AAMC
Tomorrow's Doctors, Tomorrow's Cures®

AAMC CURRICULUM INVENTORY

Technical User Guide

Curricular data from July 1, 2021-June 30, 2022

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AAMC Curriculum Inventory (CI)

Technical User Guide

This document was created by the Association of American Medical Colleges (AAMC) Curriculum Inventory (CI) staff and is intended for supporting schools and informing vendors in annually uploading their curriculum inventory data to the AAMC.

The AAMC leads and serves the academic medicine community to improve the health of people everywhere. Additional information about the AAMC is available at aamc.org.

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Purpose of this Guide

The purpose of this Guide is to provide instruction and explanation to CI users on the technical basis for the AAMC CI's structure and contents with language understandable from an educational and technical perspective.

The AAMC CI is a technically complex, large-scale data collection. For a successful CI experience, it requires those with expertise in curriculum, data management and IT to come together. Data and technical staff may be expert in data organization and software development, however, may be uncertain about the meaning of the curriculum content within the CI. Educational staff may be expert in curriculum and the data reports they need but may be uncertain of the back-end programming of their CI's technical platform.

The goal of this Guide is to provide language accessible to educational and IT audiences. This will help to:

1. Support those with education expertise to be facile with the CI standards' technical specifications
2. Facilitate conversations about CI between educational and information technology staff
3. Illustrate how the AAMC CI applies the MedBiquitous data exchange specifications.

About MedBiquitous

The purpose of data exchange standards is to provide structure so that data can be formatted and organized. This enables data to be shared, and to be used to create reports and interpretations. The AAMC CI uses the MedBiquitous data exchange specifications, available on the MedBiquitous website, to govern the structure and type of data that can be submitted to the AAMC. MedBiquitous is the standards development program of the AAMC that creates IT standards for health professions education and quality improvement.

The MedBiquitous specifications which inform the AAMC CI are the:

1. Competency Framework Specifications
2. Competency Object Specifications
3. Curriculum Inventory (CI) Specifications
4. Healthcare Learning Object Metadata (LOM) Specifications
5. Professional Profile Specifications

Please review the relevant documents to the standards on the MedBiquitous website. For questions about the MedBiquitous specifications please contact medbiq@aamc.org.

Complementary guides and resources

From an educational perspective, the Guidebook to Building a CI should be your primary resource to support curriculum documentation. This CI Technical User Guide is written to support the technical effort of adhering to the MedBiquitous specifications and AAMC CI Business Rules, allowing for the

successful upload of your curriculum to the AAMC CI. This Guide should be used in conjunction with the MedBiquitous specifications and their related documents, available on the MedBiquitous webpages.

Additional AAMC CI resources that may be useful to review, in this suggested order, as you use this Guide include:

1. Guidebook to Building a CI
    - CI Glossary
    - Physician Competency Reference Set (PCRS)
    - Standardized Vocabulary for Instructional Methods, Assessment Methods, and Resources
2. CI Frequently Asked Questions
3. CI Portal User Guide

Compliance with MedBiquitous specifications and AAMC CI Business Rules

The MedBiquitous Curriculum Inventory Implementation Guidelines version 1.0 (dated November 1, 2012) states: Before implementing the Curriculum Inventory, analyze the context in which it will be used and determine:

1. Which data elements and attributes are necessary to achieve your goals.
2. Whether additional business rules or policies are necessary to achieve your goals.
3. Whether your business partners have additional requirements or business rules or policies.

A school's CI data must first conform with the MedBiquitous specifications. Then, the AAMC CI has additional business rules which must be met to successfully upload CI data to the AAMC. It may be helpful to review the documents in the following order:

1. MedBiquitous specifications (the 5 listed above) and their related documents
2. AAMC CI Business Rules (see appendix of this guide)

The MedBiquitous specifications require that CI data be formed into a file format called XML; further explanations of XML can be found in the next section of this Guide. A school's CI XML file will not successfully upload to the AAMC unless it meets all the requirements of all these documents. If a CI XML data file does not conform with the MedBiquitous specifications when it is uploaded to the AAMC, it will cause an error and the file will not continue to load. The CI data file will not be checked for compliance with the business rules until conformity with the MedBiquitous specifications is met.

The business rules can be thought of as additional requirements to ensure data quality. The business rules provide limitations so that documentation practices which may be technically allowable but not educationally sound are removed from CI data. Adherence to data quality is addressed in additional ways beyond the business rules and are described further in this Guide.

To confirm whether a CI XML data file is conforming with the MedBiquitous specifications, a school or vendor can check a CI XML data file against MedBiquitous' XSD file available here: http://ns.medbiq.org/curriculuminventory/v10/. An XSD file is an XML schema definition file which is used by IT staff to ensure each piece of content in the XML file is formatted correctly. One way to examine your CI XML data file to ensure it is well-formed based on the MedBiquitous specifications is to use an XML validator tool. An XML validator tool validates the syntax of an XML file for correct and expected composition. There are multiple XML validator tools available. Programs that you might consider using include:

- Notepad++ (free) – if you choose this approach, make sure to also download XML Tools Plugin
- Microsoft Visual Studio
- XML Copy Editor (free)

These programs can help a user identify whether their CI XML data file does not conform to any of the MedBiquitous specifications.

Once a CI XML data file is confirmed to conform with the MedBiquitous specifications, it also needs to be in compliance with the AAMC CI Business Rules. This can be tested by uploading the CI XML data file in the CI Portal; if there are any business rule errors, an error message will be generated.

Once the MedBiquitous specifications and business rules are met in an uploaded CI XML data file, a school's Verification and Accreditation Support Reports will be generated for review.

Be careful to use Unicode consistently throughout your XML. For example, in Unicode basic Latin, only basic quotation marks will validate - the use of stylized quotation marks (e.g., slanted left, slanted right) will not allow your file to validate. Please also note that some special character formats are difficult to use within XML. For example, hyphens within XML are ok (e.g., 2021-2022), whereas extended dashes (e.g., 2021 – 2022) may be difficult to process. Please confer with your vendor and/or IT staff for guidance about how to document in XML for your specific software.

CI XML data file and upload options

XML stands for eXtensible Markup Language. It is a common language used for sharing data on the Internet and is meant to be readable for both people and computers. In a curriculum management system (CMS), the curriculum data may display in a variety of formats which are understandable for faculty, staff, and students. A CI's technical platform takes a school's curriculum mapping data and converts it into an XML file that can be shared with the AAMC.

Like any language, the syntax of XML has rules about what is well-formed and what is poorly formed language. For the purposes of this Guide, the goal is not to reproduce a crash-course in XML. Rather, it is to help educators and IT staff understand how the AAMC CI uses XML to capture curriculum data.

For technical staff, many developers may already be familiar with XML. Some may need additional resources to familiarize themselves more deeply, such as this World Wide Web Consortium (W3C) XML resource, or this W3Schools XML tutorial. It is essential that IT developers who interact with the AAMC CI have an understanding XML language.

For educators, many may have little experience with XML beyond the AAMC CI. While some basic knowledge of XML can be helpful for discussions with your IT colleagues, the expectation is not for educators to become deeply fluent in XML. The XML samples in this Guide may help educators to feel informed about how to best review their CI data for accuracy and completeness. If you are curious and wish to find more resources regarding XML in addition to those above this How To Geek explanation may be useful.

A school's CI XML data file can be uploaded by schools or on their behalf by vendors – how to set up a school's data sender (either the school themselves or a participating CI vendor on their behalf) is described in the CI Portal User Guide.

A school's CI XML data file can be uploaded to the AAMC directly through the CI Portal, or can be shared via a Web service. Schools who create their own data files often use the CI Portal for uploading their data to the AAMC, while schools with a CI participating vendor often have a Web service feature within their vendor software. A Web service allows schools or vendors to use their own process to upload CI data to the AAMC. More information about the use of a Web service is available in the CI Portal User Guide and the appendix of this guide. Please note that CI participating vendors and schools wishing to use a Web service to upload their CI data to the AAMC must confirm an IP address (or IP address range) by June 1 annually.

Formatting CI data with quality in mind

The CI data which AAMC collects is used for a variety of purposes: the reports generated support schools in benchmarking, program evaluation, continuous quality improvement, curriculum renewal, and accreditation. The reports also are used to inform AAMC initiatives, conduct research, and inform advocacy work. Because the data is used to inform decisions and disseminate knowledge, it is vital that the CI data shared with the AAMC is of high quality. CI data needs to be:

1. **Accurate**
2. **Complete**

Accuracy is the first priority; completeness is the next priority. While the AAMC has multiple post-data collection processes to clean and cull data, it is resource intense and has limitations, as additional data cannot be collected for a given year once the collection period closes.

The goals of a school's CI are to:

1. **Represent the experience of any hypothetical, proto-typical student**. For example, perhaps each student chooses one of four sub-internships. The CI file needs to make it clear that although there were four sub-internship options, any student would be responsible for taking only one of those four.
2. **Represent the breadth of curriculum offered at a school**. For example, while the individual student chooses one sub-internship, the four choices offered include primary care, pediatrics, surgery, and hospital medicine. All four sub-internship options in this hypothetical case would need to be represented in the CI.

The concept **"garbage in, garbage out"** from the fields of computer science and mathematics applies here too – if inaccurate and incomplete data are entered in a CI, the reports created from this data will be of uncertain value. The more high-quality, detailed information in your CI, the more comprehensive and useful curriculum reports can be. If a set of CI data is determined to be potentially inaccurate or incomplete, it may result in that portion of CI data being removed from the overall data set.

Further in this Guide, data quality issues as they relate to each element are described. Before reading the specific data quality issues for each element, and in addition to the data quality recommendations in the Guide to Building a CI, let us examine some data quality guidelines that apply to all your CI data:

1. **Do not include identifiable data**. Please do not include personal identifying information (e.g., professor's names, contact information, University name, etc.) in your CI data sent to AAMC. A common place identifiable data is included inadvertently is within learning objectives:
   - Sample event-level learning objective with identifiable data: "After today's session, students will be able to list all of Dr. Sample's rules for anatomy lab safety."
   - Sample program-level learning objective with identifiable data: "Upon graduation, students will reflect all the behaviors within Sample University's code of professionalism."

Other common areas for inadvertent identifying data are the event or course descriptions, when these fields are used to house instructions and communication channels to the students:
   - Sample event description with identifiable data: "Send your proposal to d.sample@ptu.edu once your team has completed the review"
   - Sample course description with identifiable data: "Tuesday and Wednesdays will be spent in Trustworthy Hospital's ICU while Monday, Thursday, and Fridays will be spent at the Named Outpatient Facility.

2. **Check spelling errors**. Many software programs have spell-check programs, but even in those cases, it is helpful to confirm that spelling errors are being effectively identified. For example, the word "clinical" is often misspelled or shortened (e.g., clin) which can make it difficult to capture in reports.

3. **Write learning objectives well**. Learning objectives are a rich source of data when querying curriculum for content. Learning objectives within the AAMC CI exist at the program, course/module, and event level. Multiple chapters within the Guidebook to Building a CI discuss factors to consider when evaluating learning objectives for quality. A library collection with resources for writing learning objectives well is available in the virtual AAMC Curriculum Community.

4. **Spell out acronyms**. Universally known and unique acronyms such as ACLS may be easier to search. However, acronyms with more than one possible meaning may make it difficult to determine content. For example, perhaps your school has the "BEST" program (Better Education for Student Teachers). Without the parentheses to make the content clear, it would be difficult to include the "BEST" program's content in curriculum reports.

5. **Choose consistent terminology**. Establish a standardized way to refer to your content in each topic so that you have consistency across courses and content. For example, will your CI have the words "cancer," "neoplasm," "oncological," "tumor," or will you provide your faculty and staff a list of terms to use consistently across your CI? The AAMC Keywords is a useful resource to ensure consistency across some terminology in your CI.

6. **Avoid duplicates**. In general, duplicate learning objectives, events, and course/modules should be avoided. Because the CI tries to represent the experience of any proto-typical student, duplicates within the CI should only be present if any proto-typical student would encounter the same content more than once. Because some software systems use real calendar data to populate the CI, it may be that duplicate courses or events are inadvertently brought into the CI. For this reason, it is important to confirm that there are no duplicates in the CI submission before it is shared with the AAMC, unless those duplicates are there deliberately to represent the curriculum accurately and

completely.

7. **Avoid documenting what did NOT occur in the curriculum in your CI uploaded to AAMC**. The AAMC CI is a place to document what *did* happen, what *was* taught. While capturing what was canceled or did not occur may be important for schools to document for internal purposes, that kind of data should not be included in schools' CI data uploads to AAMC. In addition to canceled curriculum, another way schools may be tempted to document what did not occur could be in specific content areas. For example, a school might document in the description of an event that this event covered "adult diabetes, NOT pediatric diabetes." If you were to later do a search for pediatric diabetes in your CI, this event's content might be included in the report when in fact it should not. Using keywords is a more effective way to document what curriculum content was related to pediatrics. Please see the AAMC Keywords.

8. **Use "nested course/modules."** In the Guidebook to Building a CI, there is further detail about when and how to use the nested course/module (i.e., sequence block) feature in the "Course-Level Details for Your CI" chapter. This allows the curriculum to show hierarchy, and group courses to show both the experience for any proto-typical student, and the breadth of curriculum offered. Additional features of nested course/modules are described in Section II.

9. **Multilingual CI data**. If portions of CI data are written in languages other than English, those portions should also be spelt out in parentheses in English to ensure non-English data is represented in curriculum reports. For example, a school may have an optional course regarding medical Spanish, and perhaps that course/module is titled, "Medicina en Español." In the school's CI data XML file, the course/module title would read: Medicina en Español (Medical Spanish), having both the Spanish and English spellings of the course/module title.

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: • 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 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 throughout this document and in the appendices. Where able 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	
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. All the XSD file addresses for the five MedBiquitous standards which inform the curriculum inventory are listed in this element. Part of the beginning of the XML language is information about the schema location. Files that do not include the correct schema location header will not process in a validation tool or the CI Portal. An example of the correct header is provided below in this guide, as well as in the appendix of this guide.	
1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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	

```
<?xml version="1.0" encoding="UTF-8"?>
<CurriculumInventory
xsi:schemaLocation="http://ns.medbiq.org/curriculuminventory/v10/ http://ns.medbiq.org/
curriculuminventory/v10/curriculuminventory.xsd"
xmlns="http://ns.medbiq.org/curriculuminventory/v10/"
xmlns:lom="http://ltsc.ieee.org/xsd/LOM"
xmlns:a="http://ns.medbiq.org/address/v1/" xmlns:cf="http://ns.medbiq.org/competencyframework/v1/"
xmlns:co="http://ns.medbiq.org/competencyobject/v1/" xmlns:hx="http://ns.medbiq.org/lom/extend/
v1/" xmlns:m="http://ns.medbiq.org/member/v1/" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance">
```

Attribute title: ReportID	
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.	
1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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	
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.	
1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 14 MedBiquitous Professional Profile, "InstitutionInfoType" June 2008, page(s) 19
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. 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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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	
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.	
1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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.
6. Relevant business rules	CS19
7. Common errors and mistakes	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. 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.
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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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.
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	
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.	
1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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.
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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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.
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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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>

Element title: Description (Description of the overall curriculum) ***Contains new content for 2022**

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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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 is 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 in the Guidebook to Build a 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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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)	
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.).	
1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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.
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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 25 Guidebook 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.
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 Keywords. 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	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 25 MedBiquitous Health Learning Object Metadata Standard (Healthcare LOM), version 1.0 September 2009, page(s) 10 Guidebook to Building a CI, Chapter 10: Keywords AAMC Keywords.
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.
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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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.
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 in the Guidebook to Build Your CI. 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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 26 Guidebook to Build Your CI, which includes the CI Glossary and Standardized Vocabulary in the appendices, and Chapter 9: Instructional Methods, Assessment Methods and Resources. Frequently Asked Questions
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.
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>

Element title: InstructionalMethod	***Contains new content for 2022.**

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 in the Guidebook to Build 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.

1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 27 Guidebook to Build Your CI, which includes the CI Glossary and Standardized Vocabulary in the appendices, and Chapter 9: Instructional Methods, Assessment Methods and Resources. Frequently Asked Questions Virtual curriculum community, library collection for "teaching and assessment approaches"
2. Required or Optional	Required (at least 1 instructional OR assessment method must be tagged to each event).

