Smarted Balanced Assessment Item Format Specification

V 0.61

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Introduction

Note: This section is informative.

This document (the *Specification*) defines an XML document structure for the encoding and representation of assessment items – the Smarter Balanced Assessment Consortium *Assessment Item Format Specification* (SBAIF).

The XML representation of an assessment item contained in the Specification may be used to publish assessment items for purposes such as exchange between producers such as item authoring tools and consumers such as item banks and test delivery engines. The Specification does not limit how the XML document structure and elements may be used.

The XML document structure is defined in the narrative of the Specification. The specified XML document structure may be defined, in part, in XML through XML schemata [XSD 1], XML DTDs [XML] or in descriptions encoded in other XML modeling languages. Additional requirements specified in the narrative cannot be modeled in XML Schemata or XML DTDs.

The Specification is based on the AIR Item Representation Format and is used by the SBAC to represent the SBAC assessment items.

The main audience for the Specification is developers who are producing tools and systems to create, process or consume XML documents that conform to the Specification. The Specification is not targeted at users such as item developers or assessment administrators. The Specification does not include guidance on how to use design, model or create assessment items that are encoded in the XML document format specified herein.

The Specification only describes the structure of the XML documents for assessment items. It does not address how to store or exchange these documents. The Specification does not describe how to produce, transform, process or consume the documents except for describing conforming documents that a conforming processor produces and consumes.

The Specification includes:

- **Notation** – Definitions of normative terms and conventions used in the Specification.
- **Informal Model** – The model for the digital representation of an assessment item and related items (informative)
- **XML Document Elements** – The XML element definitions for assessment item documents:
    - *Assessment Item Release XML Elements* – the XML elements defining the release of an assessment item XML document.
    - *Assessment Item XML Elements* – the XML elements defining an assessment item XML document. These elements are normally embedded in an assessment item release document.
    - *Passage Item XML Elements* – the XML elements defining a passage item XML document. These elements are normally embedded in an assessment item release document.
    - *Tutorial XML Elements* – the XML elements defining a tutorial used in an assessment item.
    - *Wordlist XML Elements* – the XML elements defining a wordlist resource used in an assessment item.
    - *Assessment Item Accessibility XML Elements* – the XML elements defining an item accessibility XML document. These elements are normally embedded in an assessment item or passage item document.

    - *Grid Item Rendering Specification XML Elements* – the XML elements defining grid interaction item rendering specification XML document. These elements are normally embedded in a grid interaction assessment item.
    - *Equation Editor Configuration XML Elements* – the XML elements defining an equation editor configuration XML document. These elements are normally embedded in an equation assessment item.
    - *Assessment Item Usage Statistics XML Elements* – the XML elements holding statistical data about assessment item usage.
    - *Assessment Item Machine Rubric XML Elements* – the XML elements defining a machine rubric XML document. The details of these elements are not documented in the Specification.
- **XML Document Criteria** – General characteristics for all XML documents for assessment items.
    - *Semantic Constraints* – constraints on the XML documents that cannot be specified at the XML element level.
    - *Specification Versioning* – criteria for identifying the specific version of the Specification in XML documents describing an assessment item.
    - *IANA Considerations* – recommendations for Internet media type names for XML documents conforming to the Specification.
    - *Implementation Considerations* –best practices on how to represent or use XML documents describing an assessment item.
- **Conformance** – Criteria for an XML document and an XML document processor to conform to the Specification.
- **Security Considerations** – Security considerations for creating, producing or consuming XML documents for assessment items that conform to the Specification.
- **Normative References** – Normative references to other specifications used in the Specification.
- **Definitions** – Definitions of terms used in the Specification.
- **Acronyms** – Acronyms used in the Specification.
- **Informative References** – References to other documents used in the Specification (informative).
- **Annex: Examples** – Sample assessment items represented as XML documents that conform to the Specification (informative).
- **Annex: XML Representation Design Decisions** – Choices and rationale in designing the XML document structure and sample schemata design (informative).
- **Annex: XML Schemata** – Description of an XML Schemata (XSDs) that conform to the Specification (informative).
- **Annex: XML DTDs** – Description of an XML DTDs that conform to the Specification (informative).

Notation

Keywords

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in the Specification are to be interpreted as described in [RFC 2119].

The key word "IS DEPRICATED" in the Specification designates a feature that MAY be removed in a future version of the Specification. The feature is maintained for backward compatibility. The feature SHOULD NOT be used when creating new assessment items. All conforming processors MUST support the feature.

The key word "TO BE DEPRICATED" in the Specification designates a feature that MAY be removed in a future version of the Specification. The feature is maintained for backward compatibility. The feature SHALL be used when creating new assessment items. All conforming processors MUST support the feature.

Normative Text

Unless otherwise noted, all sections in the Specification are normative.

Within a normative section, all notes and illustrations are informative.

Presentation of Elements

The Specification describes XML elements and XML documents in both tabular and graphical form.

The Specification uses the tabular structure shown in Table 1, Table 2 and Table 3 for the description of an XML element. Each element is described in a table using the format defined in Table 1 for Complex Elements or Table 2 for Simple Elements (no subelements or attributes). If an element has attributes, these are described in a related table using the format defined in Table 3. In the Specification, the table of attributes will immediately follow the table defining the element.

Table 1: XML Element Descriptions – Complex Elements

Element	The XML element name	
Description	A narrative description of the XML element, its semantics and its behavior. The description contains the information that a user needs to produce or consume the element.	
Element Type	Description of the type of subelements of the element. Value is one of:	
	Empty	There are no subelements. There are attributes.
	Any	Any number or type of subelements is permitted.
	~~CDATA~~	~~The subelement contains CDATA.~~
	sequence	The elements in the list MUST appear in the XML document in the sequence shown.
	mixed	The elements in the list MUST appear in the XML document in the sequence shown. Arbitrary text may appear around the elements.

Element	The XML element name		
	choice	Only one of the elements in the list MAY appear in the XML document.	
	HTML	The element contains [XHTML 1.1] content. The number in braces ({NN}) is the minimum string length that a conforming consumer MUST accept.	
	QTI	The element contains [QTI 2.1] content. The number in braces ({NN}) is the minimum string length that a conforming consumer MUST accept.	
	xsd:<type>	The element directly contains content that conforms to a specific XML datatype [XML 2] denoted by <type>.	
			For string types the number in braces ({NN}) is the minimum string length that a conforming consumer MUST accept.
			For string types constraints on the string value are defined via a regular expression.
Elements	The list of subelements of the element, each in a separate row. There are two entries (Name, Multiplicity) for each element.		
	This entry is omitted if the element is a specific XML datatype and if there are no subelements and attributes.		
	Name	The name of the element. If there are no elements, the value is *None*.	
	Multiplicity	The multiplicity of the element in an XML document:	
		[0..1]	Element occurs 0 or 1 times.
		[0..*]	Element occurs 0 or more times.
			The number in braces ({NN}) is the minimum number of element instances that a conforming consumer MUST accept.
		[1]	Element occurs 1 time.
		[1..*]	Element occurs 1 or more times.
			The number in braces ({NN}) is the minimum number of element instances that a conforming consumer MUST accept.
		☒ indicates the element a candidate TO BE DEPREICATED.	
		☒ indicates the element IS DEPREICATED.	
Attributes	The list of attributes of the element, each in a separate row. There are four entries (Name, Required, Data Type, Default) for each attribute.		
	This entry is omitted if the element is a specific XML datatype and if there are no subelements and attributes.		
	Name	The name of the attribute.	
		If there are no attributes, the value is *None*.	
	Required	☑ indicates the attribute is REQUIRED.	
		☐ indicates the attribute is OPTIONAL.	
		☒ indicates the element a candidate TO BE DEPREICATED.	
		☒ indicates the element IS DEPREICATED	
	Data Type	The XSD [XSD 2] data type of the attribute.	
	Default	The default value for an optional attribute that is omitted from the XML document.	
		The entry is empty for any required attribute that does not have a default value.	

Element	The XML element name	
		The entry is *None* for any optional attribute that does not have a default value.
Extensions	☑ indicates that the element MAY include XML namespaced extensions. ☒ indicates that the element MAY NOT include XML namespaced extensions.	
Conformance	Any additional semantics and conformance requirements not represented elsewhere.	
	This entry is omitted if there are no additional conformance requirements.	
Notes	Any additional notes about the XML element.	
	The entry is empty is there are no additional notes.	
	All notes are informative.	

Table 2: XML Element Descriptions – Simple Types

Element	The XML element name	
Description	A narrative description of the XML element, its semantics and its behavior. The description contains the information that a user needs to produce or consume the element.	
Element Type	The name of the specific XML datatype [XML 2]. There are no subelements.	
		For string types the number in braces ({NN}) is the minimum string length that a conforming consumer MUST accept.
		For string types constraints on the string value are defined via a regular expression.
	HTML indicates that the element contains [XHTML 1.1] content. The number in braces ({NN}) is the minimum string length that a conforming consumer MUST accept.	
	QTI indicates that the element contains [QTI 2.1] content. The number in braces ({NN}) is the minimum string length that a conforming consumer MUST accept.	
	The name of the specific XML element from another namespace. Subelements and attributes of the element are not presented.	
Value	The description of the value space for the element. The description may include constraints on acceptable data values for the attribute within the specified data type and value space.	
	For xsd:boolean or xsd:token (a vocabulary) there are two entries (Value, Description) for each value in the value space.	
	Value	A value for the element within the value space
	Description	A description of the meaning of the value.
Default	The default value for an optional element that is omitted from the XML document.	
	The entry is empty for any required element that does not have a default value.	
Extensions	☑ indicates that the element MAY include XML namespaced extensions. ☒ indicates that the element MAY NOT include XML namespaced extensions.	
Conformance	Any additional semantics and conformance requirements not represented elsewhere.	
	This entry is omitted if there are no additional conformance requirements.	
Notes	Any additional notes about the XML element.	
	The entry is empty is there are no additional notes.	
	All notes are informative.	

Table 3: XML Element Attribute Descriptions

Attributes	The XML element name	
The XML Attribute Name	A narrative description of the XML attribute, its semantics and its behavior. The description contains the information that a user needs to produce or consume the attribute for the element. Each attribute is described by two entries (Value, Description).	
	Value	The value space for the attribute.
	Description	Constraints on acceptable data values for the attribute within the specified data type and value space.
		If the attribute is from a constrained vocabulary or value space, there is one row per vocabulary value or value space indicating the value and describing the meaning of the vocabulary item or value space.

The Specification uses graphics generated by Altova XML Spy® software to illustrate the XML structure of a document. The illustrations use the graphical conventions shown in Figure 1.

Illustrations of XML document structure and elements are informative.

Note: The use of XML Spy does not constitute an endorsement by the SBAC of the product. Other products may be used to produce similar illustrations of the XML document structure.

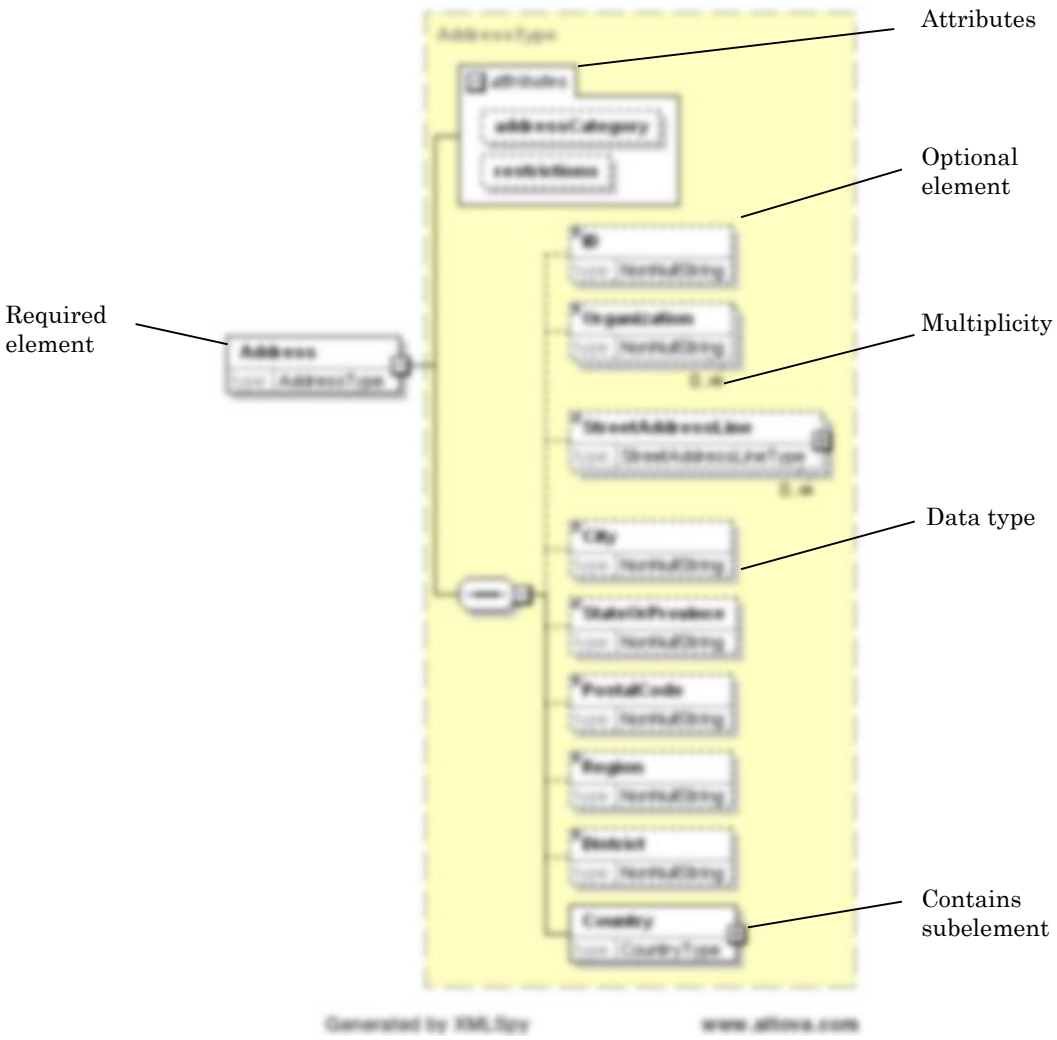


Figure 1: XML Graphical Conventions

Element Presentation Order

Within the description of an XML document, the root element of the document or element tree is described first, followed by subelements in depth-first order. If there are multiple root elements, each and its subelements are described independently.

Common subelements used by multiple elements are collected in a separate section designated *Shared Elements*.

Namespaces

The Specification uses the XML namespace prefixes shown in Table 4. Use of these prefixes in schemata or instance documents is NOT REQUIRED.

Table 4: XML Namespace Prefixes

Document Type/Element	Prefix	Namespace
XSD	xsd:	http://www.w3.org/2001/XMLSchema
Instance	xsi:	http://www.w3.org/2001/XMLSchema-Instance
QTI Assessment Item	qti:	http://www.imsglobal.org/xsd/imsqti_v2p1
MathML Content (Math Element)	mml:	http://www.w3.org/1998/Math/MathML
xHTML	xhtml:	Add NS URI

Special Characters

Special characters in strings are described with informal character name, followed in parenthesis by the character itself, the [ISO 8859-1] *character entity* and the *entity name* for the character, e.g., comma (, , ,).

Typographic Conventions

The Specification uses the typographic conventions shown in Table 5 for XML element and attribute descriptions within the element description tables and code examples.

Table 5: XML Typographic Conventions

Convention	Description
Bold Text	Descriptive metatag used as part of the element description format.
Normal Text	Description of an XML element, XML attribute or attribute value.
Italics *Italics San Serif*	A special value for an XML element, XML attribute or attribute value that is not encoded in XML. Examples include *None* and *Any*. Typically a semantic constraint.
San Serif	Sample XML tags, name, code, values, schemata, or portion thereof.

Informal Document Model

Note: This section is informative.

The entire information model consists of:

- An *Assessment Item Release* XML document.
- An *Assessment Item* XML document.
- A *Passage Item* XML document.
- A *Tutorial* XML document.
- A *Wordlist* XML document.
- An *Assessment Item Accessibility* XML document.
- A *Grid Item Rendering Specification* XML document.
- An *Equation Editor Configuration* XML document.
- An *Assessment Item Usage Statistics* XML document.
- The *Assessment Item Machine Rubric* XML documents (not documented in the Specification).

The parts of the information model are illustrated in Figure 2. The core of the information model is the *Assessment Item* XML document, identified by an item number. The *Assessment Item* XML document contains or links to all of the parts of an assessment item.

- An assessment item may include a passage item, stored separately. The assessment item references the passage item through the passage item number. A passage is a separate type of document but it has some elements that are similar to those of an assessment item. The structure of a passage is defined by the *Passage Item* XML document elements.
- An assessment item may contain resources, e.g., a wordlist, stored separately. The assessment item references the item number of the assessment item that contains the wordlist. The wordlist has a unique XML element structure within the assessment item XML element. The structure of a wordlist is defined by the *Wordlist* XML document elements. Other resources are treated in the same manner.
- An assessment item may contain a tutorial, stored separately. The assessment item references the item number of the assessment item that contains the tutorial content. A tutorial is modeled as an assessment item – some of the XML elements within the assessment item model are not used in a tutorial item.
- As assessment item may include a rendering specification used to control how the item is displayed. The rendering specification is stored separately from the item and each of the different types of assessment items are defined by their own *Rendering Specification* XML document elements. There are currently two defined rendering specifications, one for a grid item and one for the equation editor configuration for an equation item. In the actual implementation, the grid item rendering specification is stored within in the assessment item instead of being stored separately.
- As assessment item may include a machine rubric used to control how the item is automatically graded. The machine rubric is stored separately from the item and each of the different types of machine rubrics are defined by their own *Assessment Item Machine Rubric* XML document elements.
- An assessment item may incorporate usage statistics XMLs within the item. The structure of the usage statistics elements is defined by the *Assessment Item Usage Statistics* XML document elements. These elements are documented independently.
- An assessment item may contain file references to attachment files, stored separately. Attachments typically hold accessibility content.
- An assessment item may incorporate accessibility XML elements within the item. The structure of the accessibility elements is defined by the *Assessment Item Accessibility* XML document element. These elements are documented independently as they are used for both accessibility and passage items

A *Passage Item* XML document is similar to an *Assessment Item* XML document. The passage is identified by an item number The *Passage Item* XML document contains or links to all of the parts of the passage item. The passage item information model incorporates a subset of the components of an assessment item: resources, attachments and accessibility elements.

An *Assessment Item Release* XML container document is used to hold an *Assessment Item* XML document or a *Passage Item* XML document inline in the item release document. The *Assessment Item Release* may hold any of the different types of *Assessment Item* XML documents.

