



SmarterApp Assessment Item Format Specification

V 0.75

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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 SmarterApp *Assessment Item Format Specification* (SAAIF).

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 Smarter Balanced Assessment Consortium (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 or 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. These elements are normally embedded in an assessment item release document.
 - *Wordlist XML Elements* – the XML elements defining a wordlist resource used in an assessment item. These elements are normally embedded in an assessment item release document.

- *Assessment Item Accessibility XML Elements* – the XML elements defining an item accessibility XML document. These elements are normally embedded in an assessment item (including a tutorial) or passage item document.
- *Grid Item Rendering Specification XML Elements* – the XML elements defining a 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. These elements are normally embedded in an assessment item. The details of these elements are not documented in the Specification.
- *Assessment Item Machine Rubric XML Elements* – the XML elements defining a machine rubric XML document. The machine rubric XML document is normally referenced in an assessment item. 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 XML Schemata (XSDs) that conform to the Specification (informative).
- **Annex: XML DTDs** – Description of 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 DEPRECATED” 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 DEPRECATED” in the Specification designates a feature that MAY be removed in a future version of the Specification. The feature is maintained for backward compatibility. If REQUIRED, the feature SHALL be used when creating new assessment items. All conforming processors MUST support the feature.

The key word “NOT SPECIFIED” in the Specification designates a behavior that is not described. Different implementations (typically consumers) MAY behave differently. Interoperability between different implementations is not insured.

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.

Element	The XML element name	
	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.
	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.
	MathML	The element contains [MathML] 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 in the table. 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 <i>None</i> .
	Multiplicity	The multiplicity of the element in an XML document:
	[0]	Element occurs 0 times.
	[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.
		<input checked="" type="checkbox"/> indicates the element is a candidate TO BE DEPRECATED.
	<input checked="" type="checkbox"/> indicates the element IS DEPRECATED.	
Attributes	The list of attributes of the element, each in a separate row in the table. 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 <i>None</i> .
	Required	<input checked="" type="checkbox"/> indicates the attribute is REQUIRED.
		<input type="checkbox"/> indicates the attribute is OPTIONAL.

Element	The XML element name	
		<input checked="" type="checkbox"/> indicates the element is a candidate TO BE DEPRECATED.
		<input checked="" type="checkbox"/> indicates the element IS DEPRECATED
	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.
		The entry is <i>None</i> for any OPTIONAL attribute that does not have a default value.
Extensions	<input checked="" type="checkbox"/> indicates that the element MAY include XML namespaced extensions. <input checked="" type="checkbox"/> 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 if there are no additional notes.	
	All notes are informative.	

Table 2: XML Element Descriptions – Simple 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	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	<input checked="" type="checkbox"/> indicates that the element MAY include XML namespaced extensions. <input checked="" type="checkbox"/> indicates that the element MAY NOT include XML namespaced extensions.	

Element	The XML element name
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 if 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 table 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.