3. Number of instances in your CI	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 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.
6. Relevant business rules	CS12, CS14, CS27
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 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.
8. Differences from 2021 to 2022	Yes. Instructional method duration is a new optional 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 in the Guidebook to Build 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 in the Guidebook to Build 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.	
1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 28 Guidebook to Build Your CI, which includes the CI Glossary and Standardized Vocabulary in the appendices, and Chapter 9: Instructional Methods, Assessment Methods and Resources. Frequently Asked Questions Virtual curriculum community, library collection for "teaching and assessment approaches"
2. Required or Optional	Required (at least 1 instructional OR assessment method must be tagged to each event)
3. Number of instances in your CI	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.
4. Datatype	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.)
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.
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)	
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 *actual text* of the learning objectives is documented. The <Expectations> element is a container which opens this section of the XML.	
1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 30 MedBiquitous Competency Object Specifications, version 0.51, November 2011, page(s) 16
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>

Element title: CompetencyObject ***Contains new content for 2022**

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.	
1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 30 MedBiquitous Competency Object Specifications, version 0.51, November 2011, page(s) 16 Guidebook to Build Your CI, which includes the CI Glossary in the appendix, as well as Chapter 3: Program Objectives Drive Curriculum, Chapter 5: Course-Level Details for Your CI, Chapter 7: Event Learning Objectives Frequently Asked Questions Virtual curriculum community, library collection for "learning objectives" Register for the Building Better Curriculum webinar series.
2. Required or Optional	Required
3. Number of instances in your CI	One or more
4. Datatype	Refer to MedBiquitous CompetencyObject Specifications
5. AAMC CI's use of data from this element	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.
6. Relevant business rules	CF01, CF02, CF03, CF04, CF05, CF06, CF07, CF08, CF15, CF16, CF17, CF18, CF20
7. Common error and mistakes	Some common errors and mistakes include: • 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 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. • 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	Yes. The learning objective category "program-objective-domain" is new.
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	
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.	
1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 30 MedBiquitous Competency Framework Specifications, version 1.0, October 3, 2012, page(s) 17-19
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	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. Avoid duplicating learning objectives listed in the "Includes" list. Avoid neglecting to include a learning objective on the "includes" list but documenting it elsewhere in the XML; this will result in an error. 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.
8. Differences from 2021 to 2022	Yes. The learning objective category "program-objective-domain" is new.
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	MedBiquitous Competency Framework Specifications, version 1.0, October 3, 2012, page(s) 19, 31-36 Appendix of this guide: Valid Competency Relationships
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.
6. Relevant business rules	CF07, CF09, CF10, CF11, CF12, CF13, CF14, CF19, CF21, CF23, CF24
7. Common errors and mistakes	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. 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.
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	
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.	
1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 33 Guidebook to Build Your CI, which includes the CI Glossary in the appendix, as well as Chapter 4: Determining Your CI Organizational Strategy
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	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 33 Guidebook to Build Your CI, which includes the CI Glossary in the appendix, as well as Chapter 4: Determining Your CI Organizational Strategy
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.
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)	
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).	
1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 35 Guidebook to Build Your CI, which includes the CI Glossary in the appendix, as well as Chapter 4: Determining Your CI Organizational Strategy
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.
6. Relevant business rules	CS03, CS04, CS05, CS06
7. Common errors and mistakes	The most common errors with this element are • 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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 35 Guidebook to Build Your CI, which includes the CI Glossary in the appendix, as well as 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.
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 in the Guidebook to Build 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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 40 Guidebook to Build Your CI, which includes the CI Glossary in the appendix, as well as 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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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 in the Guidebook to Build Your CI. It is possible to have optional events in a required course/module, and required events in an optional course/module. The Guidebook to Build Your 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, as well as sample organizations for clinical clerkships. 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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 40 Guidebook to Build Your CI, which includes the CI Glossary in the appendix, as well as 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.
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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 40 Guidebook to Build Your 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.
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, using a value other than a positive numeral, including 0, or documenting "minimum" as an element rather than an attribute (see XML sample in section #9 below to illustrate the difference).
8. Differences from 2021 to 2022	No
9. XML sample	An XML sample of Minimum is not embedded in the running XML example 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. (In the MedBiquitous specifications, this can be referred to as a "nested sequence block). This Guide uses only one hypothetical event within one course/module to illustrate the MedBiquitous specifications relevant to the AAMC CI.

However, a brief XML, unrelated to the XML example throughout this Guide, is provided here to emphasize that it is critical to document "minimum" (and "maximum") as attributes rather than elements within the XML file.

WRONG – "Minimum" written in XML as an element

```
<SequenceBlock id="COMM 123" required="Required">
<Minimum>type="1"</Minimum>
<Maximum>type="2"</Maximum>
```

CORRECT – "Minimum" written in XML as an attribute

```
<SequenceBlock id="COMM 123" required="Required" minimum="1"
maximum="2">
```

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	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 40 Guidebook to Build Your 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 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.
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, using a value either than a positive numeral, including 0, or documenting "maximum" as an element rather than an attribute (see XML sample in section #9 below to illustrate the difference).
8. Differences from 2021 to 2022	No
9. XML sample	An XML sample of Maximum is not included in the running XML example 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. (In the MedBiquitous specifications, this can be referred to as a "nested sequence block). This Guide uses only one hypothetical event within one course/module to illustrate the MedBiquitous specifications relevant to the AAMC CI.

However, a brief XML, unrelated to the XML example throughout this Guide, is provided here to emphasize that it is critical to document "maximum" (and "minimum") as attributes rather than elements within the XML file.

WRONG – "Maximum" written in XML as an element

```
<SequenceBlock id="COMM 123" required="Required">
<Minimum>type="1"</Minimum>
<Maximum>type="2"</Maximum>
```

CORRECT – "Maximum" written in XML as an attribute

```
<SequenceBlock id="COMM 123" required="Required" minimum="1"
maximum="2">
```

Element title: Title (of a course/module)	
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.	
1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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.
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

Definitions for these course/module types are provided in the CI Glossary (an appendix in the Guidebook to Build Your CI), as well as 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 Guidebook to Build Your 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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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.
6. Relevant business rules	CS02, CS09, CS16, CS17
7. Common errors and mistakes	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 *before* the StartDate will result in a business rule error. Causes for data quality concerns are: • 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. 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.
8. Differences from 2021 to	No

9. XML sample

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

*Contains new content for 2022

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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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.
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 in the appendix of the Guidebook to Build Your CI.	
1. Other relevant documents	MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, page(s) 41 Guidebook to Build Your CI, which includes the CI Glossary in the appendix, as well as Chapter 5: Course-Level Details for Your CI
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.
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 *not* a clerkship, however, uses the word "clerkship" in the course/module title or description. This may be intentional (e.g., a course/module for "Preparing for Clerkships" which is not designated as clerkship), or variations 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 Guidebook to Build Your 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 in documented in the CompetnecyObjectReference 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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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.
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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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: • 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.
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 *same* 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 Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season, 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.
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.

Section III: Appendices

Appendix A: AAMC CI Codebook

When asked "what is in the AAMC CI?", one could provide this entire Guide as an explanation of the CI's contents. However, the XML described in this Guide may be difficult for some stakeholders to understand. To help schools communicate with their stakeholders, including those interested in performing research using CI data, to understand what data is in the AAMC CI, the following list of data points in more plain language is provided.

- School information
  - Name
  - AAMC Institutional ID
  - MD or DO program
  - Number of years (e.g., 3 or 4) in program
  - Address
- Report information
  - Report ID
  - Report date (i.e., submission date)
  - Start date of report
  - End date of report
  - Language (English)
- Program-level information
  - Narrative description of overall curriculum
  - Program objectives
  - Program objectives' domains (e.g., patient care, professionalism)
- Phases
  - Number of phases
  - Titles of phases
  - Which courses occur in each phase
    - Time (in days, converted to weeks) per phase, based on courses which occur in each phase
- Events
  - Unique ID
  - Title
  - Duration in hours/minutes
  - Start and end dates of events
  - Keywords
  - Learning objectives
  - Resources (e.g., written and visual media, clinical case)
  - Instructional methods (e.g., lecture, team-based learning)
    - Which method is primary
    - Duration in hours/minutes per instructional method
  - Assessment methods (e.g., practical laboratory exam, written or computer-based test)
    - Formative or summative per method
  - Course in which each event occurs
- Courses (including clerkships, modules, blocks, themes, etc.)
  - Unique ID
  - Title
  - Type (e.g., discipline-based, system-based, etc.)
  - Narrative description

    - Learning objectives
    - Duration in days
    - Start and end date
    - Whether course is a clerkship
        - For clerkships, whether it is rotational or longitudinal
    - Organizational structure (i.e., nested course structure, if any, including minimum and maximum courses that are taken)
    - Which events occur in a course
    - Phases in which a course occurs
- Learning objectives
    - Learning objective unique ID
    - Actual text of learning objective
    - Category of learning objective
        - Program objective domains (e.g., patient care, professionalism, etc.)
        - Program objectives
        - Course-level learning objectives
        - Event-level learning objectives
    - Learning objective relationships
        - Relationships from each of schools' program objectives to PCRS competency statements
        - Hierarchical relationships among schools' learning objectives (e.g. 1 program objective has these 5 course-level learning objectives linked to it)

Appendix B: Elements in the MedBiquitous specifications that are edited or new for 2022

The following elements within the MedBiquitous CI specifications have been changed for 2022, and can be explored further within this Guide:

- Description (of the overall curriculum) is now optional (previously was required)
- Instructional method duration (new)
- Phase start and phase end per course/module (new)

The new field for documenting program objectives' domains is new to the AAMC CI, but not specifically described in the MedBiquitous documents. Program objective domain is described fully within this Guide.

Appendix C: Optional elements in the MedBiquitous specifications that AAMC CI does not collect

The following elements within the MedBiquitous CI specifications are **optional** and not used by the AAMC CI, and do not need to be included in schools' uploads to the AAMC CI. The AAMC CI must collect all elements and attributes of the MedBiquitous specifications which are required. The MedBiquitous document to refer to for the below listed elements is: MedBiquitous Curriculum Inventory Specification, DRAFT AAMC Point Release – "v10" for AAMC Curriculum Inventory 2022 Upload Season.

- Supporting link
- Integration
- Elements from other name spaces.
- Educational context
- Profession
- Specialty
- Event description
- Event interprofessional
- Academic level description
- Sequence and Sequence description
- Pre-condition
- Post-condition
- SequenceBlockLevels – scheduling

The following elements are not described within this Guide. However, it is acceptable for schools to use these aspects of the MedBiquitous specifications and include them in their CI submissions to the AAMC:

- From the SequenceBlock attribute Required, "Required in Track" (MedBiquitous CI Specifications, page 40)
- The SequenceBlock attribute "Order" (MedBiquitous CI Specifications, page 40)
- Track (MedBiquitous CI Specifications, page 40)

Appendix D: Complete XML sample from this Guide

The XML below brings together the samples per element and attribute above in this Guide. Recall that this Guide uses 1 curricular event (within 1 course/module, which is within 1 phase) to illustrate each piece of the MedBiquitous specifications and business rules; the XML therefore is a limited example and would not pass business rules (e.g. four academic levels are identified, only one is used in the example). A school's real XML file would contain thousands more lines of text to represent each event, learning objective, and course/module in the curriculum.

Please note that indentions within an XML file (e.g., the element ReportID is indented under the element CurriculumInventory) may help with human readability, but technically are not necessary. An XML file cold include no indentions, which would be technically acceptable.

```
<?xml version="1.0" encoding="UTF-8"?>
<CurriculumInventory
xsi:schemaLocation="http://ns.medbiq.org/curriculuminventory/v10/curriculuminventory.xsd"
xmlns=http://ns.medbiq.org/curriculuminventory/v10/
xmlns:lom=http://ltsc.ieee.org/xsd/LOM
xmlns:a="http://ns.medbiq.org/address/v1/"
xmlns:cf="http://ns.medbiq.org/competencyframework/v1/"
xmlns:co="http://ns.medbiq.org/competencyobject/v1/"
xmlns:hx="http://ns.medbiq.org/lom/extend/v1/" xmlns:m="http://ns.medbiq.org/member/v1/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
   <ReportID>SampleU2022CIVERSION1</ReportID>
          <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>
         <Program>
           <ProgramName>Sample University</ProgramName>
           <ProgramID domain="idd:curriculum.hs.aamc.org:program">M.D.</ProgramID>
          </Program>
          <Title> Sample University School of Medicine 4-year M.D. Program </Title>
          <ReportDate>2022-08-01</ReportDate>
          <ReportingStartDate>2021-07-01</ReportingStartDate>
          <ReportingEndDate>2022-06-30</ReportingEndDate>
          <Language>en-US</Language>
```

<Description>The Sample University School of Medicine provides a 4-year curriculum that vertically and horizontally integrates basic, social, health systems, and clinical sciences. The curriculum is organized is 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. Scheduled time for electives throughout all 4 years allow students to take advantage of the medical school's and university's myriad offerings. 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. We use the AAMC Core EPAs to facilitate assessment of our program objectives. 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 primary instructional approaches include case-based learning, team-based learning, supplemented by independent and problem-based learning, with an eye towards cooperative, team-oriented problem solving. Patient care experiences are distributed at least once every 2 weeks. The primary assessment approaches include formative simulation and written computer-based quizzes, as well as comprehensive written computer-based examinations in each semester. In Phase 2, the primary 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 formats focus on supporting students in their preparation for USMLE examinations, as well as assessments to support students' 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 of the MD curriculum. 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>
   <Events>
    <Event id="E123A">
     <Title>Counseling for behavior change and smoking cessation</Title>
     <EventDuration>PT1H</EventDuration>
     <Keyword hx:source = "AAMC CI Keywords" hx:id = "K002">
      <hx:string>K002: addiction medicine</hx:string>
     </Keyword>
     <Keyword hx:source = "AAMC CI Keywords" hx:id = "K008">
      <hx:string>K008: behavioral sciences</hx:string>
     </Keyword>
     <Keyword hx:source = "AAMC CI Keywords" hx:id = "K086">
      <hx:string>K086: respiratory system</hx:string>
     </Keyword>
     <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>
    <ResourceType>RE005</ResourceType>
    <ResourceType>RE007</ResourceType>
    <ResourceType>RE010</ResourceType>
    <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>
     <AssessmentMethod purpose="Formative">AM010</AssessmentMethod>
      <AssessmentMethod purpose="Formative">AM017</AssessmentMethod>
</Event>
</Events>
<Expectations>
 <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>
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<lom:catalog>URI</lom:catalog>
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</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>
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</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>
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<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"/>
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 <CompetencyFramework>
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 <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>
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 <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>
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</cf:Includes>
<cf:Includes>
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<cf:Entry>SequenceBlockObjectiveID–1A-1</cf:Entry>
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<cf:Includes>
<cf:Catalog>URI</cf:Catalog>
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</cf:Includes>
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<cf:Reference1>
<cf:Catalog>URI</cf:Catalog>
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</cf:Reference1>
<cf:Relationship>http://www.w3.org/2004/02/skos/core#narrower</cf:Relationship>
<cf:Reference2>
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<cf:Entry>ProgramObjectiveID-1</cf:Entry>
</cf:Reference2>
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<cf:Reference1>
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<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>
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</cf:Reference1>
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<cf:Reference2>
<cf:Catalog>URI</cf:Catalog>
<cf:Entry>SequenceBlockObjectiveID-1A-1</cf:Entry>
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<cf:Catalog>URI</cf:Catalog>
<cf:Entry>SequenceBlockObjectiveID-1A-1</cf:Entry>
</cf:Reference1>
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<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>
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<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>
</CompetencyFramework>
</Expectations>
```

