

Section II: CI XML and technical specifications

How this Guide is organized

The elements and attributes which follow below are organized in the order in which they would appear in a CI XML data file. For more information about what an “element” and “attribute” are, please refer to the MedBiquitous CI Specifications. In reviewing the elements and attributes, two rules about XML syntax are important to understand.

- First, elements will be opened and then closed, meaning <tag> will always be followed at some point in the file with </tag>; otherwise the file is poorly formed and will not be successful.
- Second, tags are case sensitive and very specific e.g. <tag> and <Tag> are different and for manual edits to the XML, <tag> will not be closed by </Tag>, only by </tag>.

For each element and attribute in this Guide, the following information is provided:

Title of Element or Attribute *Contains new content for 2022	
In the right-hand corner, any elements or attributes that have new content from a MedBiquitous specifications perspective are noted. From an AAMC CI perspective, each element and attribute can be considered to have new content because this Guide is a new resource.	
Description: This field will state AAMC CI’s expectations of what data should be provided.	
1. Other relevant documents	Where possible, important references to this element in MedBiquitous and AAMC CI resources are provided.
2. Required or optional	If required elements or attributes are not included in the CI XML data file, the XML validator will not allow the file to continue processing, and the CI Portal will not allow the file to advance to check for business rule compliance.
3. Number of instances in your CI	Some elements can only have one instance (e.g., your institution’s address), while other elements can or should have multiple instances (e.g., keywords).
4. Datatype	There are different types of data within a CI XML data file with specific formatting requirements. Here are some definitions of the datatypes you will see in this Guide: <ul style="list-style-type: none">• Container: A data “container” holds sub-elements of your CI data file within it.• Non-null string: This means that if and when included, the element or attribute cannot be left blank.• Date, formatted (e.g., YYYY-MM-DD).• Restricted: this means the data must be formatted in a specific way. The description and XML sample make the required format clear.
5. AAMC CI’s use of data from this element	If and how the AAMC CI makes use of data from this element is described so that you understand how your accurate and complete data will ultimately benefit your school and the medical school community.

6. Relevant business rules	Relevant business rules are listed here, with more details regarding business rule errors in detail in Appendix C of this Guide.
7. Common errors and mistakes	The most common errors and mistakes are described here to help you avoid problems in entering this data element.
8. Differences from 2021 to 2022	This field will explain if there are any changes compared to previous years' versions of MedBiquitous CI specifications or AAMC CI business rules. This will help schools who have previously uploaded to the AAMC CI know where to prioritize their efforts to change documentation practices. Development effort may be needed for any elements which are edited or new. This field articulates where changes may or may not be likely based on AAMC's actions, irrespective of schools' software.
9. XML sample	

The samples provided are meant to aid educators' understanding of how data will appear in an XML file. If a user were to copy/paste the XML samples in this Guide from each element into an XML editing tool, it would not be successful because each element would be incomplete on its own. An XML example of a single course/module is available on [Resources for CI Developers](#). Where applicable in the XML examples below, text that remains the same across schools is in black; text in the XML that should be edited per school is in blue.

Initial elements to set up your CI XML data file

Element title: CurriculumInventory	
<p>Description: This is the main foundational/root element of your CI data file, which acts like an umbrella containing everything in your CI underneath it, including all your course/modules (i.e., sequence blocks) and the events they reference. All the content of your CI data will be nested underneath this CurriculumInventory concept.</p>	
1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 14
2. Required or optional	Required
3. Number of instances in your CI	One
4. Datatype	Container. This container holds all your CI data (e.g., your phases, your events, etc.).
5. AAMC CI's use of data from this element	None
6. Relevant business rules	None
7. Common errors and mistakes	Ensure you conform to XML syntax rules; remember to close the </CurriculumInventory> tag at the very end of your CI XML data file.
8. Differences from 2021 to 2022	No
9. XML sample	

<CurriculumInventory>

Attribute title: ReportID	
<p>Description: The ReportID is a unique identifier for the CI data file. This allows a user and the AAMC CI system to be able to differentiate between potential multiple versions of CI data files. Schools can choose whatever letters and numbers in their ReportID would be helpful to track their versions of CI XML data files.</p>	
1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 14
2. Required or Optional	Required
3. Number of instances in your CI	One
4. Datatype	Non-null string. This element cannot be left blank.
5. AAMC CI's use of data from this element	None
6. Relevant business rules	CS01, CS19
7. Common errors and mistakes	The most common mistake for this element is forgetting to change the ReportID before trying to upload a new CI XML data file to the CI Portal. The ReportID must be unique; it cannot have been used for a version your school already attempted to upload to the AAMC.
8. Differences from 2021 to 2022	No
9. XML sample	

<ReportID>SampleU2022CIVERSION1</ReportID>

Element title: Institution	
<p>Description: This includes the institution name (e.g., Sample University School of Medicine), the institution’s ID assigned by AAMC, and the institution’s address. If you do not know your institution’s AAMC ID, please contact ci@aamc.org. Both MD and DO schools have AAMC-assigned IDs, typically between 3-6 digits.</p>	
1. Other relevant documents	<p>MedBiquitous CI Specifications, DRAFT version v10 2021-01-06, page(s) 14</p> <p>MedBiquitous Professional Profile, “InstitutionInfoType” June 2008, page(s) 19</p>
2. Required or Optional	Required
3. Number of instances in your CI	One
4. Datatype	Container. The container of Institution holds three required sub-elements: institution name, institution’s AAMC-assigned ID, and institution’s address.
5. AAMC CI’s use of data from this element	The institution’s name and AAMC-assigned ID (a.k.a. EIS code) are in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively . The AAMC CI does not use data entered in the sub-element “Address”.
6. Relevant business rules	CR04, CS19
7. Common errors and mistakes	Errors will occur when a school uses an ID other than the one given by AAMC. For DO programs, main and branch campuses have different institution IDs.
8. Differences from 2021 to 2022	No
9. XML sample	

```

<Institution>
  <m:InstitutionName>Sample University School of Medicine</m:InstitutionName>
  <m:InstitutionID domain="idd:aamc.org:institution">123456</m:InstitutionID>
  <m:Address>
    <a:StreetAddressLine>655 K Street</a:StreetAddressLine>
    <a:City>Washington </a:City>
    <a:StateOrProvince>DC</a:StateOrProvince>
    <a:PostalCode>20001</a:PostalCode>
    <a:Country>
      <a:CountryCode>US</a:CountryCode>
    </a:Country>
  </m:Address>
</Institution>

```

Element title: Program

Description: Within the element program, there are two sub-elements: ProgramName and ProgramID. Schools can choose whatever naming conventions they would like for these sub-elements.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 14
2. Required or Optional	Required
3. Number of instances in your CI	One
4. Datatype	Container. The container of Program contains two required sub-elements: ProgramName and ProgramID, both of which are the non-null string datatype.
5. AAMC CI's use of data from this element	None
6. Relevant business rules	CS19
7. Common errors and mistakes	None
8. Differences from 2021 to 2022	No
9. XML sample	

```
<Program>  
  <ProgramName>Sample University School of Medicine</ProgramName>  
  <ProgramID domain="idd:curriculum.hs.aamc.org:program">M.D.</ProgramID>  
</Program>
```

Element title: CurriculumInventory Title	
<p>Description: The information to include in this element are: the institution title (e.g., Sample University), the number of years the program contains (e.g., 3-year), whether the program is a M.D. or D.O. program (e.g., M.D. Program), for D.O. programs whether it is a main or branch campus (e.g., Main Campus), and the academic year (e.g., 2021-2022). A completed example would look like: Sample University 4-year M.D. Program 2021-2022.</p>	
1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 14
2. Required or Optional	Required
3. Number of instances in your CI	One
4. Datatype	Non-null string. This element cannot be left blank.
5. AAMC CI's use of data from this element	Title is in schools' Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS19
7. Common errors and mistakes	<p>The most common mistake with this element is titles which are not sufficiently descriptive. An example of a too short title is, "SU2"; this example is missing most of the key information needed. An example like "Sample University School of Medicine 4-year M.D. Program 2021-2022," contains a useful amount of detail without being too lengthy.</p> <p>A quality indicator that the AAMC examines when receiving a school's CI is whether the title refers to the correct academic year. For example, if the CI upload for a given year is collecting 2021-2022 data, and yet the academic year within the Title element says "2020-2021" it prompts AAMC to examine the school's CI more deeply for accuracy and completeness. Consistent errors in updating dates within a CI may be a signal that data has been copy/pasted from a previous year.</p>
8. Differences from 2021 to 2022	No
9. XML sample	

<Title>[Sample University School of Medicine 4-year M.D. Program](#)</Title>

Element title: ReportDate	
Description: ReportDate refers to the date the CI XML data file was created.	
1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 14
2. Required or Optional	Required
3. Number of instances in your CI	One
4. Datatype	Date. This element must be formatted in YYYY-MM-DD (e.g., 2022-08-01).
5. AAMC CI's use of data from this specific element?	The AAMC CI uses data from this field to perform internal quality analytics – for example, the AAMC wishes to know how many schools generate their CI XML data files on the first available date for uploading data (i.e. August 1). Also, ReportDate is in schools' Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS19
7. Common errors and mistakes	This element may cause confusion if a school creates multiple CI XML data files on a given date, and then struggles to determine which version is the most up to date. It is recommended that schools create an internal process for saving CI XML data files in draft so that it is clear which is the accurate and complete version to share with AAMC.
8. Differences from 2021 to 2022?	No
9. XML sample	

<ReportDate>2022-08-01</ReportDate>

Element title: ReportingStartDate	
<p>Description: ReportingStartDate refers to the first day of the academic year which your CI XML data file covers. It is typically July 1 of the previous academic year. For example, when uploading data in August 2022 for the 2021-2022 academic year, the reporting start date will be July 1, 2021.</p>	
1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 15
2. Required or Optional	Required
3. Number of instances in your CI	One
4. Datatype	Date. This element must be formatted in YYYY-MM-DD (e.g., 2021-07-01).
5. AAMC CI's use of data from this element	Data from this element is in schools' Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS02, CS19, CS20, CS21
7. Common errors and mistakes	The most common error related to ReportingStartDate is forgetting to update the year from the previous year's CI submission, if using your previous year's CI as a starting point for edits.
8. Differences from 2021 to 2022	No
9. XML sample for this element:	

<ReportingStartDate>2021-07-01</ReportingStartDate>

Element title: ReportingEndDate

Description: ReportingEndDate refers to the last day of the academic year which your CI XML data file covers. It is typically June 30 of the current academic year. For example, when uploading data in August 2022 for the 2021-2022 academic year, the reporting end date will be June 30, 2022.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 15
2. Required or Optional	Required
3. Number of instances in your CI	One
4. Datatype	Date. This element must be formatted in YYYY-MM-DD (e.g., 2022-06-30).
5. AAMC CI's use of data from this element	Data from this element is in schools' Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS02, CS19, CS20, CS21
7. Common errors and mistakes	The most common error related to ReportingEndDate is forgetting to update the year from the previous year's CI submission, if using your previous year's CI as a starting point for edits.
8. Differences from 2021 to 2022	No
9. XML sample	

<ReportingEndDate>2022-06-30</ReportingEndDate>

Element title: Language

Description: For the purposes of the AAMC CI, the primary language used in CI XML data files must be English. To indicate that English is the primary language in the CI XML data file, <Language>en-US</Language> is the correct XML format. Portions of the CI may in other languages. Instructions about documenting multilingual curriculum data is available in the Multilingual CI Data section of this Guide.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 15
2. Required or Optional	Required
3. Number of instances in your CI	One
4. Datatype	Language
5. AAMC CI's use of data from this element	None
6. Relevant business rules	CS19
7. Common errors and mistakes	The most common mistake related to Language is to enter something other than <Language>en-US</Language> in the CI XML data file.
8. Differences from 2021 to 2022	No
9. XML sample	

<Language>en-US</Language>

Description: The Description element is the **only** free-text narrative space where schools describe their curriculum overall in the AAMC CI. Information to include in your school's description is below; these pieces of information do not necessarily have to be included in this order.