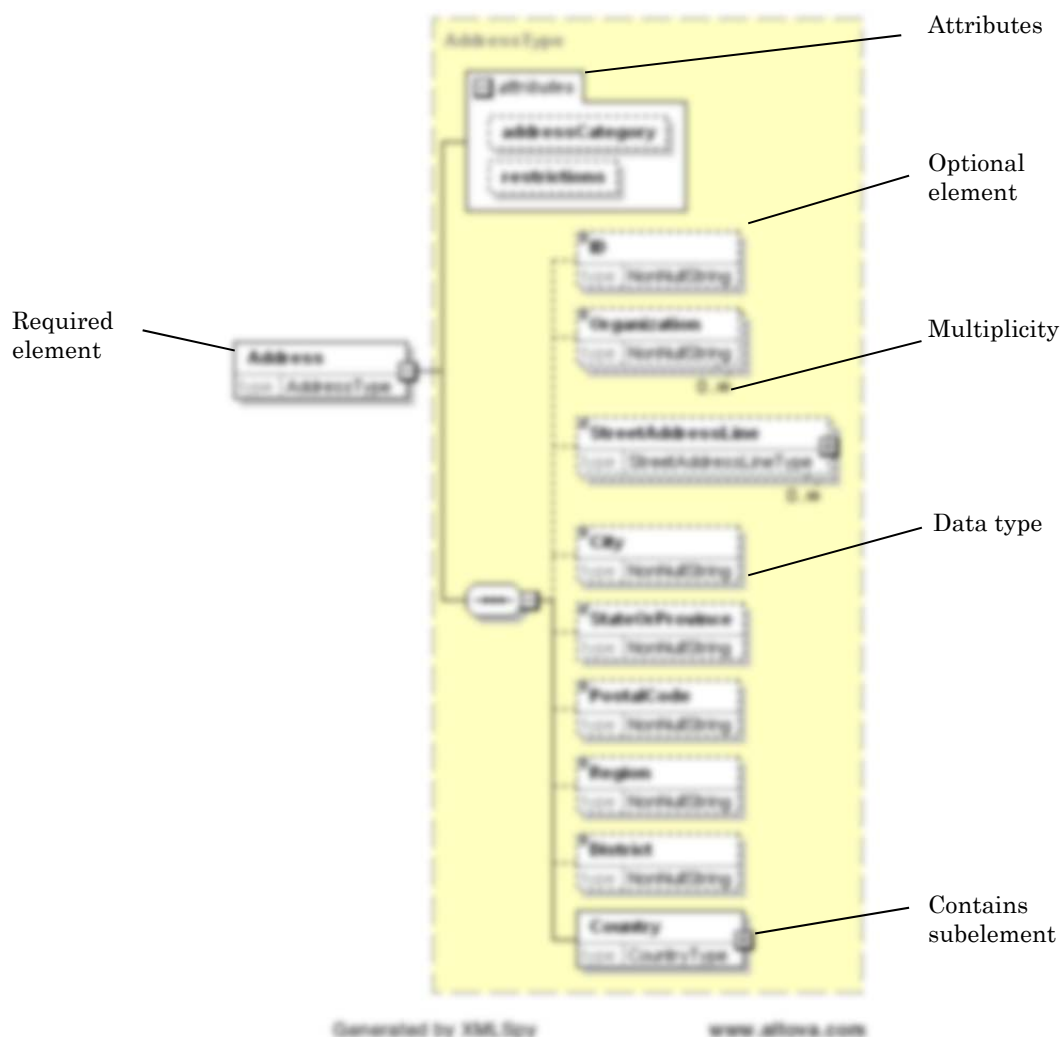


Figure 1: XML Graphical Conventions

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:	http://www.w3.org/1999/xhtml

Special Characters

Special characters in strings are described with informal character name, followed in parentheses 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.
<i>Italics</i> <i>Italics San Serif</i>	A special value for an XML element, XML attribute or attribute value that is not encoded in XML. Examples include <i>None</i> and <i>Any</i> . 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, with an item being 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 from the assessment item. A passage is a separate type of XML 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. The assessment item references the passage item through the passage item number.
- An assessment item may contain resources, e.g., a wordlist, stored separately from the assessment item. Each different type of resource is modeled as a type of an assessment item. The assessment item references the item number of the assessment item that contains the resource, e.g., the assessment item references an assessment item of type wordlist. A resource has a unique XML element structure within the assessment item XML element. The structure of a wordlist resource is defined by the *Wordlist* XML document elements. Other resources are treated in the same manner, defined by specialized assessment item XML elements. No other resources are currently defined in the Specification.
- An assessment item may contain a tutorial, stored separately from the assessment item. 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. The assessment item references the item number of the assessment item that contains the tutorial content.
- An assessment item may include a rendering specification used to control how the item is displayed. The rendering specification is generally stored separately from the assessment item and different types of assessments have their own unique *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 current implementation, the grid item rendering specification is stored within in the assessment item instead of being stored separately.
- An assessment item may include a machine rubric used to control how the item is automatically graded. Machine rubrics are present only for assessment items that are automatically graded. The machine rubric is stored separately from the assessment item and each of the different types of machine rubrics is defined by its own *Assessment Item Machine Rubric* XML document elements.
- An assessment item may incorporate usage statistics 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 from the assessment item. 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 assessment (including a tutorial) 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.

A *Tutorial XML* document is a specialized type of *Assessment Item XML* document. A *Tutorial XML* document constrains which elements of an *Assessment Item XML* document are used to describe the tutorial content.

A *Wordlist XML* (or any other type of resource) document is a variant of an *Assessment Item XML* document. While the top-level XML element is the same as an *Assessment Item XML* document, the rest of the structure of a *Wordlist XML* document is specific to a wordlist. Figure 2 illustrates a resource in an assessment item or passage linking to a specific type of resource, a wordlist.

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 XML* document may hold any of the different types of *Assessment Item XML* documents, i.e., a *Wordlist* or *Tutorial XML* document.