```
 <AcademicLevels>
  <LevelsInProgram>4</LevelsInProgram>
  <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>
<Sequence>
  <SequenceBlock id="535" required="Required">
      <Title>Clinical Skills: Health Promotion and Maintenance</Title>
      <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>
      <Timing>
        <Duration>P50D</Duration>
        <Dates>
          <StartDate>2021-09-07</StartDate>
          <EndDate>2021-11-13</EndDate>
        </Dates>
      </Timing>
      <SequenceBlockLevels>
      <StartingAcademicLevel>/CurriculumInventory/AcademicLevels/Level[@number='1']</StartingA
      cademicLevel>
      <EndingAcademicLevel>/CurriculumInventory/AcademicLevels/Level[@number='1']</EndingAca
      demicLevel>
      </SequenceBlockLevels>
      <CompetencyObjectReference>/CurriculumInventory/Expectations/CompetencyObject[lom:lom
      /lom:general/lom:identifier/lom:entry='CourseObjective1']</CompetencyObjectReference>
      <SequenceBlockEvent required="true">
      <EventReference>/CurriculumInventory/Events/Event[@id='E123A']</EventReference>
```

<StartDate>2021-09-30</StartDate>
<EndDate>2021-09-30</EndDate>
</SequenceBlockEvent>
</SequenceBlock>
</Sequence>
</CurriculumInventory>

Appendix E: AAMC CI business rules and errors

Introduction

In this CI Technical User Guide, in the above section "Conformance with the MedBiquitous specifications and business rules," the relationship between the MedBiquitous specifications and the business rules is described. Business rules are in this appendix so that they can all be viewed in one place, but are also distributed throughout this Guide so that each business rule can be considered in the context of the elements or attributes to which is it relevant. The business rules can be thought of as additional requirements to ensure quality. For example, in the MedBiquitous specifications, there are fields for sequence block (e.g., course/module) start and end dates. The business rules stipulate that a course end date cannot occur *before* the start date.

The business rules must be met by a CI XML data file for it to upload successfully and be received by the AAMC. Before a CI XML data file can be checked for compliance with the business rules, the CI XML data file must first comply with the MedBiquitous specifications and be properly formed. (How to check a CI XML data file for compliance with the MedBiquitous specifications is described above in the section "Conformance with the MedBiquitous specifications and business rules" section). Only once a CI XML data file is properly formed, complies with the MedBiquitous specifications, and meets all the business rules, can a school's reports be generated. There are three categories of AAMC CI business rules:

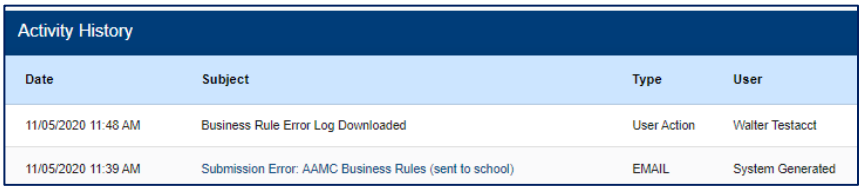
- Core rules (CR)
- Competency Framework (CF) (relates to the MedBiquitous Competency Framework and Object Specifications)
- Curriculum Inventory Structure (CS) (relates to the MedBiquitous Curriculum Inventory Specifications)

If you have used earlier editions of the business rules, you will note that this Guide contains new information around business rules, such as text of error messages, what errors mean in plain language, etc. This new, additional information is intended to facilitate resolving errors in CI data as they occur. You may notice some business rules no longer included – these rules from previous years, such as CR03 or CS13, have been removed because they are not possible to trigger. Because those rules referred to errors in XML according to the MedBiquitous specifications, the XML file would not be allowed to progress to be evaluated for compliance with business rules.

Some business rules have more than one circumstance that can trigger them, so the error message you receive may depend on the specific circumstance within your CI XML file. All possible business rule error messages are provided in the following pages.

Business rules that are new or edited for 2022 are identified with an asterisk (e.g., CF04*).

Business rules errors in the CI Portal

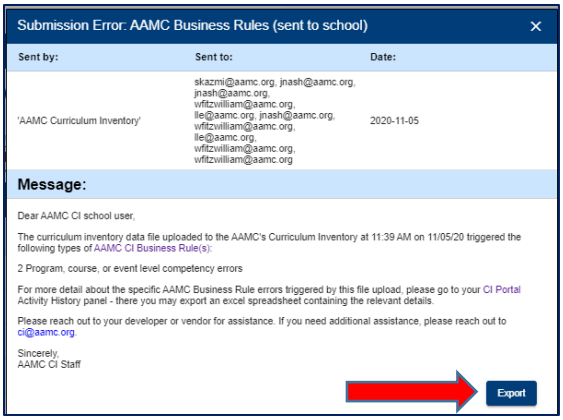


If a CI XML data file triggers one or more Competency Framework (CF) or Curriculum Inventory Structure (CS) business rule errors, an email notification will be sent to the CI primary admin, and the message will appear the Activity History panel on the **Upload** tab, titled, "Submission Error: AAMC Business Rules." A single piece of data in your CI can result in 1 or more errors if it does not meet the business rules. The CI Portal checks your data for all errors each time a CI XML data file is uploaded.

Core rule (CR) errors ***do not*** trigger email notifications because they indicate fundamental flaws in the XML formatting.

The message will show:

1. Which type of error(s) have been triggered. The possible types of business rule errors include (in alphabetical order):
   - Core rules error
   - Learning objective error
   - Learning objective relationship error
   - Course/module error
   - Data length error
   - Event error
   - Phase level error
   - Report ID, year, or report date error



2. An "export" button which downloads an Excel file detailing the business rule error type(s) and description.

Once the issues causing the error(s) are resolved in the CMS, a new CI XML data file can be uploaded to confirm that all business rule errors have been resolved and no additional errors have been introduced.

For more information regarding the business rules functions' in the CI Portal and email notifications, please see the CI Portal User Guide.

Core rules (CR)

Core rules must be met before additional business rules for the competency framework (CF) and the curriculum inventory structure (CS) are evaluated. If it is detected that a submission does not meet a core rule: a) processing of the submission discontinues, and b) an error notification window appears that describes the invalid core rule. CR errors do not trigger email notifications. To see the details of which CR errors were triggered, you can login to the CI Portal, go to your Upload tab, and export the

error details from your Activity History. Some CRs may provide popup messages within the CI Portal if a CR is violated.

Rule ID number	Description	Error message(s)	What does this error mean?
Approved data sender?			
CR01	Data senders must be certified via AAMC's on-boarding process before a Web service will allow them to send data. A data sharing attempt from an uncertified Sender will be rejected. It is not possible to send an error notification for this rule error because, unlike subsequent rules, this rule is evaluated as soon as a Sender attempts to connect to the AAMC Web service.	Unable to validate the sender information. Please contact the AAMC CI Administrator.	Schools may upload their CI data to the AAMC through the CI Portal. However, CI participating vendors and schools with institutionally developed software systems may choose to use a Web Service to share a school's CI data with AAMC. If this error is triggered, it means someone other than a certified sender attempted to send data to the AAMC. Vendors, please remember you must communicate any updates to your IP addresses (or ranges) for the CI Portal annually by June 1.
CR02	Schools must select their data Sender via the CI Portal 'Manage Sender' tab. Before a submission is validated against core rules (CR), the AAMC web service will verify that the Sender (e.g., a vendor) has been selected by the school as their Sender.	You are an unauthorized sender for the provided institution ID. Please contact ci@aamc.org.	In the CI Portal, in the Manage Sender tab, schools select who is going to create their CI XML file, and who is going to send/upload their CI XML file to the AAMC. A school must designate a given vendor as their data sender before the AAMC can accept a CI XML file from a vendor on a given school's behalf.
Institution identified?			
CR04	The <InstitutionID> must match an AAMC institution ID for a school. If the institution ID does not match an AAMC-provided institution ID, the submission is rejected. Please contact ci@aamc.org if you do not know your AAMC institution ID.	The provided institution ID %s does not match an AAMC institution ID.	Each medical school/institution is assigned an institution ID by AAMC. If an ID other than the AAMC-assigned ID is inserted in the <InstitutionID> tag of the CI XML file, an error will result.

Rule ID number	Description	Error message(s)	What does this error mean?
Submission file size below 25MB?			
CR05	A CI XML data file is not allowed to exceed 25 megabytes in size. If the file is greater than 25MB, the submission is rejected. Files with size > 25MB can be compressed/zipped and uploaded. A compressed/zipped file may be larger than 25MB; however, it is extremely unusual for a single zipped CI XML data file to exceed 25MB.	The submission cannot be processed because it exceeds the size limit of 25MBs. Files larger than 25MBs and should be compressed or zipped and uploaded. Please contact ci@aamc.org for more information.	A CI XML file that is greater than 25 megabytes (MB) must be compressed/zipped to be successfully uploaded. The AAMC CI is not able to recommend a zip/compression software program because of differences in computer systems. If you are unsure how to compress or zip a file, please contact your school's IT support for assistance.

Competency Framework (CF) and Competency Object Rules

The following rules are evaluated only once all core rules (CR) have been met. If it is detected that a submission does not meet a competency framework or competency object rule, a) processing of the submission continues to the extent possible and b) upon completion of processing, an error email notification is sent to summarize all CF and CS rule errors. As described in the following rules, program-level-competencies are required. Each program objective must be mapped to one or more PCRS competency statement. To see the details of which CF errors were triggered by a given CI XML file, you can login to the CI Portal, go to your Upload tab, and export the error details from your Activity History.

Rule ID number	Description	Error message(s)	What does this error mean?
<CompetencyObject> tags			
CF01	Within <Expectations>, <CompetencyObject> tags must be used to identify **all competencies except for PCRS** that are in the school's <CurriculumInventory>. An error is generated if an event, sequence block, or program competency URI is referenced within <CurriculumInventory> without the presence of a corresponding <CompetencyObject> tag. <CompetencyObjects> may be	Unable to validate the sender information. Please contact the AAMC CI Administrator.	Each learning objective must be written out. If you get this error, it means that the learning objective's URI is in your XML file, but the actual text for the learning objective is missing from the <CompetencyObject> section of your XML. Each learning objective needs both the URI and learning objective's actual text in your XML file.

	referenced via their URIs by <Includes>, <Relation>, or <CompetencyObjectReference> tags.		
Rule ID number	Description	Error message(s)	What does this error mean?
CF02	Within <Expectations>, <CompetencyObject> tags cannot share the same URI. An error is generated if there are duplicate <CompetencyObject> tags within <Expectations>.	The following URI is used in more than one competency object definition: %s.	Each learning objective needs a URI so it can be referenced by a course/module or event. A learning objective's URI must be unique; URIs cannot be used more than once. If you get this error, it means that a URI has been used more than once to identify a learning objective.
CF03	Within <Expectations>, <CompetencyObject> tags must not be used to identify PCRS competencies. The Curriculum Inventory will automatically integrate PCRS information (e.g., competency description) based on the URI. An error is generated if a <CompetencyObject> tag attempts to use a URI reserved by the PCRS framework.	URI %s identifies a PCRS competency. This URI cannot be used within a competency object definition.	A school's learning objectives need to have their own URIs – those learning objectives cannot use the PCRS identifiers, even if the text of the learning objective is identical to the PCRS learning objective. If you get this error, it means you have used a PCRS URI (identifier) for one of your school's own learning objectives.
CF04*	The level of all <CompetencyObject> tags must be identified using the <Category> sub-element, as in the following example: <co:Category term="program-level-competency"/> Valid terms include: a. program-objective-domain b. program-level-competency c. sequence-block-level-competency d. event-level-competency An error is generated if a <CompetencyObject> does not have a <Category> sub-element with one of the above terms. This is of importance upon evaluation of <Relation> tags. Category terms are case sensitive (e.g., the term 'Event-Level-Competency' is	A category has not been defined for competency object %s. An invalid category %s is specified in competency object %s.	There are four valid hierarchical levels of competency objects: a. program objective domains, b. program objectives, c. course/module learning objectives, and d. event learning objectives. If you get this error, it means at least one learning objective has not been designated with one of the four categories (e.g., program-objective-domain, program-level-competency, sequence-block-level-competency, event-level-competency).