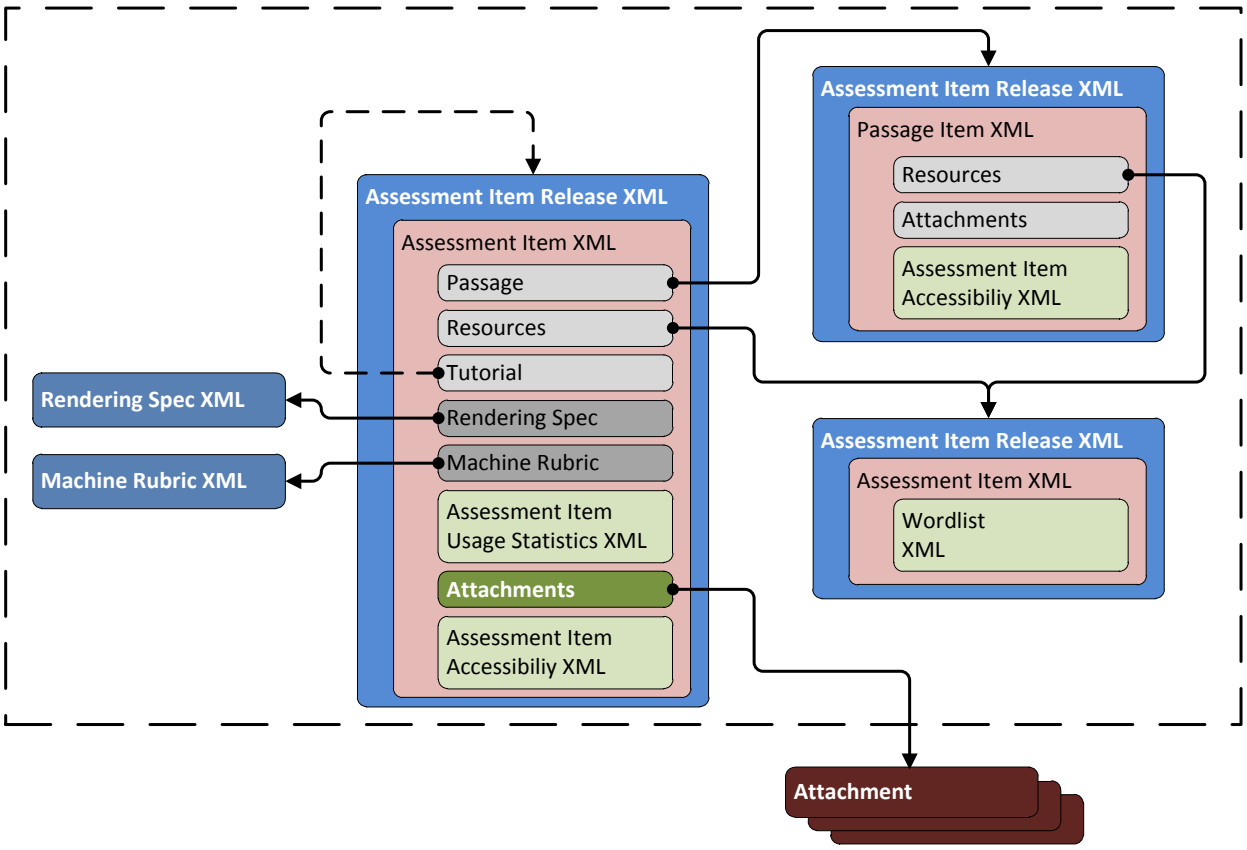


Figure 2: Overall XML Document Model (Informative)

For the purpose of item exchange, an assessment item and its associated files MAY be organized into a file folder hierarchy and packaged into an exchange format such as a ZIP file for transport. For example, SBAC uses a custom profile of the IMS APIP Profile of IMS Content Packaging [APIP Tech 1.0] that defines the specific file hierarchy and naming structure used to package and exchange SBAC assessment items [SBAC Packaging 1.4].

The Specification does not REQUIRE the use of specific item storage, file name, folder structure, packaging or exchange representations.

Assessment Item Release XML Document Information Model

An *Assessment Item Release* XML document is a container element for distribution and exchange of any type of assessment item or passage item. The container is required for the AIR implementation and AIR workflow processes.

The information model for an *Assessment Item Release* XML document includes either:

- An *Assessment Item* XML document.
- A *Passage Item* XML document.

Assessment Item XML Document Information Model

Describe an assessment item XML document.

The information model for an *Assessment Item* XML document includes:

- Item content.
- An associated passage (e.g., stimulus) which is an independent *Passage Item* XML document.
- A list of item attributes.
- An item tutorial which is an independent *Tutorial* XML document modeled as an *Assessment Item* XML document.
- A list of item resources, e.g., other independent *Assessment Item* XML document that have a special format.
- A collection of assessment item usage statistics modeled as an inline *Assessment Item Usage Statistics* XML document.
- A machine scoreable rubric modeled as an independent *Machine Rubric* XML document.
- A rendering specification modeled as an independent *rendering specification* XML document.
- The assessment item content.

The assessment item content includes:

- IMS QTI XML content.
- A list of rationale options.
- An illustration modeled as a block of HTML.
- A stem modeled as a block of HTML.
- A list of rubrics.
- A list of options.
- A list of attachments, each attachment is a separate file.
- Assessment item accessibility information modeled inline as an *Assessment Item Accessibility* XML document.

The assessment item is identified by an item number and version. The item number is unique across all XML documents that include an item number.

Passage Item XML Document Information Model

Describe a passage item XML document.

The information model for a *Passage Item* XML document includes:

- A list of item attributes.
- An item tutorial which is an independent *Tutorial* XML document modeled as an *Assessment Item* XML document.
- A list of item resources, e.g., other independent *Assessment Item* XML document that have a special format.
- The passage item content.

The passage item content includes:

- A stem modeled as a block of HTML.
- A list of attachments, each attachment is a separate file.
- Passage item accessibility information modeled inline as an *Assessment Item Accessibility* XML document.

The passage item is identified by an item number and version. The item number is unique across all XML documents that include an item number.

Tutorial XML Document Information Model

A *Tutorial* XML document is modeled as an *Assessment Item* XML document where the value of the format attribute of the item element is tut. All features of an *Assessment Item* XML document MAY be used in a *Tutorial* XML document

The information model for a *Tutorial* XML document mirrors the information model for an *Assessment Item* XML.

The assessment item is identified by an item number and version. The item number is unique across all XML documents that include an item number.

Wordlist XML Document Information Model

Describe a wordlist XML document.

A wordlist is modeled as a special type of assessment item, i.e., it contains a different set of sublelements,

The information model for a *Wordlist* XML document includes:

- A list of keywords containing individual keyword descriptions each modeled as a block of HTML.

The wordlist item is identified by an item number and version. The item number is unique across all XML documents that include an item number.

Assessment Item Accessibility XML Document Information Model

Describe an assessment item accessibility XML document.

Accessibility information is stored inline in an *Assessment Item* XML document or *Passage Item* XML document

.

The information model for an *Assessment Item Accessibility* XML document includes:

- Accessibility elements containing text to speech pronunciation information and Braille or ASL alternative text.

Grid Item Rendering Specification XML Document Information Model

Describe a grid item rendering specification XML document.

The information model for a *Grid Item Rendering Specification* XML document includes:

- Questions.
- Hot Spots.
- Add parts.

Equation Editor Configuration XML Document Information Model

Describe an equation editor configuration XML document.

The information model for an *Equation Editor Configuration* XML document includes:

- Add parts.

Assessment Item Usage Statistics XML Document Information Model

An *Assessment Item Usage Statistics* XML document captures data about the use of an assessment item. The assessment item usage statistics are represented as a collection of subelements of the statistic element. The statistic element is the root of the subtree of elements. The statistic element is one of the subelements of an assessment item.

The information model for an *Assessment Item Usage Statistics* XML document includes:

- Add description of subelement parts.

Note: This section is a placeholder pending details of the statistic elements.

Assessment Item Machine Rubric XML Document Information Model

An *Assessment Item Machine Rubric* XML document contains the rubric rules for automated item grading. An assessment item MAY include a *machine rubric*. The machine rubric is contained in an external XML document that is referenced from the assessment item through the file name attribute of the item MachineRubric element in the assessment item. Different types of assessment items use different machine rubrics.

The details of the machine rubric XML elements for the different types of assessment items are not documented in the Specification.

XML Document Elements

Details of the elements used to describe the assessment item XML documents are presented in individual sections, each section describing one of the XML documents. The element details are presented using the notation described.

Assessment Item Release XML Document Elements

An *Assessment Item Release* XML document is a container element for distribution and exchange of any type of assessment item or passage item. The container is required for the AIR implementation and AIR workflow processes.

An *Assessment Item Release* document consists of a single root XML element. The element describes release information that is part of the element development workflow. The root element of a document instance contains a single subelement. Different types of subelements are used to contain different types of assessment item documents. Each of the assessment item element document formats are documented separately in the Specification.

The *Assessment Item Release* XML document is a candidate TO BE DEPRICATED.be eliminated in a future version of the Specification.

The entire element hierarchy within an *Assessment Item* XML document is illustrated in Figure 3 (informative).

Note: The element hierarchy below is a placeholder – to be replaced by an actual diagram of the elements using the graphic conventions described.

- itemrelease
  - item
  - passage

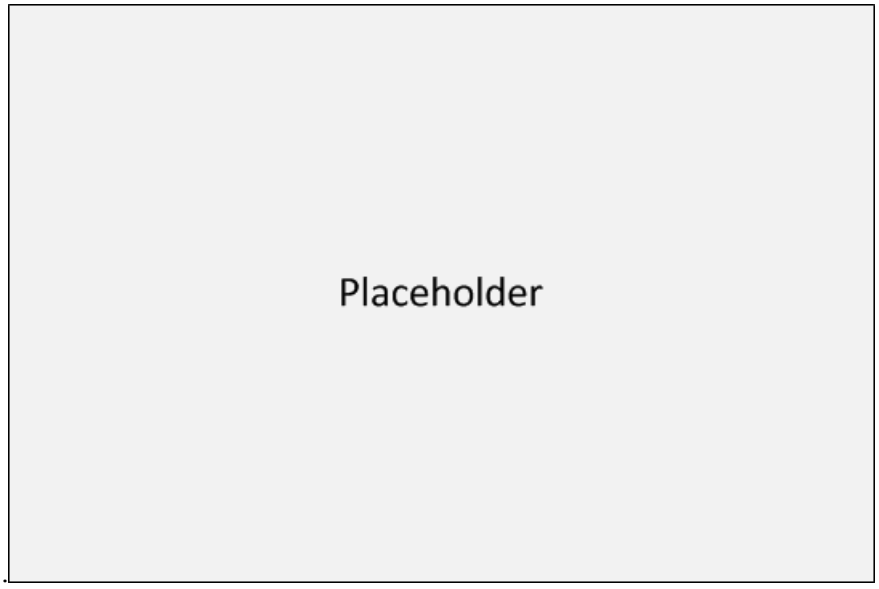


Figure 3: Assessment Item Release XML Document Structure (Informative)

Assessment Item Release Elements

Element	itemrelease
Description	Container element for the release of an assessment item.

Element	itemrelease			
Element Type	choice			
Elements	**Name**	**Multiplicity**		
	item	[1]		
	passage	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	version	☑ ☒	xsd:string {100}	*None*
Extensions	☒			
Notes	The item and passage elements are documented individually below.			
	The itemrelease element is a candidate TO BE DEPRICATED.			

Attributes	itemrelease
version	Version identifier for the item as part of the release.
	There are no constraints on the value of the attribute.
	A value is REQUIRED but not used. Any non null string MAY be used.
	The version attribute is a candidate TO BE DEPRICATED. The attribute is REQUIRED.

Assessment Item XML Document Elements

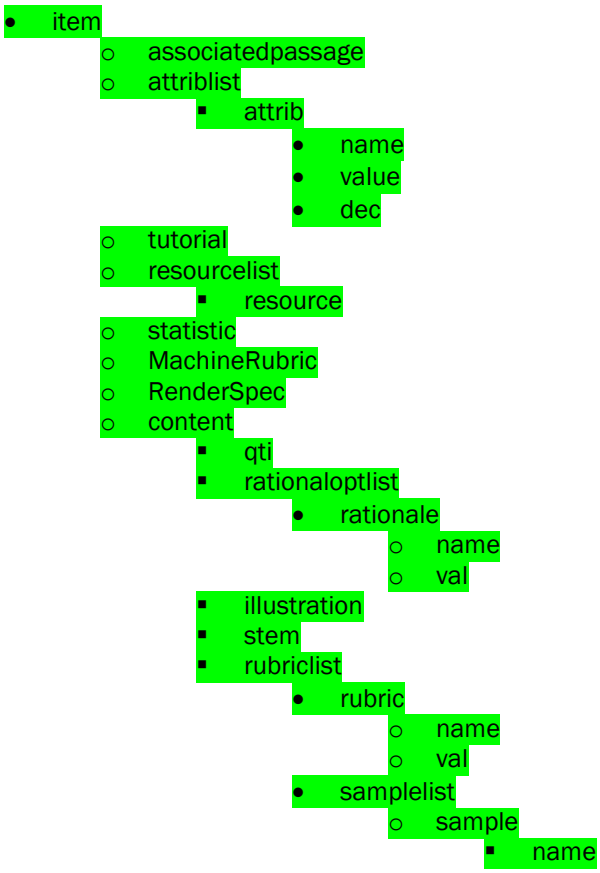
Repeat summary of an Assessment Item XML document from the informal model.

The XML elements for an *Assessment Item* document are detailed in four groups:

- *Assessment item elements* – the definition of elements used to describe the behavior of an item as a whole. A single item element is the root element of the tree. The item element is embedded in an itemrelease element.
- *Content elements* – the definition of elements used to describe the content of the item. Content elements are rooted through a set of content subelements within the item element.
- *Accessibility elements* – the definition of elements used to describe accessibility features for the item. Accessibility elements are rooted through a single apipAccessibility subelement within any set of item content elements. Accessibility elements are shared with other types of items and are documented separately in the Specification.
- *Shared elements* – the definition of simple common XML elements that are subelements of various other elements (i.e., name, val, desc, annotation). Shared elements with the same names are used in other XML documents. Their definition MAY BE XML document specific.

The entire element hierarchy within an *Assessment Item* XML document is illustrated in Figure 4 (informative).

Note: The element hierarchy below is a placeholder – to be replaced by an actual diagram of the elements using the graphic conventions described.



- annotation
- samplecontent
- optionlist
  - option
    - name
    - val
    - feedback
- attachmentlist
  - attachment
- apipAccessibility

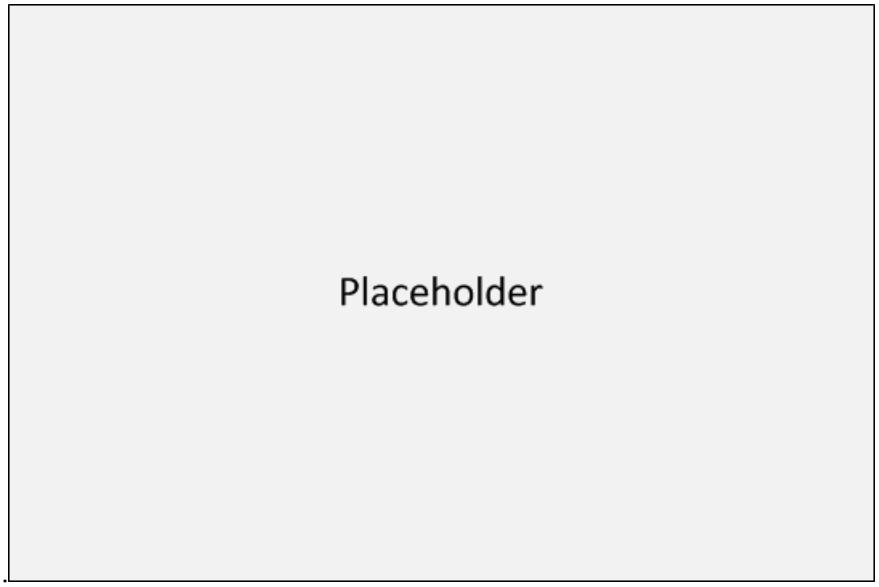


Figure 4: Assessment Item XML Document Structure (Informative)

Assessment Item Elements

Element	item			
Description	An assessment item.			
Element Type	sequence			
Elements	Name	**Multiplicity**		
	associatedpassage	[0..1]		
	attriblist	[0..1]		
	tutorial	[0..1]		
	resourcelist	[0..1]		
	statistic	[0..1]		
	MachineRubric	[0..1]		
	RenderSpec	[0..1]		
	gridanswerspace content	[0..1]		
	content	[1..*] {10}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	format	☐	xsd:token	
	type	☐ ☒	xsd:token	
	id	☑	xsd:positiveInteger	

Element	item			
	version	☑	xsd:string {100}	
Extensions	☑			
Conformance	The gridanswerspace element SHALL be present only if the format attribute value is gi (grid item).			
	An element that contains the gridanswerspace element be with a format attribute value other than gi (grid item) SHALL be non conforming.			
	Either the format or type attribute SHALL be present.			
	An element that contains both the format and type attributes SHALL be non conforming.			
Notes	All types of items except *Wordlist* items indicate the item type with the format attribute. *Wordlist* items use the type attribute instead of the format attribute to indicate the item type.			
	The type attribute is a candidate TO BE DEPRICATED in favor of using only the format attribute.			
	Wordlist items use the item element but use a different set of subelements. *Wordlist* items are documented separately in the Specification.			
	How or when the *Assessment Item* content is presented to the student is not specified.			

Attributes	item	
format	The type of the item. A vocabulary of values.	
	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	EBSR	Evidence-Based Selected Response item.
	er	Extended Response item.
	eq	Equation item.
	gi	Grid item.
	ht	Hot Text item.
	mc	Multiple Choice item.
	mi	Match Interaction item.
	ms	Multi-Select item.
	nl	Natural Language item.
	pass	Passage item.
	sa	Short Answer item.
	SIM	Simulation item.
	ti	Table Interaction item.
	tut	Tutorial item.
	wer	Writing Extended Response item.
	wordlist	Wordlist resource.
	All types of items except *Wordlist* items SHALL indicate the item type with the format attribute. wordlist is included in the vocabulary but SHALL NOT be used as a value of format. It is included to permit the type attribute TO BE DEPRICATED.	
	The value pass is reserved and SHALL NOT be used.	
type	The type of the item. A vocabulary of values.	
	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	wordlist	Wordlist resource.
	The attribute SHALL be used only for *Wordlist* items.	
	The type attribute is a candidate TO BE DEPRICATED.	

Attributes	item
id	Unique item number for the item.
	The value of the item number SHALL be unique within the context of all items.
	The value of the item number SHALL be < 2^{31}-1.
	This Specification does not indicate how a producing system insures uniqueness or the behavior of a consuming system when different items have the same id.
version	Version identifier for the item.
	The value SHALL match the regular expression: \d+(\.\d+)?(\.\d+)?

Element	associatedpassage
Description	Item number for the stimulus passage for an item.
Element Type	xsd:positiveInteger
Value	*Any*
Default	*None*
Extensions	☑
Conformance	The integer value of the element SHALL match the id of the corresponding *Passage Item*.
	An element that contains an item number that references an item that is not a *Passage Item* SHALL be non conforming.
Notes	How the element value item number is converted into the file name of the XML document holding the corresponding *Passage Item* is not specified.
	There MAY be multiple *Passage Items* with the same item number but with different version numbers. How to determine the version of the passage that is referenced is not specified.
	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].
	How or when the *Passage Item* content is presented to the student is not specified.

Element	attriblist			
Description	Attributes of an item.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	attrib	[1..*] {100}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	How or when the attributes are used is not specified.			

Element	attrib			
Description	Attribute of an item.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	name	[1]		
	value	[1]		
	desc	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**

Element	attrib			
	attid	☑	xsd:token	
Extensions	☑			
Conformance	The value of the name element and the value and value space of the value element SHALL align with the value of the attid attribute as shown in Table 7.			
	An element that contains a name element or a value or value space of the value element that does not align with the value of the attid attribute as shown in Table 7 SHALL BE non conforming.			
Notes				

Attributes	attrib	
attid	The identifier for the attribute.	
	Value	**Description**
	itm_att_Answer Key	Add description
	itm_att_Cloze Answers	Add description
	itm_att_Grade	Add description
	itm_att_Item Format	Add description
	itm_att_Item Point	Add description
	itm_att_Page Layout	Add description
	itm_att_Response Type	Add description
	itm_FTUse	Add description
	itm_OPUse	Add description
	itm_item_desc	Add description
	itm_item_id	Add description
	itm_item_subject	Add description
	stm_pass_id	Add description

Additional details of each of the attributes are shown in Table 7. The table includes:

- The attribute id attid.
- An indication if the attribute is required (☑) or optional (☐).
- The name that corresponds to the attribute id.
- The value that corresponds to the attribute id.
- The value space of the value.

Associated conformance constraints are:

- If the name element or a value or value space of the value element that does not align with the value of the attid attribute as shown SHALL BE non conforming.
- An element that contains a name element or a value or value space of the value element that does not align with the value of the attid attribute as shown SHALL BE non conforming.
- The value of the name element and the value and value space of the value element SHALL align with the value of the attid attribute.
- For an attid value of itm_att_Answer Key the value of value SHALL match the format attribute of the item element.
- For an attid value of itm_att_Answer Key a value of value that does not match the format attribute of the item element SHALL BE non conforming.
- For an attid value of itm_att_Item Format the value of value SHALL match the format attribute of the item element.
- For an attid value of itm_att_Item a value of value that does not match the format attribute of the item element SHALL BE non conforming.
- For an attid value of itm_item_id the value of value SHALL match the id attribute of the item element.