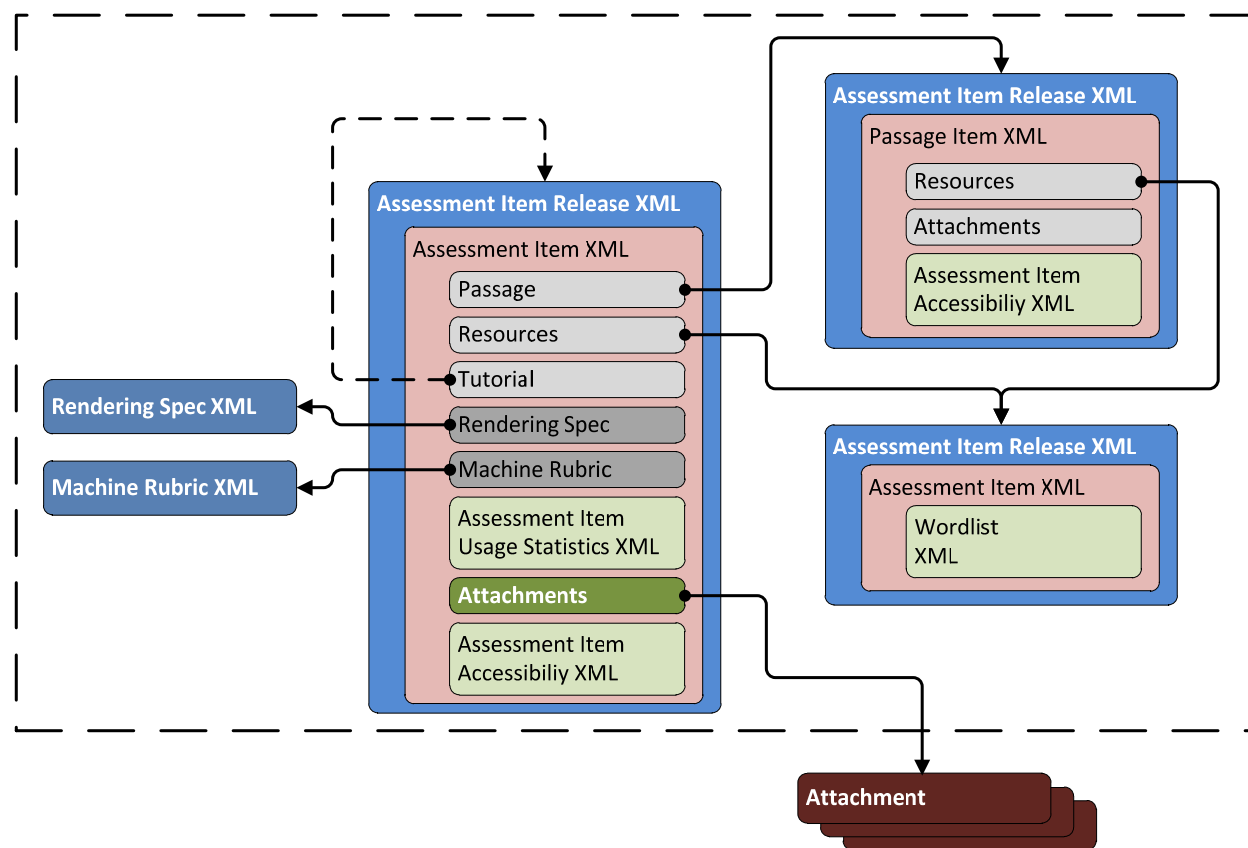


Figure 2: Overall XML Document Model (Informative)

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 allows any attachment to be stored anywhere, fully independent of an assessment system, i.e., the attachment may be a web-accessible document held and maintained by a 3rd party.

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 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 *Assessment Item Release* XML document contains no information about the assessment item.

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

- An *Assessment Item* XML document (including documents that describe assessment items, tutorials as a type of assessment item, and wordlist resources as a type of assessment item).
- A *Passage Item* XML document.

Assessment Item XML Document Information Model

An *Assessment Item* XML document holds the content for an assessment item that is presented to the student. It may be either the container for the entire assessment item, or a container for a specialized subset of content used in an assessment item, including standalone tutorial content or standalone resources used by the assessment item, such as a wordlist.