	not recognized as 'event-level-competency').		
Rule ID number	Description	Error message(s)	What does this error mean?
CF05	One or more <CompetencyObject> tags must exist with the "program-level-competency" <category> assigned. An error is generated if a submission does not include one or more program-level competencies.	No competency objects have been categorized as program-level. At least one program-level competency is required.	A school's CI must include program objectives. If you get this error, it means your CI submission is missing your school's program objectives.
CF06	All sequence block-level <CompetencyObject> tags must have a corresponding <CompetencyObjectReference> tag within a <SequenceBlock> tag. An error is generated if a sequence block-level competency object is not referenced by at least one sequence block.	The sequence block-level competency object %s must be referenced by at least one sequence block.	Each course/module learning objective must be referenced by at least one course/module. If you get this error, it means the identified course/module learning objective(s) were not referenced by any courses/modules.
CF17	All event-level <CompetencyObject> tags must have a corresponding <CompetencyObjectReference> tag within an <Event> tag. An error is generated if an event-level competency object is not referenced by at least one event.	The event-level competency object %s must be referenced by at least one event.	Each event learning objectives must be referenced by at least one event. If you get this error, it means that the identified event level learning objective(s) were not referenced by any events.
CF22*	A <CompetencyObject> with a "program-objective-domain" <Category> cannot be referenced in a <CompetencyObjectReference> tag.	Program-objective-domains cannot be referenced. Course %s references program-objective-domain %s Program-objective-domains cannot be	Program objective domains cannot be referenced by curricular content. They can only be related to program objectives. If you get this error, it means that one of your courses or events is referencing the identified program objective domain.

		referenced. Event %s references program-objective-domain %s Program-objective-domains cannot be referenced. Integration Block %s references program-objective-domain %s	
Rule ID number	Description	Error message(s)	What does this error mean?
CF16	The Title sub-element for each <lom> for each <CompetencyObject> should not contain characters outside of the Unicode Latin script and must contain at least one alphabetic character.	The Title sub-element for %s must contain at least one alphabetic character.	Learning objectives' text need to use written words. If you get this error, it means the specified learning objective is missing actual words (e.g., it is blank, it uses numbers instead of words, etc.).
CF18	The identifier and catalog sub-element for each <lom> must be defined for each <CompetencyObject>. An error is generated if no URI is provided for the competency object, or the URI catalog is not declared as <lom:catalog>URI</lom:catalog>.	You need to provide an identifier (URI) for the following competency so it can be referenced and related in your submission: %s	Learning objective identifiers need to be indicated as unique identifiers. URI is the sort of identifier used in the CI, and it's defined as a type of catalog. If you get this error, it means the named competency object didn't get its unique identity marked with <lom:catalog>URI</lom:catalog> exactly. See appendix for examples.
CF20*	The <Title> of a <CompetencyObject> with a "program-objective-domain" <Category> must be greater than 5 characters in length, and less than 200 characters in length.	Program-objective-domain %s must be greater than 5 characters in length.	If you get this error, it means the specified program objective domain is outside the accepted character counts for program objective domains.

		Program-objective-domain %s must be less than 200 characters in length.	
Rule ID number	Description	Error message(s)	What does this error mean?
CF16	The Title sub-element for each <lom> for each <CompetencyObject> should not contain characters outside of the Unicode Latin script and must contain at least one alphabetic character.	The Title sub-element for %s must contain at least one alphabetic character.	Learning objectives' text need to use written words. If you get this error, it means the specified learning objective is missing actual words (e.g., it is blank, it uses numbers instead of words, etc.).
<Includes> Tags			
CF07*	<Includes> tags should contain any competency – including PCRS, program-objective-domain, program-level, sequence block-level, and event-level competencies – that is subsequently used in a <Relation> tag. An error is generated if a <Relation> tag refers to a competency URI that does not have a corresponding <Includes> tag.	Competency object %s is referenced in a 'Relation' tag but was not referenced in a corresponding 'Includes' tag.	Each learning objective that has a relationship to at least one other learning objective must be included in the competency framework. If you get this error, it means the identified learning objective has a relationship with another learning objective but was not identified for inclusion within the competency framework.
CF08	The same URI cannot be present in two or more <Includes> tags. An error is generated if a duplicate URI is identified in <Includes> tags.	Competency object %s is referenced by more than one 'Includes' tag.	Each learning objective's URI (unique ID) must be listed in the "Includes" portion of the competency framework only once. If you get this error, it means the same learning objective URI has been listed in the "Includes" portion of the competency framework more than once.
<Relation> Tags			
CF09*	<CompetencyFramework> relationships that map program-level, sequence block-level, and event-level competency pairs must be specified in a <Relation> tag using either the #broader or #narrower relationship. Valid	Invalid relationship. %s cannot be #broader than %s.	Learning objective relationships must be documented in a hierarchical order – program objective domains contain program objectives, program objectives contain course/module objectives (i.e., sequence blocks), which contain event objectives. The direction of the relationship (e.g., program

	relationships are described by the relationship tables in the appendix of this guide. An error is generated if a relationship of the type is not specified in conformance with the relationship tables.	Invalid relationship. %s cannot be #narrower than %s.	objective is hierarchically superior to course/module objective), is communicated using the concepts of "broader" and "narrower" in the MedBiquitous competency framework specifications. If you get this error, it means that broader relationship has been used when narrower relationship was expected, or vice versa.
Rule ID number	Description	Error message(s)	What does this error mean?
CF10	All program-level competencies must be mapped to one or more PCRS competency statements. An error is generated if a program-level competency does not have a corresponding <Relation> tag that relates it to a PCRS URI.	The program-level competency object %s does not have a corresponding 'Relation' tag	Each program level learning objective must be related to at least one PCRS competency statement. If you get this error, it means that you have at least one program objective that is missing its relation to a PCRS competency statement.
CF21*	Each <CompetencyObject> with a “program-objective-domain” <Category> must have a valid <Relation> to at least one <CompetencyObject> with a “program-level-competency” <Category>.	Program-objective-domain %s must have a valid relationship with a program-level-competency object	Each program objective domain must be related to one or more program objective. If you get this error, it means the identified program objective domain has not been related to even one program objective.
CF19*	A <Relation> containing a <CompetencyObject> with a “program-objective-domain” <Category> must also include a <CompetencyObject> with a “program-level-competency” <Category> using either the #broader or #narrower relationship, depending on how the competency relationship is structured. See appendix of this guide.	Program-objective-domain %s may not have a relationship with the sequence block-level competency %s. Program-objective-domain %s may not have a relationship with the	Program objective domains may only be related to program objectives. If you get this error, it means the identified program objective domain has a relationship with the identified competency object which is not a program objective.

		event-level competency %s. Program-objective-domain %s may not have a relationship with the program-objective-domain %s. Program-objective-domain %s may not have a relationship with the PCRS %s.	
Rule ID number	Description	Error message(s)	What does this error mean?
CF11	Program-level competencies may not be mapped to domain-level PCRS (e.g., 1.00 - 'Patient Care'); they must be mapped to PCRS such as 1.07 - 'Develop and carry out patient management plans'). An error is generated if a program-level competency attempts to map to a domain-level PCRS URI.	Invalid relationship. The program-level competency object %s may not be related to a domain-level PCRS.	The PCRS contains 8 domains, and within those 8 domains, dozens of competency statements. Each school program objective must be related to at least one individual PCRS competency statement and cannot be related to any PCRS domains. This error means at least one program objective is related to a PCRS domain (e.g., 1.00 - Patient Care).
CF12	Mapping of program-level competencies to PCRS must be specified in <Relation> tags using a #related relationship. An error is generated if a <Relation> tag that includes a PCRS URI uses a #broader or #narrower relationship.	Invalid relationship. The relationship between program-level competency %s and PCRS %s cannot be #broader or #narrower.	There are three competency relationship types, broader, narrower, and related. PCRS may only have the *related* relationship and may only have the related relationship with program level learning objectives. If you get this error, it means the PCRS have been assigned a broader or narrower relationship with the program-level learning objective, instead of a related relationship.

CF23*	A program-objective-domain cannot be narrower than a program-level-competency.	Invalid relationship. Program-objective-domain %s cannot be #narrower than program-level-competency %s.	In each relationship among two learning objectives, one is listed first, and one is listed second. If the program objective is listed first, and the program objective domain is listed second, the only relationship that can be used is broader. If you get this error, it means that the identified program objective domains were documented as being narrower than the identified program objectives.
Rule ID number	Description	Error message(s)	What does this error mean?
CF24*	A program-level-competency cannot be broader than a program-objective-domain.	Invalid relationship. Program-level-competency %s cannot be #broader than program-objective-domain %s.	In each relationship among two learning objectives, one is listed first, and one is listed second. If the program objective domain is listed first, and the program objective is listed second, the only relationship that can be used is narrower. If you get this error, it means that the identified program objectives were documented as being broader than the identified program objective domains.
CF13	Mapping of sequence block-level or event-level competencies directly to PCRS is not allowed. They must be mapped through program-level competencies. An error is generated if a <Relation> tag includes a PCRS URI #related <Relationship> with any competency other than a program-level competency.	Invalid relationship. %s cannot be #related to %s. A #related relationship must reference a PCRS and a program-level competency.	PCRS competency statements cannot be linked to course/module or event level learning objectives. If you get this error, it means that there is a relationship between a PCRS competency statement and a course/module or event level learning objective.
CF14	Relationships must not result in circular references as described in the 'Note about Hierarchical Conflict' section (pp. 33-36) of the Competency Framework Specification, version 1.0. An error is generated if a circular reference between competencies is detected.	A hierarchical conflict exists in the competency framework due to a circular reference among multiple 'Relation' tags, as follows: %S	The MedBiquitous competency framework must be considered as a logical structure - program objectives contain course/module objectives, which contain event objectives. For example, if A is over B and B is over C, then C cannot be over A. If you get this error, it means that there is an illogical relationship among two or more learning objectives.

		%s and %s are referenced in two conflicting relationships (one #broader and one #narrower).	