- For an attid value of itm_item_id a value of value that does not match the id attribute of the item element SHALL BE non conforming.
- For an attid value of stm_pass_id the value of value SHALL match the value of the associatedpassage element.
- For an attid value of stm_pass_id a value of value that does not match the value of the associatedpassage item element SHALL BE non conforming.

Table 7: Assessment Item Attributes

attid	☑/☐	name	value	value space
itm_att_Answer Key	??	Item: Answer Key	Item format	xsd:token
itm_att_Cloze Answers	??	Item: Cloze Answers	??	??
itm_att_Grade	??	Item: Grade	Item grade level	xsd:token
itm_att_Item Format	??	Item: Item Format	Item format	xsd:token
itm_att_Item Point	??	Item: Item Point	??	xsd:string
itm_att_Page Layout	??	Item: Page Layout	??	??
itm_att_Response Type	??	Item: Response Type	??	??
itm_FTUse	??	Fieldtest Use	Any	xsd:string
itm_OPUse	??	Operational Use	Any	xsd:string
itm_item_desc	??	Item: Item Description	Any	xsd:string
itm_item_id	??	Item: ITS ID	Item number	xsd:positiveInteger
itm_item_subject	??	Item: Subject	Subject classifier	xsd:token
stm_pass_id	??	Stim: ITS ID	Associated passage Item number	xsd:positiveInteger

Element	tutorial			
Description	Item number for the *Tutorial* for an item.			
Element Type	*Empty*			
Elements	**Name**	**Multiplicity**		
	None			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	id	☑	xsd:positiveInteger	
Extensions	☑			
Conformance	The integer value for the id attribute SHALL match the id of the corresponding *Tutorial*.			
	An element that contains an integer value for the id attribute that references an item that is not a *Tutorial* SHALL be non conforming.			
Notes	How the id attribute item number is converted into the file name of the XML document holding the corresponding *Tutorial* is not specified.			
	There MAY be multiple *Tutorial Items* with the same item number but with different version numbers. How to determine the version of the *Tutorial* that is referenced is not specified.			
	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].			
	How or when the *Tutorial* content is presented to the student is not specified.			

Attributes	tutorial
id	Item number for the *Tutorial* for an item.
	The value of the item number SHALL be unique within the context of all items.

Element	resourcelist			
Description	Additional resources for an item. The resource is described in an XML document specific to the type of resource.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	resource	[1..*] {10}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	Most items use only one resource.			
	Tools such as a calculator, protractor, or ruler used by an assessment item are specified on the test form and not with the item.			

Element	resource			
Description	A resource for an item. The resource is described in an XML document type that is specific to the type of resource.			
Element Type	*Empty*			
Elements	**Name**	**Multiplicity**		
	None			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	type	☑	xsd:token	
	~~id~~	~~☑~~	~~xsd:string {4000}~~	
	id	☑	xsd:positiveInteger	
	index	☑	xsd:string {4000}	
Extensions	☑			
Conformance	The integer value of the id attribute SHALL match the id of the corresponding resource which has an item type attribute that matches the type attribute.			
	An element that contains an integer value for the id attribute that references a resource which has an item type attribute that does not match the type attribute SHALL be non conforming.			
Notes	This Specification does not specify how the id attribute value item number is converted into the file name of the XML document holding the corresponding resource.			
	There MAY be multiple resources with the same item number but with different version numbers. How to determine the version of the resource that is referenced is not specified.			
	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].			
	How or when the resource content is presented to the student is not specified.			

Attributes	resource	
type	Type of the resource. A vocabulary of values.	
	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	wordlist	The resource is a *Wordlist* item. The *Wordlist* XML document structure is described separately.
	tutorial	The resource is a *Tutorial* item. The *Tutorial* XML document structure is described separately.
	...	Need list of all the valid types

Attributes	resource
	The value tutorial is reserved and SHALL NOT be used.
id	Item number for the resource for an item.
	The value of the item number SHALL be unique within the context of all items.
index	Need description

Element	MachineRubric			
Description	The file name for the rubric used to machine score the item. The rubric is specific to the format of the assessment item.			
Element Type	*Empty*			
Elements	**Name**	**Multiplicity**		
	None			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	filename	☑	xsd:string {4000}	
Extensions	☑			
Conformance	The value of the filename attribute SHALL reference an *Assessment Item Machine Rubric* XML document whose content is appropriate for the assessment item format.			
	An element that contains value of the filename attribute that references an *Assessment Item Machine Rubric* XML document whose content is not is appropriate for the assessment item format SHALL be non conforming.			
Notes	The *Assessment Item Machine Rubric* XML Document structure is defined separately.			
	Different *Assessment Item Machine Rubric* XML Document structures are used for different assessment item formats.			
	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].			

Attributes	MachineRubric
filename	File name of the file containing the rubric.
	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].

Element	RenderSpec			
Description	The file name for the rendering specification used to render the item on the test client device. The rendering specification is specific to the format of the assessment item.			
Element Type	*Empty*			
Elements	**Name**	**Multiplicity**		
	None			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	filename	☑	xsd:string {4000}	
Conformance	The value of the filename attribute SHALL reference a rendering specification XML document whose content is appropriate for the assessment item format.			
	An element that contains value of the filename attribute that references a rendering specification XML document whose content is not is appropriate for the assessment item format SHALL be non conforming.			
Extensions	☑			

Element	RenderSpec
Notes	The rendering specifications are defined separately for the different types of items.
	Different rendering specifications are used for different assessment item formats.
	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].

Attributes	RenderSpec
filename	File name of the file containing the rendering specification.
	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].

Element	gridanswerspace			
Description	The container for the *Grid Item Rendering Specification* XML document elements.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	The set of elements are documented separately in the *Grid Item Rendering Specification* XML document.			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Conformance	The gridanswerspace element SHALL be present only if the format attribute value is gi (grid item).			
	An element that contains the gridanswerspace element SHALL be with a format attribute value other than gi (grid item) SHALL be non conforming.			
Notes				

Content Elements

Element	content			
Description	Content of an item.			
Element Type	mixed			
Elements	**Name**	**Multiplicity**		
	qti	[0..1]		
	rationaleoptlist	[0..1]		
	illustration	[0..1]		
	stem	[1]		
	rubriclist	[0..1]		
	optionlist	[0..1]		
	attachmentlist	[0..1]		
	apipAccessibility	[0..1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	language	☑	xsd:language	
	version	☑ ☒	xsd:string {100}	
	format	☐	xsd:token	
	approvedversion	☐	xsd:string {100}	
Extensions	☑			

Element	content
Conformance	An XML document with two or more content elements with the same value of xsd:language SHALL be non conforming.
	The value of the version attribute SHOULD match the value of the version attribute of the itemrelease element in the *Assessment Item Release* XML container document.
	The behavior if the value of the version attribute does not match the value of the version attribute of the itemrelease element is not defined.
	The value of the format attribute SHOULD match the value of the format attribute of the item element.
	An element that contains a value for the format attribute that does not match the value of the format attribute of the item element SHALL be non conforming.
	The value of the approveddversion attribute SHOULD match the value of the version attribute of the item element.
	The behavior if the element that contains a value for the approveddversion attribute that does not match the value of the version attribute of the item element is not defined.
Notes	There is one content element instance for each language variant of the item.

Attributes	content	
language	Language of the content.	
	The value SHALL conform to [RFC 5646].	
version	The version identifier for the content of the item release.	
	There are no constraints on the value of the attribute.	
	A value is REQUIRED but not used. Any non null string MAY be used.	
	The version attribute is a candidate TO BE DEPRICATED. The attribute is REQUIRED.	
format	The type of the item. A vocabulary of values.	
	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	EBSR	Evidence-Based Selected Response item.
	er	Extended Response item.
	eq	Equation item.
	gi	Grid item.
	ht	Hot Text item.
	mc	Multiple Choice item.
	mi	Match Interaction item.
	ms	Multi-Select item.
	pass	Passage item
	nl	Natural Language item.
	sa	Short Answer item.
	SIM	Simulation item.
	ti	Table Interaction item.
	tut	Tutorial item.
	wer	Writing Extended Response item.
	wordlist	Wordlist resource.
	The value pass is reserved and SHALL NOT be used.	
approvedversion	Version identifier for the item content.	
	The value SHALL match the regular expression: \d+(\.\d+)?(\.\d+)?	

Element	qti			
Description	The container for IMS QTI XML document elements describing an assessment item			
Element Type	QTI			
Elements	**Name**	**Multiplicity**		
	Any			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	spec	☑	xsd:token	
Extensions	☒			
Conformance	The content of the subelements SHALL conform to the itemBody element of [QTI 2.1 XML].			
Notes	All QTI itemBody subelements and attributes are permitted as defined in [QTI XML 2.1]. All QTI interactions are supported.			

Attributes	qti	
spec	Type of QTI content	
	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	itemBody	The QTI content is any QTI itemBody elements.

Element	rationaleoptlist			
Description	Rationales for each response option.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	rationale	[0..*] {100}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Conformance	This element SHALL be used only for multiple choice (the item format attribute value is MC) or multiple select (the item format attribute value is MS) items.			
Notes				

Element	rationale			
Description	Justification for a response.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	name	[1]		
	val	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Conformance	This element SHALL be used only for multiple choice (the item format attribute value is MC) or multiple select (the item format attribute value is MS) items.			
Notes				

Element	illustration

Element	illustration
Description	Illustration associated with an element.
Element Type	HTML {16000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	The illustration content SHOULD conform to [XHTML 1.1].
Notes	

Element	stem
Description	Directions to the student to provide a response to the item.
Element Type	HTML {64000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	The stem content SHOULD conform to [XHTML 1.1].
Notes	

Element	rubriclist			
Description	Rubrics associated with the item.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	rubric	[1..*] {100}		
	samplelist	[1..*] {100}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	The structure is a collection of pairs of rubric and samplelist.			

Element	rubric			
Description	The scoring rubric.			
Element Type	*sequence*			
Elements	**Name**	**Multiplicity**		
	name	[1]		
	val	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	scorepoint	☑	xsd:integer	
Extensions	☑			
Notes				

Attributes	rubric
scorepoint	The number of points that can be award to the student.

Element	samplelist
Description	~~Add description~~. Example responses that deserve certain item point values.
Element Type	sequence

Element	samplelist			
Elements	**Name**	**Multiplicity**		
	sample	[0..*]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	minval	☑	xsd:integer	
	maxval	☑	xsd:integer	
Extensions	☑			
Conformance	The value of minval SHALL equal the value of maxval.			
	The value of minval SHALL equal the value of scorepoint in the rubric element.			
Notes				

Attributes	samplelist
minval	Maximum number of points awarded.
maxval	Minimum number of points awarded.

Element	sample			
Description	Add description.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	name	[1]		
	annotation	[1]		
	samplecontent	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	purpose	☑	xsd:string {4000}	
	scorepoint	☑	xsd:integer	
Extensions	☑			
Notes				

Attributes	sample
purpose	Add description.
scorepoint	Add description.

Element	samplecontent
Description	Description.
Element Type	HTML {16000}
Value	*Any*
Default	*None*
Extensions	☑
Conformance	The samplecontent content SHOULD conform to [XHTML 1.1].
Notes	

Element	optionlist			
Description	Response choices associated with the item.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	option	[1..*] {100}		
Attributes	**Name**	**Required**	**Data Type**	**Default**

Element	optionlist
	None
Extensions	☑
Conformance	This element SHALL be used only for multiple choice (the item format attribute value is MC) or multiple select (the item format attribute value is MS) items.
Notes	

Element	option			
Description	Response choice description.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	name	[1]		
	val	[1]		
	feedback	[0..1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	minChoices	☐	xsd:integer	
Extensions	☑			
Notes	This element SHALL be used only for multiple choice (the item format attribute value is MC) or multiple select (the item format attribute value is MS) items.			

Attributes	option
minChoices	Add description.

Element	feedback
Description	Response choice description.
Element Type	HTML {16000}
Value	*Any*
Default	*None*
Extensions	☑
Conformance	The feedback content SHOULD conform to [XHTML 1.1].
Notes	

Element	attachmentlist			
Description	Attachments associated with the item.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	attachment	[0..*] {100}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes				

Element	attachment			
Description	URI of an attachment ~~resource~~ included with an item.			
Element Type	*Empty*			
Elements	**Name**	**Multiplicity**		

Element	attachment			
	None			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	id	☑	xsd:string {4000}	
	type	☑	xsd:token	
	subtype	☐	xsd:token	Default value
	filename	☑	xsd:string {4000}	
Extensions	☑			
Notes	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].			

Attributes	attachment	
id	Description.	
type	Type of attachment. A vocabulary of values.	
	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	Braille	The attachment is Braille.
	ASL	The attachment is American Sign Language (ASL).
	…	Need list of all the valid types
subtype	Subtype of the attachment. A vocabulary of values that are dependent on the value of type.	
	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	contracted	Braille contracted – the value is valid only for type Braille
	uncontracted	Braille uncontracted – the value is valid only for type Braille
	nemeth	Braille nemeth [Nemeth]– the value is valid only for type Braille
	Stem	ASL Stem – the value is valid only for type ASL
	Option A	ASL Option A – the value is valid only for type ASL
	Option B	ASL Option B – the value is valid only for type ASL
	…	Need list of all the valid types
filename	File name of the file containing the rendering specification.	
	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].	

Shared Elements

Element	name
Description	Human readable name of an attribute, rationale rubric, scorepoint or option.
Element Type	xsd:string {4000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	Markup embedded in the string SHALL be ignored and treated as plain text.
	For an attribute element, the value of name SHALL correspond to the value of attid as shown in Table 7.
Notes	name is a subelement of several other elements (attribute, rationale, rubric, scorepoint, option). The definition is the same for all uses.

Element	val
Description	Value of an attribute, rationale rubric, scorepoint or option.
Element Type	HTML {4000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	For an attribute element, the value of val SHALL correspond to the value of attid as shown in Table 7.
	For an attribute element embedded in the string SHALL be ignored and treated as plain text.
	For a rationale rubric, scorepoint or option element content SHOULD conform to [XHTML 1.1].
Notes	name is a subelement of several other elements (attribute, rationale, rubric, scorepoint, option). Except as noted in Conformance, definition is the same for all uses.

Element	desc
Description	Human readable description of an attribute.
Element Type	xsd:string {4000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	Markup embedded in the string SHALL be ignored and treated as plain text.
Notes	

Element	annotation
Description	Add description.
Element Type	
Value	
Default	
Extensions	☒
Notes	

Passage Item XML Document Elements

Repeat summary of a Passage Item XML document from the informal model.

The XML elements for a *Passage Item* document are detailed in four groups:

- *Passage item elements* – the definition of elements used to describe the behavior of a passage item as a whole. A single passage element is the root element of the tree. The passage element is embedded in an itemrelease element.
- *Content elements* – the definition of elements used to describe the content of the passage. Content elements are rooted through a set of content subelements within the passage element.
- *Accessibility elements* – the definition of elements used to describe accessibility features for the passage. Accessibility elements are rooted through a single apipAccessibility subelement within any set of passage content elements. Accessibility elements are shared with other types of items and are documented separately in the Specification.
- *Shared elements* – the definition of simple common XML elements that are subelements of various other elements (i.e., name, val, desc). Shared elements with the same names are used in other XML documents. Their definition MAY BE XML document specific.

The entire element hierarchy within a *Passage Item* XML document is illustrated in Figure 5 (informative).

Note: The element hierarchy below is a placeholder – to be replaced by an actual diagram of the elements using the graphic conventions described.

- passage
  - attriblist
    - attrib
      - name
      - value
      - desc
  - resourcelist
    - resource
  - content
    - title
    - author
    - stem
    - attachmentlist
    - apipAccessibility

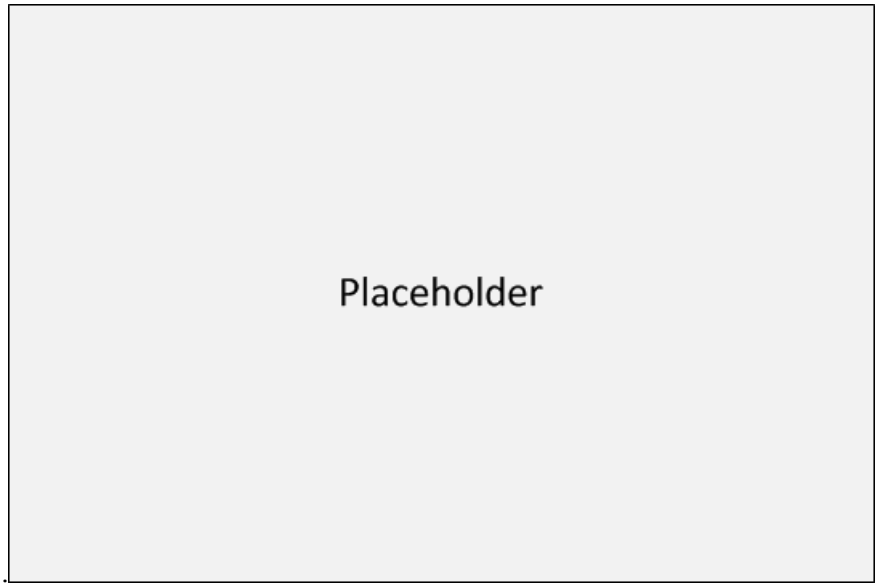


Figure 5: Passage Item XML Document Structure (Informative)

Passage Item Elements

Element	passage			
Description	An assessment item passage.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	attriblist	[0..1]		
	resourcelist	[0..1]		
	content	[1..*] {10}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	id	☑	xsd:positiveInteger	
	version	☑	xsd:string {100}	
Extensions	☑			
Notes	How or when the *Passage Item* content is presented to the student is not specified.			

Attributes	passage
id	Unique item number for the passage item.
	The value of the item number SHALL be unique within the context of all items.
	The value of the item number SHALL be < 2^{31}-1.
	This Specification does not indicate how a producing system insures uniqueness or the behavior of a consuming system when different items have the same id.
version	Version identifier for the passage.
	The value SHALL match the regular expression: \d+(\.\d+)?(\.\d+)?

Element	attriblist
Description	Attributes of a passage.
Element Type	sequence

Element	attriblist			
Elements	**Name**	**Multiplicity**		
	attrib	[1..*] {100}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	How or when the attributes are used is not specified.			

Element	attrib			
Description	Attribute of a passage.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	name	[1]		
	value	[1]		
	desc	[1]		
Extensions	☑			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	attid	☑	xsd:token	
Conformance	The value of the name element and the value and value space of the value element SHALL align with the value of the attid attribute as shown in Table 8.			
	An element that contains a name element or a value or value space of the value element that does not align with the value of the attid attribute as shown in Table 8 SHALL BE non conforming.			
Notes				

Attributes	attrib	
attid	The identifier for the attribute.	
	Value	**Description**
	stm_pass_desc	Add description
	stm_pass_id	Add description
	stm_pass_subject	Add description

Additional details of each of the attributes are shown in Table 8. The table includes:

- The attribute id attid.
- An indication if the attribute is required (☑) or optional (☐).
- The name that corresponds to the attribute id.
- The value that corresponds to the attribute id.
- The value space of the value.
-

Associated conformance constraints are:

- If the name element or a value or value space of the value element that does not align with the value of the attid attribute as shown SHALL BE non conforming.
- An element that contains a name element or a value or value space of the value element that does not align with the value of the attid attribute as shown SHALL BE non conforming.
- For an attid value of stm_passage_id the value of value SHALL match the id attribute of the passage element.
- For an attid value of stm_passage_id a value of value that does not match the id attribute of the passage element SHALL BE non conforming.

Table 8: Passage Item Attributes

attid	☑/☐	name	value	value space
stm_pass_desc		Stim: Item Description	Any	xsd:string
stm _ pass _id		Stim: ITS ID	Item number	xsd:positiveInteger
stm _ pass _subject		Stim: Subject	Subject classifier	xsd:token

Element	resourcelist			
Description	Additional resources for a passage. The resource is described in an XML document specific to the type of resource.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	resource	[1..*] {10}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	Most passages use only one resource.			