- a. Curriculum overall, including years/phases and organizational approach of the curriculum,
- b. Medical school mission, program objectives' overall content and sources (e.g., ACGME, PCRS, etc.),
- c. Highlights of teaching and assessment approaches and resources,
- d. Clinical learning opportunities, including the first direct, real patient care opportunity in the curriculum, and the first clerkship experience in the curriculum,
- e. Unique features (e.g., specializations, tracks) and highlights of curriculum,
- f. Major changes in the curriculum which occurred during the reported year.
- g. Regional medical campus(es) – if your medical school has a regional medical campus, please describe.
 - i. If the purpose, mission, or curriculum of the regional medical campus (RMC) differs from the main campus curriculum, how, and why? What about the regional medical campus is unique?
 - ii. Is the RMC's academic environment used to pilot test curricular intervention(s) that is or will be later incorporated in the broader institutional curriculum?
- h. Confirmation that your CI XML data file contains all available phases/years of the curriculum. For example, new medical schools with only 1 year of curriculum experienced by a cohort of students will submit only 1 year of curriculum. An established medical school with a 4-year program is expected to submit 4 years of curriculum data.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 15
2. Required or Optional	Optional
3. Number of instances in your CI	One
4. Datatype	Non-null string. If included, this element cannot be left blank.
5. AAMC CI's use of data from this element	The AAMC CI uses data from this element to understand overall features of schools' curriculum, make strategic decisions, and support advocacy efforts.
6. Relevant business rules	CS19
7. Common errors and mistakes	The most common mistakes with this element are insufficient amount of detail to represent the overall curriculum, and not accurately capturing changes in the curriculum from year to year.
8. Differences from 2021 to 2022	Yes. This element was previously required. In the updated MedBiquitous CI specifications, it is now optional.
9. XML sample	

<Description>The Sample University School of Medicine provides a 4-year curriculum that vertically and horizontally integrates basic, social, health systems, and clinical sciences, and provides elective time in all 4 years. The curriculum is organized in two phases; the 1st phase contains the initial 2 years, and the 2nd phase contains the second 2 years. The focus of Phase 1 is building a strong foundation in knowledge, skills, and attitudes; the focus of Phase 2 is to create opportunities for deliberate practice with an eye towards career preparation. The curriculum is patient case-based and within courses organized by body systems.

The mission of Sample University School of Medicine is graduate students with a solid foundation as clinicians, with an emphasis on clinical excellence, leadership, and service to our communities. Our program objectives are organized according to the 8 domains of the Physician Competency Reference Set (PCRS), with 1 additional domain to contain our leadership curriculum. Our program objectives were last reviewed by our curriculum committee in 2019.

Clinical training begins in the first semester of the first year. Students engage in supervised patient care in their first two weeks of their orientation. In Phase 1, the instructional approaches include case-based learning, team-based learning, supplemented by independent and problem-based learning. Patient care experiences are at least once every 2 weeks. The assessment approaches include formative simulation and written quizzes, as well as comprehensive written examinations in each semester. In Phase 2, the instructional approaches include in-patient and ambulatory patient care, with the first clerkship experience for students beginning in the first semester of the third year. Assessment focus on supporting students in preparation for USMLE examinations, as well as supporting patient care skills such as oral presentation and clinical care evaluations. Sample University School of Medicine's resources include small and large group classrooms, a traditional anatomy lab, a simulation center, community health sites, and our two hospital sites.

Sample University School of Medicine offers a special track program for students pursuing an MD/MPH combined program completed in 4 or 5 years. Medical students accepted into the dual degree program begin their MPH focused courses between their 2nd and 3rd year. The culmination of the MD/MPH curriculum is a practical experience in which students work with community members to improve our community health sites.

Important changes to the curriculum in 2021-2022 include a new software program to support students in their longitudinal development, incorporating outcomes and reflective exercises. We also refined our policies on the number of electives required in fourth year to accommodate financial aid eligibility criteria.

We have one regional campus established in 2018 in Example Town, A.L., 60 miles from our main campus. The purpose, mission, and curriculum of this regional campus is identical to our main campus except for a new track we are piloting around preventive health. Our intention is to incorporate this in our main campus curriculum.

The data being submitted for Curriculum Inventory reflects all phases and years, phases 1 and 2, years M1-M4. The scope of this data is 2021-2022.</Description>

Elements related to events (i.e., sessions)

The XML samples in this Guide use one hypothetical event; however a real curriculum (and real CI XML data file) would contain hundreds to thousands of events. An event is an educational session, such as a teaching or assessment event. A definition of “event” for the purposes of the AAMC CI is provided in the CI Glossary on [Resources to Establish Your CI](#).

Element title: Events	
Description: The element Events is a container for all the events (across all courses, blocks, etc.) within your curriculum.	
1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 23
2. Required or Optional	Required
3. Number of instances in your CI	One
4. Datatype	Container. The container of Events will hold all events.
5. AAMC CI’s use of data from this element	None
6. Relevant business rules	CS11, CS15
7. Common errors and mistakes	None
8. Differences from 2021 to 2022	No
9. XML sample	

<Events>

Element title: Event (i.e., Event ID)

Description: In the element Event, the only attribute in the MedBiquitous specifications is an ID for each event. This must be a unique ID, such that each event in your CI XML data file will have a different ID. The Event element also will hold sub-elements for each event such as Title, EventDuration, etc.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 23
2. Required or Optional	Required
3. Number of instances in your CI	One per event
4. Datatype	Container. The container of Event has only one attribute, an ID for each event.
5. AAMC CI's use of data from this element	None
6. Relevant business rules	CS11, CS15
7. Common errors and mistakes	The most common error for this element is to accidentally use the same ID for more than one event. Each Event ID must be unique.
8. Differences from 2021 to 2022	No
9. XML sample	

<Event id="E123A">

Element title: Title (i.e., Event title)	
<p>Description: This is the title for your instructional and/or assessment event. Note that the element “title” exists in multiple places in the MedBiquitous CI specifications (e.g., Titles for events, Title for your <CurriculumInventory> file, etc.).</p>	
1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 25
2. Required or Optional	Required
3. Number of instances in your CI	One per event
4. Datatype	Non-null string. This sub-element cannot be left blank.
5. AAMC CI’s use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS19
7. Common errors and mistakes	More descriptive titles are more useful for reporting purposes. For example, if your curriculum is case based, an event title like “Mr. Jones” is difficult to make use of for content analysis purposes; a title that included the chief complaint or diagnosis, and/or the focus of the patient case (coaching for behavior change) would be more helpful for content analysis purposes. Similarly, non-descript titles like “Session #3” are difficult to use for content searching and reports.
8. Differences from 2021 to 2022	No
9. XML sample	

<Title>Counseling for behavior change and smoking cessation</Title>

Element title: EventDuration (Hours and minutes per event)

Description: This is the amount of time per event in hours and minutes. This will be documented as “PT,” (i.e., ‘period of time’), a given number, and “H” (for hours) or “M” (for minutes). For example, a 1-hour event would be documented as “PT1H.” A combination of hours and minutes, or hours or minutes alone, are both acceptable approaches from an XML standpoint. For example, if an event were 90 minutes, it could be documented as “PT1H30M” or “PT90M.” Either approach would be acceptable for the AAMC CI, although it is recommended to choose one consistent approach throughout your XML to improve human readability.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 25 Guide to Building a CI, Chapter 7: Documenting Time .
2. Required or Optional	Required
3. Number of instances in your CI	One per event
4. Datatype	Duration restricted to hours and minutes.
5. AAMC CI’s use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS27
7. Common errors and mistakes	The most common problems from event durations come from unexpectedly long event durations. For example, an event with 1000 hours may be an indicator that there are limitations in software or documentation practices.
8. Differences from 2021 to 2022	No
9. XML sample	

<EventDuration>[PT1H](#)</EventDuration>

Element title: Keyword

Description: Keywords tagged to an event highlight the curriculum content it contains. Please see the AAMC CI Keywords on [Resources to Use Your CI Effectively](#). Schools may also document their local keywords. In the XML sample below, this hypothetical event is on ‘counseling for behavior change and smoking cessation’. Based on the event’s learning objectives (which appear later in the XML), this event is tagged with 3 keywords: K002: addiction medicine, K008: behavioral science (behavior change is an included/related term), and K086: respiratory system.

1. Other relevant documents	<p>MedBiquitous CI Specifications, DRAFT version v10 2021-01-06, page(s) 25</p> <p>MedBiquitous Health Learning Object Metadata Standard (Healthcare LOM), version 1.0 September 2009, page(s) 10</p> <p>Guide to Building a CI, Chapter 10: Keywords</p> <p>AAMC CI Keywords available on Resources to Use Your CI Effectively.</p>
2. Required or Optional	Optional
3. Number of instances in your CI	One or more per event
4. Datatype	LanguageString. This means a value can be specified by the document creators.
5. AAMC CI’s use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS19
7. Common errors and mistakes	The most common problem with keywords is over-tagging. The AAMC CI Keywords, as well as the Guide to Building a CI contain guidelines to support consistent and useful keyword tagging.
8. Differences from 2021 to 2022	No
9. XML sample	

```
<Keyword hx:source="AAMC CI Keywords-v.1" hx:id="K002">
  <hx:string>K002: addiction medicine</hx:string>
</Keyword>
<Keyword hx:source="AAMC CI Keywords-v.1" hx:id="K008">
  <hx:string>K008: behavioral sciences</hx:string>
</Keyword>
```

```
<Keyword hx:source="AAMC CI Keywords-v.1" hx:id="K086">  
  <hx:string>K086: respiratory system</hx:string>  
</Keyword>
```

Element title: CompetencyObjectReference (i.e., event-level learning objective IDs)