Rule ID number	Description	Error message(s)	What does this error mean?
CF15	Several sub-elements and attributes of the CompetencyFramework or CompetencyObject elements are restricted in text length. The maximum allowable field lengths are summarized below. An error is generated if any field exceeds its maximum allowable length. Please note that this field size restriction relates to English characters; if any foreign characters are in the text, allowable characters size might reduce.	The following text contained in the CompetencyFramework or in a CompetencyObject tag exceeds the maximum allowable field length of %s : %s.	Each field (e.g., learning objective, course/module title, etc.) in a CI submission has a maximum character count. The maximum character counts vary by field. If you get this error, the business rule error message will specify which text has exceeded the maximum number of characters allowed for that field. Please note that spaces are counted within the maximum character count limits.

Parent Element	Sub-element or Attribute	Max Length
CompetencyFramework	Lom:General:Title	1500
	Lom:General:Description	1500
CompetencyObject	Lom:Entry (i.e., URI)	1500
	Lom:Title	1500
	Lom:Description	1500

Curriculum Inventory Structure (CS) Rules

The following rules are evaluated only once all core rules (CR) 2 have been met. If it is detected that a submission does not meet a curriculum inventory structure (CS) rule, a) processing of the submission continues to the extent possible and b) upon completion of processing an error notification is sent via email that summarizes all CS and CF rule errors. To see the details of which CS errors were triggered by a given CI XML file, you can login to the CI Portal, go to your Upload tab, and export the error details from your Activity History.

Rule ID number	Description	Error message(s)	What does this error mean?
<CurriculumInventory> Tag			

CS01	The <ReportID> sub-element must be unique for each of a school's submissions and may only use alphanumeric characters (i.e., no punctuation or symbols). An error is generated if a school's submission uses the same <ReportID> as one of its prior submissions or uses invalid characters in the <ReportID>.	Report ID %s includes invalid characters. Only alphanumeric characters are allowed (i.e., no punctuation). Report ID %s matches the ID of a previous submission for institution ID %s.	Each CI XMl file includes a <ReportID> that is supplied by the data sender (school or vendor). If you get this error, it means that the CI XML data file uploaded to the AAMC re-used a previously used <ReportID> or that the <ReportID> used characters other than letters or numbers.
Rule ID number	Description	Error message(s)	What does this error mean?
CS02	Submissions are checked to ensure they contain information for only the previous academic year (AY). Schools must submit data with <ReportingStartDate> and <ReportingEndDate> in between July 1 (of the previous year) and June 30 (of the current year). For example, in a submission for AY 2022, it would be an error if the reporting start date is before July 1, 2021. An error is generated if the <ReportingStartDate> does not precede the <ReportingEndDate>. Dates at the sequence block or event level are not checked to ensure they are within the previous academic year. Dates specified at these levels that fall within 8 years of the date range for a previous academic year will not cause an error or rejection.	The reporting end date is not within acceptable date limits. The reporting end date precedes or matches the reporting start date. The reporting start date is not within acceptable date limits.	The CI XML data file includes fields for <ReportingStartDate> and <ReportingEndDate>. The reporting dates must be within the span of July 1 of the previous year and June 30 of the current year, and the start date must precede the end date.
<AcademicLevels> Tag			
CS03	The number of academic levels, or phases, are defined by <LevelsInProgram> and each academic level is defined as a <Level> within the <AcademicLevels> tag. An error is generated if there is a mismatch between	The number in 'LevelsInProgram' tag does not correspond with the number of levels defined in 'Level' tags.	In a CI XML file, a school indicates how many phases (i.e., academic levels) their curriculum includes. If you get this error, the number you indicated in <LevelsInProgram> was not the same as the number of phases indicated with <Level> tags.

	<LevelsInProgram> and the number of <Level> tags.		
Rule ID number	Description	Error message(s)	What does this error mean?
CS04	A <Level> that is not defined within the <AcademicLevels> tag cannot be referenced by a sequence block. An error is generated if a <SequenceBlock> attempts to refer to an undefined academic level.	The level ID %s referenced by sequence block ID %s does not have a corresponding 'Level' tag. The Ending Academic level ID %s referenced by sequence block ID %s does not have a corresponding 'Level' tag. The Starting Academic level ID %s referenced by sequence block ID %s does not have a corresponding 'Level' tag.	In your CI XML file, you must define your phases (i.e., academic levels) before you reference them by course/modules (i.e., sequence blocks). If you get this error, it means that the identified course/module(s) references a phase which was not listed in the <AcademicLevels> section of your XML.
CS05	<Level> sub-elements of the <AcademicLevels> tag must have sequential numbers (i.e., the *number* attribute) starting with 1. An error results if a submission has academic levels that are not sequential or does not start with 1. An error is also generated if a submission has academic levels with duplicate level ID values.	The level ID %s is used to identify more than one 'level' tag definition. The 'Level' tags should be in sequence starting with 1. A skip in the sequence or irregular sequence of 'Level' tags is not allowed. They may continue up to 10. The sequence of 'level' tags should begin with 1.	Phases must be identified as happening sequentially, i.e. 1, 2, 3, 4, and the list must start at 1. If you get this error, either the phases did not start at 1, and/or that the phase numbers are not in sequential order.

CS06	Each academic level must be referenced by at least one sequence block. An error is generated if a <Level> tag is not referenced by at least one <SequenceBlock> tag.	At least one sequence block must reference the level ID %s.	Each phase (i.e., academic level) must have at least one course/module (i.e., sequence block) in it. If you get this error you have indicated a phase as part of your curriculum without populating it with any course/modules.
Rule ID number	Description	Error message(s)	What does this error mean?
CS25*	Each <SequenceBlock> must include a <StartingAcademicLevel> that precedes its <EndingAcademicLevel>. A business rule error is generated if the <StartingAcademicLevel> occurs after the <EndingAcademicLevel>.	The Starting Academic Level for Sequence %s must precede or be equal to the Ending Academic Level.	Each course/module must document in which phase of the curriculum it begins and end (required in the MedBiquitous CI Specifications). The majority of course/modules may begin and end in the same phase (e.g., begins in Phase 1, ends in Phase 1), but this element allows schools to model longitudinal courses which cross over more than one phase. If you get this error, it means that a given phase start (e.g., phase 2) occurs before the phase end (e.g., 1).
<SequenceBlock> Tag			
CS07	<SequenceBlock> tags must have unique identifiers (i.e., the id attribute). An error is generated if a <SequenceBlock> identifier is duplicated.	The sequence block ID %s is used to identify more than one sequence block definition.	Each course/module needs a unique identification code so it can be meaningfully integrated into the curricular structure. If you get this error, it means that a course/module unique ID was applied to more than one course/module, instead of using a unique ID code for each course/module.
CS17	The <Timing> sub-element of all <SequenceBlocks> tags must specify a <Dates> element. The <StartDate> must precede the <EndDate>. An error is generated if the start date and end date are not specified for a sequence block, or if the <StartDate> does not precede the <EndDate>.	The 'Dates' tag is not specified in the sequence block %s. The end date of %s precedes the start date.	Course/modules must have start and end dates, and the start date of a course/module must be before the course/module's end date. If you get this error, it means that either a start or end date for a course/module are missing, or a start date was incorrectly entered as occurring after the end date.
CS09	The <Timing> sub-element of <SequenceBlocks> tags with a *ClerkshipModel* attribute must specify <Dates> **and** <Duration>. An error is generated if the duration, start date, and end date is not specified for a sequence block.	The 'Dates' and 'Duration' tags are not both specified in the identified sequence block(s) %s.	Course/modules that are designated as clerkships must have a duration in days as well as a start and end date. If you get this error, it means that the clerkships indicated in the error are missing their dates and/or duration.

CS20	The <StartDate> and <EndDate> sub-elements of <Dates>, a sub-element of <Timing>, must be no earlier or later than 8 calendar years before or after the <ReportingStartDate> and <ReportingEndDate>.	The start date for sequence block: %s must be no earlier or later than 8 years before or after the reporting end date. The start date for sequence block: %s must be no earlier or later than 8 years before or after the reporting start date.	Your CI XML data file will have a reporting start and end date. All curriculum experiences within the CI XML data file, including course/modules and events, must occur within 8 years of your CI XML data file's reporting start date and reporting end date.
Rule ID number	Description	Error message(s)	What does this error mean?
CS21	The <StartDate> and <EndDate> sub-elements of <SequenceBlockEvent>, a sub-element of <SequenceBlock>, must be no earlier or later than 8 calendar years before or after the <ReportingStartDate> and <ReportingEndDate>.	The end date in sequence block event %s referred in sequence block: %s must be no earlier or later than 8 years before or after the reporting start date. The start date in sequence block event %s referred in sequence block: %s must be no earlier or later than 8 years before or after the reporting start date.	Your CI XML data file will have a reporting start start and reporting end date. All course/modules and events must occur within 8 years of your CI XML data file's reporting start date and reporting end date.
CS16	If it is provided, the duration of a sequence block must be specified as a number of days. An error is generated if the <Duration> (sub-element of <Timing>) for a sequence block includes any units of time other	A unit other than days is used to specify duration in sequence block ID %s.	Course/module durations need to be specified in days, not other units of time (such as weeks or months). If you get this error, it means a unit other than days was used to document duration for a course/module.

	than days. As described in rule CS09, duration is required for clerkship sequence blocks.		
Rule ID number	Description	Error message(s)	What does this error mean?
CS10	When nesting sequence blocks, <SequenceBlockReference> must not result in circular references. An error is generated if a circular reference between sequence blocks is detected.	A hierarchical conflict exists in the curriculum structure due to circular references among sequence blocks, as follows: %s	Curricular structures must make logical sense - a 'parent' course/module may contain a 'child' course/module, but that 'child' course/module cannot then contain the 'parent' course/module.
CS24	A Sequence Block ID that is not defined by a corresponding <SequenceBlock> tag cannot be referenced by a sequence block. An error is generated if a <SequenceBlockReference> attempts to refer to an undefined sequence block.	Sequence %s referenced by sequence block %s does not have a corresponding 'Sequence' tag.	In your CI XML file, you must define your course/modules (i.e., sequence blocks) before you reference them as nested course/modules (i.e., sequence blocks). If you get this error, it means that the referenced course/module ID was not listed in the <SequenceBlock> section of your XML.
<Event> Tag			
CS11	<Event> tags must have unique identifiers (i.e., the id attribute). An error is generated if an <Event> identifier is duplicated.	The event ID %s is used to identify more than one event definition.	Each event needs to be uniquely identified so it can be referenced by a course/module. If you get this error, it means an event ID code has been used for more than one event.
CS15	All <Event> tags must be referenced by at least one <SequenceBlockEvent> tag within a <SequenceBlock>. An error is generated if an <Event> is not referenced by one or more <SequenceBlock>.	Event %s is not referenced by any sequence block.	Events must be within a course/module. If you get this error, it means one or more events in your CI have not been assigned to a course/module.