Element	resource			
Description	A resource for a passage. The resource is described in an XML document type that is specific to the type of resource.			
Element Type	*Empty*			
Elements	**Name**	**Multiplicity**		
	None			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	type	☑	xsd:token	
	id	☑	xsd:positiveInteger	
	index	☑	xsd:string {4000}	
Extensions	☑			
Conformance	The integer value of the id attribute SHALL match the id of the corresponding resource which has an item type attribute that matches the type attribute.			
	An element that contains an integer value for the id attribute that references a resource which has an item type attribute that does not match the type attribute SHALL be non conforming.			
Notes	This Specification does not specify how the id attribute value item number is converted into the file name of the XML document holding the corresponding resource.			
	There MAY be multiple resources with the same item number but with different version numbers. How to determine the version of the resource that is referenced is not specified.			
	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].			
	How or when the resource content is presented to the student is not specified.			

Attributes	resource	
type	Type of the resource. A vocabulary of values.	
	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**

Attributes	resource	
	wordList	The resource is a word list. The Wordlist XML document structure is described separately.
	...	Need list of all the valid types
id	Item number for the resource for an item.	
	Item number for the resource for an item.	
	The value of the item number SHALL be unique within the context of all items.	
index	Need description	

Content Elements

Element	content			
Description	Content of a passage.			
Element Type	mixed			
Elements	**Name**	**Multiplicity**		
	title	[1]		
	author	[1]		
	stem	[1]		
	attachmentlist	[0..1]		
	apipAccessibility	[0..1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	language	☑	xsd:language	
	version	☑ ☒	xsd:string {100}	
	approvedversion	☐	xsd:string {100}	
Extensions	☑			
Conformance	An XML document with two or more content elements with the same value of xsd:language SHALL be non conforming.			
	The value of the version attribute SHOULD match the value of the version attribute of the itemrelease element in the *Assessment Item Release* XML container document.			
	The behavior if the value of the version attribute does not match the value of the version attribute of the itemrelease element is not defined.			
	The value of the approveddversion attribute SHOULD match the value of the version attribute of the passage element.			
	The behavior if an element that contains a value for the approveddversion attribute that does not match the value of the version attribute of the passage element is not defined.			
Notes	There is one content element instance for each language variant of the passage.			

Attributes	content
language	Language of the content.
	The value SHALL conform to [RFC 5646].
version	The version identifier for the content of the passage item release.
	There are no constraints on the value of the attribute.
	A value is REQUIRED but not used. Any non null string MAY be used.
	The version attribute is a candidate TO BE DEPRICATED. The attribute is REQUIRED.
approvedversion	Version identifier for the passage content.

Attributes	content
	The value SHALL match the regular expression: \d+(\.\d+)?(\.\d+)?

Element	title
Description	The title of the passage.
Element Type	HTML {4000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	The title content elements SHOULD conform to [XHTML 1.1].
Notes	How or when the title content is presented to the student is not specified.

Element	author
Description	The author of the passage.
Element Type	HTML {4000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	The author content elements SHOULD conform to [XHTML 1.1].
Notes	How or when the author content is presented to the student is not specified.

Element	stem
Description	Directions to the student to provide a response to the item.
Element Type	HTML {64000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	The stem content SHOULD conform to [XHTML 1.1].
Notes	How or when the stem content is presented to the student is not specified.

Element	attachmentlist			
Description	Attachments associated with the item.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	attachment	[0..*] {100}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes				

Element	attachment			
Description	URI of an attachment included with an item.			
Element Type	*Empty*			
Elements	**Name**	**Multiplicity**		
	None			

Element	attachment			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	id	☑	xsd:string {4000}	
	type	☑	xsd:token	
	subtype	☐	xsd:token	Default value
	filename	☑	xsd:string {4000}	
Extensions	☑			
Notes	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].			

Attributes	attachment	
id	Description.	
type	Type of attachment. A vocabulary of values.	
	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	ASL	The attachment is American Sign Language (ASL).
	Braille	The attachment is Braille.
	BRF	Need description
	...	Need list of all the valid types
subtype	Subtype of the attachment. A vocabulary of values. The value is dependent on the value of type.	
	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	Option A	ASL Option A – the value is valid only for type ASL
	Option B	ASL Option B – the value is valid only for type ASL
	Stem	ASL Stem – the value is valid only for type ASL
	contracted	Braille contracted – the value is valid only for type Braille or BRF
	nemeth	Braille nemeth [Nemeth]– the value is valid only for types Braille or BRF
	uncontracted	Braille uncontracted – the value is valid only for type Braille or BRF
	...	Need list of all the valid types
filename	File name of the file containing the attachment.	
	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].	

Shared Elements

Element	name
Description	Human readable name of an attribute.
Element Type	xsd:string {4000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	Markup embedded in the string SHALL be ignored and treated as plain text.
	For an attribute element, the value of name SHALL correspond to the value of attid as shown in Table 8.

Element	name
Notes	

Element	val
Description	Value of an attribute.
Element Type	xsd:string {4000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	For an attribute element, the value of val SHALL correspond to the value of attid as shown in Table 8.
Notes	

Element	desc
Description	Human readable description of an attribute.
Element Type	xsd:string {4000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	Markup embedded in the string SHALL be ignored and treated as plain text.
Notes	

Tutorial XML Document Elements

A *Tutorial* XML document is modeled as an *Assessment Item* XML document where the value of the format attribute of the item element is tut. All features of an *Assessment Item* XML document MAY be used in a *Tutorial* XML document

To use a *Tutorial* in an assessment item, the assessment item will contain a reference the *Tutorial* by including a tutorial element containing an id attribute with a value of an item number that corresponds to the id attribute of the item element in the *Tutorial* XML document.

How the id attribute item number is converted into the file name of the *Tutorial* XML document is not specified.

The information model for a *Tutorial* XML document mirrors the information model for an *Assessment Item* XML.

Note: Additional details on the *Tutorial* XML document is pending determination of which elements of an *Assessment Item* XML document cannot be used in a tutorial.

Wordlist XML Document Elements

Repeat summary of a Wordlist Item XML document from the informal model.

The *Wordlist* XML document elements contain a set of list of glossary and multi-lingua thesaurus keywords. A single item element is the root element of the tree. The item element is embedded in an itemrelease element. The item element contains a single keywordList element.

The entire element hierarchy within the *Wordlist* XML document elements is illustrated in Figure 6 (informative).

Note: The element hierarchy below is a placeholder – to be replaced by an actual diagram of the elements using the graphic conventions described.

- item
  - keywordList
    - keyword
      - html

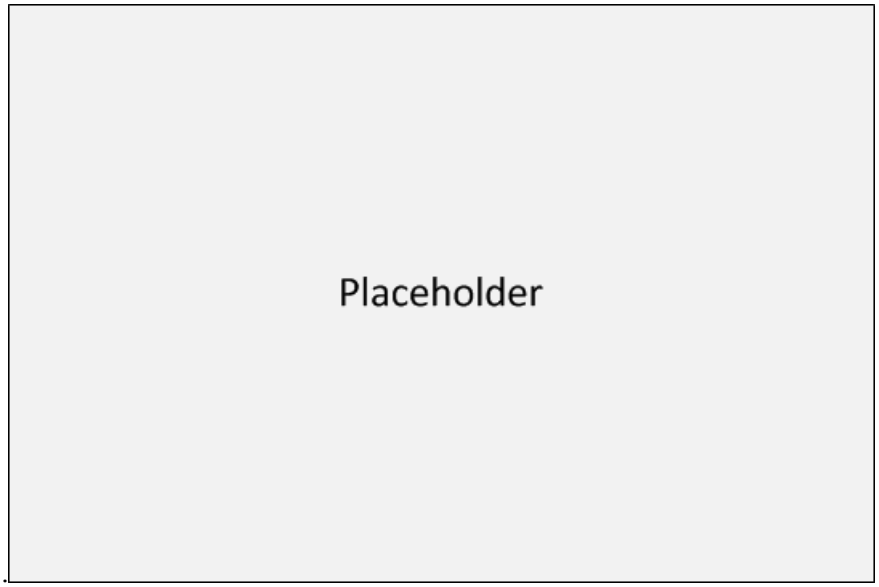


Figure 6: Wordlist XML Document Structure (Informative)

Wordlist Elements

Element	item			
Description	An item container for a wordlist.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	keywordList	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**

Element	item			
	format	☐	xsd:token	
	type	☐ ☒	xsd:token	
	id	☑	xsd:positiveInteger	
	version	☑	xsd:string {100}	
	None			
Extensions	☑			
Conformance	Either the format or type attribute SHALL be present.			
	An element that contains both the format and type attributes SHALL be non conforming.			
Notes	The type attribute is a candidate TO BE DEPRICATED in favor of using only the format attribute.			
	How or when the *Wordlist* content is presented to the student is not specified.			

Attributes	item	
format	The type of the item. A vocabulary of values.	
	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	wordlist	Wordlist resource.
	wordlist is included in the vocabulary but SHALL NOT be used as a value of format. It is included to permit the type attribute TO BE DEPRICATED.	
type	The type of the item. A vocabulary of values.	
	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	wordlist	Wordlist resource.
	The attribute SHALL be used.	
	The type attribute is a candidate TO BE DEPRICATED.	
id	Unique item number for the item/wordlist.	
	The value of the item number SHALL be unique within the context of all items.	
	The value of the item number SHALL be $< 2^{31}-1$.	
	This Specification does not indicate how a producing system insures uniqueness or the behavior of a consuming system when different items have the same id.	
version	Version identifier for the item/wordlist.	
	The value SHALL match the regular expression: \d+(\.\d+)?(\.\d+)?	

Element	keywordList			
Description	The list of keywords in a wordlist.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	keyword	[1..*] {1000}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes				

Element	keyword
Description	A keyword in a wordlist.
Element Type	sequence

Element	keyword			
Elements	**Name**	**Multiplicity**		
	html	[1..*] {1000}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	text	☑	xsd:string {1000}	
	index	☑	xsd:positiveInteger	
Extensions	☑			
Notes	The keyword elements do not need to have contiguous or ordered values for the index attribute.			

Attributes	keyword
text	The text of the keyword.
index	A sort key used to order the keywords. The values need not be contiguous.

Element	html			
Description	A keyword in a wordlist entry for a particular type of entry.			
Element Type	HTML {4000}			
Elements	**Name**	**Multiplicity**		
	None			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	listType	☑	xsd:token	
	listCode	☑	xsd:token	
Extensions	☑			
Conformance	The keyword text SHOULD conform to [XHTML 1.1].			
	The value of the listType attribute and the value of the listCode attribute SHALL correspond as shown in Table 7.			
	An element that contains a listType attribute and a listCode attribute that does not align as shown in Table 7 SHALL BE non conforming.			
Notes				

Attributes	html
listType	The type of entry for the keyword.
	The value SHALL be one of the vocabulary values listed in Table 8.
	The value SHALL correspond to the value of listType as shown in Table 8.
listType	The code of the type of entry for the keyword.
	The value SHALL be one of the vocabulary values listed in Table 8.
	The value SHALL correspond to the value of listCode as shown in Table 8.

Table 8: Glossary Entry Types and Codes

Keyword Entry Type (listType)	Keyword Entry Code (listCode)
glossary	TDS_WL_Glossary
thesaurus	TDS_WL_THES
esnGlossary	TDS_WL_ESNGlossary
???Glossary	TDS_WL_ArabicGloss
???Glossary	TDS_WL_CantoneseGloss
???Glossary	TDS_WL_KoreanGloss
???Glossary	TDS_WL_MandarinGloss
???Glossary	TDS_WL_PunjabiGloss

???Glossary	TDS_WL_RussianGloss
???Glossary	TDS_WL_TagalGloss
???Glossary	TDS_WL_UkrainianGloss
???Glossary	TDS_WL_VietnameseGloss
???Glossary	TDS_WL_Glossary&TDS_WL_ArabicGloss
???Glossary	TDS_WL_Glossary&TDS_WL_CantoneseGloss
???Glossary	TDS_WL_Glossary&TDS_WL_ESNGlossary
???Glossary	TDS_WL_Glossary&TDS_WL_KoreanGloss
???Glossary	TDS_WL_Glossary&TDS_WL_MandarinGloss
???Glossary	TDS_WL_Glossary&TDS_WL_PunjabiGloss
???Glossary	TDS_WL_Glossary&TDS_WL_RussianGloss
???Glossary	TDS_WL_Glossary&TDS_WL_TagalGloss
???Glossary	TDS_WL_Glossary&TDS_WL_UkrainianGloss
???Glossary	TDS_WL_Glossary&TDS_WL_VietnameseGloss
???	TDS_WL0

Assessment Item Accessibility XML Document Elements

Repeat summary of an Assessment Item Accessibility XML document elements from the informal model.

The *Assessment Item Accessibility Elements* consists of a single root XML element. The element and its subelements describe the accessibility features of an assessment item. The *Accessibility Elements* appears within the *Content Elements* of an Assessment Item or a Passage Item.

The entire element hierarchy within the *Assessment Item Accessibility* XML document elements is illustrated in Figure 7 (informative).

Note: The element hierarchy below is a placeholder – to be replaced by an actual diagram of the elements using the graphic conventions described.

- apipAccessibility
  - accessibilityInfo
    - accessElement
      - contentLinkInfo
        - objectLink
      - relatedElementInfo
        - readAloud
          - textToSpeechPronounciation
          - textToSpeechPronounciationAlternative
          - audioText
          - audioShortDesc
          - audioLongDesc
        - brailleText
          - brailleTextString
          - brailleCode

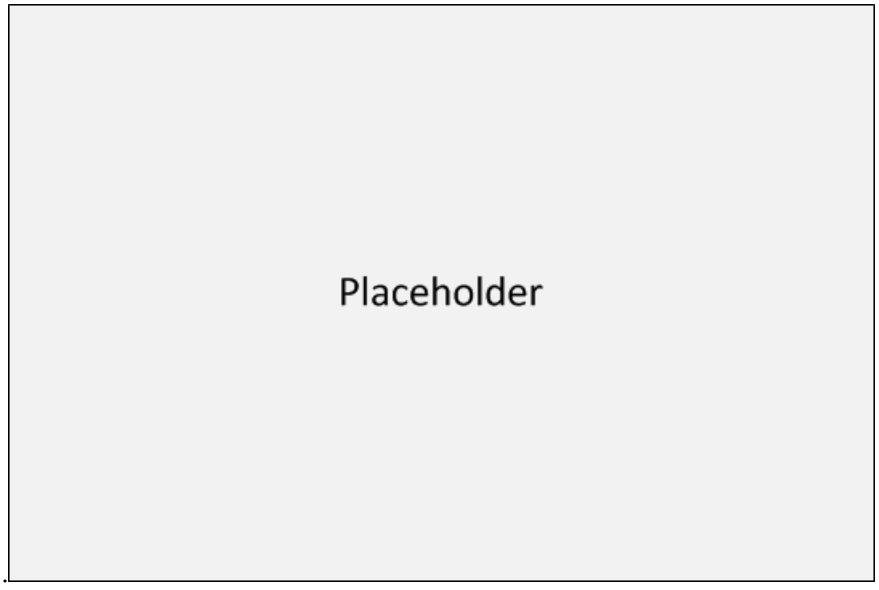


Figure 7: Assessment Item Accessibility XML Document Structure (Informative)

Accessibility Elements

Element	apipAccessibility			
Description	[APIP] accessibility information for the item.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	accessibilityInfo	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	While the element name include "APIP", the content does not conform to the [APIP] profile.			
	How or when the item accessibility content is presented to the student is not specified.			

Element	accessibilityInfo			
Description	Accessibility information for an item.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	accessElement	[1..*]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes				

Element	accessElement			
Description	Accessibility information for an item.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	contentLinkInfo	[1]		
	relatedElementInfo	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	identifier	☑	xsd:string {4000}	
Extensions	☑			
Notes				

Attributes	accessElement
identifier	Unique identifier for the accessibility information.
	The value of the identifier SHALL be unique within the context of all items.

Element	contentLinkInfo			
Description	Link to accessibility content.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		

Element	contentLinkInfo			
	objectLink	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	itsLinkIdentifierRef	☑	xsd:string {4000}	
	type	☑	xsd:token	
Extensions	☑			
Notes				

Attributes	contentLinkInfo	
itsLinkIdentifierRef	A narrative description of the value space of the attribute for the element.	
type	A narrative description of the value space of the attribute for the element.	
	Value	**Description**
	Text	A description of the value, its semantics and its behavior.
	Equation	A description of the value, its semantics and its behavior.
		Next value

Element	objectLink
Description	Link to the accessibility content.
Element Type	xsd:anyURI
Value	*Any*
Default	*None*
Extensions	☒
Notes	The element is required but MAY be an empty element if there is no accessibility content.

Element	relatedElementInfo			
Description	Additional accessibility information.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	readAloud	[1]		
	brailleText	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes				

Element	readAloud			
Description	Pronunciation text for text-to-speech.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	textToSpeechPronounciation	[1]		
	textToSpeechPronounciationAlternate	[0..1]		
	audioText	[0..1]		
	audioShortDesc	[0..1]		
	audioLongDesc	[0..1]		

Element	readAloud			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	The accessibility profile will determine which of the alternatives will be used in which situation.			

Element	textToSpeechPronounciation
Description	String containing pronunciation directives.
Element Type	xsd:string {16000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	Phonetic spelling, if present, SHALL conform to the International Phonetic Alphabet (IPA) [IPA].
Notes	The string MAY contain both plain text and phoneme spelling.

Element	textToSpeechPronounciationAlternative
Description	Alternative string containing pronunciation directives.
Element Type	xsd:string {16000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	Phonetic spelling, if present, SHALL conform to the International Phonetic Alphabet (IPA) [IPA].
Notes	The string MAY contain both plain text and phoneme spelling.

Element	audioText
Description	String containing pronunciation text.
Element Type	xsd:string {16000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	Phonetic spelling, if present, SHALL conform to the International Phonetic Alphabet (IPA) [IPA].
Notes	The string MAY contain both plain text and phoneme spelling.

Element	audioShortDesc
Description	String containing pronunciation text.
Element Type	xsd:string {16000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	Phonetic spelling, if present, SHALL conform to the International Phonetic Alphabet (IPA) [IPA].
Notes	The string MAY contain both plain text and phoneme spelling.

Element	audioLongDesc			
Description	String containing pronunciation text.			
Element Type	xsd:string {16000}			
Value	*Any*			
Default	*None*			
Extensions	☒			
Conformance	Phonetic spelling, if present, SHALL conform to the International Phonetic Alphabet (IPA) [IPA].			
Notes	The string MAY contain both plain text and phoneme spelling.			

Element	brailleText			
Description	Braille text for Braille transcription.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	brailleTextString	[1]		
	brailleCode	[0..1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes				

Element	brailleTextString			
Description	Modified text for Braille display or embossers.			
Element Type	xsd:string {16000}			
Value	*Any*			
Default	*None*			
Extensions	☒			
Notes	Avoid lexical and structural elements that are known to cause issues with faithful transcription to Braille.			

Element	brailleCode			
Description	Code for Braille display or embossers.			
Element Type	xsd:string {16000}			
Elements	**Name**	**Multiplicity**		
	None			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	type	☑	xsd:token	
Extensions	☑			
Notes	Avoid lexical and structural elements that are known to cause issues with faithful transcription to Braille.			

Attributes	brailleCode	
type	The type of Braille code.	
	Value	**Description**
	Nemeth	A description of the value, its semantics and its behavior.

Attributes	brailleCode	
		What other values.

Grid Item Rendering Specification XML Document Elements

Repeat summary of a Grid Item Rendering Specification XML document from the informal model.

The XML elements for a *Grid Item Rendering Specification* document are detailed in three groups:

- *AnswerSet elements* – the definition of elements used to describe xxx. A single AnswerSet element is one of the two the top-level elements in the document.
- *Shared elements* – the definition of simple common XML elements that are subelements of various other elements (i.e., FileSpec, Label). Shared elements with the same names are used in other XML documents. Their definition MAY BE XML document specific.

The entire element hierarchy within a *Grid Item Rendering Specification* XML document is illustrated in Figure 8 (informative).

Note: The element hierarchy below is a placeholder – to be replaced by an actual diagram of the elements using the graphic conventions described.