Description: CompetencyObjectReference refers to the learning objectives, in this case for a given event. The purpose of the CompetencyObjectReference in your CI XML data file is to point to the actual learning objectives' text which will appear later in the CI XML data file. In the XML sample below, there are three CompetencyObjectReferences documented, to correlate with three learning objectives whose text would appear later in the XML file. Continuing the hypothetical example of an event on 'counseling for behavior change and smoking cessation,' there is one learning objective related to addiction, one learning objective related to behavior change, and one learning objective related to basic science of the respiratory system. Each of these are given a unique ID number in the XML sample below.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 25
2. Required or Optional	Optional
3. Number of instances in your CI	Zero or more per event
4. Datatype	Restricted
5. AAMC CI's use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools' Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CF17, CF22
7. Common errors and mistakes	The most common errors with this element are using the same text (e.g., EventObjective1) in more than one CompetencyObjectReference. The text within each CompetencyObjectReference must be unique to each learning objective.
8. Differences from 2021 to 2022	No
9. XML sample	

```
<CompetencyObjectReference>/CurriculumInventory/Expectations/CompetencyObject[lom:lom/lom:general/lom:identifier/lom:entry='EventObjective1']</CompetencyObjectReference>
<CompetencyObjectReference>/CurriculumInventory/Expectations/CompetencyObject[lom:lom/lom:general/lom:identifier/lom:entry='EventObjective2']</CompetencyObjectReference>
<CompetencyObjectReference>/CurriculumInventory/Expectations/CompetencyObject[lom:lom/lom:general/lom:identifier/lom:entry='EventObjective3']</CompetencyObjectReference>
```

Element title: ResourceType

Description: Resources are the tools and supplies (e.g., film/video, mannequin), including people (e.g., patient- receiving clinical care) used in each instructional and/or assessment event. A list of possible resources to use can be found in the Standardized Vocabulary on the [Resources to Establish Your CI](#) webpage. The only resources that can be documented in your CI are the ones on this list, and each resource must be documented by its code (e.g., RE001: animation). (Some vendors have ways to document alternative resources and reference the official list on the backend of their software). Continuing the hypothetical example of an event on ‘counseling for behavior change and smoking cessation,’ perhaps this event uses the context of a clinical case (RE005), includes a short video (RE010), and is delivered over Zoom (RE007). Within the XML, the numerical order in which you list your resources does not affect the XML’s validation; in other words, you could list RE005 *before* RE007, or you could list RE007 *before* RE005. Either approach would be acceptable in terms of XML formatting, but a consistent approach improves human readability.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 26 CI Glossary, FAQs, and Standardized Vocabulary, and Guide to Building a CI, Chapter 9: Instructional Methods, Assessment Methods and Resources, found on Resources to Establish Your CI .
2. Required or Optional	Optional
3. Number of instances in your CI	One or more per event
4. Datatype	Non-null string. If included, this element cannot be left blank. ResourceType in the CI XML data file must be documented using the Standardized Vocabulary ID codes per resource (e.g., RE001, etc.)
5. AAMC CI’s use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS12
7. Common errors and mistakes	The most common errors with this element are neglecting to use a term found on the standardized vocabulary list of possible resources, and/or neglecting to document the appropriate code (e.g., RE001) along with the resource (e.g., animation).
8. Differences from 2021 to 2022	No

9. XML sample

```
<ResourceType>RE005</ResourceType>
<ResourceType>RE007</ResourceType>
<ResourceType>RE010</ResourceType>
```

Description: Just like resources, instructional methods are tagged to an event. These are the teaching approaches used in a given event. A list of possible instructional methods can be found in the standardized vocabulary on [Resources to Establish Your CI](#). The only instructional methods that can be documented in your CI are the ones on this list, and each method must be accompanied by its code (e.g., IM013: Lecture). (Some vendors have ways to document alternative methods and reference the official list on the backend of their software). An event can be tagged with no instructional methods, one or more instructional methods, and more than one of the *same* instructional method.

Either an instructional or assessment method must be tagged to an event. There cannot be an event without any instructional or assessment methods. If one or more instructional methods are tagged to an event, one of the instructional methods must be tagged as the primary method.

Continuing the hypothetical example of an event on ‘counseling for behavior change and smoking cessation,’ perhaps this event is framed within case-based learning (IM001), and includes a short lecture (IM013) and video followed by large-group discussion (IM007), with a reflection exercise (IM020) at the end.

Within the XML, the numerical order in which you list your methods does not affect the XML’s validation; in other words, you could list IM001 *before* IM013, or you could list IM013 *before* IM001. Either approach would be acceptable in terms of XML formatting.

Within InstructionalMethod is the concept of “primary.” This the method that was predominantly used in the event. In the hypothetical example above, perhaps the primary method would be case-based learning (IM001). It is a judgment call as to which method is the one used the most, if more than one method is used in a given event.

>>New for 2022>> Within Instructional is the concept of duration. Duration captures the amount of time per instructional method (e.g., 30 minutes of lecture followed by 120 minutes of team-based learning). Time can be represented as hours and minutes (PT\d+H\d+M), hours (PT\d+H), or minutes (PT\d+M). Continuing our hypothetical example of a 1-hour event it would be documented PT1H.

<p>1. Other relevant documents</p>	<p>MedBiquitous CI Specifications, DRAFT version v10 2021-01-06, page(s) 27</p> <p>CI Glossary, FAQs, and Standardized Vocabulary, and Guide to Building a CI, Chapter 9: Instructional Methods, Assessment Methods and Resources, found on the Resources to Establish Your CI webpage</p> <p>Virtual curriculum community, library collection for “teaching and assessment approaches”</p>
<p>2. Required or Optional</p>	<p>Required (at least 1 instructional OR assessment method must be tagged to each event).</p>
<p>3. Number of instances in your CI</p>	<p>Zero or more per event. An event can have zero instructional methods if it is tagged with only assessment method(s). An event can have only instructional</p>

	methods, only assessment methods, or both instructional and assessment methods.
4. Datatype	Non-null string. This element cannot be left blank. InstructionalMethod in the CI XML data file must be documented using the Standardized Vocabulary ID codes per resource (e.g., IM001, etc.)
5. AAMC CI's use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools' Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS12, CS14, CS27
7. Common errors and mistakes	<p>Either an instructional or assessment method must be tagged to an event. There cannot be an event without any instructional or assessment methods.</p> <p>The most common errors with this element are neglecting to use a term found on the standardized vocabulary list of possible instructional methods, neglecting to document the appropriate code (e.g., IM001), neglecting to designate one of the instructional methods as primary, or neglecting to assign a duration to each instructional method tagged in an event.</p>
8. Differences from 2021 to 2022	Yes. Instructional method duration is a new attribute of the InstructionalMethod element.
9. XML sample	

```

<InstructionalMethod primary="true"
instructionalMethodDuration="PT1H">IM001</InstructionalMethod>
<InstructionalMethod primary="false"
instructionalMethodDuration="PT30M">IM007</InstructionalMethod>
<InstructionalMethod primary="false"
instructionalMethodDuration="PT20M">IM013</InstructionalMethod>
<InstructionalMethod primary="false"
instructionalMethodDuration="PT10M">IM020</InstructionalMethod>

```

Element title: AssessmentMethod

Description: Just like resources and instructional methods, assessment methods are tagged to an event. These are the approaches used in a given event used to measure student knowledge, skills, and attitudes (e.g., progress and/or accomplishment of learning objectives). A list of possible assessment methods can be found in the Standardized Vocabulary on [Resources to Establish Your CI](#). The only assessment methods that can be documented in your CI are the ones on this list, and each method must be accompanied by its code (e.g., AM013: Peer Assessment). (Some vendors have ways to document alternative methods and reference the official list on the backend of their software). An event can be tagged with no assessment methods, one or more assessment methods, and more than one of the *same* assessment method.

Each instance of an assessment method documented must be tagged as either formative or summative. Definitions and criteria of these statements for the purposes of AAMC CI are available in the CI glossary on [Resources to Establish Your CI](#).

Continuing the hypothetical example of an event on ‘counseling for behavior change and smoking cessation,’ which ended with a reflection exercise (IM020), perhaps students’ reflection statements are used for formative narrative assessment by faculty (AM010), and formative self-assessment (AM017) by students.

Within the XML, the numerical order in which you list your methods does not affect the XML’s validation; in other words, you could list AM010 *before* AM017, or you could list AM017 *before* AM010. Either approach would be acceptable in terms of XML formatting.

<p>1. Other relevant documents</p>	<p>MedBiquitous CI Specifications, DRAFT version v10 2021-01-06, page(s) 28</p> <p>CI Glossary, FAQs, and Standardized Vocabulary, and Guide to Building a CI, Chapter 9: Instructional Methods, Assessment Methods and Resources, found on Resources to Establish Your CI</p> <p>Virtual curriculum community, library collection for “teaching and assessment approaches”</p>
<p>2. Required or Optional</p>	<p>Required (at least 1 instructional OR assessment method must be tagged to each event)</p>
<p>3. Number of instances in your CI</p>	<p>Zero or more per event. An event can have zero assessment methods if it is tagged with only instructional method(s). An event can have only instructional methods, only assessment methods, or both instructional and assessment methods.</p>
<p>4. Datatype</p>	<p>Non-null string. This element cannot be left blank. AssessmentMethod in the CI XML data file must be documented using the Standardized Vocabulary ID codes per resource (e.g., AM001, etc.)</p>
<p>5. AAMC CI’s use of data from this element</p>	<p>This element is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation</p>

	Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS12
7. Common errors and mistakes	Either an instructional or assessment method must be tagged to an event. There cannot be an event without any instructional or assessment methods. The most common errors with this element are neglecting to use a term found on the standardized vocabulary list of possible assessment methods, neglecting to document the appropriate code (e.g., AM001), or neglecting to tag each assessment method as either formative or summative.
8. Differences from 2021 to 2022	No
9. XML sample	

```
<AssessmentMethod purpose="Formative">AM010</AssessmentMethod>
<AssessmentMethod purpose="Formative">AM017</AssessmentMethod>
```

Elements related to learning objectives (i.e., expectations, competencies, learning outcomes, etc.)

In the literature, there are various terms used to refer to expectations for student performance (the development and attainment of knowledge, skills, and attitudes) for a given portion of the curriculum (e.g., event, course). In the MedBiquitous CI specifications, the terms “expectations”, “competencies,” and “competency objects” are sometimes used to refer to similar concepts. For the purposes of the AAMC CI, and to assist in alignment with the LCME, it is helpful to think of these concepts as referring to “learning objectives.” The XML samples regarding learning objectives are abbreviated to limit the length of this Guide. A real curriculum (and real CI XML data file) would contain hundreds to thousands of learning objectives.

