtherIncome currency="USD">5400</OtherIncome>
      <Expenses currency="USD">9550</Expenses>
      <DesignedToChangeCompetence>true</DesignedToChangeCompetence>
      <DesignedToChangePerformance>false</DesignedToChangePerformance>

   <DesignedToChangePatientOutcomes>false</DesignedToChangePatientOutcomes>
      <ChangesInCompetenceMeasured>true</ChangesInCompetenceMeasured>
      <ChangesInPerformanceMeasured>false</ChangesInPerformanceMeasured>

   <ChangesInPatientOutcomesMeasured>false</ChangesInPatientOutcomesMeasured>
   </ActivityDescription>
   <ParticipantActivityEvaluation>
      <SurveyItemData source="medbiq.org" id="95452">
         <SurveyQuestion>The course achieved its educational
objectives.</SurveyQuestion>
         <ResponseData>
            <ScaleData type="likert" points="5">
               <One label="Strongly Agree" source="medbiq.org"
id="85463">100</One>
               <Two source="medbiq.org" id="45698">40</Two>
               <Three source="medbiq.org" id="78512">10</Three>
               <Four source="medbiq.org" id="23658">0</Four>
               <Five label="Strongly Disagree" source="medbiq.org"
id="36547">0</Five>
            </ScaleData>
         </ResponseData>
      </SurveyItemData>
      <SurveyItemData source="medbiq.org" id="65414">
         <SurveyQuestion>Did the course present a balanced view of clinical
options?</SurveyQuestion>
         <ResponseData>
            <YesNoData>
               <Yes source="medbiq.org" id="16434">140</Yes>
               <No source="medbiq.org" id="15733">10</No>
            </YesNoData>
         </ResponseData>
      </SurveyItemData>
      <SurveyItemData source="medbiq.org" id="46575">
         <SurveyQuestion>How many years have you been in
practice?</SurveyQuestion>
         <ResponseData>
            <MultipleChoiceSelectOneData>
```

```
                    <ResponseItemData source="medbiq.org" id="24654">
                        <ResponseText>less than 5 years</ResponseText>
                        <TotalRespondents>20</TotalRespondents>
                    </ResponseItemData>
                    <ResponseItemData source="medbiq.org" id="68734">
                        <ResponseText>5-10 years</ResponseText>
                        <TotalRespondents>50</TotalRespondents>
                    </ResponseItemData>
                    <ResponseItemData source="medbiq.org" id="58878">
                        <ResponseText>10-20 years</ResponseText>
                        <TotalRespondents>70</TotalRespondents>
                    </ResponseItemData>
                    <ResponseItemData source="medbiq.org" id="98562">
                        <ResponseText>more than 20 years</ResponseText>
                        <TotalRespondents>20</TotalRespondents>
                    </ResponseItemData>
                </MultipleChoiceSelectOneData>
            </ResponseData>
        </SurveyItemData>
        <SurveyItemData source="medbiq.org" id="45858">
            <SurveyQuestion>What factors influenced you to participate in this
program?</SurveyQuestion>
            <ResponseData>
                <MultipleChoiceSelectManyData>
                    <ResponseItemData source="medbiq.org" id="43731">
                        <ResponseText>Course description</ResponseText>
                        <TotalRespondents>40</TotalRespondents>
                    </ResponseItemData>
                    <ResponseItemData source="medbiq.org" id="98526">
                        <ResponseText>List of faculty</ResponseText>
                        <TotalRespondents>60</TotalRespondents>
                    </ResponseItemData>
                    <ResponseItemData source="medbiq.org" id="65744">
                        <ResponseText>Host city</ResponseText>
                        <TotalRespondents>50</TotalRespondents>
                    </ResponseItemData>
                </MultipleChoiceSelectManyData>
            </ResponseData>
        </SurveyItemData>
        <SurveyItemData source="medbiq.org" id="46566">
            <SurveyQuestion>If there were one thing you would change about the
program, what would it be?</SurveyQuestion>
            <ResponseData>
                <FreeTextData>
                    <TextResponse>Great program - wouldn't change a
thing.</TextResponse>
                    <AnalysisCategory>Positive comment</AnalysisCategory>
                </FreeTextData>
                <FreeTextData>
                    <TextResponse>More interactivity.</TextResponse>
                    <AnalysisCategory>Interactivity</AnalysisCategory>
                </FreeTextData>
```

```
            <FreeTextData>
                <TextResponse>Different faculty - it's the same faces all the
time.</TextResponse>
                <AnalysisCategory>Faculty</AnalysisCategory>
            </FreeTextData>
        </ResponseData>
    </SurveyItemData>
    <ComparisonData>
        <SurveyItemDataForComparison source="cmequal" id="1010">
            <SurveyQuestion>Thinking about my expectations for this CME
activity, it is important  that it address my most pressing questions.
</SurveyQuestion>
            <ResponseData>
                <ScaleData type="low/high" points="5">
                    <One label="Low" source="cmequal" id="10101">5</One>
                    <Two source="cmequal" id="10102">15</Two>
                    <Three source="cmequal" id="10103">35</Three>
                    <Four source="cmequal" id="10104">70</Four>
                    <Five label="High" source="cmequal" id="10105">25</Five>
                </ScaleData>
            </ResponseData>
            <Timing duration="P1D">Before</Timing>
        </SurveyItemDataForComparison>
        <SurveyItemDataForComparison source="cmequal" id="1020">
            <SurveyQuestion>Thinking about  my participation in this CME
activity, I thought it was able to address my most pressing questions.
</SurveyQuestion>
            <ResponseData>
                <ScaleData type="minimally/completely" points="5">
                    <One label="Minimally" source="cmequal" id="10201">5</One>
                    <Two source="cmequal" id="10202">10</Two>
                    <Three source="cmequal" id="10203">30</Three>
                    <Four source="cmequal" id="10204">75</Four>
                    <Five label="Completely" source="cmequal"
id="10205">30</Five>
                </ScaleData>
            </ResponseData>
            <Timing duration="P1D">After</Timing>
        </SurveyItemDataForComparison>
    </ComparisonData>
  </ParticipantActivityEvaluation>
  <KnowledgeAssessment>
    <MultipleChoiceAssessmentItemData>
        <Question>What type of imaging is most often used for breast cancer
screening?</Question>
        <AssessmentResponseData>
            <AssessmentResponseItemData correct="true">
                <ResponseText>Mammography</ResponseText>
                <TotalRespondents>140</TotalRespondents>
            </AssessmentResponseItemData>
            <AssessmentResponseItemData correct="false">
                <ResponseText>Ultrasound</ResponseText>
```