- Question
  - Description
  - QuestionPart
    - Options
      - ShowButtons
      - GridColor
      - GridSpacing
      - CenterImage
      - ScaleImage
    - ~~Text~~
    - ObjectMenuIcons
      - IconSpec
        - FileSpec
        - Label
    - ImageSpec
      - FileSpec
      - Position
  - Hotspots
    - Regions
      - Region
        - Event
          - Styles
          - Image
    - RegionGroups
      - RegionGroup
        - Include

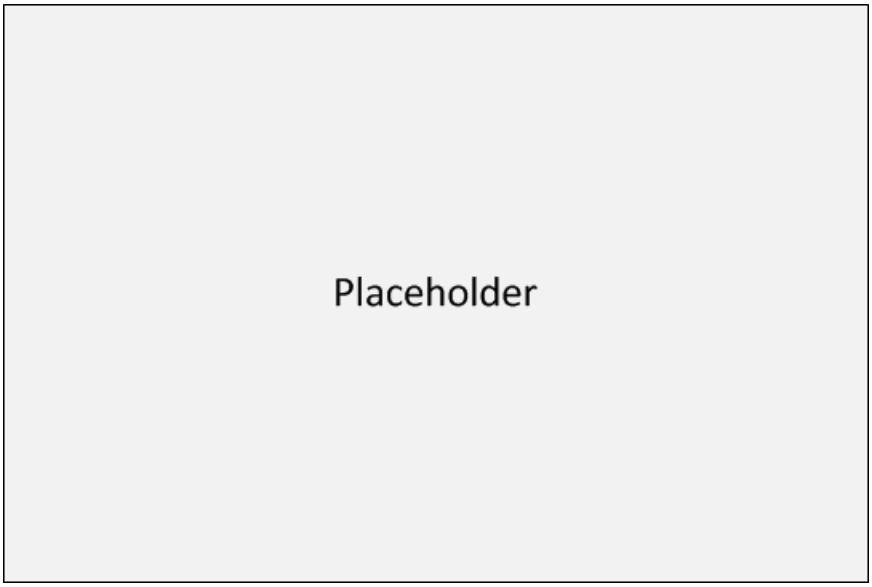


Figure 8: Grid Item Rendering Specification XML Document Structure (Informative)

Question Elements

Element	Question			
Description	A graphic response item.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	Description	[1]		
	QuestionPart	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	ScoreEngineVer	☑	xsd:string {100}	
	id	☑	xsd:positiveInteger	
	version	☑	xsd:string {100}	
Extensions	☑			
Conformance	The value of the id attribute SHALL match the value of the id attribute of the item.			
	The behavior if the element contains a value for the id attribute does not match the value of the id attribute of the item SHALL be non conforming.			
	The value of the version attribute SHOULD match the value of the version attribute of the itemrelease element in the *Assessment Item Release* XML container document.			
	The behavior if the value of the version attribute does not match the value of the version attribute of the itemrelease element is not defined.			
Notes				

Attributes	Question
ScoreEngineVer	Score Engine Version identifier for the item.
	The value SHALL match the regular expression: \d+(\.\d+)?(\.\d+)?
id	Unique item number for the item.
	The value SHALL match the id of the item.

Attributes	Question
version	The version identifier for the content of the item release.
	There are no constraints on the value of the attribute.
	A value is REQUIRED but not used. Any non null string MAY be used.
	The version attribute is a candidate TO BE DEPRICATED. The attribute is REQUIRED.

Element	Description
Description	Human readable description of the question.
Element Type	xsd:string {4000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	Markup embedded in the string SHALL be ignored and treated as plain text.
Notes	

Element	QuestionPart			
Description	Rendering description for a graphic response item.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	Options	[1]		
	Text	[1] ☒		
	ObjectMenuIcons	[0..1]		
	ImageSpec	[0..1]		
	SnapPoint	[0..1]		
	HotSpots	[0..1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	id	☑	xsd:string {4000}	
Extensions	☑			
Notes				

Attributes	QuestionPart
id	Unique identifier for the question part.
	The value of the identifier SHALL be unique within the context of the individual items.

Element	Options			
Description	Options that control grid item appearance.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	ShowButtons	[1]		
	GridColor	[1]		
	GridSpacing	[1]		
	CenterImage	[1]		
	ScaleImage	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			

Element	Options
Extensions	☑
Notes	

Element	ShowButtons
Description	List of buttons on the toolbar.
Element Type	xsd:string {4000}
Value	*Define value.*
Default	*None*
Extensions	☒
Notes	

Element	GridColor	
Description	Color of grid lines	
Element Type	xsd:token – A vocabulary of values.	
Value	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	None	Grid lines SHALL NOT be displayed.
	LightBlue	Grid lines SHALL be displayed in LightBlue, RGB Hex code #ADD8E6
Default	*None*	
Extensions	☑	
Notes	The width of the grid line is not specified.	
	The gridline color is not altered for accessibility.	
	A valid value is the character literal None. This is not the metavalue *None* (in italics) used in the Specification when a value does not exist.	

Element	GridSpacing
Description	Spacing between grid lines, in pixels.
Element Type	xsd:string {100}
Value	The value SHALL match the regular expression \d+(,(Y|N))?
Default	*None*
Extensions	☒
Notes	The grid spacing is the same for both the X and Y directions.
	The value is an integer for the grid spacing, followed by an optional comma (, , ,) and the character Y or N.
	If the character Y is present, display object SHALL snap to the grid.
	If the character Y is not present, display object SHALL NOT snap to the grid.

Element	CenterImage	
Description	Controls centering of the images on the palette.	
Element Type	xsd:boolean	
Value	**Value**	**Description**
	true	Images SHALL be centered on the palette in both the X and Y dimensions.
	false	There is no constraint on image placement.

Element	CenterImage
Default	*None*
Extensions	☒
Notes	

Element	ScaleImage			
Description	Controls scaling of the image to fit the palette.			
Element Type	xsd:boolean			
Value	**Value**	**Description**		
	true	The image SHALL be scaled to fit the palette.		
	false	There is no constraint on image scaling.		
Default	*None*			
Extensions	☒			
Notes				

Element	Text
Description	A narrative description of the XML element, its semantics and its behavior, its semantics and its behavior.
Element Type	xsd:string {NN}
Value	*Any*
Default	*None*
Extensions	☒
Notes	The elements SHOULD be empty.
	The element is a candidate TO BE DEPRICATED.

Element	ObjectMenuIcons			
Description	Images to appear on the palette.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	IconSpec	[1..*] {100}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes				

Element	IconSpec			
Description	Image to be rendered on the palette.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	FileSpec	[1]		
	Label	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].			

Element	ImageSpec			
Description	Background graphic to be rendered on the item grid canvas.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	FileSpec	[1]		
	Position	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].			

Element	Position
Description	Background image position on the canvas.
Element Type	xsd:string {100}
Value	Pair of comma delimited coordinates (X and Y).
	The value SHALL match the regular expression: \d+,\d+
Default	*None*
Extensions	☒
Notes	The value is an integer for the x position, followed by a comma (, , ,) and an integer for the x position.
	The origin of the coordinate system is the upper left hand corner of the background image. X is positive to the left. Y is positive downward.

Element	SnapPoint
Description	Points on the object that exhibit snap behavior.
Element Type	xsd:string {4000}
Value	The value SHALL match the regular expression \d+@(\d+,\d+)(;\d+,\d+)*
Value	*None*
Extensions	☒
Notes	The value is the snap radius (pixels) followed by the at character (@ @ @) followed by a list of coordinate pairs. The coordinate pairs are delimited by a semi colon (; ; ;). The coordinate pair consists of an x and y coordinate, each a non negative integer values, delimited by a comma (, , ,).

Element	Hotspots			
Description	Grid areas that responds to mouse events.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	Regions	[1]		
	RegionGroups	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			

Element	Hotspots
Notes	

Element	Regions			
Description	Set of hotspot areas.			
Element Type	sequence			
Elements	Name	Multiplicity		
	Region	[1..*] {100}		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	☑			
Notes				

Element	Region			
Description	Shape and position of a hotspot.			
Element Type	sequence			
Elements	Name	Multiplicity		
	Event	[1]		
Attributes	Name	Required	Data Type	Default
	name	☑	xsd:string {4000}	
	shape	☑	xsd:token	
	coords	☑	xsd:string {4000}	
Extensions	☑			
Notes				

Attributes	Region	
name	Name of the region/hotspot.	
	The name MUST be unique within the context of the item.	
shape	Shape of the region. A vocabulary of values.	
	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	rect	Rectangular region.
	circle	Circular region.
	poly	Polygon region.
coords	List of coordinate values or dimensions that define the region.	
	Shape	**Description**
	rect	A description of the coordinate pairs of the corners of the rectangle. 4 values: x coordinate of the upper left-hand corner, y coordinate of the upper left-hand corner; x coordinate of the lower right-hand corner, y coordinate of the lower right-hand corner.
		The value SHALL match the regular expression: \d+,\d+;\d+,\d+
	circle	The coordinates pair of the origin plus the radius 3 values: x coordinate of the origin of the circle, y coordinate of the origin of the circle, radius of the circle.
		The value SHALL match the regular expression: \d+,\d+;\d+

Attributes	Region	
	poly	An arbitrary long ordered list of coordinate pairs of the vertices of the polygon, each pair consisting of the x coordinate of a vertex of the polygon and the y coordinate of the vertex of the polygon.
		The value SHALL match the regular expression: \d+,\d+(;\d+,\d+)*

Element	Event			
Description	Visual effects applied to the region when a specific mouse event occurs.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	Styles	[1]		
	Image	[1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	name	☑	xsd:token	
Extensions	☑			
Notes				

Attributes	Event	
name	Type of the event. A vocabulary of values.	
	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	select	Region gets user focus.
	unselect	Region loses focus.
	hover	Mouse is dwelling over the region.
	uncover	Mouse no longer is dwelling over the region.

Element	Styles			
Description	Display attributes applied to a region when an event occurs.			
Element Type	*Empty*			
Elements	**Name**	**Multiplicity**		
	None			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	fill	☑	xsd:string {6}	
	fill-opacity	☑	xsd:float	
	stroke	☑	xsd:string {6}	
	stroke-dasharray	☑	xsd:string {1000}	
	stroke-opacity	☑	xsd:float	
	stroke-width	☑	xsd:integer	
Extensions	☑			
Notes				

Attributes	Styles
fill	The interior fill color of the region.
	The value SHALL match the regular expression #?([0-9a-fA-F]{3}|[0-9a-fA-F]{6})
fill-opacity	The opacity of the region.

Attributes	Styles
	The value SHALL be between 0.0 and 1.0, inclusive. 0.0 is transparent. 1.0 is opaque.
	The opacity applies only to the interior of the region. It does not apply to the outline of the region.
stroke	Line color for all lines in the region, including the border as a hex color code.
	The value SHALL match the regular expression #?([0-9a-fA-F]{3}|[0-9a-fA-F]{6})
stroke-dasharray	Comma delimited list of integers describing the stroke and space pattern of the dash pattern of lines including the border in pixels. A comma delimited list of pairs of integers describing the stroke and space pattern of a dashed line. The first number of each pair is the length of the stroke in pixels. The second number of each pair is the length of the space in pixels.
	The pattern is repeated as needed, including partial lengths of stroke or space.
	The value SHALL match the regular expression \d+,\d+(,\d+,\d+)*
stoke-opacity	The opacity of the outline of region.
	The value SHALL be between 0.0 and 1.0, inclusive. 0.0 is transparent. 1.0 is opaque.
	The value MAY be null.
stoke-width	The width of the outline of the region in pixels.

Element	Image			
Description	Graphic associated with a region.			
Element Type	*Empty*			
Elements	**Name**	**Multiplicity**		
	None			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	src	☑	xsd:string {4000}	
	x	☑	xsd:integer	
	y	☑	xsd:integer	
Extensions	☑			
Notes	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].			

Attributes	Image		
scr	Link (filename) for an image.		
	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].		
	The test client SHALL support the following media types:		
	Name	**Media Type**	**Default File Extension**
	PNG	image/png	.png
	JPEG		.jpg
	GIF		.gif
x	X coordinate where the origin of the image is placed in the region.		
y	Y coordinate where the origin of the image is placed in the region.		

Element	RegionGroups
Description	A grouping of regions.
Element Type	sequence

Element	RegionGroups			
Elements	**Name**	**Multiplicity**		
	RegionGroup	[1..*] {100}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes				

Element	RegionGroup			
Description	Regions processed as a group.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	Include	[1..*] {100}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	max	☑	xsd:nonNegativeInteger	
	min	☑	xsd:nonNegativeInteger	
	name	☑	xsd:string {4000}	
Extensions	☑			
Notes				

Attributes	RegionGroup
max	The maximum number of regions in the group that can be selected for an answer.
	The value SHALL NOT exceed the number of regions in the group.
min	The minimum number of regions in the group that must be selected for a valid answer.
	The value SHALL NOT exceed max.
name	The name of the region group.
	The name MUST be unique within the context of the item.

Element	Include			
Description	References to regions included in the region group.			
Element Type	*Empty*			
Elements	**Name**	**Multiplicity**		
	None			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	region	☑	xsd:string {4000}	
Extensions	☑			
Conformance	The name SHALL match the name attribute of a region element for the item.			
Notes				

Attributes	Include
region	Name of the region included in the region group.
	The name SHALL match the name attribute of a region element for the item.

Shared Elements

Element	FileSpec

Element	FileSpec		
Description	Link (filename) for an image.		
Element Type	xsd:string {4000}		
Value	*Any*		
Default	*None*		
Extensions	☒		
Notes	The file location and naming convention are not specified. Details may be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].		
	The test client SHALL support the following media types:		
	Name	**Media Type**	**Default File Extension**
	PNG	image/png	.png
	JPEG		.jpg
	GIF		.gif

Element	Label
Description	Label for an image.
Element Type	xsd:string {4000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	Markup embedded in the string SHALL be ignored and treated as plain text.
Notes	

Equation Editor Configuration XML Document Elements

Repeat summary of an Equation Editor Configuration XML document from the informal model.

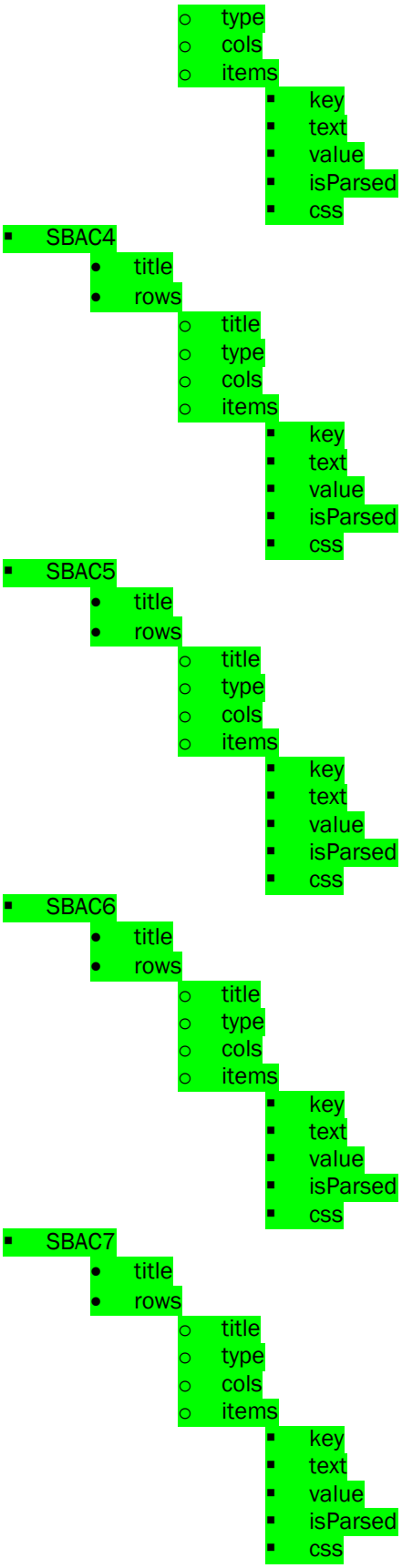
The XML elements for an Equation Editor Configuration document are detailed in three groups:

- *Equation Editor Configuration elements* – the definition of elements used to describe the equation editor configuration.
- *Tabbed Entry elements* – the definition of elements used to describe rows and columns of tabbed entry fields.
- *MathML elements* – the definition of elements used to describe MathML.

The entire element hierarchy within an Equation Editor Configuration XML document is illustrated in Figure 9 (informative).

Note: The element hierarchy below is a placeholder – to be replaced by an actual diagram of the elements using the graphic conventions described.

- editorconfig
  - contentLabel
  - configure
  - tabs
  - TeXEntryEnabled
  - TeX
  - tabConfig
    - Order
    - Algebra
      - title
      - rows
        - title
        - type
        - cols
        - items
          - key
          - text
          - value
          - isParsed
          - css
    - Basic
      - title
      - rows
        - title
        - type
        - cols
        - items
          - key
          - text
          - value
          - isParsed
          - css
    - SBAC3
      - title
      - rows
        - title


type
cols
items
key
text
value
isParsed
css
SBAC4
title
rows
title
type
cols
items
key
text
value
isParsed
css
SBAC5
title
rows
title
type
cols
items
key
text
value
isParsed
css
SBAC6
title
rows
title
type
cols
items
key
text
value
isParsed
css
SBAC7
title
rows
title
type
cols
items
key
text
value
isParsed
css

- SBAC8
  - title
  - rows
    - title
    - type
    - cols
    - items
      - key
      - text
      - value
      - isParsed
      - css
- SBAC11
  - title
  - rows
    - title
    - type
    - cols
    - items
      - key
      - text
      - value
      - isParsed
      - css
- id
- navigation
- mathML
  - math
    - mstyle
      - mrow
- placeHold
- TeXEntryModel
- TeXEntryInit
- editMode
- fontSizePt
- fontSizeHt
- sanitizeTekEnabld
- defaultTextBoxPx
- isMobile
- magicDisabled

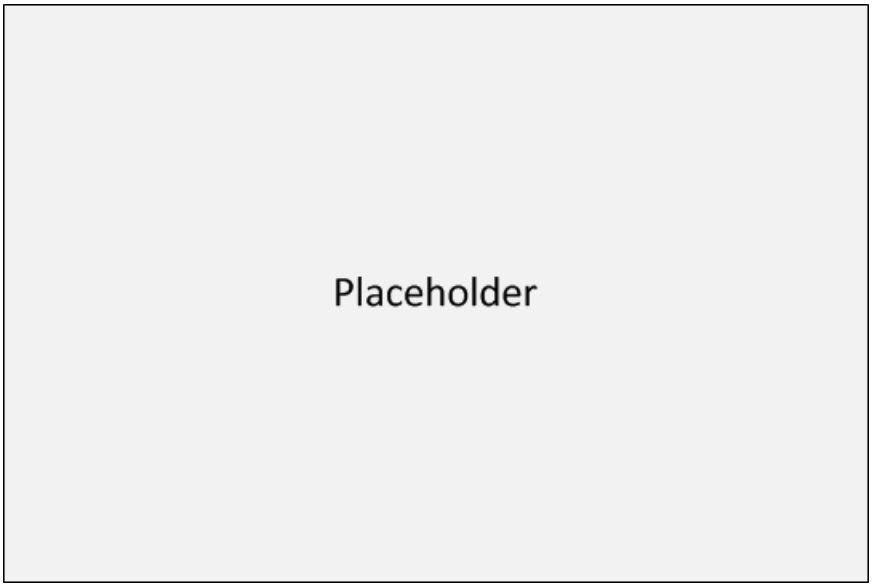


Figure 9: Equation Editor Configuration XML Document Structure (Informative)

Equation Editor Configuration Elements

Element	editorconfig			
Description	Description of the settings used to configure and render the equation editor.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	contentLabel	[0..1]		
	configure	[1]		
	tabs	[1]		
	TeXEntryEnabled	[1]		
	TeX	[1]		
	tabConfig	[1]		
	id	[1]		
	navigation	[1]		
	mathML	[1]		
	placeHold	[1]		
	TeXEntryMode	[1]		
	TeXEntryInit	[1]		
	editMode	[1]		
	fontsizePt	[0..1]		
	fontsizeHt	[0..1]		
	sanitizeTeXEnabled	[0..1]		
	defaultTextBoxPx	[0..1]		
	isMobile	[0..1]		
	magicDisabled	[0..1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes				

Element	contentLabel
Description	Text to be displayed above the equation editor entry form.
Element Type	xsd:string {4000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	Markup embedded in the string SHALL be ignored and treated as plain text.
Notes	

Element	configure	
Description	Control of item configuration data display when the item is viewed in the tool.	
Element Type	xsd:boolean	
Value	**Value**	**Description**
	true	The item configuration data SHALL be displayed.
	false	The item configuration data SHALL NOT be displayed. This value SHALL be used for input to the renderer.
Default	*None*	
Extensions	☒	
Notes	How and where the configuration data is displayed is not specified.	