Element title: Expectations (i.e., learning objectives)	
<p>Description: In the element <CompetencyObjectReference> for events earlier in this Guide, the ID codes for each event-level learning objective, per event, was documented. In the following parts of the Expectations XML, the <i>actual text</i> of the learning objectives is documented. The <Expectations> element is a container which opens this section of the XML.</p>	
1. Other relevant documents	<p>MedBiquitous CI Specifications, DRAFT version v10 2021-01-06, page(s) 30</p> <p>MedBiquitous Competency Object Specifications, version 0.51, November 2011, page(s) 16</p>
2. Required or Optional	Required
3. Number of instances in your CI	One
4. Datatype	Container. The Expectations container holds the sub-element CompetencyObject.
5. AAMC CI’s use of data from this element	None
6. Relevant business rules	None
7. Common errors and mistakes	None
8. Differences from 2021 to 2022	No
9. XML sample	

<Expectations>

Description: In the CompetencyObject element, the actual text of your learning objectives is documented. Although the previous sections of the XML have focused on events, in this portion of the XML, you document the **actual text of all your learning objectives**. Much of the XML language for CompetencyObjects is essentially the same from one learning objective to the next. The sub-elements within CompetencyObject are:

1. Learning objective ID
2. Learning objective text
3. Learning objective category (e.g., event-level learning objective, course-level learning objective)

You will notice that in this CompetencyObject section of your XML, you are documenting three pieces of content related to your learning objective (e.g., the learning objective ID, the learning objective text, the learning objective category) – **you are not documenting the *relationship* among your learning objectives yet** (e.g., X event learning objective is connected underneath Y course learning objective). The relationships among your learning objectives is documented in the next element in your XML, in CompetencyFramework. This is why you will notice that the Physician Competency Reference Set (PCRS) is NOT included in this section of the XML, because relationships between learning objectives are documented later.

As you list all your learning objectives in this CompetencyObjects section of the XML, from an XML standpoint, the learning objectives can be listed in any order. However, we **recommend organizing your learning objectives by grouping them by category and hierarchically** (e.g., program-objective domain, program-level-competency, etc.). This will make your XML more human readable and easier to evaluate. In addition, this approach will reinforce best practices in curriculum design and accreditation expectations that program objectives drive curriculum.

Each learning objective is designated as being part of one of the following four categories. These **four learning objective categories**, listed in their hierarchical order:

1. >>New for 2022>> program-objective-domain
2. program-level-competency
3. sequence-block-level-competency (i.e., course/module)
4. event-level-competency

The **new category, program-objective-domain**, refers to areas or domains of content which may be “buckets” to summarize your total curriculum succinctly. Your school may use the ACGME six domains, the PCRS eight domains, create your own original, school-specific domains, other external resources, or some combination of these approaches. Common program-objective-domain examples are words like “Patient Care,” “Knowledge for Practice,” “Interpersonal and Communication Skills,” etc. This new category, program-objective-domain, is the highest CompetencyObject category possible.

The category program-level-competency refers to your school’s program objectives. According to the Liaison Committee on Medical Education (LCME), program objectives are, “statements of the knowledge, skills, behaviors, and attitudes that medical students are expected to exhibit as evidence of their achievement by completion of the program.”

The category sequence-block-competency is analogous to learning objectives at a course, clerkship, block, and/or module level. The category event-level-competency refers to events, sessions, and/or other learning experiences.

<p>1. Other relevant documents</p>	<p>MedBiquitous CI Specifications, DRAFT version v10 2021-01-06, page(s) 30</p> <p>MedBiquitous Competency Object Specifications, version 0.51, November 2011, page(s) 16</p> <p>CI Glossary and FAQs found on Resources to Establish Your CI</p> <p>Guide to Building a CI, Chapter 3: Program Objectives Drive Curriculum, Chapter 5: Course-Level Details for Your CI, Chapter 7: Event Learning Objectives</p> <p>Virtual curriculum community, library collection for “learning objectives”</p> <p>Register for the Building Better Curriculum webinar series. The theme for 2022 is “Learning Objectives.”</p>
<p>2. Required or Optional</p>	<p>Required</p>
<p>3. Number of instances in your CI</p>	<p>One or more</p>
<p>4. Datatype</p>	<p>Refer to MedBiquitous Competency Object Specifications</p>
<p>5. AAMC CI’s use of data from this element</p>	<p>Learning objectives are arguably the richest source of data for curriculum reports. It is critical that learning objectives are written well. This element is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively.</p>
<p>6. Relevant business rules</p>	<p>CF01, CF02, CF03, CF04, CF05, CF06, CF07, CF08, CF15, CF16, CF17, CF18, CF20</p>
<p>7. Common error and mistakes</p>	<p>Some common errors and mistakes include:</p> <ul style="list-style-type: none"> • Attempting to use the same learning objective ID more than once (each learning objective ID must be unique). • Duplicating learning objectives. Learning objectives should only be duplicated in the CI if any hypothetical, typical student would encounter the same learning objective more than once. Learning objectives may be accidentally entered into a CI more than once if the same event or course is run multiple times to accommodate different cohorts of students. The most common example of this may be clinical clerkships, where each student engages in a given discipline’s clerkship (e.g., pediatrics) once, but the clerkship appears multiple times on the

	<p>school’s calendar to accommodate an entire class of students. This mistake is critical to address before submitting data to AAMC, as it may result in misrepresenting and magnifying the amount of curriculum content.</p> <ul style="list-style-type: none"> • Neglecting to accurately apply the category tags (e.g., event-level-competency, etc.) to each learning objective. For example, if a learning objective is going to be referenced by an event, it should be given the event-level-competency category. Program-level-competency-objects should be related to other competency objects (e.g., down to a sequence-block-level-competency), and typically not referenced by course/modules or events. • Neglecting to have the right number of learning objectives entered as CompetencyObjects as were specified earlier in the XML in the CompetencyObjectReference (for events) section. For example, in this Guide’s CompetencyObjectReference section, there were three learning objectives for a given event – therefore, three learning objectives must be listed as event-level-competencies in the CompetencyObjects section of the XML.
8. Differences from 2021 to 2022	<p>Yes. The learning objective category “program-objective-domain” is new.</p>
9. XML sample	

This sample includes 1 sample program-objective-domain, 1 sample program-level-competency, 1 sample sequence-block-level-competency, and 3 sample event-level-competencies to continue our hypothetical event described in earlier elements of this Guide. Again, a real curriculum would contain many more learning objectives.

```

<CompetencyObject>
<lom:lom>
<lom:general>
<lom:identifier>
<lom:catalog>URI</lom:catalog>
<lom:entry>ProgramDomain-1</lom:entry>
</lom:identifier>
<lom:title>
<lom:string>Patient Care</lom:string>
</lom:title>
</lom:general>
</lom:lom>
<co:Category term="program-objective-domain"/>
</CompetencyObject>
<CompetencyObject>
<lom:lom>

```

```

<lom:general>
<lom:identifier>
<lom:catalog>URI</lom:catalog>
<lom:entry>ProgramObjectiveID-1</lom:entry>
</lom:identifier>
<lom:title>
<lom:string>Educate and counsel patients to maintain and improve health and prevent
disease</lom:string>
</lom:title>
</lom:general>
</lom:lom>
<co:Category term="program-level-competency"/>
</CompetencyObject>
<CompetencyObject>
<lom:lom>
<lom:general>
<lom:identifier>
<lom:catalog>URI</lom:catalog>
<lom:entry>SequenceBlockObjectiveID-1A-1</lom:entry>
</lom:identifier>
<lom:title>
<lom:string>Describe the Prochaska transtheoretical model of the 5 stages of behavior
change</lom:string>
</lom:title>
</lom:general>
</lom:lom>
<co:Category term="sequence-block-level-competency"/>
</CompetencyObject>
<CompetencyObject>
<lom:lom>
<lom:general>
<lom:identifier>
<lom:catalog>URI</lom:catalog>
<lom:entry>EventObjectiveID-123A-1</lom:entry>
</lom:identifier>
<lom:title>
<lom:string>Discuss with patient the resources available to support their efforts to quit
smoking</lom:string>
</lom:title>
</lom:general>
</lom:lom>
<co:Category term="event-level-competency"/>
</CompetencyObject>
<CompetencyObject>
<lom:lom>
<lom:general>
<lom:identifier>

```

```

<lom:catalog>URI</lom:catalog>
<lom:entry>EventObjectiveID-123A-2</lom:entry>
</lom:identifier>
<lom:title>
<lom:string>Explore and counsel with patient on the barriers that hinder their efforts to quit
smoking</lom:string>
</lom:title>
</lom:general>
</lom:lom>
<co:Category term="event-level-competency"/>
</CompetencyObject>
<CompetencyObject>
<lom:lom>
<lom:general>
<lom:identifier>
<lom:catalog>URI</lom:catalog>
<lom:entry>EventObjectiveID-123A-3</lom:entry>
</lom:identifier>
<lom:title>
<lom:string>Describe the physiological damage caused to the airway, lungs, and alveoli by smoking
</lom:string>
</lom:title>
</lom:general>
</lom:lom>
<co:Category term="event-level-competency"/>
</CompetencyObject>

```

Please note that the above XML sample continued the hypothetical example described earlier in this Guide regarding an event on ‘counseling for behavior change and smoking cessation. In the <CompetencyObjectReference> element for events above, we documented three learning objectives for this event. That means that three entries of event-level learning objectives in the CompetencyObject section of the XML must appear.

Also recall that we documented three keywords (K002: addiction medicine, K008: behavioral sciences, and K086: respiratory system) in the Keyword section of this XML. Because the AAMC CI’s keywords are derived from event-level learning objectives, the learning objectives’ content should correlate well with the keywords tagged. Thus, there is one event-level learning objective related to *addiction*, one learning objective related to *behavior change*, and one learning objective related to *basic science of the respiratory system*.

Elements related to competency framework

At this point in your XML, you will refer to the MedBiquitous Competency Framework specifications (rather than the MedBiquitous CI specifications). This section of the XML demonstrates the *relationships* among learning objectives. There are three elements of the Competency Framework which must be in your CI XML: the CompetencyFramework LOM, Includes, and Relation. Each of these are described in this section of the Guide.

Element title: CompetencyFramework LOM	
<p>Description: LOM stands for Learning Object Metadata. It is an identifier, and the identifier for the AAMC CI is always “URI.” This element is optional from a MedBiquitous specifications perspective; from an AAMC CI perspective, this element is necessary to document schools’ learning objectives. Schools may use any text they would like for the blue portions of the XML sample below as they would like.</p>	
1. Other relevant documents	<p>MedBiquitous CI Specifications, DRAFT version v10 2021-01-06, page(s) 30</p> <p>MedBiquitous Competency Framework Specifications, version 1.0, October 3, 2012, page(s) 17-19</p>
2. Required or Optional	Optional
3. Number of instances in your CI	One
4. Datatype	Container. The CompetencyFramework LOM container holds the sub-elements identifier catalog, entry, and title string.
5. AAMC CI’s use of data from this element	None
6. Relevant business rules	CF15
7. Common errors and mistakes	None
8. Differences from 2021 to 2022	No
9. XML sample	

```
<CompetencyFramework>
<lom:lom>
<lom:general>
<lom:identifier>
```



```
<lom:catalog>URI</lom:catalog>
<lom:entry>Sample University School of Medicine</lom:entry>
</lom:identifier>
<lom:title>
<lom:string>Sample University School of Medicine</lom:string>
</lom:title>
</lom:general>
</lom:lom>
```

Element title: Includes

Description: There are two parts to the XML at this stage to demonstrate the relationships among learning objectives:

1. In “Includes,” all the learning objectives’ IDs are listed (discussed in this element)
2. In “Relation,” the relationships among learning objectives are identified (e.g., this event-level learning objective is underneath and linked to this course-level learning objective). (discussed in the next element)

Documenting all the learning objectives in the “Includes” list **MUST** be done before documenting the relationships among learning objectives, or an error will result. This includes the PCRS, which must be documented in your “Includes” portion of the XML. (Recall that the PCRS were deliberately not documented in the CompetencyObject portion of the XML earlier in this Guide). The learning objectives to list in “Includes” are:

- >>New for 2022>>Program objective domains (i.e., program-objective-domain)
- Program objectives (i.e., program-level-competency)
- PCRS competency statements
- Course/module objectives (i.e., sequence-block-level-competency)
- Event/session objectives (i.e., event-level-competency)

The learning objectives in the “Includes” list do not necessarily have to be ordered as demonstrated in the above bullet points, but it is recommended to choose a consistent approach as it makes the XML more human readable.