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

- A list of assessment item attributes.
- The assessment item content.
- An associated passage for the assessment item, e.g., a stimulus. The actual passage content is stored in an independent *Passage Item* XML document.
- An item tutorial that is stored 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 documents 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 includes:

- IMS QTI XML content.
- A list of rationale options describing the expected assessment item response.
- An illustration for an assessment item modeled as a block of HTML, i.e., an HTML wrapper for media.

- A stem modeled as a block of HTML.
- A list of grading rubrics.
- A list of response choice options for the item.
- A list of attachments containing accessibility content for the item; 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

A *Passage Item* XML document holds the content for a stimulus passage that is presented to the student. A passage item is used with an assessment item and the *Passage Item* XML document is referenced from the associated passage element within the assessment item.

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

- A list of item attributes.
- The passage item content.
- An item tutorial that is stored 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 documents that have a special format.

The passage item content includes:

- A stem modeled as a block of HTML.
- A list of attachments containing accessibility content for the item; 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 holds the content for a tutorial that is presented to the student. A tutorial is used with an assessment item and the *Tutorial* XML document is referenced from the tutorial element within the assessment item.

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. Most features of an *Assessment Item* XML document may be used in a *Tutorial* XML document. Additional conformance constraints apply to some of the elements.

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

The tutorial as an 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

A *Wordlist* XML document holds the content for a wordlist (thesaurus and glossary definitions) type of resource. A wordlist is used in with an assessment item and the *Wordlist* XML document is referenced from the resource element within the assessment item.

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

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

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

The wordlist 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

An *Assessment Item Accessibility* XML document holds accessibility content (e.g., Braille alternative content). Accessibility content is used with an Assessment Item (including a tutorial) or a passage item and is referenced from the *apipAccessibility* element within the assessment item or passage item.

Accessibility information is stored inline in an *Assessment Item* XML document or *Passage Item* XML document in the *apipAccessibility* element.

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

- Accessibility elements containing text-to-speech pronunciation information and Braille or American Sign Language (ASL) alternative text.

Grid Item Rendering Specification XML Document Information Model

A *Grid Item Rendering Specification* XML document holds the rendering configuration settings for a grid type of assessment item. The grid item rendering specification is a type of rendering specification. The grid item rendering specification is referenced from the *gridanswerspace* element within a grid type of assessment item and is stored inline in the *gridanswerspace* element.

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

- A description of the grid, its rendering and behavior of UI interactions on the grid.
- A description of the initial elements placed on the grid.

Equation Editor Configuration XML Document Information Model

An *Equation Editor Configuration* XML document holds the configuration settings for the equation editor that is presented to the student with an equation type of assessment item. The equation

editor configuration is a type of rendering specification. The equation editor configuration is referenced from the `RendererSpec` element within an equation type of assessment item.

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

- The overall configuration settings for the equation editor.
- Details of the rows and columns of tabbed entry fields.
- MathML elements.

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 complete information model for an *Assessment Item Usage Statistics* XML document will be included in a future version of the Specification.

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 for the 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 *Assessment Item Release* XML document contains no information about the assessment item.

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 (assessment item [which includes tutorial and resource] and passage). 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 DEPRECATED and removed in a future version of the Specification. The different types of assessment item documents will be standalone documents; workflow processes will be documented separately from the assessment item 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 graphical conventions described.

- itemrelease
 - item
 - passage

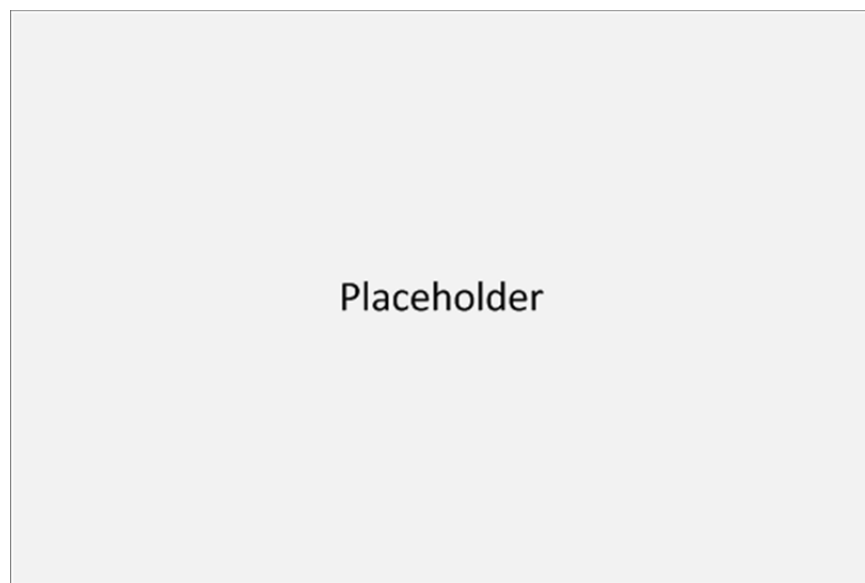


Figure 3: Assessment Item Release XML Document Structure (Informative)