Element	tabs	
Description	Control of multi-table input panel display.	
Element Type	xsd:boolean	
Value	**Value**	**Description**
	true	Multi-table input panel SHALL be displayed.
	false	Multi-table input panel SHALL NOT be displayed.
Default	*None*	
Extensions	☒	
Notes	Equation items can have multiple tables in the input panel. Each table displays a set of input elements with row and columns elements.	

Element	TeXEntryEnabled	
Description	Control of permitted [TeX] entry into the equation editor.	
Element Type	xsd:boolean	
Value	**Value**	**Description**
	true	TeX input is permitted.
	false	TeX input is not permitted.
Default	*None*	
Extensions	☒	
Notes		

Element	TeX
Description	TeX element to be displayed in the input box.
Element Type	xsd:string {16000}

Element	TeX
Value	*Any*
Default	*None*
Extensions	☒
Conformance	The value SHALL be a valid [TeX] element.
Notes	

Element	id
Description	Identifier of the equation editor item.
Element Type	xsd:string {4000}
Value	*Any*
Default	*None*
Extensions	☒
Notes	This element is optional for some elements, manatory for others.

Element	navigation	
Description	Controls the display of the equation input tool cursor navigation buttons .	
Element Type	xsd:boolean	
Value	**Value**	**Description**
	true	The navigation buttons SHALL be displayed.
	false	The navigation buttons SHALL NOT be displayed.
Default	*None*	
Extensions	☒	
Notes		

Element	placeHold
Description	TeX content to be used as a placeholder for user input to equations elements.
Element Type	xsd:string {16000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	The value SHALL be valid [TeX] content.
Notes	

Element	TeXEntryMode	
Description	User entered [TeX] input allowed.	
Element Type	xsd:token	
Value	**Value**	**Description**
	Allow	Direct TeX input SHALL be permitted.
	None	Direct TeX input SHALL NOT be permitted. Only input keys may be used.
Default	*None*	
Extensions	☒	
Notes		

Element	TeXEntryInit	
Description	Initial [TeX] entry mode.	
Element Type	xsd:token	
Value	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	Allow	Description of value.
	None	Description of value.
	Vim	Description of value.
Default	*None*	
Extensions	☒	
Notes	A valid value is the character literal None. This is not the metavalue *None* (in italics) used in the Specification when a value does not exist.	

Element	editMode	
Description	Supported editing mode.	
Element Type	xsd:token	
Value	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	INSERT	Description of value.
	REPLACE	Description of value.
	UPDATE	Description of value.
Default	*None*	
Extensions	☒	
Notes		

Element	fontsizePt
Description	
Element Type	xsd:double, minExclusive=0
Value	*Any*
Default	*None*
Extensions	☒
Notes	

Element	fontsizeHt
Description	
Element Type	xsd:float, minExclusive=0
Value	*Any*
Default	*None*
Extensions	☒
Notes	

Element	sanitizedTeXEnabled	
Description	Control of ASCII math strings typeset using [TeX].	
Element Type	xsd:boolean	
Value	**Value**	**Description**
	true	ASCII math strings SHALL be typeset using TeX.

Element	sanitizedTeXEnabled	
	false	ASCII math strings SHALL NOT be typeset using TeX.
Default	*None*	
Extensions	☒	
Notes		

Element	defaultTextBoxPx
Description	Default width of the editor input ~~text~~ box in pixels.
Element Type	xsd:positiveInteger
Value	*Any*
Default	*None*
Extensions	☒
Notes	The implementation MAY impose constraints on the maximum and minimum value of defaultTexBoxPx. The behavior when the value is smaller than the minimum or larger than the maximum is not specified.

Element	isMobile	
Description	Controls if the item will be optimized for display on a mobile device when rendered on a mobile device.	
Element Type	xsd:boolean	
Value	**Value**	**Description**
	true	The item will be optimized for display on a mobile device.
	false	The item will not be optimized for display on a mobile device.
Default	*None*	
Extensions	☒	
Notes		

Element	magicDisabled	
Description	Controls if the item is will be optimized for display on a mobile device when rendered on a mobile device.	
Element Type	xsd:boolean	
Value	**Value**	**Description**
	true	The previous input token value SHALL NOT be used as a value for a placeholder in the next input token.
	false	The previous input token value SHALL be used as a value for a placeholder in the next input token value.
Default	*None*	
Extensions	☒	
Notes		

Table Layout Elements

Element	tabConfig
Description	Configuration for each input panel table.

Element	tabConfig			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	Order	[1]		
	Algebra	[0..1]		
	Basic	[0..1]		
	SBAC3	[0..1]		
	SBAC4	[0..1]		
	SBAC5	[0..1]		
	SBAC6	[0..1]		
	SBAC7	[0..1]		
	SBAC8	[0..1]		
	SBAC11	[0..1]		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Conformance	Only one of the subelements from the group Algebra, Basic, SBAC3, SBAC4, SBAC6, SBAC6, SBAC7, SBAC8, SBAC11 SHALL appear.			
	A tabconfig element that contains more than one subelement from the group Algebra, Basic, SBAC3, SBAC4, SBAC6, SBAC6, SBAC7, SBAC8, SBAC11 SHALL be non conforming.			
Notes				

Element	Order			
Description	Table order.			
Element Type	xsd:string {100}			
	The name of the table order.			
Elements	**Name**	**Multiplicity**		
	None			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes				

Element	Algebra			
Description	Predefined table layout and content specification.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	title	[1]		
	rows	[1..*] {1000}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	The table layout and content specification is not specified.			

Element	BASIC
Description	Predefined table layout and content specification.
Element Type	sequence

Element	BASIC			
Elements	**Name**	**Multiplicity**		
	title	[1]		
	rows	[1..*] {1000}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	The table layout and content specification is not specified.			

Element	SBAC3			
Description	Predefined table layout and content specification.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	title	[1]		
	rows	[1..*] {1000}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	The table layout and content specification is not specified.			

Element	SBAC4			
Description	Predefined table layout and content specification.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	title	[1]		
	rows	[1..*] {1000}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	The table layout and content specification is not specified.			

Element	SBAC5			
Description	Predefined table layout and content specification.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	title	[1]		
	rows	[1..*] {1000}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	The table layout and content specification is not specified.			

Element	SBAC6			
Description	Predefined table layout and content specification.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		

Element	SBAC6			
	title	[1]		
	rows	[1..*] {1000}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	The table layout and content specification is not specified.			

Element	SBAC7			
Description	Predefined table layout and content specification.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	title	[1]		
	rows	[1..*] {1000}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	The table layout and content specification is not specified.			

Element	SBAC8			
Description	Predefined table layout and content specification.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	title	[1]		
	rows	[1..*] {1000}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	The table layout and content specification is not specified.			

Element	SBAC11			
Description	Predefined table layout and content specification.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	title	[1]		
	rows	[1..*] {1000}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes	The table layout and content specification is not specified.			

Element	title
Description	Title of the input area to be displayed for the item.
Element Type	xsd:string {4000}
Value	*Any*
Default	*None*

Element	title
Extensions	☒
Conformance	Markup embedded in the string SHALL be ignored and treated as plain text.
Notes	How or when the *title* content is presented to the student is not specified.

Element	rows			
Description	Individual row definition of the input area.			
Element Type	choice sequence			
Elements	**Name**	**Multiplicity**		
	title	[1]		
	type	[1]		
	cols	[0..1]		
	items	[1..*] {100}		
Attributes	**Name**	**Required**	**Data Type**	**Default**
	None			
Extensions	☑			
Notes				

Element	title
Description	Title of the row.
Element Type	xsd:string {4000}
Value	*Any*
Default	*None*
Extensions	☒
Conformance	Markup embedded in the string SHALL be ignored and treated as plain text.
Notes	How or when the *title* content is presented to the student is not specified.
	This title element is different from the title element of the container element.

Element	type	
Description	Type of layout of the rows in the input ~~area~~ box.	
Element Type	xsd:token– A vocabulary of values.	
Value	The value SHALL be one of the vocabulary values listed.	
	Value	**Description**
	grid	Definition of value
	row	Definition of value
Default	*None*	
Extensions	☒	
Notes		

Element	cols
Description	Number of columns in a row in the input area.
Element Type	xsd:positiveinteger
Value	*Any*
Default	*None*
Extensions	☒

Element	cols
Notes	

Element	items			
Description	Individual input element in a row in the input area description.			
Element Type	choice			
Elements	Name	Multiplicity		
	~~ANY~~?			
	key	[1]		
	text	[0..1]		
	value	[1]		
	isParsed	[0..1]		
	css	[0..1]		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	☑			
Notes				

Element	key
Description	Identifier for a keyboard key.
Element Type	xsd:string {1000}
Value	*Any*
Default	*None*
Extensions	☒
Notes	

Element	text
Description	Label that is displayed for a keyboard key.
Element Type	xsd:string {1000}
Value	*Any*
Default	*None*
Extensions	☒
Notes	

Element	value
Description	Value that is entered into the input field when the corresponding key is pressed.
Element Type	xsd:string {4000}
Value	*Any*
Default	*None*
Extensions	☒
Notes	

Element	isParsed
Description	Specification if the item SHALL be parsed by the ~~renderer~~ test client.
Element Type	xsd:boolean

Element	isParsed	
Value	Value	Description
	true	The item SHALL be parsed by the ~~renderer~~ test client.
	false	The item SHALL NOT be parsed by the test client.
Default	*None*	
Extensions	☒	
Notes		

Element	css
Description	Identifier for a keyboard key.
Element Type	xsd:string {4000}
Value	*Any*
Default	*None*
Extensions	☒
Notes	

MathML Elements

Element	mathML			
Description	MathML [MathML] to be displayed in the input box.			
Element Type	sequence			
Elements	Name	Multiplicity		
	math	[1..*]		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	☑			
Notes				

Element	math			
Description	Settings used to control the display of MathML content in an item.			
Element Type	sequence			
Elements	Name	Multiplicity		
	mstyle	[1]		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	☑			
Notes				

Element	mstyle			
Description	Style directives for spacing and layout of MathML content.			
Element Type	sequence			
Elements	Name	Multiplicity		
	mrow	[1]		
Attributes	Name	Required	Data Type	Default

Element	mstyle			
	displaystyle	☑	xsd:boolean	
Extensions	☑			
Notes				

Attributes	mstyle	
displaystyle	Specifies whether more vertical space is used for displayed equations.	
	Value	**Description**
	true	More vertical space is used for displayed equations.
		More or less are not defined and left to the implementation.
	false	A more compact layout is used to display equations.
		More or less are not defined and left to the implementation.

Element	mrow			
Description	A narrative description of the XML element, its semantics and its behavior.			
Element Type	*Empty*			
Elements	**Name**	**Multiplicity**		
	None			
Attributes	**Name**	**Required**	**Data Type**	**Default**
	class	☑	xsd:token	
Extensions	☑			
Notes				

Attributes	mrow	
class	A narrative description of the value space of the attribute for the element.	
	Value	**Description**
		A description of the value, its semantics and its behavior.

Assessment Item Usage Statistics XML Document Elements

An *Assessment Item Usage Statistics* XML document captures data about the use of an assessment item. The assessment item usage statistics are represented as a collection of subelements of the statistic element. The statistic element is the root of the subtree of elements. The statistic element is one of the subelements of an assessment item.

The entire element hierarchy within the *Assessment Item Statistics Usage* XML document elements is illustrated in Figure 10 (informative).

Note: The element hierarchy below is a placeholder – to be replaced by an actual diagram of the elements using the graphic conventions described.

- statistic
  - subelements TBD

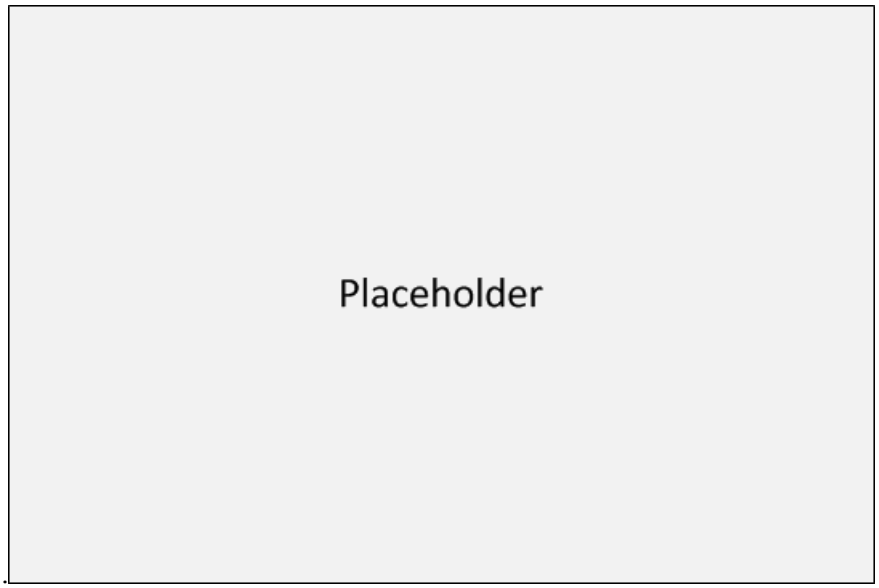


Figure 10: Assessment Item Usage Statistics XML Document Structure (Informative)

Assessment Item Usage Statistics Elements

Note: This section is a placeholder pending details of the statistic elements.

Element	statistic			
Description	Assessment item usage statistics.			
Element Type	sequence			
Elements	**Name**	**Multiplicity**		
	Placeholder	[0..?]		
Attributes	**Name**	**Required**	**Data Type**	**Default**

Element	statistic
	None
Extensions	☑
Notes	The element is normally empty (<statistic />) when authoring an item or before the item has been used.
	An empty element SHOULD NOT be interpreted to mean that there are no usage statistics for the item.

Assessment Item Machine Rubric XML Document Elements

An *Assessment Item Machine Rubric* XML document contains the rubric rules for automated item grading. An assessment item MAY include a *machine rubric*. The machine rubric is contained in an external XML document that is referenced from the assessment item through the file name attribute of the item MachineRubric element in the assessment item. Different types of assessment items use different machine rubrics as shown in Table 9.

For an item type not listed in the table, the MachineRubric element SHOULD be omitted from the assessment item. If the MachineRubric element is included in an assessment item for any item type not listed in the table, the file reference to the external XML document containing the rubric SHALL be ignored.

Table 9: Item Machine Rubrics

Assessment Item Type (Format)	Machine Rubric Type
Equation (EQ)	Equation Rubric (erx)
Grid (GI)	Grid Rubric (grx)
Hot Text (HT)	Hot Text Rubric (hrx)
Natural Language (NL)	Natural Language Rubric (nlx)
Match Interaction (MI)	Match Interaction Rubric (mrx)
Evidence-Based Selected Response (EBSR)	Evidence-Based Selected Response Rubric (qrx)
Simulation (SIM)	Simulation Rubric (srx)
Table Interaction (TI)	Table Interaction Rubric (trx)

The details of the machine rubric XML elements for the different types of assessment items are not documented in the Specification.

XML Schemata and Document Criteria

In addition to the document element definitions, all XML documents for assessment items SHALL satisfy the following criteria:

- *Semantic Constraints* – constraints on the XML documents that cannot be specified at the XML element level.
- *Specification Versioning* – criteria for identifying the specific version of the Specification in XML schemata describing an assessment item.
- *IANA Considerations* – criteria for Internet media type names for XML documents conforming to the Specification.
- *Implementation Considerations* – best practices on how to represent or use XML documents describing an assessment item.

Semantic Constraints

The XML elements listed include element specific or attribute semantic constraints. There are additional document semantic constraints between elements document as part of the individual elements that are part of the sematic relationship between elements.

An implementation MAY impose additional semantic constraints on an instance of a conforming XML document.

Specification Versioning

Any significant change to the Specification SHALL be indicated by an update to the specification version number and an update to the corresponding XML schemata specification or DTD version number. A change that is backward compatible SHALL be indicated by an update to the minor part of the version number. A change that is not backward compatible SHALL be indicated by an update to the major part of the version number.

Modifications to the Specification narrative that do not impact the schemata or DTDs be indicated by an update to the subpart of the minor part of the specification version number, but the XML schemata version number SHALL NOT change.

XML schemata and DTDs conforming to the Specification SHALL include a version number indicating the version of the Specification. The XML schemata SHALL use the xsd:schema version attribute to specify the schema version number. The specification version number for XML schemata are listed in Table 10.

Table 10: XML Schemata Specification Versions

Schemata	Specification Version	XML Schema Version
Assessment Item Release XML document	1.0.0	SBAIF IR v1p0
Assessment Item XML document	1.0.0	SBAIF AI v1p0
Passage Item XML document	1.0.0	SBAIF PI v1p0
Tutorial XML document	1.0.0	SBAIF TUT v1p0
Wordlist XML document	1.0.0	SBAIF WL v1p0
Grid Item Rendering Specification XML document	1.0.0	SBAIF GR v1p0

Equation Editor Configuration XML document	1.0.0	SBAIF EE v1p0
Item Usage Statistics XML document	1.0.0	SBAIF STAT v1p0
Assessment Item Machine Rubric XML document	1.0.0	SBAIF MR v1p0

XML documents SHOULD include an attribute on each root element that indicates the specification version number. Since the Specification does not mandate specific schemata or DTDs, the attribute is not included with the description of the root XML elements.

IANA Considerations

XML documents for assessment items SHALL be given a media type (MIME Type) and file extension. The MIME media type for the XML serialization of different assessment item documents is listed in Table 11. Corresponding file extensions are also shown in the table.

Table 11: XML Document Media Types

Document	Name	Subtype	Ext
Assessment Item Release XML document	application	vnd.SBAC.assessmentitemrelease+XML	.xml
Assessment Item XML document	application	vnd.SBAC.assessmentitem+XML	.xml
Passage Item XML document	application	vnd.SBAC.passageitem+XML	.xml
Tutorial XML document	application	vnd.SBAC.tutorial+XML	.xml
Wordlist XML document	application	vnd.SBAC.assessmentitem+XML	.xml
Grid Item Rendering Specification XML document	application	vnd.SBAC.griditemrenderingspec+XML	.xml
Equation Editor Configuration XML document	application	vnd.SBAC.equationeditorconfig+XML	.xml
Item Usage Statistics XML document	application	vnd.SBAC.useagestatistics+XML	.xml
Assessment Item Machine Rubric XML documents	application	vnd.SBAC.machinerubric+XML	.xml

The media type SHALL conform to [RFC 4288] and SHOULD be registered with IANA [http://www.iana.org/cgi-bin/mediatypes.pl] in accordance with [RFC 4289].

In lieu of the media types listed in Table 11, an XML document MAY use MIME type application/xml

Documents for attachments SHALL be given a media type (MIME Type) and file extension. The MIME media type for different attachment file types are listed in Table 12. Corresponding file extensions are also shown in the table.

Table 12: Attachment Media Types

Document	Name	Subtype	Ext
ASL Option A	???	vnd.SBAC.???	???
ASL Option B	???	vnd.SBAC.???	???
ASL Option C	???	vnd.SBAC.???	???
Braille Contracted	text	vnd.SBAC.braille	.brf
Braille Nemeth	text	vnd.SBAC.braille	.brf
Braille Uncontracted	text	vnd.SBAC.braille	.brf

The media type SHALL conform to [RFC 4288] and SHOULD be registered with IANA [http://www.iana.org/cgi-bin/mediatypes.pl] in accordance with [RFC 4289].

In lieu of the media types listed in Table 12, a Braille document MAY use MIME type text.

Implementation Considerations

Assessment item identifiers are integer "item numbers". There is no mechanism to insure that different item producers do not use the same item number for different items; item numbers are not globally unique. Consumes need to be aware that items from different producers may use the same item number for different items

Assessment items include elements that refer to other assessment items by their item number. Consumers need to be aware that the Specification does not define a mechanism to convert the item number into a file name or any other mechanism that can be used to access the referenced item.