Web addresses are sometimes used as each learning objective’s ID; this is most often seen with vendor systems. This field can be populated with letters, numbers, or web addresses.

1. Other relevant documents	MedBiquitous Competency Framework Specifications , version 1.0, October 3, 2012, page(s) 18
2. Required or Optional	Optional. This element is optional from a MedBiquitous specifications perspective. From an AAMC CI perspective, this element is required and necessary to document schools’ learning objectives.
3. Number of instances in your CI?	One or more
4. Datatype	Container. The container “Includes” lists all the curriculum’s learning objectives by their ID codes.
5. AAMC CI’s use of data from this specific element?	None
6. Relevant business rules	CF01, CF07, CF08

7. Common errors and mistakes	<p>Learning objectives' IDs as documented in the CompetencyObject portion of the XML earlier in this Guide must match up exactly with the "Entry" field within "Includes," or an error will result.</p> <p>Avoid duplicating learning objectives listed in the "Includes" list.</p> <p>Avoid neglecting to include a learning objective on the "includes" list but documenting it elsewhere in the XML; this will result in an error.</p> <p>Avoid neglecting to document all the AAMC PCRS in the "Includes" which relate to one or more of your school's program objectives; this will result in an error.</p>
8. Differences from 2021 to 2022	<p>Yes. The learning objective category "program-objective-domain" is new.</p>
9. XML sample	

Recall the abbreviated XML sample provided in CompetencyObjects earlier in this Guide (1 program objective domain, 1 program objective, 1 course/module objective, and 3 event objectives). Note that all the learning objectives' ID codes used in the CompetencyObjects portion of the XML are now repeated below in the "Includes" portion of the XML to demonstrate the need for *these two portions of the XML to match exactly*.

Please note that this XML sample below includes only 1 PCRS competency statement for the sake of demonstration, but a school's real XML file would need to list *all* the PCRS competency statements that were related to *any* of the school's program objectives. (If there are PCRS competency statements that are not related to any of your school's program objectives, they do not need to be included in your XML Includes list).

To continue our hypothetical example of 1 curriculum event regarding smoking cessation, the PCRS most relevant is 2.5: "Apply principles of social-behavioral sciences to provision of patient care, including assessment of the impact of psychosocial and cultural influences on health, disease, care-seeking, care compliance, and barriers to and attitudes toward care." The ID codes for this PCRS statement is aamc-pcrs-comp-c0205. More information regarding the PCRS and relations to schools' program objectives is in the following element, "Relation."

```

<cf:Includes>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>ProgramDomain-1</cf:Entry>
</cf:Includes>
<cf:Includes>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>ProgramObjectiveID-1</cf:Entry>
</cf:Includes>
<cf:Includes>
<cf:Catalog>URI</cf:Catalog>

```

```
<cf:Entry>aamc-pcrs-comp-c0205</cf:Entry>
</cf:Includes>
<cf:Includes>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>SequenceBlockObjectiveID-1A-1</cf:Entry>
</cf:Includes>
<cf:Includes>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>EventObjectiveID-123A-1</cf:Entry>
</cf:Includes>
<cf:Includes>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>EventObjectiveID-123A-2</cf:Entry>
</cf:Includes>
<cf:Includes>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>EventObjectiveID-123A-3</cf:Entry>
</cf:Includes>
```

Element title: Relation

Description: Recall that there are two parts to the XML at this stage to demonstrate the relationships among your learning objectives. The previous element, Includes, listed all the IDs of the learning objectives within your curriculum. This element, “Relation,” is the second step, which demonstrates learning objectives’ relationships. There are four circumstances of relationships among learning objectives to document:

- program-objective-domain > program-level-competency
- program-level competency *related* to PCRS
- program-level-competency > sequence-block-level-competency (i.e., course/module)
- sequence-block-level-competency (i.e., course/module) > event-level-competency

There is a concept of “**narrower**” and “**broader**” in the MedBiquitous Competency Framework. Essentially, the narrower and broader concepts illustrate the hierarchical relationship between two learning objectives from different categories. (Recall the four possible categories of learning objectives, documented in the CompetencyObject portion of the XML: program-objective-domain, program-level-competency, sequence-block-level-competency, and event-level-competency).

Just as the symbol “>” indicates something is greater/bigger than something else, in curriculum, it may look like this:

X course objective is hierarchically above (e.g., > than) Y event objective

Continuing the smoking cessation event example, the course/module learning objective “Describe the Prochaska transtheoretical model of the 5 stages of behavior change” is > the event learning objective, “Explore and counsel with patient on the barriers that hinder their efforts to quit smoking.”

Another way to say this is, ‘**X course objective has a narrower concept, and it is Y event objective.**’ Saying ‘**Y event objective has a broader concept, and it is X course objective**’ *means the same thing*. This is especially important to understand and troublesome for users. Here is a simple mathematical example to further illustrate the concept:

2 < 5 means the same thing as 5 > 2

Essentially, in your XML, you can document the hierarchical relationships among your learning objectives from either direction (X course objective has a narrower concept, and it is Y event objective, OR, Y event objective has a broader concept, and it is X course objective). Either approach is valid from a MedBiquitous XML formatting standpoint.

We recommend that you choose one approach to use consistently in your XML to make it more human readable. To follow best practices in curriculum design and to further align with accreditation expectations, the recommended approach for the purposes of the AAMC CI is to document learning objective relationships in your XML in this order:

- program-objective-domain > program-level-competency
- program-level competency related to PCRS
- program-level-competency > sequence-block-level-competency (i.e., course/module)
- sequence-block-level-competency (i.e., course/module) > event-level-competency

Note that rather than “narrower” or “broader,” the tag “relates” is used to demonstrate the relationship between each of a school’s program objectives and one or more PCRS competency statements.

1. Other relevant documents	<p>MedBiquitous Competency Framework Specifications, version 1.0, October 3, 2012, page(s) 19, 31-36</p> <p>Appendix D of this Guide: Valid Compyetency Relationships</p>
2. Required or Optional	Optional. This element is optional from a MedBiquitous specifications perspective. From an AAMC CI perspective, this element is required and necessary to show relationships among learning objectives from different categories (e.g., event-level, program-level, etc.).
3. Number of instances in your CI	Zero or more
4. Datatype	Container. The container of “Relation” contains all the relationships (broader, narrower, or relates) among learning objectives.
5. AAMC CI’s use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CF07, CF09, CF10, CF11, CF12, CF13, CF14, CF19, CF21, CF23, CF24
7. Common errors and mistakes	<p>Documenting an incorrect or illogical relationship among the learning objectives will result in an error. For example, documenting that an event-level learning objective > course/module learning objective, or documenting any kind of relationship other than “related” between a school’s program objective and a PCRS competency statement, would result in errors.</p> <p>If your XML tries to document a relationship between a given objective and another in the “Relation” element, but the learning objective has not yet been listed in “Includes,” it will cause an error.</p>
8. Differences from 2021 to 2022	Yes. The learning objective category “program-objective-domain” is new.
9. XML sample	

Recall again that this is an abbreviated sample of XML; a real curriculum would have upwards of thousands of learning objectives. Note that the “related” relationship documented between an individual program objective and at least one person is in black text, because “related” is the only kind of relationship that can be documented between schools’ program objectives and PCRS competency statements.

```

<cf:Relation>
<cf:Reference1>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>ProgramDomain-1</cf:Entry>
</cf:Reference1>
<cf:Relationship>http://www.w3.org/2004/02/skos/core#narrower</cf:Relationship>
<cf:Reference2>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>ProgramObjectiveID-1</cf:Entry>
</cf:Reference2>
</cf:Relation>
<cf:Relation>
<cf:Reference1>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>ProgramObjectiveID-1</cf:Entry>
</cf:Reference1>
<cf:Relationship>http://www.w3.org/2004/02/skos/core#related</cf:Relationship>
<cf:Reference2>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>https://services.aamc.org/30/ci-school-web/pcrs/PCRS.html#aamc-pcrs-comp-
c0205</cf:Entry>
</cf:Reference2>
</cf:Relation>
<cf:Relation>
<cf:Reference1>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>ProgramObjectiveID-1</cf:Entry>
</cf:Reference1>
<cf:Relationship>http://www.w3.org/2004/02/skos/core#narrower</cf:Relationship>
<cf:Reference2>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>SequenceBlockObjectiveID-1A-1</cf:Entry>
</cf:Reference2>
</cf:Relation>
<cf:Relation>
<cf:Reference1>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>SequenceBlockObjectiveID-1A-1</cf:Entry>
</cf:Reference1>
<cf:Relationship>http://www.w3.org/2004/02/skos/core#narrower</cf:Relationship>
<cf:Reference2>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>EventObjectiveID-123A-1</cf:Entry>
</cf:Reference2>
</cf:Relation>
<cf:Relation>
<cf:Reference1>

```

```
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>SequenceBlockObjectiveID-1A-1</cf:Entry>
</cf:Reference1>
<cf:Relationship>http://www.w3.org/2004/02/skos/core#narrower</cf:Relationship>
<cf:Reference2>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>EventObjectiveID-123A-2</cf:Entry>
</cf:Reference2>
</cf:Relation>
<cf:Relation>
<cf:Reference1>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>SequenceBlockObjectiveID-1A-1</cf:Entry>
</cf:Reference1>
<cf:Relationship>http://www.w3.org/2004/02/skos/core#narrower</cf:Relationship>
<cf:Reference2>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>EventObjectiveID-123A-3</cf:Entry>
</cf:Reference2>
</cf:Relation>
```


Elements related to phases (i.e., academic levels) of the curriculum

In the MedBiquitous specifications, this section of the XML is referred to as AcademicLevels. For the purposes of the AAMC CI, we refer to this section as “phases” for alignment with accreditation language. A definition of “phase” for the purposes of the AAMC CI can be found in the CI Glossary.