CS18	An Event ID that is not defined by a corresponding <Event> tag cannot be referenced by a sequence block. An error is generated if a <SequenceBlock> attempts to refer to an undefined event.	Event %s referenced by sequence block %s does not have a corresponding 'Event' tag.	Course/modules cannot refer to events that do not exist in the CI XML file. If you get this error, it means that either the course/module identifier needs to be changed to one that exists in the CI XML data file, or the event needs to be documented before it can be referenced by a course/module.
CS12	Within <Event> tags, the <ResourceType>,	The %s specified in event ID %s is	Events may only use the standardized identifiers and their associated definitions

	<InstructionalMethod>, and <AssessmentMethod> tags must reference a unique ID from the CI Standardized Vocabulary available in the appendix of the Guidebook to Build a CI. This includes unique identification codes (i.e., UIDs) for each instructional and assessment method, and resource. An error is generated if a <ResourceType> does not match the unique ID of a resource, an <InstructionalMethod> does not match the unique ID of an instructional method, or an <AssessmentMethod> does not match the unique ID of an assessment method.	not a valid assessment method UID. The %s specified in event ID %s is not a valid instructional method UID. The %s specified in event ID %s is not a valid resource type UID.	to indicate their resources, instructional methods, and assessment methods. The CI Standardized Vocabulary is available in the appendix of the Guidebook to Build a CI. If you get this error, it means your CI XML has either used a word (e.g., lecture) instead of the unique ID code for the method or resource (e.g., IM013), or has used a code incorrectly.
Rule ID number	Description	Error message(s)	What does this error mean?
CS14	If one or more <InstructionalMethod> tags are provided, one and only one must be denoted as the primary. An error is generated if two or more <InstructionalMethod> tags are marked as primary.	More than one primary instructional method is specified in event ID %s. No primary instructional method is specified in event ID %s.	Each session (aka event) may have multiple instructional methods, but only one instructional method must be listed as the primary instructional method. If you get this error, it means either no instructional method was identified as primary, or more than one instructional method was identified as primary.
CS27*	The total amount of instructional method duration for an event cannot exceed the EventDuration for that event.	Event %s duration value, %s has been exceeded by the total instructional method duration for this event.	When instructional method(s) are tagged within events, a new attribute for instructional method duration allows time in hours and/or minutes to be assigned per instructional method. For example, perhaps in a 2-hour event, 1 hour is spent in lecture, and 1 hour is spent in demonstration. If you get this error, the total time for all instructional method(s) for a given event exceeds the total possible time for the event.
CS19*	Several sub-elements and attributes of the	The %s of %s exceeds the	Many of the fields in the CI standards have character count limitations. If you get this

	CurriculumInventory, Institution, SequenceBlock and other elements in the curriculum structure are restricted in text length. The maximum allowable field lengths are summarized below. An error is generated if any field exceeds its maximum allowable length. Please note that this field size restriction is for English characters; if any foreign characters are in the text, allowable characters size might reduce.	maximum allowable field length of %s.	error, one or more of the fields in the CI XML data file has exceeded the allowable character count. The error message will include which text has triggered the error, and the maximum allowable length for that given element or attribute. Please note that spaces are counted within the maximum character count limits.

Parent Element	Sub-element or Attribute	Max Length
CurriculumInventory	ReportID	100
	Title	4000
	ReportDate	100
	ReportingStartDate	100
	ReportingEndDate	100
	Language	100
	Description	4000
	SupportingLink	2048
Institution	InstitutionName	4000
	Address:Organization	500
	Address:StreetAddressLine	200
	Address:City	100
	Address:StateOrProvince	100
	Address:PostalCode	40
	Address:Region	100
	Address:District	100
	CountryName	50
	CountryCode	15
	AddressCategory	15
Program	ProgramID	200
	ProgramName	4000
	EducationalContext	4000
	Profession	500
	Speciality	500
Parent Element	Sub-element or Attribute	Max Length
Event	ID	30
	Title	2000
	EventDuration	15

	Description	4000	
	Keyword	4000	
Level	Label	50	
	Description	4000	
Sequence	Description	4000	
SequenceBlock	ID	15	
	Title	2000	
	Description	4000	
	Minimum	3	
	Maximum	3	
	Timing:Dates:StartDate	100	
	Timing:Dates:EndDate	100	
	Precondition	4000	
	Postcondition	4000	
	SequenceBlockReference:Order	3	
SequenceBlockEvent	StartDate	100	
	EndDate	100	
Integration	Description	4000	
IntegrationBlock	ID	15	
	Title	4000	
	Description	4000	

Appendix F: Valid competency relationships

Earlier in this Guide, in the element "Relation," information regarding different kinds of relationships among learning objectives allowable in the XML were described. Recall that competency relationships are defined within the <CompetencyFramework> tag using a <Relation> tag. In the MedBiquitous Competency Framework, there are three types of relationships which may be expressed in the "Relation" section of the CI XML file:

1. related ("is related to concept")
2. narrower (or "has narrower concept")
3. broader (or "has broader concept")

Related relationships

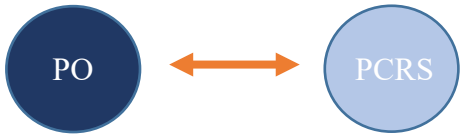
When documenting the **relationships between your school's program objectives and individual PCRS competency statements** in the "Relation" portion of your CI XML, the only type of relationship that can be used is *related*. If any other type of relationship (e.g., narrower, broader) is used to for school's program objectives and the PCRS, an error will occur. At least one relationship between each of your school's program objectives and the PCRS is required.

Where to use the "**related**" relationship tag among my CI's learning objectives?

	PCRS domains (e.g., 1.00 Patient Care)	PCRS competency statements	Program objective domains	Program objectives (i.e., program-level -competency)	Course/module objectives (i.e., sequence-block-level-competency)	Event objectives (i.e., event-level-competency)
PCRS domains (e.g., 1.00 Patient Care)	X	X	X	X	X	X
PCRS competency statements	X	X	X	✓	X	X
Program objective domains	X	X	X	X	X	X
Program objectives (i.e., program-level -competency)	X	✓	X	X	X	X
Course/module objectives (i.e., sequence-block-level-competency)	X	X	X	X	X	X
Event objectives (i.e., event-level-competency)	X	X	X	X	X	X

For the purposes of your XML, stating that a given program objective (PO) is related to a given PCRS means the same thing as stating that a given PCRS is related to a given program objective. For example, the following two examples of 'related' relationships are logically equivalent:

<PO> skos:related <PCRS> → where <PCRS> is related to <PO>
<PCRS> skos:related <PO> → where <PO> is related to <PCRS>



Whether your XML is organized such that your program objectives or the PCRS competency statements come first in each listing of the "Relation" element in your XML may depend on your software and how the developers chose to organize your curricular content. From an AAMC CI data standpoint, either approach is acceptable.

Narrower and broader relationships

For school's learning objectives relationships among each other (e.g., this 1 program objective has these 5 course/module learning objectives linked underneath it, the narrower or broader relationships can be

used. Remember that there are three relationships among your school's learning objectives to document:

- Project objective domain > Program objective
- Program objective > Course/module objective
- Course/module objective > Event objective

In math, documenting 2 < 5 means the same thing as 5 > 2. From an XML perspective, you can document in either direction (narrower, or broader). It is recommended to choose one consistent approach to ease human readability and evaluation. Continuing the hypothetical example in this Guide, your XML could reflect:

1. The program objective domain Patient care contains a *narrower* concept, and it is the program objective Educate and counsel patients to maintain and improve health and prevent disease, OR
2. The program objective Educate and counsel patients to maintain and improve health and prevent disease contains a *broader* concept, and it is the program objective domain Patient Care.

Here are two shorthand examples of hierarchical relationships among your learning objectives:

<A> skos:narrower <A> → <A> has a narrower concept than <B>

<B> skos:broader <A> → <B> has a broader concept than <A>

These tables and diagrams below depict relationships between competencies.

✓ indicates a valid relationship per the CI profile of the MedBiquitous CI standard.

X indicates an invalid relationship. An error is generated if an invalid relationship is detected, as described above in the '<Relation> Tags' section.

Where to use the "**narrower**" relationship tag among my CI's learning objectives?						
B / A	PCRS domains (e.g., 1.00 Patient Care)	PCRS competency statements	Program objective domains	Program objectives (i.e., program-level -competency)	Course/module objectives (i.e., sequence-block-level-competency)	Event objectives (i.e., event-level-competency)
PCRS domains (e.g., 1.00 Patient Care)	X	X	X	X	X	X
PCRS competency statements	X	X	X	X	X	X
Program objective domains	X	X	X	✓	X	X
Program objectives (i.e., program-level -competency)	X	X	X		✓	X
Course/module objectives (i.e., sequence-block-level-competency)	X	X	X	X	✓ (for nested course/modules)	✓
Event objectives (i.e., event-level-competency)	X	X	X	X	X	

Where to use the "**broader**" relationship tag among my CI's learning objectives?						
B A	PCRS domains (e.g., 1.00 Patient Care)	PCRS competency statements	Program objective domains	Program objectives (i.e., program-level - competency)	Course/module objectives (i.e., sequence-block-level-competency)	Event objectives (i.e., event-level-competency)
PCRS domains (e.g., 1.00 Patient Care)	X	X	X	X	X	X
PCRS competency statements	X	X	X	X	X	X
Program objective domains	X	X	X	X	X	X
Program objectives (i.e., program-level -competency)	X	X	✓		X	X
Course/module objectives (i.e., sequence-block-level-competency)	X	X	X	✓	✓ (for nested course/modules)	X
Event objectives (i.e., event-level-competency)	X	X	X	X	✓	

Appendix G: XML validator tools

XML validators are components of programs and XML composition tools that examine the XML file syntax for correct and expected composition. An example of a free XML modification tool with a validator is Notepad++ with the XML Tools plugin enabled. This is not the only solution, but one which has worked reliably. As with any software, ensure the installation and usage are within the guidelines established by your institution.

Note: XML validation will not ensure that the XML submission meets AAMC's business rules, only that a submission upload attempt can be made.

1. Notepad++ version 7.9.5 has been confirmed to be successful for CI XML validation purposes. It may be that other, later versions of Notepad++ may also be successful. Notepad++ may downloaded from the following site: https://notepad-plus-plus.org/downloads/
2. Once downloaded, begin the installation process, ensuring that the Plug-in Admin will be included in the installation.
3. Run Notepad++.
4. Under the Plugins dropdown menu, select Plugins Admin… and from the Available tab of the Plugin Admin pop-up window, check the XML Tools Plugin.
5. Click "Install" and then "Yes" to allow the installation of the XML Tools Plugin and the restarting of Notepad++.
6. Once Notepad++ has restarted, open an XML file, and select the Plugins dropdown, the XML Tools menu option, and finally "Validate now". The validation process will run and report an error it encounters or affirm a valid file. Each reported error will need to be corrected, or the file will not successfully upload to the AAMC CI.

Other XML Validator Tools

- Microsoft Visual Studio – requires additional plugins including XML Tools and XML Language Support
- xmlvalidation.com – free to use but may have limits to file sizes

Appendix H: Use of a Web service

CI participating vendors may choose to offer a Web service for their clients to share CI data more easily with the AAMC. More about the use of a Web service is described in the CI Portal User Guide. Please note that CI participating vendors must share updates to their IP address by June 1 annually to be included in the CI data upload beginning August 1.

SOAP UI is an application that enables users to connect to a Web service and submit a file to the service. Installation, configuration, and the file submission procedure are described below.

Installation instructions

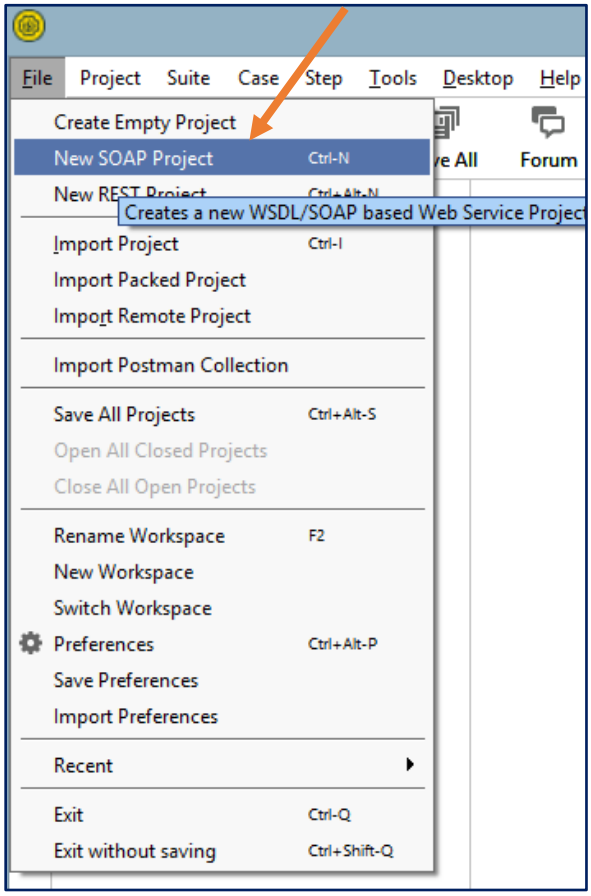
1. Download SOAP UI from the following link: https://www.soapui.org/downloads/soapui/source-forge.html
2. Follow installation instructions available at: http://www.soapui.org/Getting-Started/installing-on-windows.html
3. Once installation is completed, follow the instructions provided in the 'Configuring SOAP UI for CI Web Service' section below.