Assessment items that refer to other assessment items refer to only the item number, not the combination of item plus version. Consumers need to be aware that the Specification does not define a mechanism to determine which of the multiple versions of an item is being referenced.

XML Document Conformance

To conform to the Specification, an XML document holding an *assessment item release*, *assessment item*, a *passage item*, a *tutorial*, a *wordlist*, a *grid item rendering specification,* an *equation editor configuration, item usage statistics* or an *assessment item machine rubric*:

- SHALL be a valid, well-formed XML 1.1 [XML] document.
- SHALL conform to all required structural constraints defined herein.
- SHALL conform to all required semantic constraints defined herein.
- SHALL conform to all required XML document criteria defined herein.

The qti element of an *assessment item*:

- SHALL conform to the itemBody element of [QTI 2.1 XML].

Any XML element that contains HTML content within an *assessment item*:

- SHOULD conform to [XHTML 1.1].

The mathML element of an equation editor configuration:

- SHALL conform to [MathML].

If an XML document is treated as a file, the document SHALL be given a media type and file extension as defined herein.

Conformance to or use of specific XML Schemata or XML DTDs is NOT REQUIRED. Schema validation is NOT REQUIRED.

Inclusion of an XML Schema definition or XML DTD reference in an XML document is RECOMMENDED. Use of an XML Schema definition is preferred. Schema validation is RECOMMENDED.

If an XML Schema definition is used, the XSD SHALL be versioned as defined herein.

If an XML Schema definition is used, the XSD SHOULD be the XSD defined in the Annex of the Specification.

If an XML DTD is used, the DTD SHOULD be the DTD defined in the Annex of the Specification.

XML Document Producer Conformance

To produce an XML document that conforms to the Specification, a document producer:

- SHALL produce a conforming XML 1.1 document as described above.
- SHALL include all required XML elements in the XML document (all elements with multiplicity [1] or [1..*]).
- SHALL include all required XML element attributes in the XML document.
- SHOULD NOT include any IS DEPRICATED XML elements in the XML document.
- SHOULD NOT include any IS DEPRICATED XML element attributes in the XML document.
- SHALL include XML document version information.
- SHALL use the media type and file extension defined if the document is treated as a file.
- MAY include any optional XML elements in the XML document (any elements with multiplicity [0] or [0..*]).
- MAY include any optional XML elements attributes in the XML document.

- MAY include any number of element instances for an element with unbounded multiplicity ([0..*] or [1..*]), including more element instances than the minimum number that a conforming consumer will accept.
- MAY include extension elements in the XML document only for those elements that permit extensions and only if the elements are namespace qualified to be within a separate XML namespace.
- SHOULD include references for all XML Schemata or XML DTDs used in the XML document.
- SHOULD include references to the schemata location for all XML Schemata used in the XML document.
- SHOULD include a schema version attribute on all root elements.

XML Document Consumer Conformance

An application that processes or consumes an XML document that conforms to the Specification:

- SHALL indicate with an error if an XML document is not well formed. The application SHALL reject the entire document.
- SHALL accept and process an XML document with the required XML elements.
- SHALL indicate with an error if an XML document does not include any required XML elements. The application SHALL reject the entire document.
- SHALL accept and process an XML document with the required XML element attributes.
- SHALL indicate with an error if an XML document does not include any required XML elements attributes. The application SHALL reject the entire document.
- SHALL accept and process an XML document with any optional XML elements.
- SHALL accept and process an XML document with any optional XML element attributes.
- SHALL accept an XML document with extensions elements only for those elements that permit extensions and only if the elements are namespace qualified to be within a separate XML namespace.
- SHALL indicate with an error if an XML document includes extension elements for those elements that do not permit extensions. The application MAY either reject the entire document or reject or ignore the extension elements.
- SHALL indicate with an error if an XML document includes extension elements that are not within a separate XML namespace. The application MAY either reject the entire document or reject or ignore the extension elements.
- SHALL accept and process an XML document with any IS DEPRICATED or TO BE DEPRICATED XML elements.
- SHALL accept and process an XML document with any IS DEPRICATED or TO BE DEPRICATED XML element attributes.
- SHALL indicate with an error if the schema version attribute on a root element does not correspond to the schema version if a schema is used.
- MAY process extension elements only for those elements that permit extensions and only if the elements are namespace qualified to be within a separate XML namespace.
- SHALL provide the specified default value for any optional element not included in the XML document.
- SHALL accept and process the minimum number of element instances for an element with unbounded multiplicity ([0..*] or [1..*]).
- SHALL indicate with an error or warning if the number of element instances for an element with unbounded multiplicity ([0..*] or [1..*]) exceeds the number of instances that the application can process (this number that the application processes SHALL be equal to or greater than the minimum number of element instances specified herein). The application SHOULD accept and process the required number of element instances.
- SHALL indicate with an error or warning if the length of an XML string element exceeds the length of a string that the application can process (this length that the application processes

SHALL be equal to or greater than the minimum element string length specified herein). The application SHOULD accept and process the minimum element string length.

- SHALL NOT rely on any XML file naming conventions or file extensions to infer the type of content in the file.

The Specification does not describe how errors are indicated.

A document that conforms to the Specification MAY include URIs from different web origins. The application that processes the document SHOULD be aware of the issues when attempting to access documents from different web origins as outlined in [RFC 6454].

XML Document Security Considerations

Assessment items MAY include arbitrary text strings and structured markup.

Producers including assessment items in an XML document or consumers accessing assessment items MAY want to consider the potential for unsolicited or malicious content and SHOULD take preventive measures to recognize such content and either identify it or not include it in their document.

Producers SHOULD take reasonable measures to make sure potentially malicious user input such as cross-site scripting attacks are not included in the assessment item XML documents.

Services that provide assessment item XML documents to consumers and other services MUST take reasonable measures to make sure potentially malicious ingested input is not distributed or emitted.

Consumers SHOULD be aware of the potential for malicious content where the attacker publishes documents with falsified property values with the intent of injecting malicious content, hiding or corrupting legitimate content, or misleading users.

Consumers that make assessment items available for crawling by search engines SHOULD take reasonable measures to limit any use of their site as a Search Engine Optimization loophole. This may include converting un-trusted hyperlinks to text or including a rel="nofollow" attribute.

The XML documents MAY include URIs; see [RFC 3986] for security considerations.

The XML documents MAY include IRIs; see [RFC 3987] for security considerations.

The XML documents MAY include URIs from different origins; see [RFC 6454] for security considerations.

Producers and consumers SHOULD be aware that the list of security considerations is not exhaustive. Producers and consumers SHOULD take reasonable measures to address other potential security issues.

Normative References

Note: For dated references, only the edition cited applies. For undated references, the most recent edition applies.

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Definitions

Attachment: Definition TBC.

Assessment Item: Definition TBC.

Associated Passage: Definition TBC.

Canvas: Definition TBC.

Consumer: A person or computer system that reads, processes, examines or uses an XML document.

Dwell: Definition TBC.

Equation Editor: A tool provided by the test client that the student can use to enter an equation. The equation editor incorporates an equation text input box, navigation buttons and table panels.

Equation Editor Configuration: Attributes and values that specify the configuration of the equation editor.

Equation Item: A type of assessment item where the student enters an equation.

Grid Item Rendering Specification: Definition TBC.

Grid: Definition TBC.

Input Box: An area provided by the equation editor consisting of one or more text areas that display the student input.

Illustration: Definition TBC.

Item Rendering Specification: Definition TBC.

Machine Rubric: Definition TBC.

Navigation Buttons: Buttons provided by the equation editor that allows the student to navigate around in the equation while building and edit it.

Palette: Definition TBC.

Passage Item: Definition TBC.

Producer: A person or computer system that creates or originates an XML document.

Rendering Specification: Definition TBC.

Resource: Definition TBC.

Rubric: Definition TBC.

Snap Behavior: Definition TBC.

Stem: Definition TBC.

Stimulus Passage: Definition TBC.

Tab Panel: A panel displayed by the equation editor that contains editor controls (e.g., navigation buttons) that are displayed when a tab is selected in the tab row.

Tab Row/Column Layout: The organization of equation editor controls in rows and columns of a table. There is a separate row/column specification for each table in a tab.

Test Client: Definition TBC.

Tutorial: Definition TBC.

User Focus: Definition TBC.

Wordlist: Definition TBC.

Acronyms

AIF	Assessment Interoperability Framework
AIR	American Institutes for Research
APIP	Accessible Portable Item Protocol
ASL	American Sign Language
DTD	Document Type Definition
GUID	Globally Unique Identifier
IANA	Internet Corporation for Assigned Names and Numbers
IPA	International Phonetic Alphabet
HTML	Hypertext Markup Language
SBAC	Smarter Balanced Assessment Consortium
xHTML	Extensible Hypertext Markup Language
XML	eXtensible Markup Language
XSD	XML Schema Definition

Informative References

Note: This section is informative.

[APIP] *The Accessible Portable Item Protocol (APIP)*, IMS Global Learning Consortium Inc.
[http://www.imsglobal.org/apip/]

[APIP BP 1.0] *Accessible Portable Item Protocol (APIP): Best Practices and Implementation Guide*, Candidate Final Release, Version 1.0, G. Driscoll, et al., IMS Global Learning Consortium Inc., March 2012
[http://www.imsglobal.org/apip/apipv1p0cf/APIPv1p0_Best_v1p0cf.html]

[APIP Conformance 1.0] *Accessible Portable Item Protocol (APIP) Conformance and Certification*, Candidate Final Release, Version 1.0, G. Driscoll, et al., IMS Global Learning Consortium Inc., March 2012
[http://www.imsglobal.org/apip/apipv1p0cf/APIPv1p0_Conf_v1p0cf.html]

[APIP Overview 1.0] *Accessible Portable Item Protocol (APIP) Overview, Candidate Final Release*, Version 1.0, G. Driscoll, et al., IMS Global Learning Consortium Inc., March 2012
[http://www.imsglobal.org/apip/apipv1p0cf/APIPv1p0_Oview_v1p0cf.html]

[APIP PNP 1.0] *Accessible Portable Item Protocol (APIP): Technical Specification for AfA PNPv2.0 Features*, Candidate Final Release, Version 1.0, G. Driscoll, et al., IMS Global Learning Consortium Inc., March 2012
[http://www.imsglobal.org/apip/apipv1p0cf/APIPv1p0_PNP_v1p0cf.html]

[APIP QTI 1.0] *Accessible Portable Item Protocol (APIP): Technical Specification for QTIv2.1 Features*, Candidate Final Release, Version 1.0, G. Driscoll, et al., IMS Global Learning Consortium Inc., March 2012
[http://www.imsglobal.org/apip/apipv1p0cf/APIPv1p0_QTI_v1p0cf.html]

[APIP Tech 1.0] *Accessible Portable Item Protocol (APIP): Technical Specification*, Candidate Final Release, Version 1.0, G. Driscoll, et al., IMS Global Learning Consortium Inc., March 2012
[http://www.imsglobal.org/apip/apipv1p0cf/APIPv1p0_Profile_v1p0cf.html]

[APIP Terms 1.0] *Accessible Portable Item Protocol (APIP) Terms and Definitions*, Candidate Final Release, Version 1.0, G. Driscoll, et al., IMS Global Learning Consortium Inc., March 2012
[http://www.imsglobal.org/apip/apipv1p0cf/APIPv1p0_Terms_v1p0cf.html]

[APIP Validator] *IMS Assessment Conformance and Certification Validator*, IMS Global Learning Consortium Inc.
[http://validator.imsglobal.org/assessment/]

[SBAC Packaging 1.4] *Item Package Specification for Smarter Balanced Assessment Consortium*, Version 1.4, Publisher, January 2014.

Annex: XML Document Examples

Note: This section is informative.

Note: The examples are for illustrative purposes only.

Examples include:

- An *Assessment Item* example (including *Assessment Item Accessibility* elements).
- A *Passage Item* example (including *Assessment Item Accessibility* elements).
- A *Tutorial* example.
- A *Wordlist* example.
- A *Grid Item Rendering Specification* example embedded in a Grid Assessment Item
- An *Equation Editor Configuration* example embedded in an Equation Grid Assessment Item.
- An *Item Usage Statistics* example embedded in an Assessment Item.

The examples use the sample schemata provided.

Assessment Item Example

This example shows the XML document for an assessment item. Add example overview. The example includes accessibility content. The complete example XML document is shown in Code Listing A.1. The item rendering is shown in Figure A.1.

Code Listing A.1: Assessment Item Example XML Document

```
00 <?xml version="1.1" encoding="UTF-8"?>
01 <item
02   xmlns="http://www.smarterapp.org/xsd/assessmentitem_v1p0"
03   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
04   xsi:schemaLocation=http://www.smarterapp.org/xsd/assessmentitem_v1p0
05 http://www.smarterapp.org/xsd/assessmentitem_v1p0.xsd
06   schemaversion="1.0"
07   format="xx"
08   id="a5a048bdf90245deb185c2cf2cdb5ce6S"
09   version="1.0"
10 >
11 ...
12 </item>
```

☒ Example Validated: not validated
XML: ☒ Schema: ☒

In the example:

- Lines 00-10: Standard XML document header and namespace information
  - Line 00: XML header
  - Line 01: item element
  - Lines 02-05: XML namespace information
  - Line 06: Specification/schema version used in the document.
  - Lines 07-09: Required item element attributes
- Lines xx-xx: Description

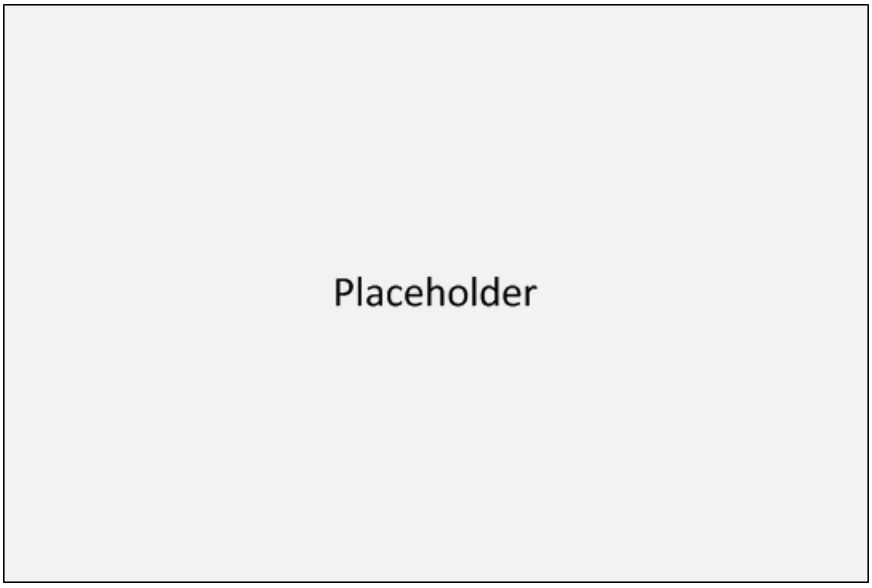

Figure A.1: Assessment Item Example Rendering

Passage Item Example

This example shows the XML document for a passage item. The example includes accessibility content. Add example overview. The complete example XML document is shown in Code Listing A.2. The item rendering is shown in Figure A.2.

Code Listing A.2: Passage Item Example XML Document

```
00 <?xml version="1.1" encoding="UTF-8"?>
01 <passage
02  xmlns="http://www.smarterapp.org/xsd/itempassage_v1p0"
03  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
04  xsi:schemaLocation="http://www.smarterapp.org/xsd/passageitem_v1p0
05 http://www.smarterapp.org/xsd/passageitem_v1p0.xsd"
06  schemaversion="1.0"
07  id="25603c19314f43e789e88522f9b5467f"
08  version="1.0"
09 >
10 ...
11 </passage>
```

☒ Example Validated: not validated
XML: ☒ Schema: ☒

In the example:

- Lines 00-09: Standard XML document header and namespace information
  - Line 00: XML header
  - Line 01: passage element
  - Lines 02-05: XML namespace information
  - Line 06: Specification/schema version used in the document.
  - Lines 07-08: Required passage element attributes
- Lines xx-xx: Description

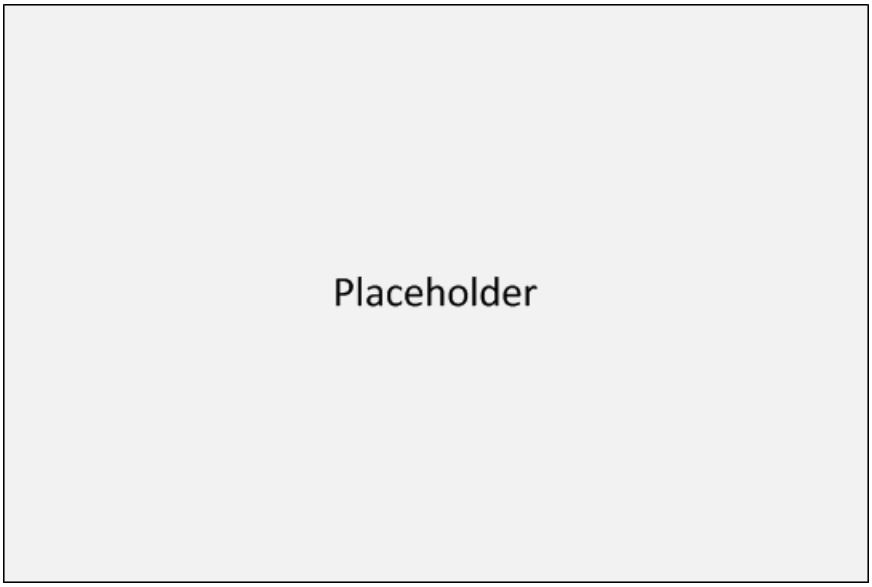

Figure A.2: Passage Item Example Rendering

Tutorial Example

This example shows the XML document for a tutorial. Add example overview. The complete example XML document is shown in Code Listing A.3. The item rendering is shown in Figure A.3.

Code Listing A.3: Tutorial Example XML Document

```
00 <?xml version="1.1" encoding="UTF-8"?>
01 <item
02  xmlns="http://www.smarterapp.org/xsd/assessmentitem_v1p0"
03  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
04  xsi:schemaLocation=http://www.smarterapp.org/xsd/assessmentitem_v1p0
05 http://www.smarterapp.org/xsd/assessmentitem_v1p0.xsd
06  schemaversion="1.0"
07  format="xx"
08  id="a5a048bdf90245deb185c2cf2cdb5ce6S"
09  version="1.0"
10 >
11 ...
12 </item>
```

☒ Example Validated: not validated
XML: ☒ Schema: ☒

In the example:

- Lines 00-10: Standard XML document header and namespace information
  - Line 00: XML header
  - Line 01: item element
  - Lines 02-05: XML namespace information
  - Line 06: Specification/schema version used in the document.
  - Lines 07-09: Required item element attributes
- Lines xx-xx: Description

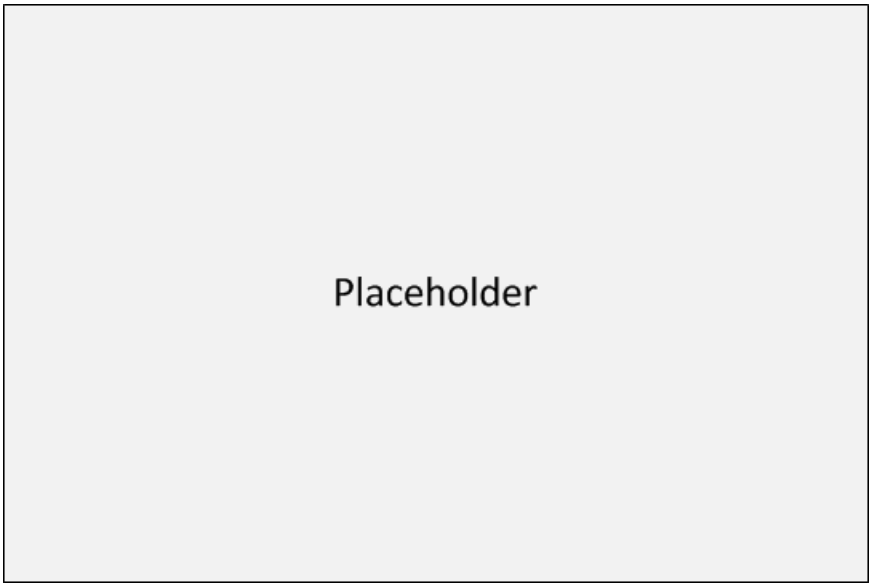

Figure A.3: Tutorial Example Rendering

Wordlist Example

This example shows the XML document for a wordlist. Add example overview. The complete example XML document is shown in Code Listing A.4. The item rendering is shown in Figure A.4.