Element title: AcademicLevels	
<p>Description: For the purposes of the AAMC CI, the element AcademicLevels is analogous to a phase or year. In this section of the XML, the curriculum’s organization and structure begins to take shape. This element is a container for further details about the curriculum’s phases.</p>	
1. Other relevant documents	<p>MedBiquitous CI Specifications, DRAFT version v10 2021-01-06, page(s) 33</p> <p>CI Glossary on Resources to Establish Your CI</p> <p>Guide to Building a CI, Chapter 4: Determining Your CI Organizational Strategy</p>
2. Required or Optional	Required
3. Number of instances in your CI	One
4. Datatype	Container. The AcademicLevel (e.g., phase) container holds two sub-elements: LevelsInProgram and Level.
5. AAMC CI’s use of data from this element?	None
6. Relevant business rules	CS03, CS04, CS05, CS06
7. Common errors and mistakes	None
8. Differences from 2021 to 2022	No
9. XML sample	

<AcademicLevels>

Element title: LevelsInProgram (i.e., how many phases are in the curriculum)

Description: LevelsInProgram indicates how many phases or years are in the curriculum with a numeric value. If your curriculum is a 4-year program, you would document <LevelsInProgram>4</LevelsInProgram>. Your LevelsInProgram should indicate the number of phases (i.e., years) are needed to represent your complete curriculum in which students have matriculated.

1. Other relevant documents	<p>MedBiquitous CI Specifications, DRAFT version v10 2021-01-06, page(s) 33</p> <p>CI Glossary on Resources to Establish Your CI</p> <p>Guide to Building a CI, Chapter 4: Determining Your CI Organizational Strategy</p>
2. Required or Optional	Required
3. Number of instances in your CI	One
4. Datatype	Restricted. LevelsInProgram must be a number somewhere between 1 and 10 and cannot be duplicated.
5. AAMC CI's use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools' Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS03, CS04, CS05, CS06
7. Common errors and mistakes	The most common error is documenting a given number of phases, and then neglecting to document all the phases you indicated later in your XML. For example, if you document 4 LevelsInProgram, and then later in your XML only list 2 phases, an error will occur. The number of LevelsInProgram should indicate the number of phases (i.e., years) are needed to represent your complete curriculum in which students have matriculated. A new medical school with only 1 year of curriculum in which students have matriculated would be expected to document <LevelsInProgram>1</LevelsInProgram>; however if an established medical school documents fewer than 3 or 4 phases, it may trigger a data quality concern.
8. Differences from 2021 to 2022	No
9. XML sample	

<LevelsInProgram>4</LevelsInProgram>

Element title: Level (i.e., each phase number listed)	
<p>Description: In the previous element, LevelsInProgram, the total number of phases in the curriculum was indicated (e.g., 4). In the element Level, each phase of the curriculum is listed separately (e.g, 1, 2, 3, 4).</p>	
1. Other relevant documents	<p>MedBiquitous CI Specifications, DRAFT version v10 2021-01-06, page(s) 35</p> <p>CI Glossary on Resources to Establish Your CI</p> <p>Guide to Building Your CI, Chapter 4: Determining Your CI Organizational Strategy</p>
2. Required or Optional	Required
3. Number of instances in your CI	1-10
4. Datatype	Restricted. Level number must be a number, and it must be a number somewhere between 1 and 10. The first Level number listed in the XML must be begin at 1.
5. AAMC CI's use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools' Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS03, CS04, CS05, CS06
7. Common errors and mistakes	<p>The most common errors with this element are</p> <ul style="list-style-type: none"> • Using characters other than numbers between 1-10, • Neglecting to begin the first Level at "1," • Duplicating Level numbers, • Neglecting to align the number of phases indicated in the previous element (LevelsInProgram) with this section of the XML. For example, if you documented 4 LevelsInProgram, then 4 separate entries in your XML for "Level numbers" should appear.
8. Differences from 2021 to 2022	No
9. XML sample	

<Level number="1">

Element title: Label (i.e., Title for each phase)

Description: For each phase you list in the “Level” element above, each is assigned a Label (i.e., phase title). One common approach is to assign a Label (i.e., phase title) that corresponds with the year in the curriculum. For example, the Label for the first phase of your curriculum may be “Year 1,” the Label for the second phase of the curriculum is “Year 2”, etc. If you indicated more than 4 phases in your total curriculum in <LevelsInProgram>, you can use Label to indicate *why*. For example, perhaps your curriculum includes a 3-week orientation which is considered your first phase (e.g., <Level number="1">). The Label you assign may be <Label>First Year Orientation</Label>. Then your <Level number="2"> may be labeled <Label>First Year Curriculum</Label>. The most common approach with Label is to use years (e.g., year 1, year 2, etc.). If you are using phases in some other way, it is important to make clear using Label.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 35 CI Glossary on Resources to Establish Your CI Guide to Building a CI, Chapter 4: Determining Your CI Organizational Strategy
2. Required or Optional	Required
3. Number of instances in your CI	One per Level (i.e., Level number)
4. Datatype	Non-null string. This element cannot be left blank.
5. AAMC CI’s use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS03, CS04, CS05, CS06
7. Common errors and mistakes	The most common problem with this element is insufficient detail in the title of each Level to describe how each Level differs from each other.
8. Differences from 2021 to 2022	No
9. XML sample for this element:	

```
<Level number="1"> <Label>Year 1: Foundations of Medicine Phase</Label></Level>
<Level number="2"> <Label>Year 2: Science of Medicine Phase</Label></Level>
<Level number="3"> <Label>Year 3: Clinical Medicine Phase</Label></Level>
<Level number="4"> <Label>Year 4: Clinician Career Phase</Label> </Level>
</AcademicLevels>
```

Elements related to course/modules (i.e., sequence blocks, clerkships, themes, etc.)

In the MedBiquitous CI specifications, this section of the XML is referred to as Sequence Blocks. For the purposes of the AAMC CI, we refer to these as “course/modules” for understanding among our educator audiences. Further definitions of course/modules, including clerkships, are available in the CI Glossary on [Resources to Establish Your CI](#).

Element title: Sequence	
Description: For the purposes of the AAMC CI, this section of the XML will document all the courses, modules, clerkships, blocks, threads, or any/all other organizational approaches for educational events. Courses, including clerkships, are the most common organizational approach, but this section of the XML can be used for other kinds of organization, such as blocks or modules.	
1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 37
2. Required or Optional	Optional. This element is optional from a MedBiquitous specifications perspective. From an AAMC CI perspective, this element is required because sub-elements within the container of Sequence are required.
3. Number of instances in your CI	One
4. Datatype	Container. The container of Sequence will contain all the course/modules (i.e., sequence blocks) in the CI.
5. AAMC CI’s use of data from this element	None
6. Relevant business rules	None
7. Common errors and mistakes	None
8. Differences from 2021 to 2022	No
9. XML sample	

<Sequence>

Element title: SequenceBlock (i.e., course/module)

Description: For the purposes of the AAMC CI, the element SequenceBlock is analogous to a course, module, clerkship, block, thread, or other similar concept. It is an organizational bucket for curriculum. Courses, including clerkships, are the most common organizational approach, but the SequenceBlock specification can be used for other kinds of organization, such as blocks or modules. The SequenceBlock element contains the following attributes, described later in this Guide:

- id,
- Required,
- Minimum,
- Maximum.

The SequenceBlock container also contains many sub-elements related to course/modules, such as Title, Description, etc. described later in this Guide. There should be one SequenceBlock in the XML for each course/module in the curriculum.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 40 CI Glossary on Resources to Establish Your CI Guide to Building a CI, Chapter 4: Determining Your CI Organizational Strategy , Chapter 5: Course-Level Details for Your CI
2. Required or Optional	Required
3. Number of instances in your CI	One per course/module
4. Datatype	Container. The container of SequenceBlock (i.e., course/module) contains the following attributes: id, Required, Minimum, Maximum. The SequenceBlock container also contains many sub-elements such as the Title, Description, etc.
5. AAMC CI's use of data from this element	None
6. Relevant business rules	None
7. Common errors and mistakes	None
8. Differences from 2021 to 2022	No
9. XML sample	

<SequenceBlock>

Attribute title: id (i.e., Course/module unique ID code)

Description: The id is an attribute of a SequenceBlock (i.e., Course/module). It is a unique alphanumeric identifier, or ID code, for each of your course/modules. Schools can choose an approach in assigning course/module IDs that is meaningful for them, such as using course numbers from the course catalogue; this will aid searching in the XML for content. For example, a course numbered “535” in the course catalogue might appear as <SequenceBlock id="535" in the XML.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 40
2. Required or Optional	Required
3. Number of instances in your CI	One per course/module
4. Datatype	Schools can choose letters, numbers, or a combination of letters and numbers for their SequenceBlock IDs.
5. AAMC CI's use of data from this element	None
6. Relevant business rules	CS07
7. Common errors and mistakes	None
8. Differences from 2021 to 2022	No
9. XML sample	

<SequenceBlock id="535"

Attribute title: Required (i.e., is this course/module required or optional?)

Description: The “Required” attribute within SequenceBlock indicates whether each course/module is required or optional for students. Definitions of required and optional course/modules for the purposes of the AAMC CI are available in the CI Glossary on [Resources to Establish Your CI](#). It is possible to have optional events in a required course/module, and required events in an optional course/module. The Guide to Building a CI, Chapter 4: [Determining Your CI Organizational Strategy](#), and Chapter 5: [Course-Level Details for Your CI](#), provide guidance around distinguishing optional elective courses versus selective courses.

To indicate a given course/module is **required**, the XML should appear like this: required="Required"
 To indicate a given course/module is **optional**, the XML should appear like this: required="Optional"

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 40 CI Glossary on Resources to Establish Your CI Guide to Building a CI, Chapter 4: Determining Your CI Organizational Strategy , Chapter 5: Course-Level Details for Your CI
2. Required or Optional	Required
3. Number of instances in your CI	One per SequenceBlock (i.e., course/module)
4. Datatype	Restricted
5. AAMC CI’s use of data from this element	The AAMC CI does not specifically use data from the option “Required In Track,” however schools may make use of it as needed. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	None
7. Common errors and mistakes	The most common error is to enter a value other than Required, Optional, or Required in Track, which are the only values allowed in “Required”.
8. Differences from 2021 to 2022	No
9. XML sample	

<SequenceBlock id="535" required="Required">

Attribute title: Minimum (i.e., what is the minimum number, of this set of course/modules, that students take?)

Description: The “minimum” attribute can only be used if there are “nested course/modules”, meaning there is a hierarchical relationship in which one ‘parent’ course/module contains one or more ‘child’ course/modules within it. Minimum should only be designated for the ‘parent’ course/module (not for any non-parent ‘child’ course/modules). Minimum and maximum are used to model selectives to document both what any individual student *must* take (e.g., minimum 1) versus what students *could* take (e.g., maximum up to 2). For optional courses, such as electives, the minimum is 0.