```xml
                <TotalRespondents>5</TotalRespondents>
            </AssessmentResponseItemData>
            <AssessmentResponseItemData correct="false">
                <ResponseText>Thermal imaging</ResponseText>
                <TotalRespondents>5</TotalRespondents>
            </AssessmentResponseItemData>
        </AssessmentResponseData>
        <Timing>After</Timing>
    </MultipleChoiceAssessmentItemData>
    <AssessmentScoreData>
        <AssessmentName>Breast Imaging Assessment</AssessmentName>
        <ScoreMethod>Percent</ScoreMethod>
        <ScoreValue>90</ScoreValue>
        <Timing duration="P30D">After</Timing>
    </AssessmentScoreData>
</KnowledgeAssessment>
<ParticipationMetrics>
    <TargetedAudience>1000</TargetedAudience>
    <RegisteredParticipants>200</RegisteredParticipants>

<NumberOfParticipantsReceivingCredit>150</NumberOfParticipantsReceivingCredit>
    <CreditsAwarded>
        <hx:creditType>CME</hx:creditType>
        <hx:numberOfCredits>150</hx:numberOfCredits>
    </CreditsAwarded>
    <NumberOfDistinctHostsOrVisitors>250</NumberOfDistinctHostsOrVisitors>
    <NumberOfSuccessfulPageRequests>500</NumberOfSuccessfulPageRequests>

<NumberOfParticipantsCompletingActivity>150</NumberOfParticipantsCompletingActivity>
    <ParticipantsBySpecialty specialty="radiology-
diagnostic">100</ParticipantsBySpecialty>
    <ParticipantsBySpecialty specialty="radiation
oncology">50</ParticipantsBySpecialty>
</ParticipationMetrics>
</MedicalEducationMetrics>
```

Multifaceted Activity Referencing Online and In Person Activity

```xml
<?xml version="1.0" encoding="UTF-8"?>
<MedicalEducationMetrics xmlns="http://ns.medbiq.org/metrics/v1/"
xmlns:lom="http://ltsc.ieee.org/xsd/LOM"
xmlns:hx="http://ns.medbiq.org/lom/extend/v1/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://ns.medbiq.org/metrics/v1/.xsd">
    <ReportDescription>
        <ReportingStartDate>2009-08-01</ReportingStartDate>
        <ReportingEndDate>2009-09-30</ReportingEndDate>
    </ReportDescription>
    <ActivityDescription>
```

```
        <lom:lom>
            <lom:general>
                <lom:identifier>
                    <lom:catalog>NoSuchOrg</lom:catalog>
                    <lom:entry>95435</lom:entry>
                </lom:identifier>
                <lom:title>
                    <lom:string language="en">Breast Imaging: Current Practice and
New Techniques</lom:string>
                </lom:title>
                <lom:keyword id="D001940" source="MeSH">
                    <lom:string>breast</lom:string>
                </lom:keyword>
                <lom:keyword id="D003952" source="MeSH">
                    <lom:string>diagnostic imaging</lom:string>
                </lom:keyword>
                <lom:description>
                    <lom:string>A multifaceted activity including an online
introduction to breast imaging and a workshop focusing on experimental
techniques.</lom:string>
                </lom:description>
            </lom:general>
            <lom:relation>
                <lom:kind>
                    <lom:source>LOMv1.0</lom:source>
                    <lom:value>haspart</lom:value>
                </lom:kind>
                <lom:resource>
                    <lom:identifier>
                        <lom:catalog>URI</lom:catalog>

    <lom:entry>https://www2.nosuchsite.org/courseCOD77</lom:entry>
                    </lom:identifier>
                </lom:resource>
            </lom:relation>
            <lom:relation>
                <lom:kind>
                    <lom:source>LOMv1.0</lom:source>
                    <lom:value>haspart</lom:value>
                </lom:kind>
                <lom:resource>
                    <lom:identifier>
                        <lom:catalog>NoSuchOrg</lom:catalog>
                        <lom:entry>23456</lom:entry>
                    </lom:identifier>
                </lom:resource>
            </lom:relation>
        </lom:lom>
    </ActivityDescription>
    <ParticipationMetrics>
        <TargetedAudience>1000</TargetedAudience>
        <RegisteredParticipants>320</RegisteredParticipants>
```

```
        <NumberOfParticipantsCompletingActivity>140
        </NumberOfParticipantsCompletingActivity>
    </ParticipationMetrics>
</MedicalEducationMetrics>
```