Assessment Item Release Elements

Element	itemrelease			
Description	Container element for the release of an <i>Assessment Item</i> .			
Element Type	choice			
Elements	Name	Multiplicity		
	item	[1]		
	passage	[1]		
Attributes	Name	Required	Data Type	Default
	version	<input checked="" type="checkbox"/> <input type="checkbox"/>	xsd:string {100}	None
Extensions	<input checked="" type="checkbox"/>			
Notes	The item and passage elements are documented individually below.			
	The itemrelease element is a candidate TO BE DEPRECATED and removed. The different types of <i>Assessment Item</i> documents will be standalone documents.			

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 DEPRECATED and removed. The attribute is REQUIRED.

Assessment Item XML Document Elements

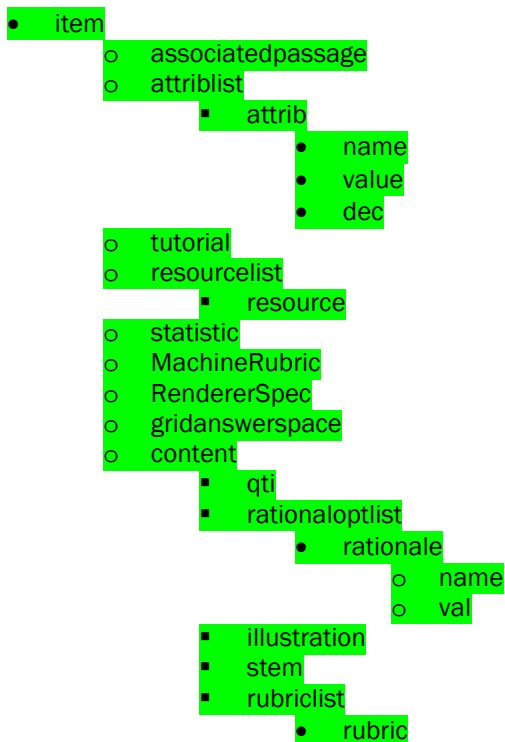
An *Assessment Item* XML document holds the content for an assessment item that is presented to the student. It MAY be either the container for the entire assessment item, or a container for a specialized subset of content used in an assessment item, including standalone tutorial content or standalone resources used by the assessment item, such as a wordlist.

The XML elements for an *Assessment Item* XML 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 element 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) and have common usage throughout the assessment item. 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 graphical conventions described.



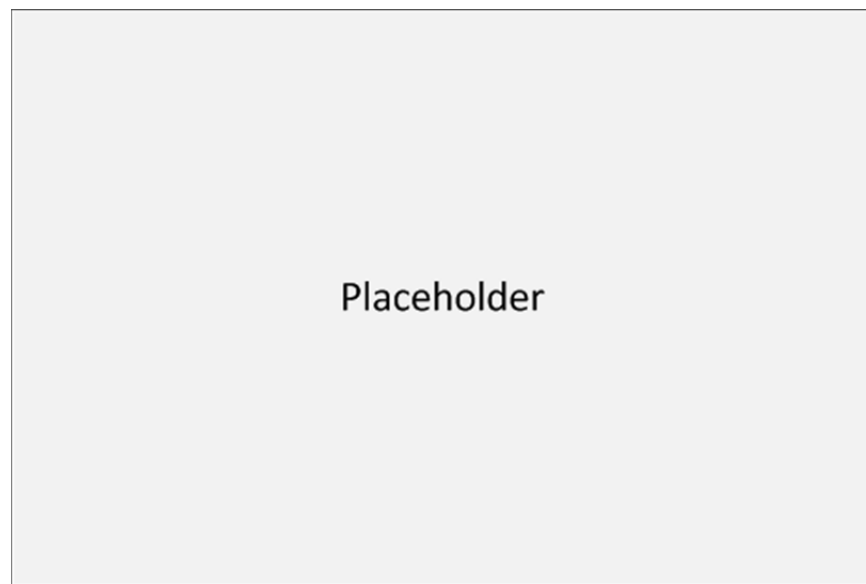
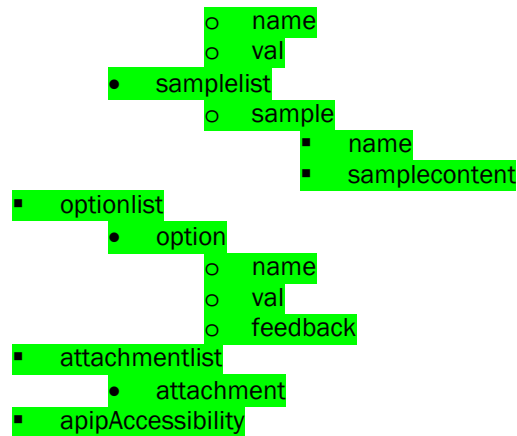