It is recommended that, when using the attribute Minimum for a ‘parent’ course/module, to:

- Begin with either 0 (for optional course/modules) or 1 (if only 1 of the ‘child’ nested course/modules must be taken)
- For whatever number is documented as Minimum (e.g., 3), there should be *at least* the same number of corresponding ‘child’ course/modules nested under the ‘parent’ course/module.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 40 Guide to Building a CI, Chapter 4: Determining Your CI Organizational Strategy , Chapter 5: Course-Level Details for Your CI
2. Required or Optional	Required (only for the ‘parent’ course/module in nested set of course/modules)
3. Number of instances in your CI	One per ‘parent’ course/module (i.e., sequence block) when documenting nested course/modules
4. Datatype	Positive integer, including 0 (source: from the XSD file used to validate XML files against the MedBiquitous specifications)
5. AAMC CI’s use of data from this element	Data is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	None
7. Common errors and mistakes	The most common mistakes in using “minimum” are to try to assign a minimum to one of the ‘child’ course/modules rather than the ‘parent’ course/module, neglecting to also document a maximum value (described next in this Guide) to the ‘parent’ course/module, or using a value other than a positive numeral, including 0.
8. Differences from 2021 to 2022	No
9. XML sample	An XML sample of Minimum is not included in this Guide because the attribute Minimum should only be used for the ‘parent’ course/module when nesting other course/modules underneath a ‘parent’ course/module. This Guide uses only one hypothetical event within one course/module to illustrate the MedBiquitous specifications relevant to the AAMC CI.

Attribute title: Maximum (i.e., what is the maximum number, of this set of course/modules, that students take?)

Description: The “maximum” attribute can only be used if there are “nested course/modules”, meaning there is a hierarchical relationship in which one ‘parent’ course/module contains one or more ‘child’ course/modules within it. Maximum should only be designated for the ‘parent’ course/module (not for any ‘child’ course/modules). Minimum and maximum are used most often to model selectives to document both what any individual student *must* take (e.g., minimum 1) versus what students *could* take (e.g., maximum up to 2).

It is recommended that, when using the attribute Maximum for a ‘parent’ course/module, to:

- For whatever number is documented as Maximum (e.g., 3), there should be *at least* the same number of corresponding ‘child’ course/modules nested under the ‘parent’ course/module.

1. Other relevant documents	<p>MedBiquitous CI Specifications, DRAFT version v10 2021-01-06, page(s) 40</p> <p>Guide to Building a CI, Chapter 4: Determining Your CI Organizational Strategy, Chapter 5: Course-Level Details for Your CI</p>
2. Required or Optional	Required (only for the ‘parent’ course/module in a set of nested course/modules)
3. Number of instances in your CI	One per ‘parent’ course/module (i.e., sequence block) when documenting nested course/modules
4. Datatype	Positive integer, including 0 (source: from the XSD file used to validate XML files against the MedBiquitous specifications)
5. AAMC CI’s use of data from this element	Data is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	None
7. Common errors and mistakes	The most common mistakes in using “maximum” are to try to assign a maximum to one of the ‘child’ course/modules rather than the ‘parent’ course/module, neglecting to also document a minimum value (described in the previous section of this Guide) to the ‘parent’ course/module, or trying to use a value either than a positive numeral, including 0.
8. Differences from 2021 to 2022	No
9. XML sample	An XML sample of Maximum is not included in this Guide because the attribute Maximum should only be used for the ‘parent’ course/module when nesting other course/modules underneath a ‘parent’ course/module. This Guide uses only one hypothetical event within one course/module to illustrate the MedBiquitous specifications relevant to the AAMC CI.

Element title: Title (of a course/module)	
<p>Description: Each course/module (e.g., clerkships, blocks, nested course/modules, etc.) must have a Title. The more descriptive and specific the course/module title is, the more useful it can be for reports. For example, a course/module title like “MED” would be difficult to discern whether its content should be considered for a report.</p>	
1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 41
2. Required or Optional	Required
3. Number of instances in your CI	One per SequenceBlock (i.e., course/module)
4. Datatype	Non-null string. This element cannot be left blank.
5. AAMC CI’s use of data from this element	Data from this element is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS19
7. Common errors and mistakes	The most common mistake is with course/module titles is to provide non-descriptive or too little text to be useful for report creation.
8. Differences from 2021 to 2022	No
9. XML sample	

<Title>Clinical Skills: Health Promotion and Maintenance</Title>

Element title: Description (of a course/module)

Description: In the description element, schools detail the purpose and overall content of each course/module. Providing free-text narrative description as needed for schools is helpful for report creation; however, the most important aspect of the course/module description is to detail the *type(s)* of each course/module. The possible course/module types are provided below. Schools may choose more than one of the type options per course/module, as needed, to accurately describe each course/module. For each of the course/module types, a type should only be included in the course/module description if the course/module:

1. meets the definition(s) provided below,
2. was intentionally designed as a given type, and
3. contains at least 50% of events reflecting this type.

For example, a course that was originally designed as a discipline-based course/module, and now contains only one event which reflects integrated content, would *not* warrant the integrated course/module type.

Course/module type options:

- Clinical presentation-based
- Discipline-based
- Integrated
- Longitudinal
- Preceptorship
- Rotation
- Selective
- Sub-internship
- System-based

These course/module types are further described below:

Clinical presentation-based. These course/modules are organized by symptoms (e.g., syncope), diagnoses, or clinical cases. (Woloschuk et al, 2004; Mandin et al, 1995; Gelb et al, 2002).

Discipline-based. These course/modules are primarily focused on a basic science, behavioral science, or clinical discipline. If there are other disciplines included in the course/module, the integration is limited. (Dubin, 2016; Cooles et al, 2014; Werner et al, 1994; Papa & Harasym, 1999). Examples may include course/modules like pharmacology, or neurology.

Integrated. These course/modules include content that “cuts across subject matter lines, bringing together various aspects of the curriculum into meaningful association to focus upon broad areas of study” (Shoemaker, 1989). In a medical school context, it includes the “trans-disciplinary delivery of information between the foundational sciences and the applied sciences” (Brauer & Ferguson, 2015). (Quintero et al, 2016). Subject matters could follow a horizontal, vertical, or spiral integration model. Examples of integrated course/modules include normal/abnormal clinical presentations, basic, behavioral, and clinical sciences, foundational and applied sciences.

Note: In the MedBiquitous specifications, “rotational” and “integrated” can only be applied to clerkships in the Clerkship Model element. Because course/modules that are *not* clerkships may also be rotational or integrated, the AAMC CI needs any course/module, including clerkships and non-clerkships, that are rotational or integrated be documented in this Description element.

Longitudinal. These course/modules occur over a period of time, and students simultaneously experience other curriculum in parallel. For example, students may be enrolled in a 12-month study skills and coaching course/module, while they are also taking science and clinical courses. In a clinical context, longitudinal course/modules emphasize “the comprehensive care of patients over time” (Latessa et al, 2017). (Gonzalo et al, 2019).

Preceptorship. These course/modules are practical clinical experiences in which the student works outside the academic environment under the supervision of an established professional (MeSH, 2019). Preceptorships are often under the supervision of an individual rather than being connected to a specialty. The preceptor “works either with small groups of students or with individual students, and serves as the teacher, role model, and evaluator (Sachdeva, 1996). Preceptors can also act as facilitators. Preceptorships may include shadowing or observing the preceptor, as well as hands on practice.

Rotational. This course/module may repeat throughout the year but contain different groups of students, such that the rotation course is a year-long course but a single student’s time in the course is only a portion of that year. Rotation can also refer to a rotational component of the course, for example students needing to rotate through several different clinical settings to achieve successful completion of the course (Smalley & Keskinocak, 2016). An example is a psychiatry clerkship that for a single student is a four-week experience, but which runs throughout the year so that all students in a given cohort or class have a psychiatry clerkship experience.

Note: In the MedBiquitous specifications, “rotational” and “integrated” can only be applied to clerkships in the Clerkship Model element. Because course/modules that are *not* clerkships may also be rotational or integrated, the AAMC CI needs any course/module, including clerkships and non-clerkships, that are rotational or integrated be documented in this Description element.

Selective course/modules allow students to choose from a number of alternatives that are predetermined by their program. Examples may include an intensive care unit (ICU) course, where all students must complete an intensive care course, but students are able to choose from a medical ICU, a surgical ICU, or a pediatric ICU.

Note: If modeling a selective, schools would need to use the nested sequence block feature of the MedBiquitous specifications, to show a hierarchical relationship from one ‘parent’ course/module, with two or more ‘children’ course/modules nested underneath it. Read more about nested course/modules in the Guide to Building a CI, Chapter 4: [Determining Your CI Organizational Strategy](#), Chapter 5: [Course-Level Details for Your CI](#).

Sub-internship. These clinical experiences during the final year of medical school are related to a medical specialty (e.g., pediatrics, surgery), and are intended to prepare students for internship and residency (Aiyer et al, 2008). Synonyms include acting internship, advanced clerkship. (Vu et al, 2019; Vu et al, 2015; Issa et al, 2015).

System-based. These course/modules are organized by a human body organ system and may integrate various basic and clinical science topics as relevant to the given organ system. In these course/modules, students explore the organ system and “learn all the basic science and clinical science of that system” (Dublin, 2016). Examples include courses for the cardiovascular system, or the gastro-intestinal system, or reproductive and sexual health.

Whether or not a course is required or optional (i.e., elective) is documented through the Required attribute earlier in this Guide. Whether a course/module is a clinical clerkship is documented in the Clerkship Model element described later in this Guide.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 41
2. Required or Optional	Optional. This element is necessary to understand what types of course/modules in which curricular content occurs.
3. Number of instances in your CI	One per SequenceBlock (i.e., course/module)
4. Datatype	Non-null string. If included, this element cannot be left blank.
5. AAMC CI’s use of data from this element	Data from this element is used for searching content and creating national aggregate reports.
6. Relevant business rules	CS19
7. Common errors and mistakes	Course/module types, and their definitions, is a new concept for 2022. From a MedBiquitous Specifications and AAMC CI business rules perspective, this element has not changed. It will be important to carefully apply the course/module types and follow the instructions provided for high quality of data for useful reports. It is helpful to separately identify the “course/module type” section and “narrative description” sections from within the Description element, as shown in the XML sample provided.
8. Differences from 2021 to 2022	No
9. XML sample	

<Description>Course/module types: Clinical presentation-based, Integrated, Longitudinal. Narrative description: In this course, Clinical Skills: Health Promotion and Maintenance, students are simultaneously enrolled in systems-based course/modules which primarily focused on the basic science content related to human body systems. For this course, 10 clinical scenarios were selected based on their relevance to our local community. The clinical scenarios were co-developed with community leaders to ensure that the content will best prepare students to be part of a healthcare team that

prioritizes the health promotion, disease prevention, and health maintenance for our local community. This course is integrated in that it reflects, and was deliberately designed to include, behavioral science, health systems science, basic science, and social science concepts. Through team-based learning, small group discussions, lectures, simulations, and patient care experiences, students are able to apply the concepts they learn in real-world scenarios.</Description>

Element title: Timing (i.e., duration in days, and start and end dates, of a course/module)