Code Listing A.4: Wordlist Example XML Document

```
00 <?xml version="1.1" encoding="UTF-8"?>
01 <item
02   xmlns="http://www.smarterapp.org/xsd/assessmentitem_v1p0"
03   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
04   xsi:schemaLocation=http://www.smarterapp.org/xsd/wordlist_v1p0
05 http://www.smarterapp.org/xsd/wordlist_v1p0.xsd
06   schemaversion="1.0"
07   format="xx"
08   id="a5a048bdf90245deb185c2cf2cdb5ce6S"
09   version="1.0"
10 >
11 ...
12 </item>
```

☒ Example Validated: not validated
XML: ☒ Schema: ☒

In the example:

- Lines 00-10: Standard XML document header and namespace information
  - Line 00: XML header
  - Line 01: item element
  - Lines 02-05: XML namespace information
  - Line 06: Specification/schema version used in the document.
  - Lines 07-09: Required item element attributes
- Lines xx-xx: Description

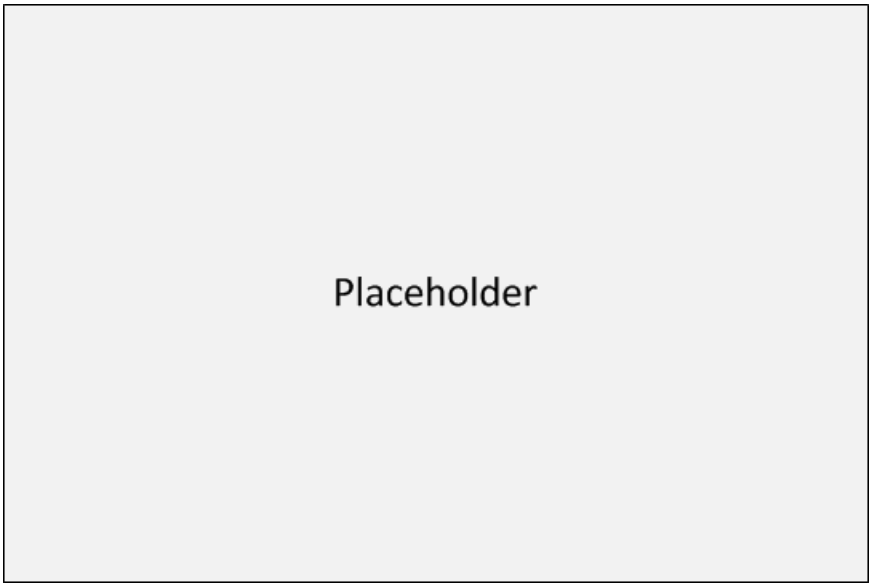

Figure A.4: Wordlist Example Rendering

Grid Item Rendering Specification Example

This example shows the XML document for a grid item rendering specification embedded within a grid assessment item. Add example overview. The complete example XML document is shown in Code Listing A.5. The item rendering is shown in Figure A.5.

Code Listing A.5: Grid Item Rendering Specification Example XML Document

```
00 <?xml version="1.1" encoding="UTF-8"?>
01 <question
02   xmlns="http://www.smarterapp.org/xsd/ graphcresponseitem _v1p0"
03   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
04   xsi:schemaLocation="http://www.smarterapp.org/xsd/gridrenderspec_v1p0
05 http://www.smarterapp.org/xsd/gridrenderspec_v1p0.xsd"
06   schemaversion="1.0"
07   id="677a8bc7157443b0a6d8342105abd1e9"
08   version="1.0"
09 >
10 ...
11 </question>
```

☒ Example Validated: not validated
XML: ☒ Schema: ☒

In the example:

- Lines 00-09: Standard XML document header and namespace information
  - Line 00: XML header
  - Line 01: question element
  - Lines 02-05: XML namespace information
  - Line 06: Specification/schema version used in the document.
  - Lines 07-08: Required question element attributes
- Lines xx-xx: Description

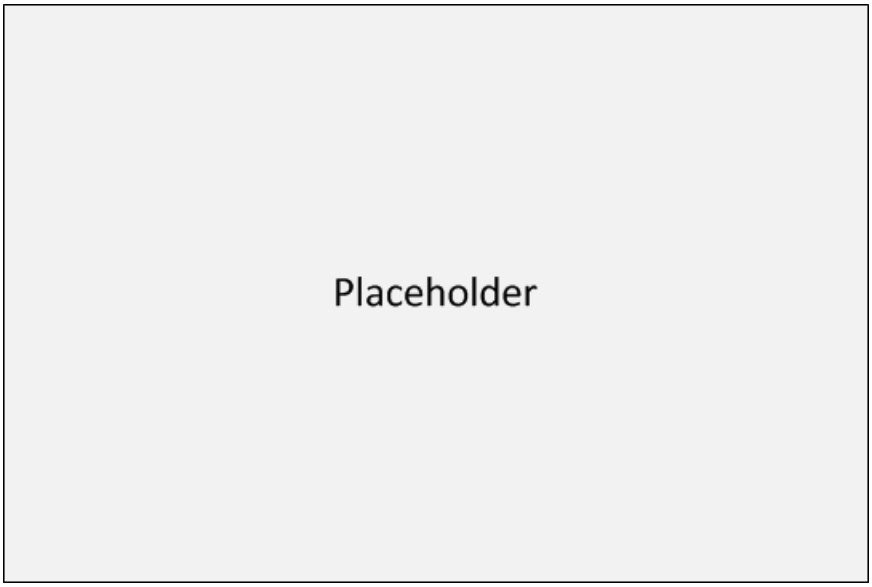

Figure A.5: Grid Item Rendering Specification Example Rendering

Equation Editor Configuration Example

This example shows the XML document for an equation editor configuration embedded within an equation assessment item. Add example overview. The complete example XML document is shown in Code Listing A.6. The item rendering is shown in Figure A.6.

Code Listing A.6: Equation Editor Configuration Example XML Document

```
00 <?xml version="1.1" encoding="UTF-8"?>
01 <editorconfig
02   xmlns="http://www.smarterapp.org/xsd/equationeditorconfig _v1p0"
03   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
04   xsi:schemaLocation="http://www.smarterapp.org/xsd/equationeditorconfig_v1p0
05 http://www.smarterapp.org/xsd/equationeditorconfig _v1p0.xsd"
06   schemaversion="1.0"
07   id="e5e28021440c4f878fed4b980667a85a"
08   version="1.0"
09 >
10 ...
11 </editorconfig>
```

☒ Example Validated: not validated
XML: ☒ Schema: ☒

In the example:

- Lines 00-09: Standard XML document header and namespace information
  - Line 00: XML header
  - Line 01: editorconfig element
  - Lines 02-05: XML namespace information
  - Line 06: Specification/schema version used in the document.
  - Lines 07-08: Required editorconfig element attributes
- Lines xx-xx: Description

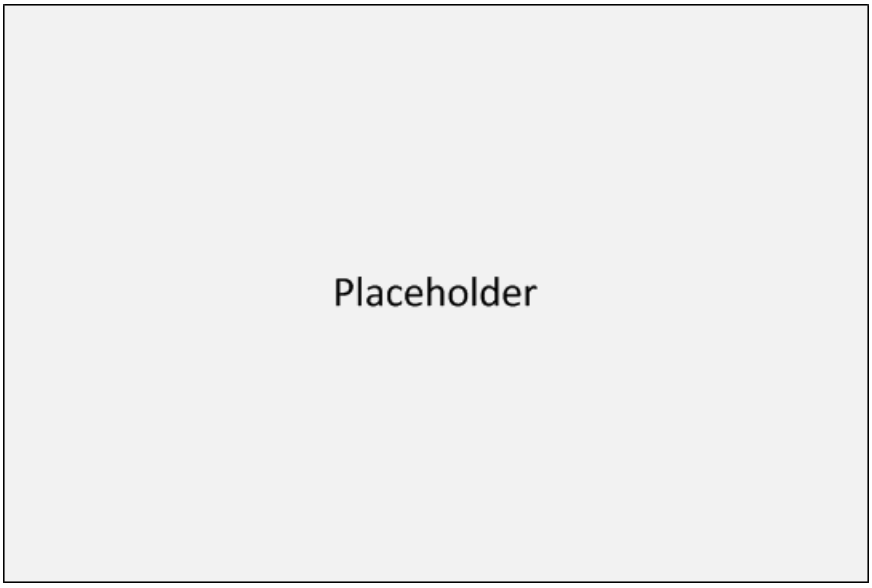

Figure A.6: Equation Editor Configuration Example Rendering

Assessment Item Usage Statistics Example

This example shows the XML document for item usage statistics embedded within an assessment item. Add example overview. The complete example XML document is shown in Code Listing A.7.

Note: No illustration is included. Assessment Item Usage Statistics are not presented to the student. How the data is presented to item developers and psychometricians is not part of the Specification.

Code Listing A.7: Assessment Item Usage Statistics Example XML Document

```
00 <?xml version="1.1" encoding="UTF-8"?>
01 <editorconfig
02   xmlns="http://www.smarterapp.org/xsd/equationeditorconfig _v1p0"
03   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
04   xsi:schemaLocation="http://www.smarterapp.org/xsd/usagestatistics_v1p0
05 http://www.smarterapp.org/xsd/usagestatistics _v1p0.xsd"
06   schemaversion="1.0"
07   id="e5e28021440c4f878fed4b980667a85a"
08   version="1.0"
09 >
10 ...
11 </editorconfig>
```

☒ Example Validated: not validated
XML: ☒ Schema: ☒

In the example:

- Lines 00-09: Standard XML document header and namespace information
  - Line 00: XML header
  - Line 01: editorconfig element
  - Lines 02-05: XML namespace information
  - Line 06: Specification/schema version used in the document.
  - Lines 07-08: Required editorconfig element attributes

- Lines xx-xx: Description

****

Annex: XML Schemata

Note: This section is informative.

XML Schema Definitions (XSDs) [XSD 1] can be used to describe part of the XML document model for assessment items. An XSD is insufficient to represent the entire document model. Different XSDs can be equivalent; there is no unique XSD.

A sample set of schemata has been developed that represent the Specification. An XML document that uses these schemata conforms to part of the Specification, but the schemata are insufficient to determine if an XML document is fully conformant to the Specification. A conformant XML document need not use these specific schemata. These schemata are informative.

The sample schemata are available on the web at the URI's listed in Table A.2.

Table A.2: XSD Schema Locations

Schema	Version	Schema Location
Assessment Item Release	1.0.0	http://www.smarterapp.org/xsd/assessmentitemre;ease_v1p0.xsd
Assessment Item	1.0.0	http://www.smarterapp.org/xsd/assessmentitem_v1p0.xsd
Passage Item	1.0.0	http://www.smarterapp.org/xsd/itempassage_v1p0.xsd
Tutorial Item	1.0.0	http://www.smarterapp.org/xsd/tutorial_v1p0.xsd
Wordlist Item	1.0.0	http://www.smarterapp.org/xsd/wordlist_v1p0.xsd
Grid Item Rendering Specification	1.0.0	http://www.smarterapp.org/xsd/griditemrenderingspec _v1p0.xsd
Equation Editor Configuration	1.0.0	http://www.smarterapp.org/xsd/equationeditorconfig _v1p0.xsd
Assessment Item Usage Statistics	1.0.0	http://www.smarterapp.org/xsd/usagestatistics _v1p0.xsd
Assessment Item Machine Rubric	1.0.0	http://www.smarterapp.org/xsd/machinerubric _v1p0.xsd

The schemata are available for download or for direct references from an XML document using the schemaLocation attribute.

Multiple versions of each schema may exist, with the schema location following the schema versioning strategy. The schemata may be updated to reflect changes, errata or new versions. Users are advised to verify the version of any schema they use.

****

Annex: XML DTDs

Note: This section is informative.

XML Document Type Definitions (DTDs) can be used to describe part of the XML document model for assessment items. A DTD is insufficient to represent the entire document model. Different DTDs can be equivalent.

A set of sample DTDs has been developed that represent XML documents that use the Specification. An XML document that uses these DTDs conforms to part of the Specification, but the DTDs are insufficient to determine if an XML document is fully conformant to the Specification. A conformant XML document need not use these specific DTDs. These DTDs are informative.

The sample DTDs are available on the web at the URI's listed in Table A.3.

Table A.3: DTD Locations

DTD	Version	DTD Location
Assessment Item Release	1.0.0	http://www.smarterapp.org/dtd-URL-TBD
Assessment Item	1.0.0	http://www.smarterapp.org/dtd-URL-TBD
Passage Item	1.0.0	http://www.smarterapp.org/dtd-URL-TBD
Tutorial	1.0.0	http://www.smarterapp.org/dtd-URL-TBD
Wordlist	1.0.0	http://www.smarterapp.org/dtd-URL-TBD
Grid Item Rendering Specification	1.0.0	http://www.smarterapp.org/dtd-URL-TBD
Equation Editor Configuration	1.0.0	http://www.smarterapp.org/dtd-URL-TBD
Assessment Item Usage Statistics	1.0.0	http://www.smarterapp.org/dtd-URL-TBD
Assessment Item Machine Rubric	1.0.0	http://www.smarterapp.org/dtd-URL-TBD

The DTD are available for download or for direct references from an XML document.

Multiple versions of each DTD may exist, with the DTD location following the DTD versioning strategy. The DTDs may be updated to reflect changes, errata or new versions. Users are advised to verify the version of any DTD they use.

DTD Versioning Strategy

Add DTD versioning strategy.

Index: XML Elements and Attributes

Note: Page numbers in bold indicate the location where the XML element is defined. Page numbers in italics indicate the location where the XML attribute is defined. If an index entry does not have a bold or italics page number, the item is both defined and referenced on the single page indicated.

Change Log

Date	Version	Author	Notes
20131107	0.35	DR	Baseline working document for AIR information gathering.
20131128	0.40	DR, JD	Incorporate initial AIR information on element descriptions. Internal release for SBAC stakeholders.
20140205	0.50	DR, JD	Incorporate additional AIR information on element descriptions. Add passage item document type. Editorial updates. Document organizational changes. Technical revisions and clarifications throughout.
20140224	0.60	DR, JD, DL	Incorporate additional AIR information on element descriptions. Add tutorial and wordlist item document types. Editorial updates. Document organizational changes. Technical revisions and clarifications throughout.
20140224	0.61		Prerelease.
2014xxxx	0.x		Project Draft.
2014xxxx	1.0		V1.0 public release.

Document Open Issues

Note: Section to be deleted prior to public release. CHECK PAGE HEADER ON CHANGE LOG AFTER DELETE.

Notation Used for Open Issues

- Placeholder text to replace with detailed information from SBAC (yellow): © & URLs.
- Placeholder text to go away (green): Element hierarchies.
- Placeholder for needed AIR information (turquoise).
- Information to be verified (red).
- Internal notes to be replaced or updated (gray).
- Internal critical issues (black): currently none.

Document Layout

- Get official SBAC Logo.
- ~~Verify spec title~~.
- Adjust blank page between front matter and document body.
- Check consistent font usage.
- Add tags to URLs.
- Add accessibility tags to figures, tables, code.
- Add table page breaks.
- Word doesn't do dup index entries for same page number.
- Change log is set for an odd page, but there's no blank page.

Front Matter

- Verify ©.
- Verify license, etc. (CC 3.0 vs. 4.0).
- Determine formal © owner.
- ~~Update © year~~.
- Update contact info and document URL.
- Remove "Draft" statement upon publication.

Introduction

- *Draft completed.*

Notation

- ~~Add notation for simple elements (only used for assessment items – needed for other items?). Tables will be renumbered~~.
- Resolve and delete all comments.
- Generate XML Spy diagram to match spec.

Informal Model

- ~~Add overview~~.
- ~~Add diagram~~.
- ~~Add any additional parts~~.
- Fill in details for all parts.
    - ~~Assessment Item Release~~.
    - Assessment Item.
    - Passage Item.
    - ~~Tutorial~~.
    - Wordlist.
    - Assessment Item Accessibility.

    - Grid Item Rendering Spec.
    - Equation Editor Configuration.
    - ~~Assessment Item Usage Statistics~~.
    - ~~Assessment Item Machine Rubric~~.
- Resolve and delete all comments.

Elements (All Documents)

- Verify from examples.
    - ~~Assessment Item Release~~.
    - ~~Assessment Item~~.
    - ~~Passage Item~~.
    - ~~Tutorial~~.
    - ~~Wordlist~~.
    - ~~Assessment Item Accessibility~~.
    - Grid Item Rendering Spec.
    - Equation Editor Configuration.
    - ~~Assessment Item Usage Statistics~~.
    - ~~Assessment Item Machine Rubric~~.
- Include all descriptions of all elements and attributes.
    - Assessment Item Release.
    - Assessment Item.
    - Passage Item.
    - ~~Tutorial~~.
    - Wordlist.
    - Assessment Item Accessibility.
    - Grid Item Rendering Spec.
    - Equation Editor Configuration.
    - ~~Assessment Item Usage Statistics~~.
    - ~~Assessment Item Machine Rubric~~.
- Add XML illustrations.
    - Assessment Item Release.
    - Assessment Item.
    - Passage Item.
    - ~~Tutorial~~.
    - Wordlist
    - Assessment Item Accessibility.
    - Grid Item Rendering Spec.
    - Equation Editor Configuration.
    - Assessment Item Usage Statistics.
    - ~~Assessment Item Machine Rubric~~.
- Resolve and delete all comments.

XML Schemata and Document Criteria

- ~~Add any semantic considerations~~.
- ~~Define how to indicate the specification version number in the document~~.
- ~~Add IANA info~~.
- ~~Add any implementation considerations~~.
- *Draft completed.*

Conformance

- ~~Should XSD or DTD use be required~~?
- ~~Add any additional produce conformance criteria~~.
- ~~Add any additional consumer conformance criteria~~.

- *Draft completed.*

Security Considerations
- ~~Add any additional security considerations~~.
- *Draft completed.*

Normative References
- ~~Complete list of references~~.
- Need an HTML or HTML5 reference?

Definitions
- ~~Complete list of definitions~~.
- ~~Add any additional definitions~~.
- Fill in definitions.

Acronyms
- ~~Complete list of acronyms~~.
- ~~Add any additional acronyms~~.
- *Draft completed.*

Informative References
- ~~Complete list of references~~.
- *Draft completed.*

Examples
- Complete all examples.
    - Assessment Item.
    - Passage Item.
    - Tutorial.
    - Wordlist.
    - Grid Item Rendering.
    - Equation Editor Configuration.
    - Usage Statistics.
- Add examples for other schemata.
    - Assessment Item.
    - Passage Item.
    - Tutorial.
    - Wordlist.
    - Grid Item Rendering.
    - Usage Statistics.
- Add rendering figure for all examples.
    - Assessment Item.
    - Passage Item.
    - Tutorial.
    - Wordlist.
    - Grid Item Rendering.
    - Equation Editor Configuration.

Design Decisions
- ~~Add additional general design decisions~~.
- Add design decisions for each document type.
    - ~~Assessment Item Release~~.
    - ~~Assessment Item~~.

- ~~Passage Item~~.
- ~~Tutorial~~.
- ~~Wordlist~~.
- ~~Assessment Item Accessibility~~.
- Grid Item Rendering Spec.
- Equation Editor Configuration.
- ~~Assessment Item Usage Statistics~~.
- ~~Assessment Item Machine Rubric~~.

XML Schema

- Provide hosting URLs.
- ~~Add versioning strategy~~.

XML DTD

- Provide hosting URLs.
- Add versioning strategy.

Suggested XML Changes

Note: Section to be deleted prior to public release. CHECK PAGE HEADER ON CHANGE LOG AFTER DELETE.

Consider changing YES|NO vocabularies to xs.boolean.
Make id attribute names consistent.
Change language to xml:lang.
Drop namespace attributes.
Change name of SBAC specific elements to more meaningful names..
What else?