Configuring SOAP UI for CI Web Service

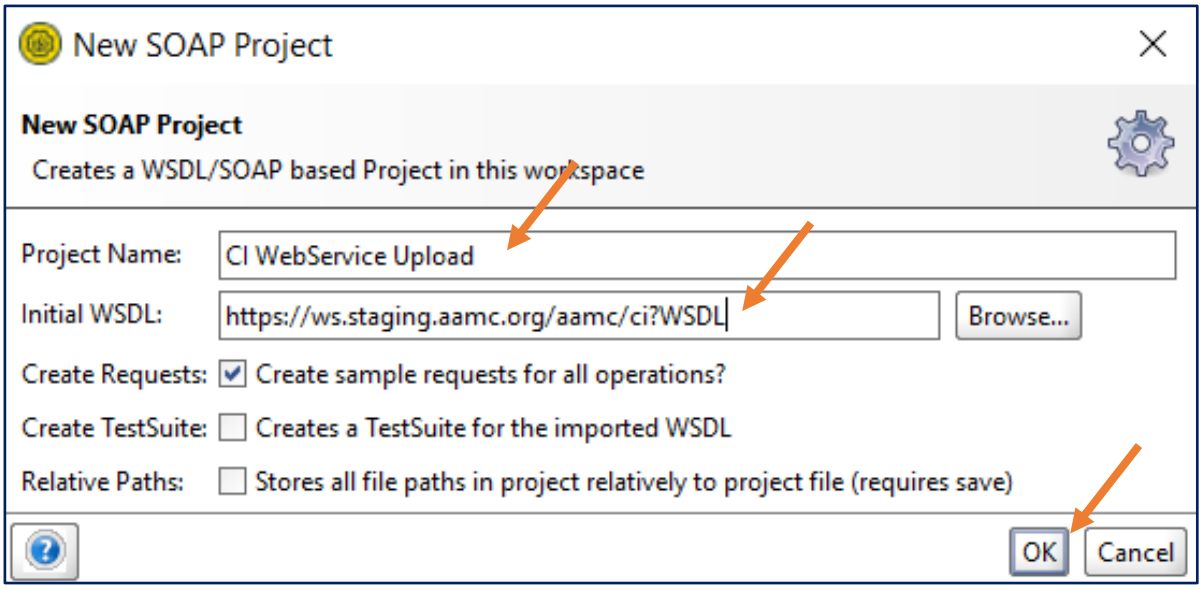
First time users should follow steps in the 'New Project Configuration and File Submission' section. If Soap UI is already installed and configured, then follow steps in the 'File Submission' section. Separate projects will need to be prepared for upload a CI XML data file in the CI Portal.

New Project Configuration and Submission

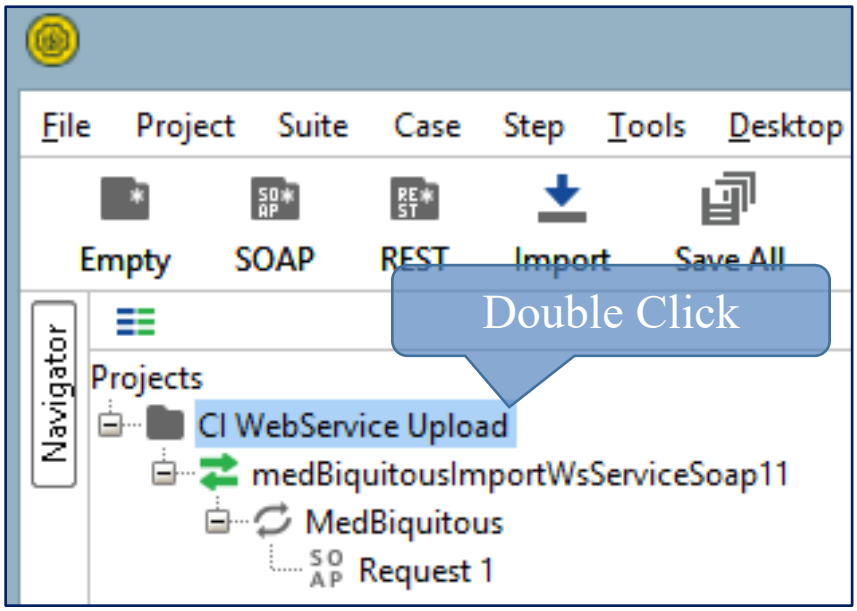
1. Create a project.



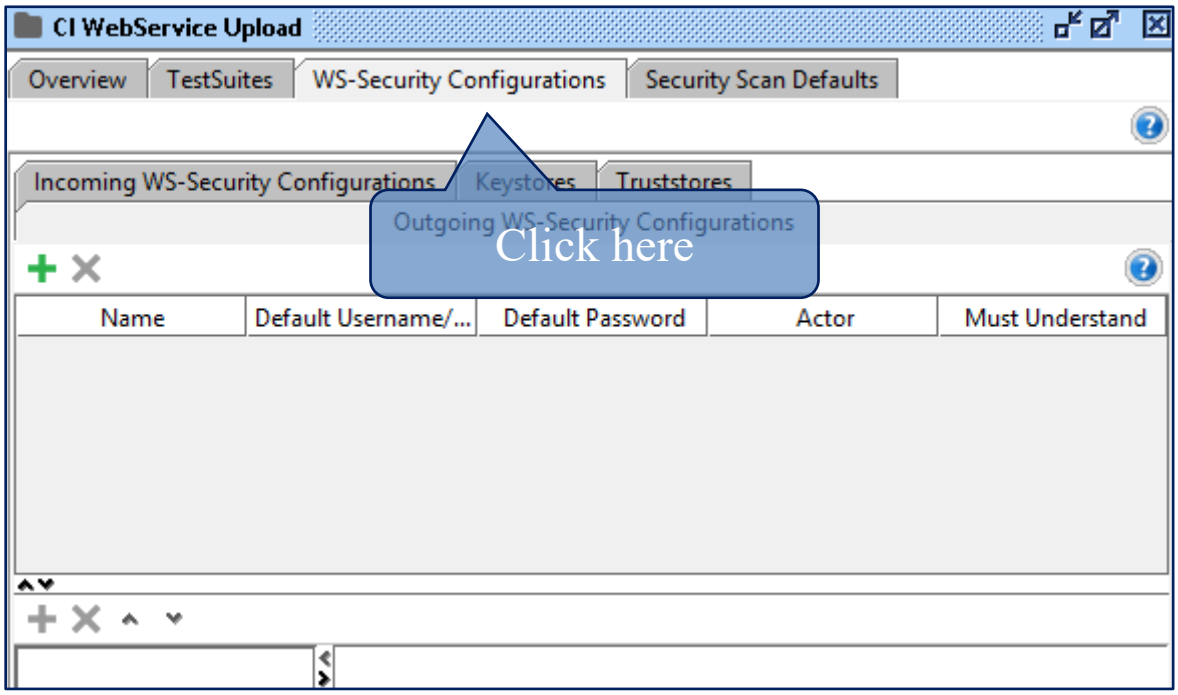
2. Enter the following information:
    a. Project name: CI Web Service Upload (suggested project name)
    b. Initial WSDL/WADL for CI Portal: https://ws.aamc.org/aamc/ci?WSDL OR



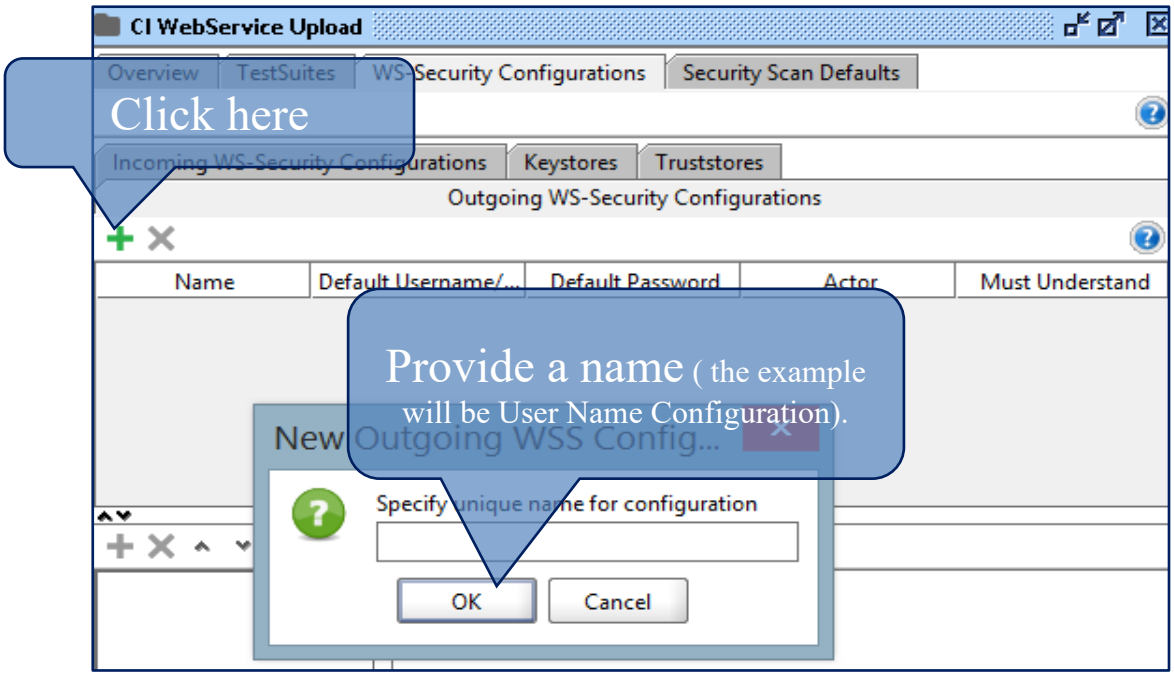
3. Enter the Project menus.



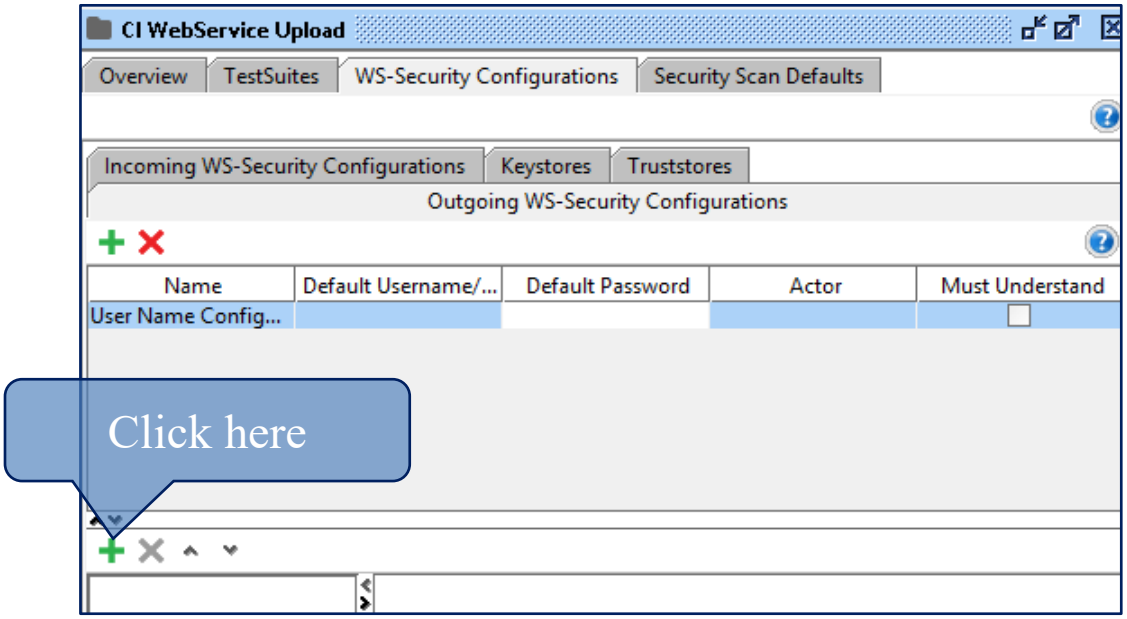
4. Enter the WS-Security Configuration tab.



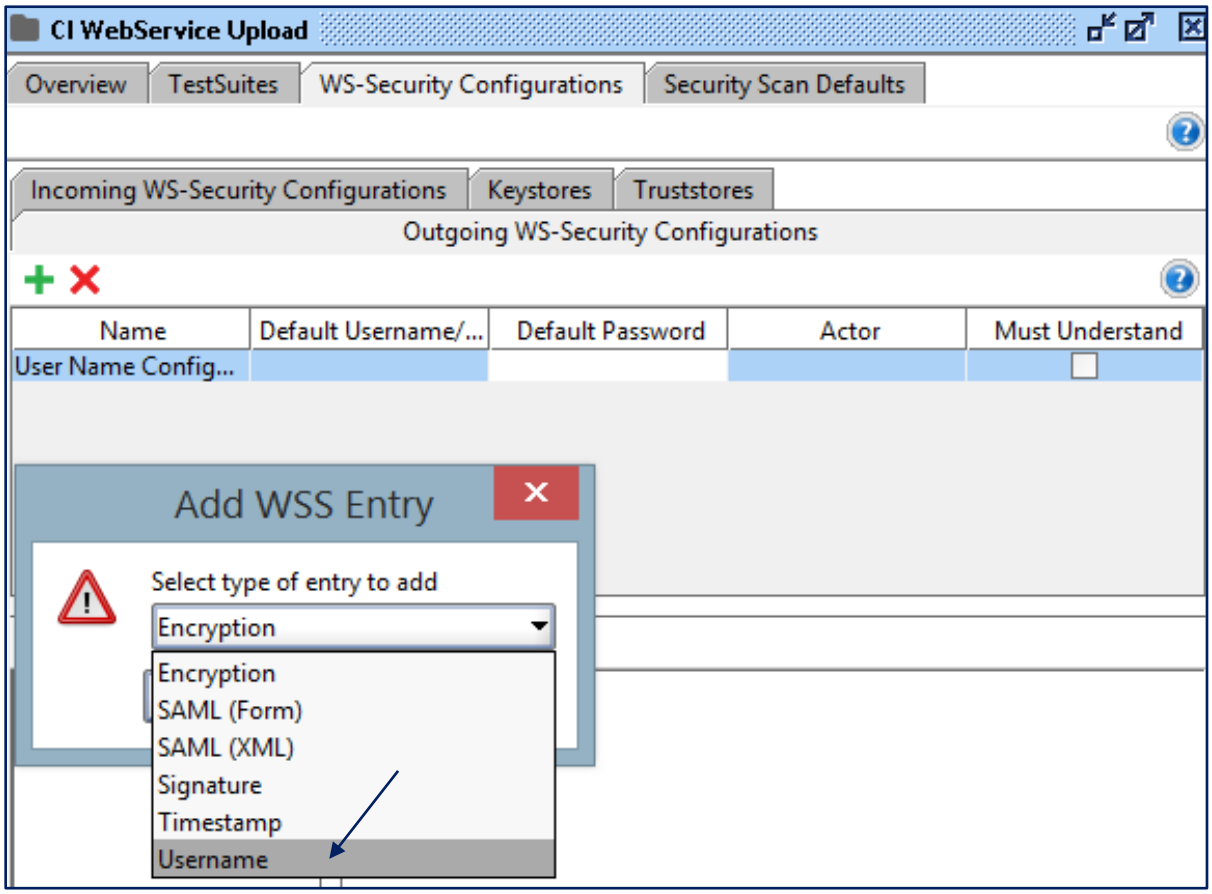
5. Create and name a new outgoing WS Security Configuration.



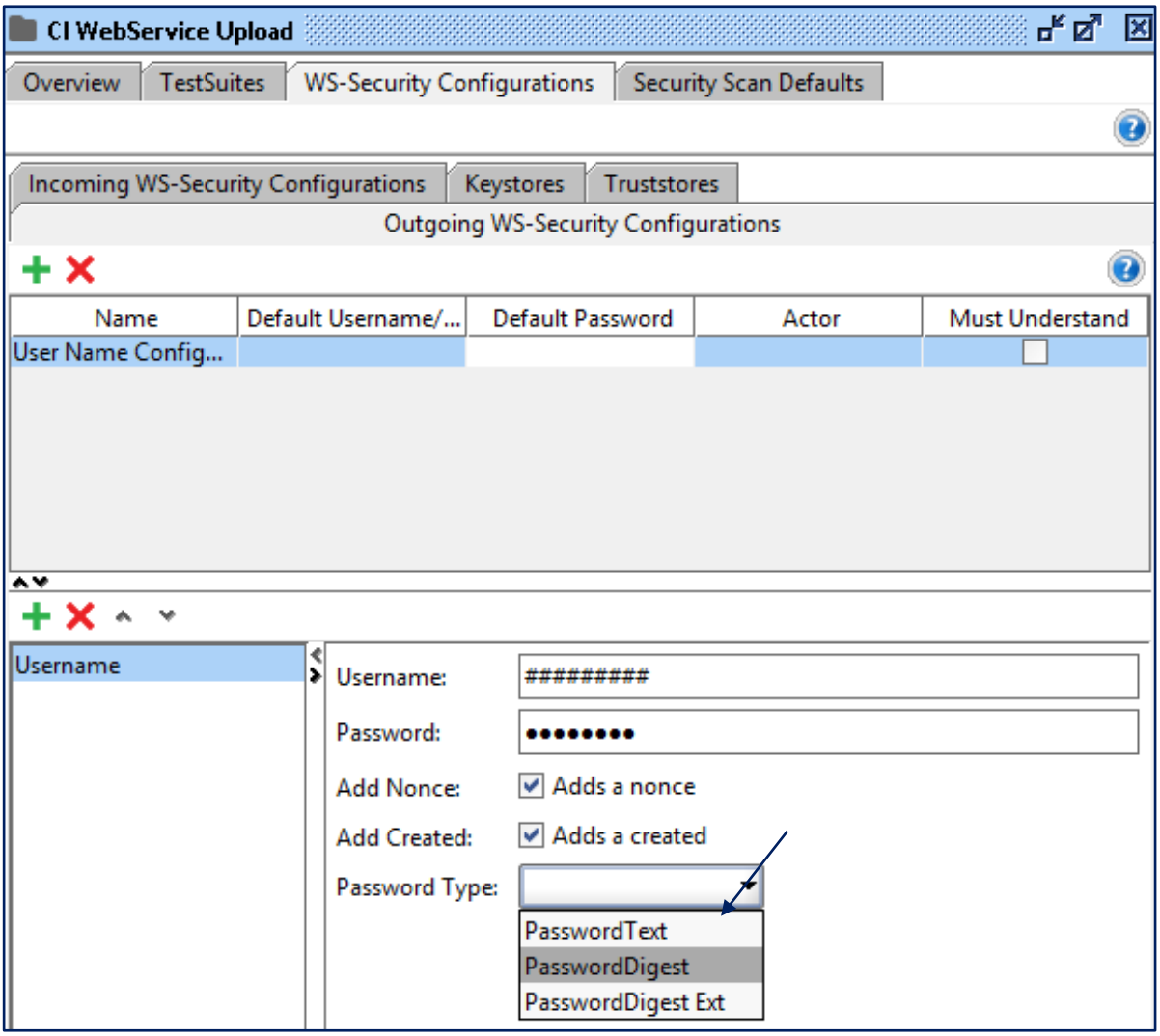
6. Open a WSS Entry



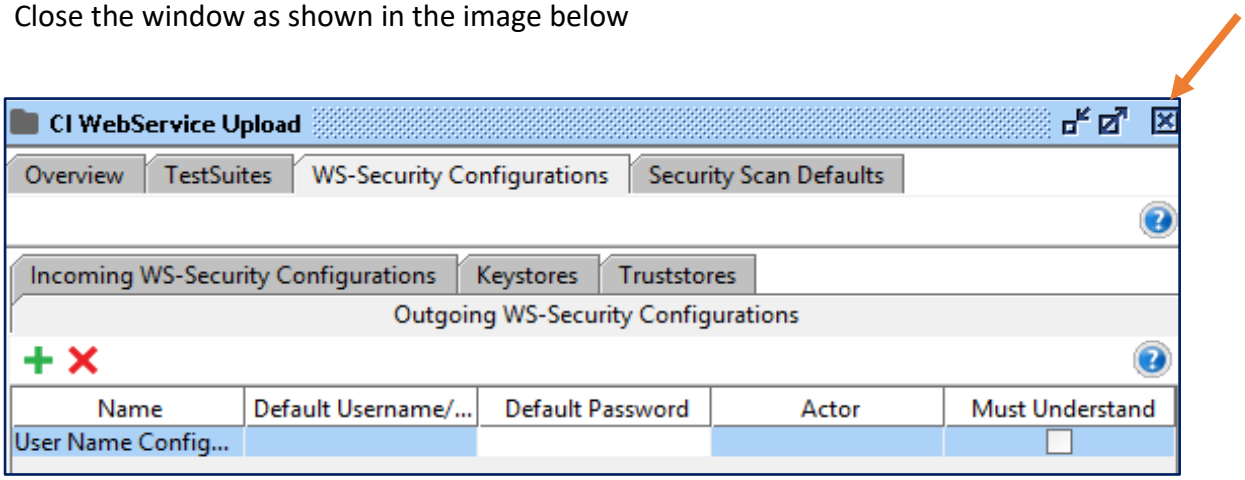
7. Choose the ‘Username’ option from the dropdown box and click OK.



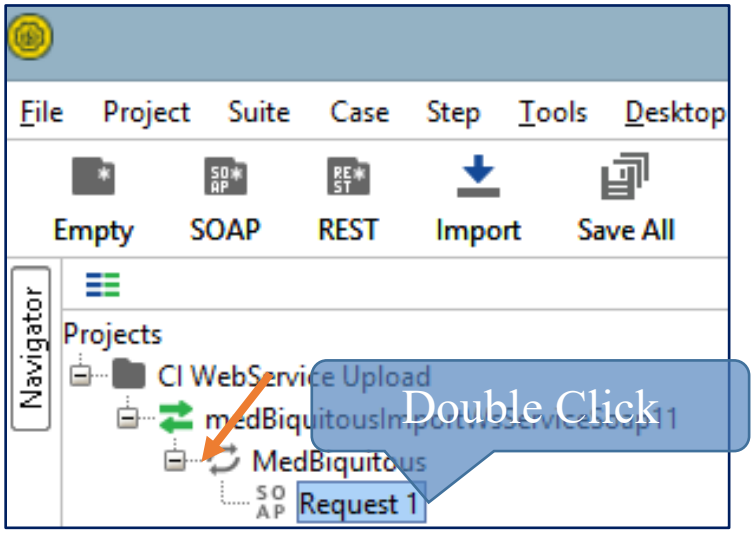
8. Enter the username and password as provided by AAMC CI staff for the CI Portal to be accessed with this specific project. If you have not requested a username and password, please email ci@aamc.org.
    a. Choose 'PasswordDigest' option from the Password Type dropdown.



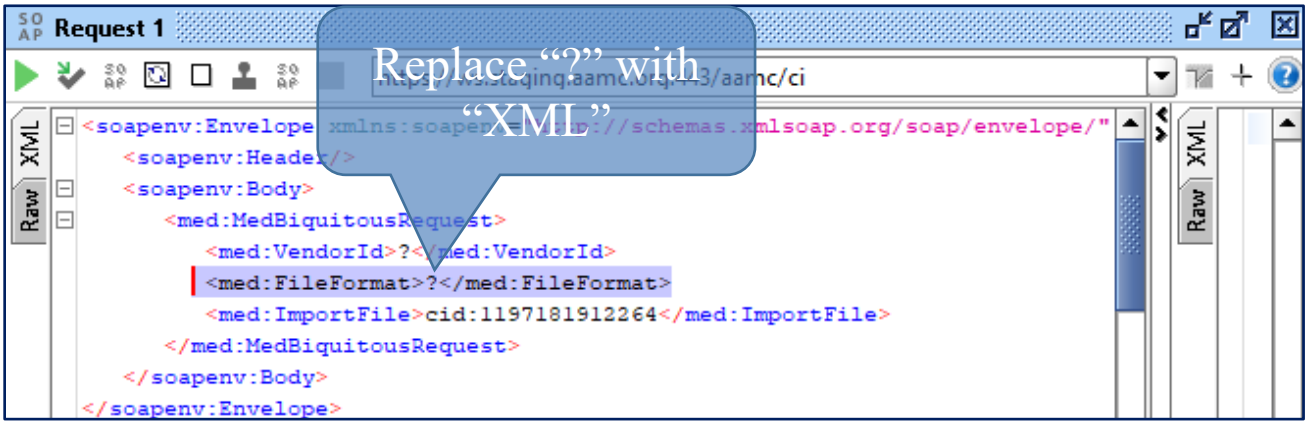
9. Close the window as shown in the image below



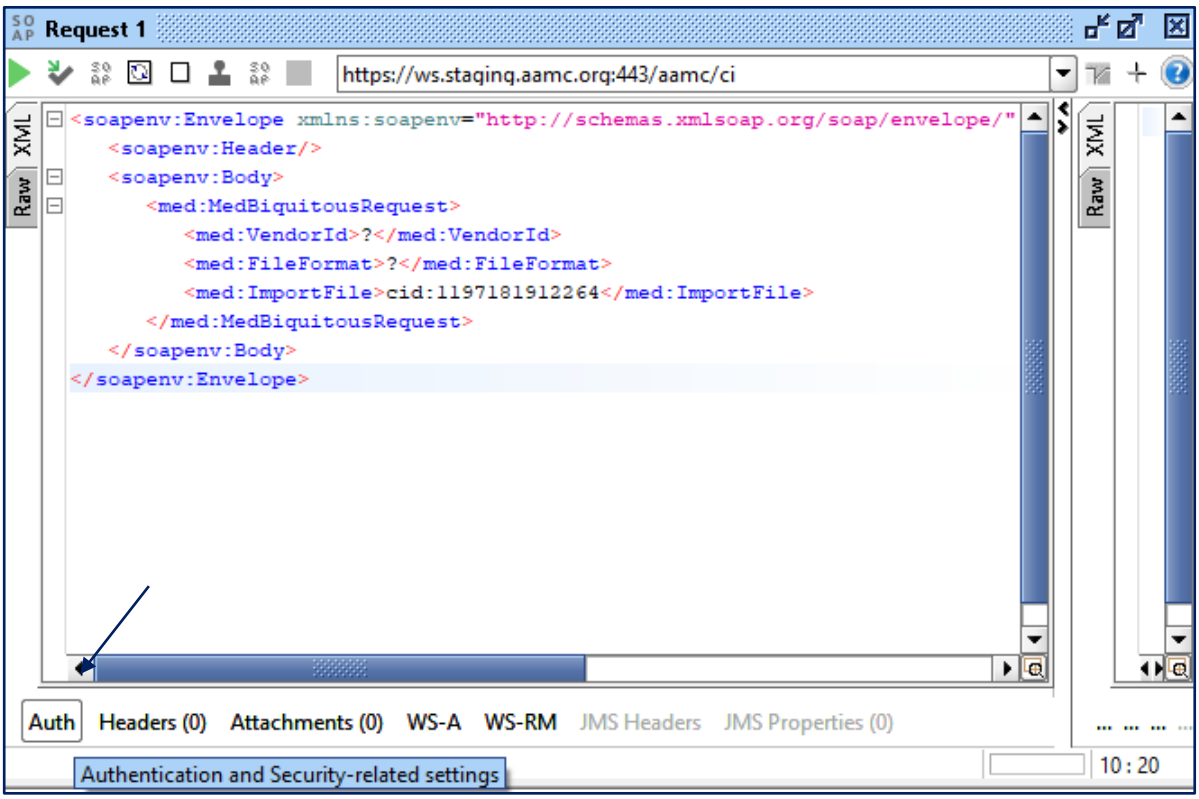
10. Open the Request.



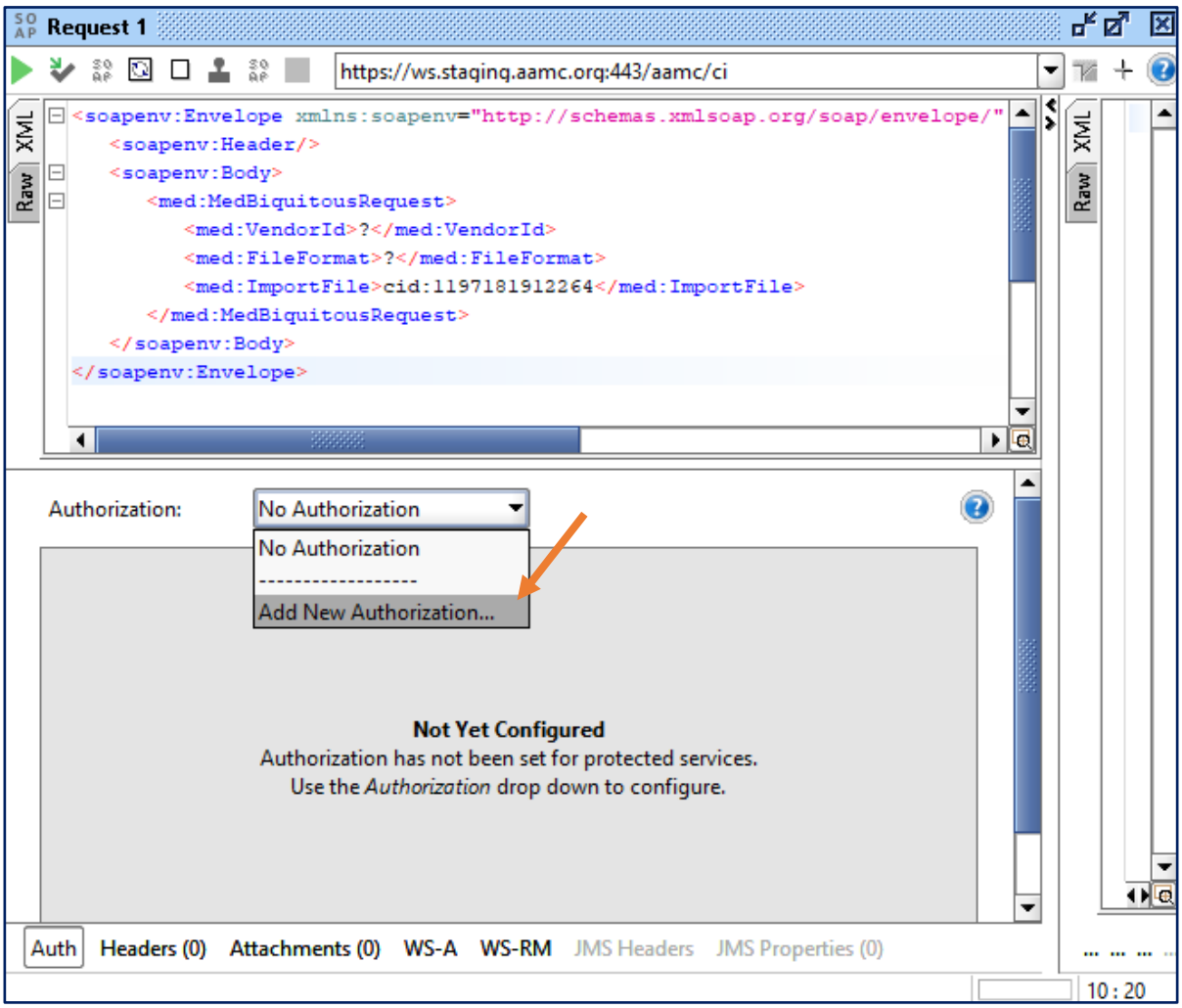
11. Edit the FileFormat field in the Request by replacing the ? with XML



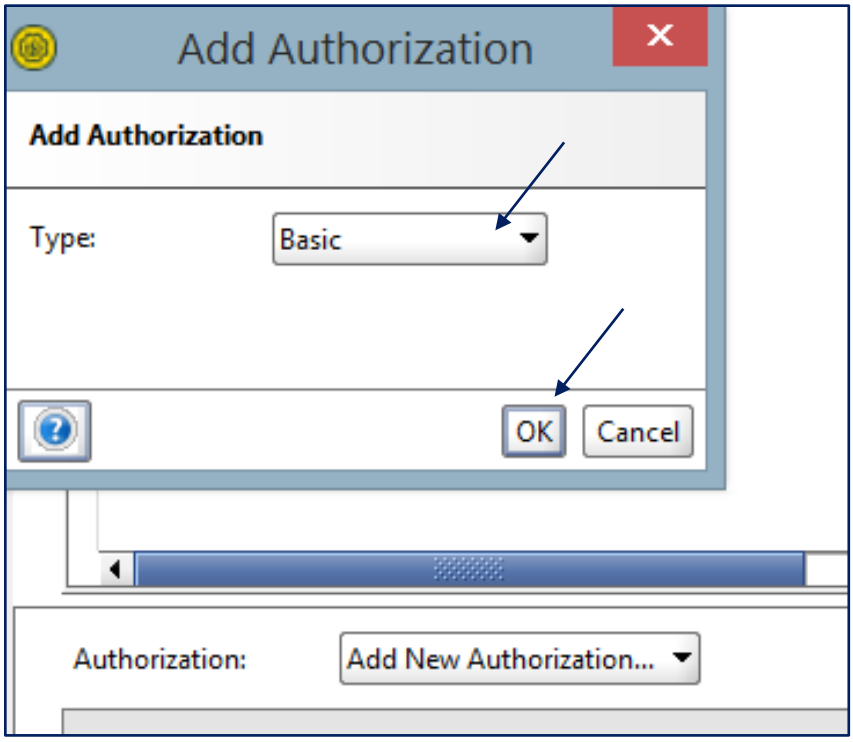
12. Click 'Auth' tab near the base of the SOAP UI window



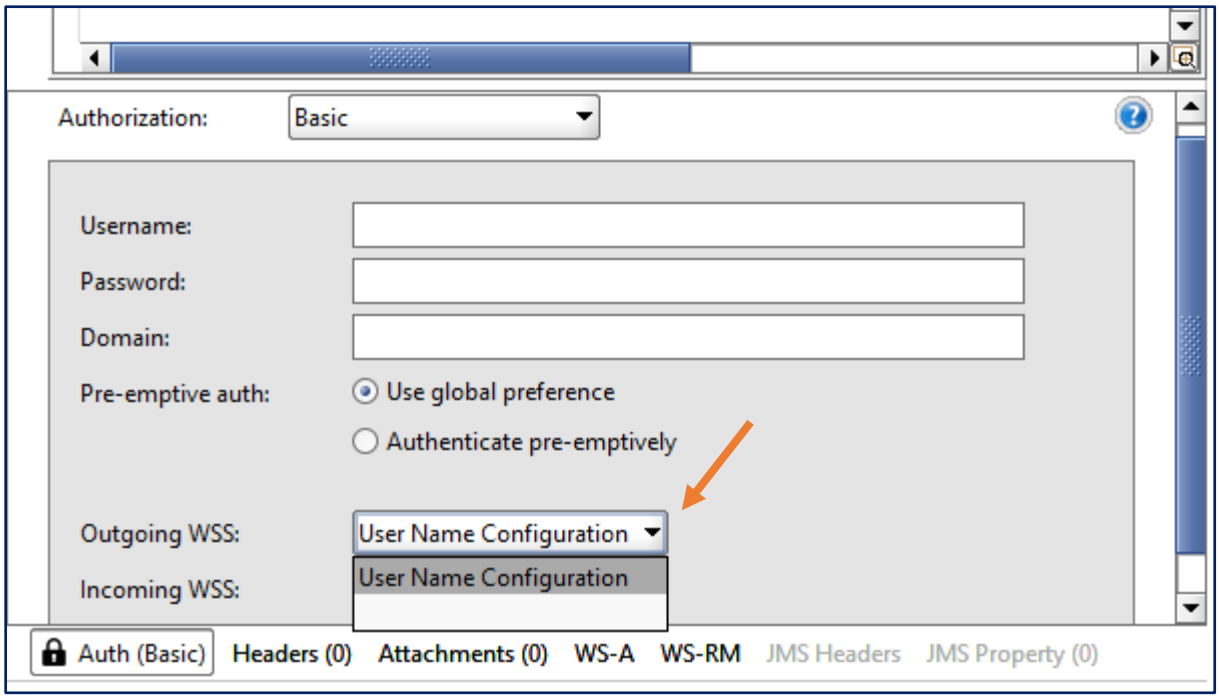
13. Select ‘Add New Authorization’ from the drop down



14. Select ‘Basic’ from the Type dropdown and click OK.



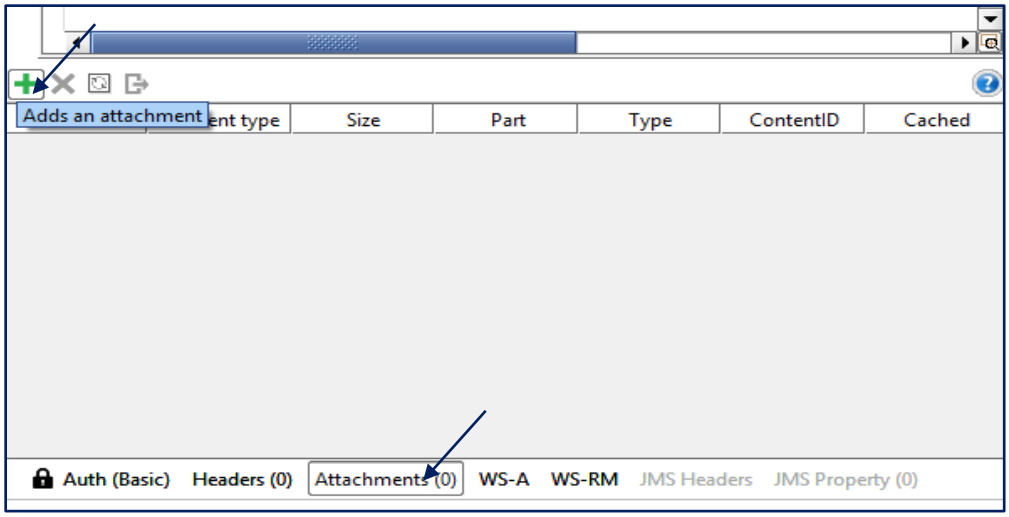
15. Select ‘User Name Configuration’ from the Outgoing WS dropdown



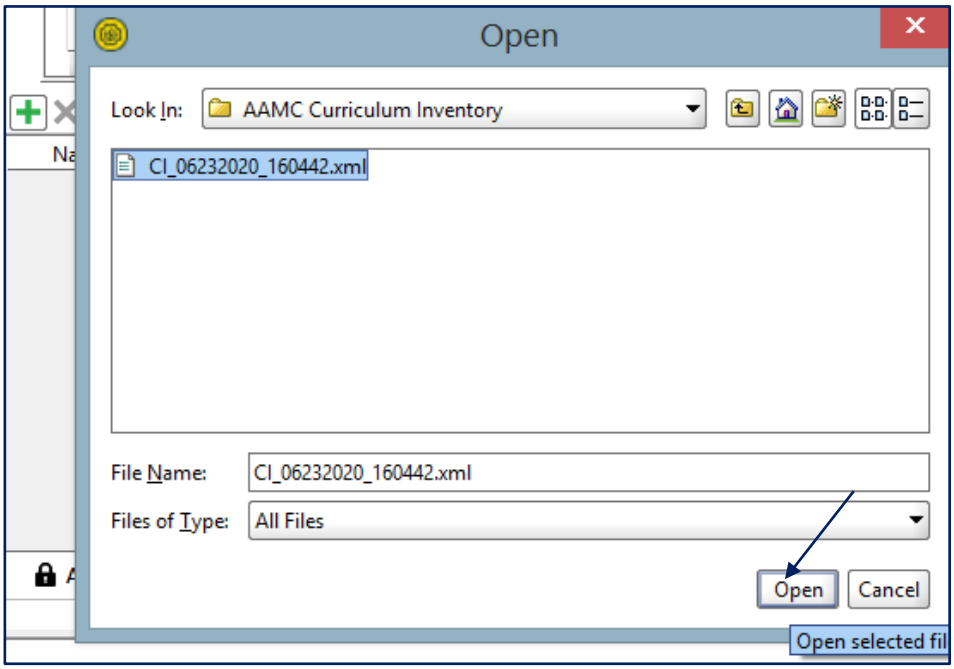
The preparation of the project is complete. If you save the project, you can return to it and use the File Submission method explained below. If you are going to perform submissions in the CI Portal, you will need a second project for the other environment.

File Submission

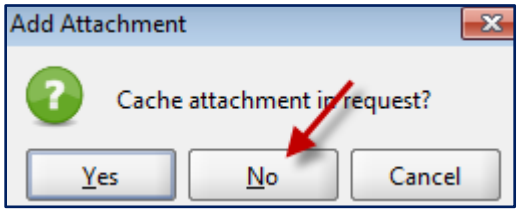
1. If continuing immediately from the Project Configuration steps above, click Attachments.
    a. If returning to the Project, double click Request and then click Attachments.
2. In the 'Attachments' tab, click the Adds an attachment icon



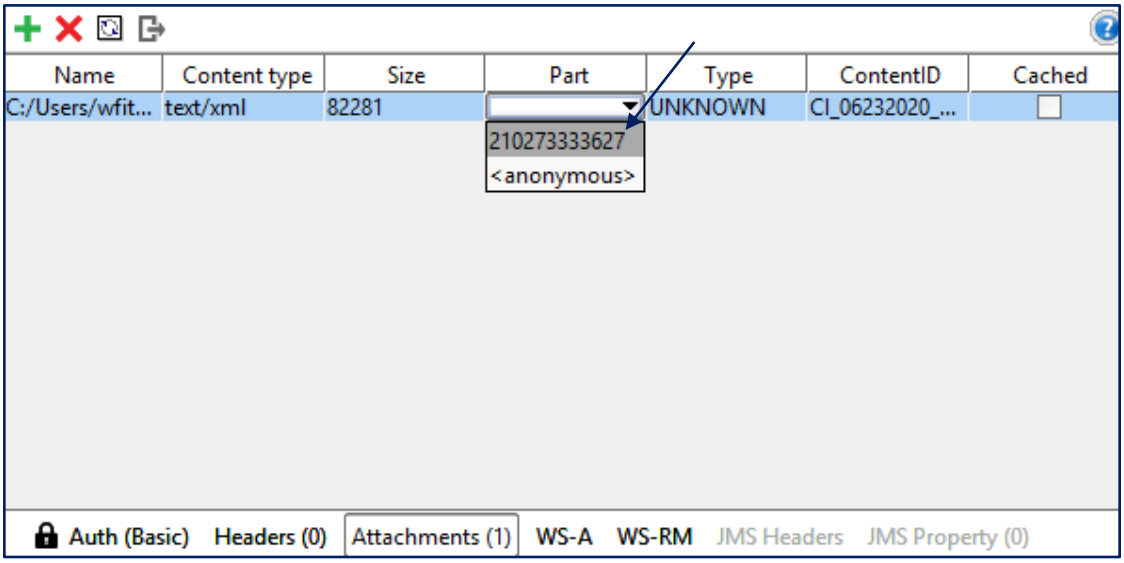
3. Select the file to be uploaded and click Open



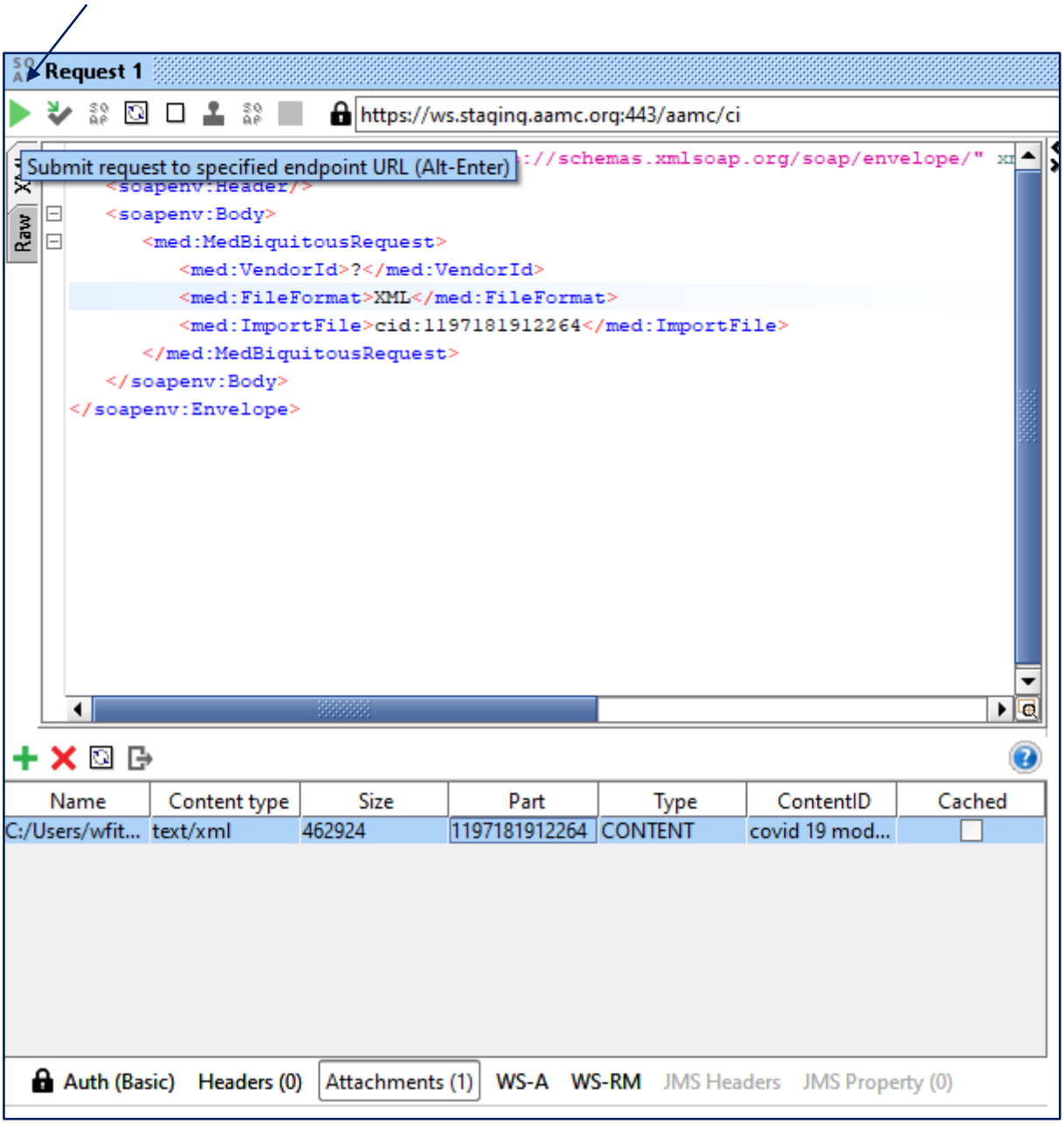
4. Choose 'No' on the Cache



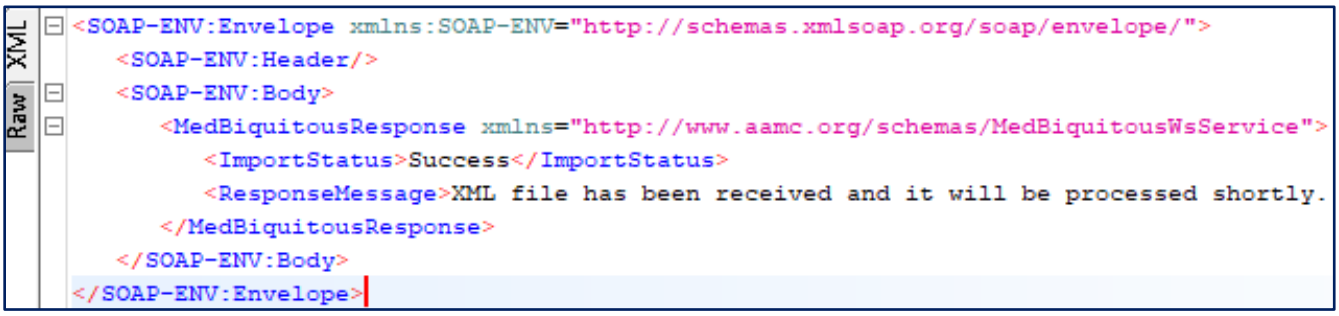
5. Choose the first option from dropdown (the value will vary) as shown in figure below.



6. Click the ‘Submit’ button and allow the submitted file to process.



7. Finally, if the project was prepared correctly, the file prepared correctly, and the school portal options for Sender chosen to allow this method of submission, the Web Service response is shown as below.



Appendix I: List of CI Participating Vendors

Background

The Association of American Medical Colleges Curriculum Inventory (AAMC CI) provides a platform and structure for health professions educators' to establish their local curriculum inventory and benchmark their curriculum according to national aggregates. The structural basis for the AAMC CI is the MedBiquitous standards for competencies and curriculum data, which allows the AAMC CI to receive data from commercial and institution-developed curriculum management and learning management systems.

To participate in the AAMC CI, schools can choose to use their own institutionally developed curriculum and learning management system or leverage an outside vendor's platform. Whether a school uses an institutionally developed system or chooses a vendor, all AAMC CI submissions are shared in XML. To learn more about the technical basis for the AAMC CI's structure and contents, please further review this CI Technical User Guide.

Participating Vendors

Vendor Profile

The following vendors have committed to following the AAMC CI technical standards, including the MedBiquitous specifications and business rules, have signed a participating agreement, and have submitted their profile questionnaire to the AAMC. If you do not see a vendor you are using or considering listed below, please contact ci@aamc.org. The language describing each vendor below was provided by the vendor.

AllofE Solutions

http://www.allofe.com/

"AllofE's eMedley is the most comprehensive and advanced platform for Health Sciences Education, specifically medical schools. It is the culmination of 20+years of R&D and is built on a highly flexible infrastructure that allows for extensive customization and scaling to meet program specific requirements. Key modules include:

- eCurriculum (Curriculum Mapping and Management): Gap/Overlap Analyses, Pre-Loaded Standards,, Aamc Curriculum Inventory, Curriculum Website, Course Syllabus Generation, Curriculum Map/ Data Tree/Calendar
- ExamN (Assessment and Testing): Secure Lockdown Browser, Online/Offline Testing, Question Banks, Automated Proctoring, Irat/Trats, Grading Rubrics, Standards Alignment, Extensive Reporting/Dashboard
- eduCate(Learning Management): LMS for medical schools. Section Management, Course Feed, Assignments, Discussions, Gradebooks, Attendance, Student Communication, Exam and Evaluation Integration, External Scores Tracking.
- eClas(Clinical Experience Tracking): Case Logging, Time Tracking, Self-Reflection, Student Portfolios,

Competency Tracking, Data Dashboards, And Ad-Hoc Reporting
- eduSched(Scheduling): Schedule Planner, Multiple Schedule Views, Granular Capacity Tracking, Student Preferencing, Lottery Based Scheduling, Track/Path Scheduling, Self Scheduling, Schedule Reports
- eValuate(Evaluations): 360 Evaluations, Course/Instructor, Formative/Summative, Competency Based Evaluations, Osce's, Clinical Site And Preceptor Evaluations, Student/Self Evaluations, Automated Reminders
- eKeeper(Documentation Management): Student, Faculty, Preceptor, And Site Documents. Immunization/Certification Tracking, License Expiration Reminders, Site Logistics, Mail Merge, Preceptor Pay, MSPE Generation
- ei3(Data Intelligence): Comprehensive Student Data Warehouse, Real-Time Analytics, Extensive Graphical Representations, Ad-Hoc Analysis."

DaVinci Education

www.davinci-ed.com

"DaVinci Education is the premier enterprise software partner for health science programs around the country. Originally created in conjunction with Duke School of Medicine, the Leo platform from DaVinci Education helps make accreditation reporting faster, easier and more accurate; streamlines curriculum management to increase efficiencies; and enhances measurement of teaching and learning from a single platform.

Leo provides all this and more:

- The most robust and granular curriculum mapping available (including multiple competency sets)
- Powerful course management tools to help make your work faster and easier
- Custom demographics to allow you to create and track specialized data sets
- 360-degree evaluations with automated scheduling and reminders
- Rich content management tools including built-in Q/A functionality
- Messaging and discussion boards
- An integrated exam system with point bi-serial item analysis and support for TBL and PBL modalities
- Patient encounter logs and duty hour tracking
- Lotteries and sign-ups
- Robust reporting functionality
- Integration with your central authentication and registrar systems

Faculty contribution tracking to help you understand what it costs to deliver your curriculum In addition, only Leo offers the Academic Portrait™, a comprehensive profile of a student's entire academic experience. It's all wrapped up in an easy-to-use, calendar-based system with highly flexible, role-based access and security levels. WCAG 2.0 AA accessibility is a key focus of ongoing development efforts. Our expert team of healthcare educators offers strategic and tactical support to help you leverage Leo to gain greater insights that can drive improved outcomes."

Education Management Solutions, LLC
https://www.competency.ai/

"Education Management Solutions (EMS) is an industry pioneer in simulation, experiential and online didactic healthcare education solutions – ranging from clinical simulation management software and hardware, competency and clerkship management, to counselor education and virtual interactive computer-based training tools. Working alongside subject matter experts, we serve as the driving force behind numerous consumer-centered innovations that continue to move the clinical healthcare education market forward with breakthrough technologies."

Elentra
https://elentra.org

"Elentra is a community-source Integrated Teaching and Learning Platform™ created by an international consortium of medical schools, which provides learners, instructors, and curriculum administration with a simple way of accessing, interacting, and managing information within a unified online environment.

The Elentra Platform™ is well suited for health sciences education because of its tightly integrated curriculum management and clinical scheduling support. Although Elentra was initially designed to meet the needs of medical education, it could easily be modified and adapted to suit many other professional programs.

Elentra is full featured and takes a much different approach to online learning than a traditional course-centric Learning Management System; so much so that we try not to classify Elentra under that umbrella and have instead coined "Integrated Teaching and Learning Platform.""

eValue by MedHub
https://www.medhub.com/evalue/evalue-product/

"MedHub is the leading provider of healthcare education management solutions for graduate and undergraduate medical education, and advanced practice healthcare institutions.

MedHub is committed to elevating the future of healthcare education and provides both industry-leading consulting and proven software solutions. Its two healthcare education software solutions, MedHub and eValue by MedHub, are used by more than 600 organizations to address the complex tasks and interactions between trainees, educators, programs and institutions, allowing for continuous improvements that increase accuracy, efficiency and ease of operation across the healthcare education enterprise.

Learn more at medhub.com."

Exxat: Comprehensive Solutions for Medical Education Management
https://www.exxat.com

"Exxat is a company focused on giving health sciences students and academicians "exactly what they are looking for" by providing education management solutions. Founded in 2011, Exxat has grown from a stand-alone product built for a single client to an integrated suite of modules supporting a

dynamic community of 900+ educational programs across the country through clinical education placements, accreditation processes, compliance management and more.

MedHub, Inc.
https://www.medhub.com/

"MedHub is the leading provider of healthcare education management solutions for graduate and undergraduate medical education, and advanced practice healthcare institutions.

MedHub is committed to elevating the future of healthcare education and provides both industry-leading consulting and proven software solutions. Its two healthcare education software solutions, MedHub and eValue by MedHub, are used by more than 600 organizations to address the complex tasks and interactions between trainees, educators, programs and institutions, allowing for continuous improvements that increase accuracy, efficiency and ease of operation across the healthcare education enterprise.

Learn more at medhub.com."

Medtrics
https://www.medtricslab.com

"Medtrics is a scalable, user experience driven, curriculum & education management platform for academic institutions. Our belief is to "Learn Medicine, Not Software", which summarizes our team's approach to product development and implementation. While there are many platforms out there, what makes Medtrics unique is our hands-on approach to onboarding and supporting our clients to maximize their student experience. By providing exceptional user experience to learners and educators, we ensure compliance with tasks, which translates to decreased administrative burden. For larger organizations, Medtrics includes full support and integration capabilities for to automate various processes and minimize duplication of work.

Medtrics was built from the ground up for AAMC's Medbiquitous data standards, allowing organizations to seamlessly submit data to the Curriculum Inventory (CI).

In-addition to full curriculum mapping capabilities, Medtrics includes the following:

- Curriculum driven scheduling & content delivery
- Outcomes-Based Evaluations and Assessments
- Automated evaluation and schedule
- Student Onboarding and Document Management (including expiration tracking)
- Student Portfolios
- Integrated Calendar and Attendance Tracking
- Classroom and Hospital-Based Activity Scheduling
- Diagnosis & Procedure Logs

- Work Hour Logs
- Sites & Affiliation Management