Description: For the purposes of the AAMC CI, the duration per course/module must be provided in days. A “day” in the curriculum is any date upon which formal learning was scheduled, or is unscheduled but expected to occur (e.g., unscheduled independent learning, studying). This will be documented as “P,” (stands for ‘period of time’), a given number of days, and “D” (for days). For example, a 10-week course/module, with 5 days per week of scheduled and unscheduled learning, would be documented as “P50D.” (Note the “P” rather than “PT” as was used earlier in this Guide to document event duration. This is deliberate and based on the MedBiquitous specifications and proper XML formatting). The start date and end date of a course/module should be formatted as follows: YYYY-MM-DD.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 41, 44, 48
2. Required or Optional	Required. Based on the MedBiquitous specifications, either duration or dates must be provided per sequence block (i.e., course/module). For the purposes of the AAMC CI, dates are required per course/module based on the business rules. Also, minimally, duration must be provided for course/modules indicated as clerkships (in the Clerkship Model element, described later in this Guide).
3. Number of instances in your CI	One per SequenceBlock (i.e., course/module)
4. Datatype	Container. Timing includes sub-elements for Duration and Dates. Duration is the datatype “duration.” Dates is the datatype “container,” containing sub-elements for a StartDate and EndDate.
5. AAMC CI’s use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS02, CS09, CS16, CS17
7. Common errors and mistakes	<p>The most common errors are formatting or calculating the duration in days, and the start and end dates, incorrectly. Documenting a course/module EndDate which occurs <i>before</i> the StartDate will result in a business rule error. Causes for data quality concerns are:</p> <ul style="list-style-type: none"> • documenting unexpected values for durations (e.g., unexpectedly long) or for StartDate and EndDate (occurring on the same day or very close together), • documenting a duration and StartDate and EndDate which do not align with each other. <p>From a report quality perspective, providing both duration in days as well as dates per course/module which are accurate and align with each other is very important.</p>
8. Differences from 2021 to 2022	No

9. XML sample

```
<Timing>  
  <Duration>P50D</Duration>  
  <Dates>  
    <StartDate>2021-09-07</StartDate>  
    <EndDate>2021-11-13</EndDate>  
  </Dates>  
</Timing>
```

Element title: AcademicLevelReferences (i.e., phase start and phase end per course/module)

Description: This element was developed by MedBiquitous in 2014 but not implemented by AAMC at the time. This element allows schools to show in which phase (e.g., 1, 2, 3, etc.) a course/module begins, and in which phase a course/module ends. It may be most common for course/modules to begin and end within the same phase (e.g., began in phase 1, ends in phase 1), but this element allows schools to also model course/modules which cross multiple phases (e.g., starts in phase 1, ends in phase 4).

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 45-46
2. Required or Optional	Required
3. Number of instances in your CI	One per SequenceBlock (i.e., course/module)
4. Datatype	Container. The element AcademicLevelReferences is a container, containing sub-elements StartingAcademicLevel and EndingAcademicLevel, for which the datatype is restricted.
5. AAMC CI's use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools' Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS04, CS25
7. Common errors and mistakes	This element is new; best practices to avoid errors and mistakes may be more readily identified once data has been collected according to this new element. It is important to ensure that the numbers assigned in the AcademicLevelReferences element correspond with the phase numbers identified in the LevelsInProgram element. For example, if in the LevelsInProgram element, it was identified that a given curriculum has a total of 4 phases, then using numbers beyond 4 (e.g., 5, 6, etc.) in the AcademicLevelReferences element would cause an error.
8. Differences from 2021 to 2022	Yes. This is a new element for the 2021-2022 curriculum.
9. XML sample	

```
<SequenceBlockLevels>
<StartingAcademicLevel>/CurriculumInventory/AcademicLevels/Level[@number='1']</StartingAcademicLevel>
<EndingAcademicLevel>/CurriculumInventory/AcademicLevels/Level[@number='1']</EndingAcademicLevel>
</SequenceBlockLevels>
```

Element title: ClerkshipModel (i.e., whether a course/module is a clinical clerkship or not)

Description: The ClerkshipModel element is where schools indicate whether a course/module is a clinical clerkship or not. For the purposes of the AAMC CI, a definition for what constitutes a clinical clerkship is provided in the CI Glossary. Within an CI XML file, each course/module is indicated as either being a clerkship, or not. For course/modules which are indicated as clerkships, additional documentation about whether the clerkship is integrated, or a rotation are documented. Only one of these two options, rotation or integrated, may be chosen, and only for course/modules which are clerkships. Definitions for “rotation” and “integrated” for the purposes of the AAMC CI are provided in the CI Glossary on [Resources to Establish Your CI](#).

1. Other relevant documents	<p>MedBiquitous CI Specifications, DRAFT version v10 2021-01-06, page(s) 41</p> <p>CI Glossary on Resources to Establish Your CI</p> <p>Guide to Building a CI, Chapter 5: Course-Level Details for Your CI</p>
2. Required or Optional	Optional
3. Number of instances in your CI	One per SequenceBlock (i.e., course/module)
4. Datatype	Restricted
5. AAMC CI’s use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	None
7. Common errors and mistakes	The most common cause for quality concern is when a course/module is indicated as <i>not</i> a clerkship, however, uses the word “clerkship” in the course/module title or description. This may be intentional depending on the school’s use of the word clerkship, or it may indicate data error.
8. Differences from 2021 to 2022	Yes
9. XML sample	An XML sample for this element is not provided below because the hypothetical example used throughout this Guide is not a clerkship. However, you may see more detail regarding modeling clerkships in the Guide to Building a CI, Chapter 5: Course-Level Details for Your CI , as well as the MedBiquitous CI specifications.

Element title: CompetencyObjectReference (i.e., course-level learning objective ID)

Description: CompetencyObjectReference refers to learning objectives’ IDs, in this case for a given course/module (i.e., sequence block). Recall that earlier in this Guide, CompetencyObjectReference per event was documented in the CI XML. The purpose of the CompetencyObjectReference in your CI XML data file is to point to the actual learning objectives’ text which appear later in the CI XML data file.

In the XML example below, there is one CompetencyObjectReference documented to correlate with the one course/module-level learning objective used earlier in this Guide as an example. A real curriculum would likely have many more learning objectives per course/module. Remember, only the ID value of the course/module learning objective is documented in the CompetencyObjectReference element – the actual text of your course/module-level learning objectives is documented in the CompetencyObject section of the XML.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 41
2. Required or Optional	Optional
3. Number of instances in your CI	Zero or more per SequenceBlock (i.e., course/module)
4. Datatype	Restricted
5. AAMC CI’s use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CF06
7. Common errors and mistakes	The most common errors with this element are using the same text (e.g., CourseObjective1) in more than one CompetencyObjectReference. The text within each CompetencyObjectReference must be unique to each learning objective.
8. Differences from 2021 to 2022	No
9. XML sample	

```
<CompetencyObjectReference>/CurriculumInventory/Expectations/CompetencyObject[lom:lom/lom:general/lom:identifier/lom:entry='CourseObjective1']</CompetencyObjectReference>
```

Element title: SequenceBlockEvent (i.e., events within a course/module)

Description: SequenceBlockEvent is the element which indicates what events, documented earlier in the XML, belong in a given course/module. Each SequenceBlockEvent element entry in the XML references a single event which occurs in a given sequence block. SequenceBlockEvent contains several pieces of information:

- Required attributes: Required (i.e., whether this event is required or optional within the course/module). It is possible to have an optional course (i.e., elective) with required events, and a required course (i.e., Clinical Skills 1) with optional events.
- Required sub-elements: EventReference (i.e., Event ID). Recall that earlier in the XML in the “Event (i.e., Event ID)” section of the XML, an ID per event was identified. To continue with our hypothetical example, the event ID used earlier is <Event id="E123A"> - you can view how this will display in the context of SequenceBlockEvent element in the XML sample below. It is important that event IDs in EventReference *match exactly* with the event IDs identified earlier in the XML section “Event (i.e., Event ID).”
- Optional sub-elements: StartDate of the event, and EndDate, documented as YYYY-MM-DD (because these are the data type of “date”)

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 41
2. Required or Optional	Either SequenceBlockEvent or SequenceBlockReference is required per Sequence Block (i.e., course/module)
3. Number of instances in your CI	One per SequenceBlock (i.e., course/module)
4. Datatype	Container. The Container of SequenceBlockEvent contains the following: <ul style="list-style-type: none"> • Required attributes: Required (i.e., whether this event is required) • Required sub-elements: EventReference (i.e., Event ID) • Optional sub-elements: StartDate, EndDate (YYYY-MM-DD)
5. AAMC CI’s use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS15, CS18, CS21
7. Common errors and mistakes	Remember that each event has a unique ID. While your XML can include multiple SequenceBlockEvent references back to the same individual event, please make sure that your intention is to reference to the same instance of that event. For example, if you have an assessment event for a quiz, and that quiz is given once per week in a course – if you were to enter the same event ID in the SequenceBlockEvent for each iteration of the weekly quiz, it would appear that your students are taking the <i>same</i> quiz over and over again, rather than indicating that students take a weekly quiz that varies in content.
8. Differences from 2021 to 2022	No

9. XML sample

```
<SequenceBlockEvent required="true">  
<EventReference>/CurriculumInventory/Events/Event[@id='E123A']</EventReference>  
<StartDate>2021-09-23</StartDate>  
<EndDate>2021-09-23</EndDate>  
</SequenceBlockEvent>
```

Element title: SequenceBlockReference (i.e., Does this course/module have another course/module nested within it?)

Description: The element SequenceBlockReference is used to “nest” course/modules within a given course/module, to show an organizational relationship among a set of courses. Recall that the “nested” feature of course/modules (i.e., sequence blocks) was earlier described in this Guide in the [<SequenceBlock> section](#) of the XML.

For example, perhaps the hypothetical course used as an example throughout this Guide, ‘Clinical Skills: Health Promotion and Maintenance’, could be nested within a ‘parent’ course/module titled, ‘Clinical Skills,’ so that predominantly clinical-skills courses could be grouped together in the XML. Because we have considered this hypothetical example course as a stand-alone, non-nested course/module throughout this Guide, an XML sample of this nesting is not provided below. However, you may see more information about nesting sequence blocks in the MedBiquitous CI Specifications.

1. Other relevant documents	MedBiquitous CI Specifications, DRAFT version v10 2021-01-06 , page(s) 41
2. Required or Optional	Either SequenceBlockEvent or SequenceBlockReference is required per Sequence Block (i.e., course/module)
3. Number of instances in your CI	One per SequenceBlock (i.e., course/module)
4. Datatype	SequenceBlockReference
5. AAMC CI’s use of data from this element	This element is used for searching content and creating national aggregate reports. Data from this element is in schools’ Verification and Accreditation Support Reports; samples are available on Resources to Use Your CI Effectively .
6. Relevant business rules	CS10, CS19, CS24
7. Common errors and mistakes	If you have a set of course/modules which are nested, ultimately, there must be an event within the ‘child’ course/module. For example, if you were to create a ‘parent’ course/module for ‘Clinical Skills,’ as described in the Description section above, the ‘Clinical Skills’ parent course/module would not necessarily have to contain any events; however, the ‘child’ course/module, ‘Clinical Skills: Health Promotion and Maintenance’ would have to contain at least 1 event – otherwise, an error would occur.
8. Differences from 2021 to 2022	No
9. XML sample	An XML sample of this nesting is not provided; please see element description above for further detail.