- MSPE Generation & Management
- File Sharing
- Fully mobile
- Role-Based Access
- Single-Sign-On (SSO) and APIs for IT Integration (CI).

New Innovations Inc.

https://www.new-innov.com/pub/

"For over 25 years, New Innovations has built a business around shared ideas and beliefs that all point to a larger purpose - empowering medical educators and administrators to provide quality medical education. New Innovations' Curriculum module, launched in 2015, provides a means to define the educational plan, use it as a reference for answering questions from accrediting bodies, and share what customers doing at the national level via the Association of American Medical Colleges (AAMC) Curriculum Inventory."

OASIS, Schilling Consulting LLC

https://www.schillingconsulting.com

"OASIS development and service is customer driven. We pride ourselves on assisting our clients in ide ntifying their individualized needs and helping them tailor OASIS features to meet those needs. Requests for new reports and customizations can be made at any time, and do not have to wait for a scheduled Release to be completed. When schools are preparing curriculum data for the Curriculum Inventory, we provide individual support to help them meet AAMC requirements but also capture the unique elements of their educational experience. We provide flexible tools and multiple Curriculum Reports to allow clients to test and then upload a complete Report to the CI portal."

One45 Curriculum

https://altusassessments.com/

"Altus Assessments/One45 has over 15 years experience helping Medical Schools find success with their overarching Curriculum Management needs. Known for our outstanding support functions, our experts can help with everything from mapping and reporting to supporting continuous quality improvement initiatives that provide data clarity for future reporting. We've supported Curriculum Inventory reporting since the beginning and pride ourselves on keeping curriculum review, updates, and submission to the CIR as straightforward as possible."

Number of Schools Per Vendor Report

The CI Portal is the AAMC system schools may use to upload their curriculum inventory data to AAMC. In the CI Portal, schools can designate a CI participating vendor as their data sender. This means the vendor may create a school's CI XML file, upload a school's CI XML file to AAMC on their behalf, or both.

Based on schools' designations of CI participating vendors as their data senders, numbers of schools supported are provided below. Please note that **it is possible for a school to engage with a vendor for curriculum mapping support outside of the CI Portal, and not identify that vendor in the CI Portal as their data sender**; thus, it is possible that a given vendor may have additional medical school clients whom they support in curriculum mapping efforts which are not represented below.

CI participating vendor	Number of schools who identified this vendor as supporting their AAMC CI upload process in the CI Portal "Manage Sender" tab		
	2019	2020	2021
AllofE Solutions	3	2	5
DaVinci Education	14	15	19
Education Management Solutions, LLC	NA	NA	NA
Elentra	2	3	9
eValue by MedHub	8	7	9
Exxat: Comprehensive Solutions for Medical	NA	NA	NA
Medtrics	1	0	0
New Innovations Inc.	2	2	4
OASIS, Schilling Consulting LLC	22	21	27
One45 Curriculum	28	26	32

Appendix J: COVID-19 Keywords for Upload 2022

Introduction

Keywords related to COVID-19 were provided in 2020, and in 2021, and have evolved each year as the curriculum change due to COVID-19 has evolved. To document how your curriculum changed in the 2021-2022 year due to COVID-19 within your CI, use the optional "keyword" field of the CI standards. Schools' CI keyword data is presented in Table 9 of the Verification Report 2022. Keep in mind these COVID-19 related keywords for 2021-2022 are in addition to the AAMC CI Keywords. Please note that you may enter more than one keyword per event in your CI.

Recall that in 20202-2021, there were three COVID-19 related keywords to potentially use:

1. **"COVID-19 Remote"**
2. **"COVID-19 Altered"**
3. **"COVID-19 Added"**

The keywords "**COVID-19 Remote**" and "**COVID-19 Altered**" were used in the 2019-2020 curriculum. The keyword "**COVID-19 Added**" was new for the 2020-2021 curriculum.

For the 2021-2022 academic year, based on review with the CI Committee, the following is advised:

"COVID-19 Remote"

For each session or event *delivered remotely (i.e., virtually) due to COVID-19*, enter **"COVID-19 Remote"** in the keyword field.

In this way, whatever the instructional or assessment methods (e.g., lecture, simulation, ward rounds), the fact that they were delivered remotely because of COVID-19 will be documented. The standardized vocabulary around terms for instructional methods, assessment methods, and resources is available on the Resources to Establish Your CI webpage. Please note that as you adjust instructional methods, assessment methods, and resources to accommodate COVID-19's impact, there are two resources, RE006 – Distance Learning-Asynchronous, and RE007-Distance Learning-Synchronous, which may be most likely to be used in conjunction with the "**COVID-19 Remote**" keyword.

You would not apply the "**COVID-19 Remote**" keyword tag to curriculum that was intended to be taught remotely regardless of COVID-19. For example, if there were a fourth year elective that has historically been taught remotely, or an event that was already designated to be taught remotely before COVID-19 was taken into account, you would not apply the "**COVID-19 Remote**" keyword tag.

"COVID-19 Altered"

For each session or event that was *altered in some other way* due to COVID-19, enter **"COVID-19 Altered"** in the keyword field. Examples of how a session could have been altered due to COVID-19, aside from being delivered remotely, include:

- Some of the learning objectives originally planned for an event were delayed due to COVID-19 because they require in-person performance, so this event's learning content will look different compared to the pre-COVID curriculum.
- Fewer students were scheduled at the Simulation Center to comply with social distancing needs, so the schedule and room usage for this event was different compared to the pre-COVID curriculum.

Changes that you intended or would have made to the curriculum regardless of COVID-19 would not warrant the "**COVID-19 Altered**" keyword tag. For example, perhaps students have historically struggled with a portion of the content in a pharmacological exam. To address this issue, learning objectives were intended to be edited to include reinforcing pharmacology material prior to the exam. In this instance, the curriculum was altered (e.g., learning objectives were edited); the change was due to student exam performance, not due to COVID-19. The event(s) with pharmacology learning objective edits would not warrant the "**COVID-19 Altered**" keyword tag.

"COVID-19 Added"

For each session or event that was *added to the curriculum* due to COVID-19, enter **"COVID-19 Added"** in the keyword field.

This keyword tag is for curriculum events that were removed, paused, or delayed from the 2019-2020 curriculum due to COVID-19, which are now being reinserted into the curriculum in 2020-2021. These could be events which the school was not able to deliver remotely or safely with social distancing accommodations previously, but now is ready for. This keyword could also refer to brand new content that is being added as a direct result of COVID-19.

For example, perhaps your second-year students typically have a year-long course for service-learning. The students had the fall 2019 service-learning course as expected, but in March 2020, the service-learning course was put on hold. It was determined that as the learning required in-person patient contact, this curriculum would need to be delayed.

Later in the 2020-2021 curriculum year, it was determined students were now able to resume their service-learning curriculum. The students are now in their third year, so the service-learning events are being re-inserted in the curriculum within the students' other third-year curriculum requirements. In addition to this re-inserted service-learning content, you add a brand-new event to the curriculum to explain these changes and detail COVID-19 precautions such as use of PPE in the service-learning clinic locations. In this hypothetical example, both the re-inserted events and the brand-new event would all warrant the "**COVID-19 Added**" keyword tag.

Content that is new to the curriculum but is irrelevant to COVID-19 would *not* warrant the "**COVID-19 Added**" keyword tag. For example, perhaps your curriculum has been steadily adding new content related to leadership skill development over the last few years. In 2020-2021, you added a few new events to support this goal. Because your school intended to add these sessions regardless of or irrelevant to COVID-19, these would not warrant the "**COVID-19 Added**" keyword tag.

COVID-19 Keywords in Your CI

Within your CI data file, you may have:

- Some events/sessions *completely unchanged* from your original plan, and therefore not tagged with *any* COVID-related keywords (e.g., "**COVID-19 Remote**," etc.)
- Some events/sessions tagged with only one COVID-related keyword (e.g., "**COVID-19 Added**")
- Some events/sessions tagged with a combination of COVID-related keywords (e.g., **"COVID-19 Remote**" and **"COVID-19 Altered**")

It is understandable that some curriculum content could not be taught remotely or differently due to COVID-19, and thus some content may have been removed from the original planned curriculum. Your CI data file should not include any curriculum that was not delivered or completely canceled. Your CI data file should reflect what actually happened in the curriculum to keep your data as accurate and complete as possible.

XML documentation modifications:

The file COVID-19 Modified XML.xml contains a single sequence block (e.g., course) and its referenced events, along with relevant competency framework components referenced by the sequence block and its events. In addition, several comments have been included in the XML to illustrate what sort of changes are being modeled. This XML file is a partial sample; it is not intended to represent an entire curriculum.

Good Documentation Practices

Beyond the COVID-19 related modeling, this sample is also meant to highlight a few other aspects of curricular documentation which may increase the value CI participants get out of their efforts with their own systems and with reports.

- Events titles, descriptions, and keywords all capture details about events and are used when the AAMC identifies relevant content for inclusion in reports. Using complete words rather than shorthand or institution-specific acronyms increases the ability of all readers and reviewers to share an understanding of what was intended.
- Documenting a competency framework can be well supported by adhering to structural ideas parallel to the structure of the curriculum.
    - Event level competencies should be referenced by events.

- Sequence block level competencies should be referenced by sequence blocks.
- Program level competencies should be related to sequence block level competencies.
- Sequence block level competencies should be related to event level competencies

Following the practices above will help create a searchable curricular database and will result in a more thoroughly populated Verification Report.

COVID-19 Documentation Practices

As documented in the CI Newsletter referenced above, events that have been adjusted to accommodate changes to educational modalities due to potential spread of SARS-CoV-2 should feature a COVID-19 related keyword (e.g., “COVID-19 Remote”, “COVID-19 Altered”, “COVID-19 Added”) as appropriate. The XML file included with this document contains examples of those keywords being used and commentary explaining what changes occurred. Commentary in the XML file is discernable because it starts with the following: <!-- and end with the following: -->.

Content within comment tags is not considered part of a submission and will not appear in the AAMC databases. However, reviewing those comments may help guide your thinking about how to document change in your educational practices.

XML Viewing and Editing

XML files can be opened by a number of programs, including common text editors like Notepad, but also programs more specifically designed to recognize XML coding. Consult your Information Technology department/staff for information about what program they recommend/permit on systems they are responsible for. The AAMC does not specifically endorse or support the use of any program, but for the purposes of illustration, XML Copy Editor is an example of relevant software freely accessible for purposes such as viewing the XML file included with this document. The XML Copy Editor program can be found here: https://sourceforge.net/projects/xml-copy-editor/. Be sure to adhere to all relevant protocols established at your workplace or institution before downloading, installing, or using any software. Adhere to decisions and policies made by the IT department/staff responsible for ensuring the integrity of your systems and the systems you connect with.

Appendix K: Literature references

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