Figure 4: Assessment Item XML Document Structure (Informative)

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]		
	RendererSpec	[0..1]		
	gridanswerspace	[0..1]		
	content	[1..*] {10}		

Element	item			
Attributes	Name	Required	Data Type	Default
	format	<input type="checkbox"/>	xsd:token	
	type	<input type="checkbox"/> <input checked="" type="checkbox"/>	xsd:token	
	id	<input checked="" type="checkbox"/>	xsd:positiveInteger	
	version	<input checked="" type="checkbox"/>	xsd:string {100}	
Extensions	<input checked="" type="checkbox"/>			
Conformance	Either the format or type attribute SHALL be present.			
	An element that contains both the format and type attributes SHALL be non conforming.			
	The attriblist element SHALL be present only if the format attribute value or type attribute value is not wordlist (wordlist).			
	An element that contains the attriblist element with a format attribute value or type attribute value of wordlist (wordlist) SHALL be non conforming.			
	The tutorial element SHALL be present only if the format attribute value is not tut (tutorial).			
	An element that contains the tutorial element with a format attribute value of tut (tutorial) SHALL be non conforming.			
	The gridanswerspace element SHALL be present only if the format attribute value is gi (grid item).			
	An element that contains the gridanswerspace element with a format attribute value other than gi (grid item) SHALL be non conforming.			
Notes	All types of items except <i>Wordlist</i> items indicate the item type with the format attribute. <i>Wordlist</i> items use the type attribute instead of the format attribute to indicate the item type.			
	The type attribute is a candidate TO BE DEPRECATED and replaced by the format attribute.			
	If present, the associatedpassage element is ignored for <i>Passage</i> or <i>Tutorial</i> items.			
	<i>Wordlist</i> items use the item element but use a different set of subelements.			
	<i>Wordlist</i> items are documented separately in the Specification.			
	How or when the <i>Assessment Item</i> 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.
	eq	Equation item.
	er	Extended Response 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.

Attributes	item	
	ti	Table Interaction item.
	tut	Tutorial item.
	wer	Writing Extended Response item.
	wordlist	Wordlist resource.
	All types of items except <i>Wordlist</i> 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 DEPRECATED and replaced by the format attribute.	
type	The value pass is reserved and SHALL NOT be used.	
	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 <i>Wordlist</i> items.	
	The type attribute is a candidate TO BE DEPRECATED and replaced by the format attribute.	
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 $< 2^{31}-1$.	
	The 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 SHOULD match the regular expression: $\backslash d+(\backslash \backslash \backslash d+)?(\backslash \backslash \backslash d+)?$	

Element	associatedpassage
Description	Item number for the stimulus for an item.
Element Type	xsd:positiveInteger
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Conformance	The integer value of the element SHALL match the id of the corresponding <i>Passage Item</i> .
	An element that contains an item number that references an item that is not a <i>Passage Item</i> SHALL be non conforming.
Notes	How the element value item number is converted into the file name of the XML document holding the corresponding <i>Passage Item</i> is NOT SPECIFIED.
	There MAY be multiple <i>Passage Items</i> 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 for the <i>Passage Item</i> XML document are NOT SPECIFIED. Details MAY be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].
	How or when the <i>Passage Item</i> content is presented to the student is NOT SPECIFIED.

Element	attriblist
Description	Attributes of an item.

Element	attriblist			
Element Type	sequence			
Elements	Name	Multiplicity		
	attrib	[1..*] {100}		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
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
	attid	<input checked="" type="checkbox"/>	xsd:token	
Extensions	<input checked="" type="checkbox"/>			
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 6.			
	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 6 SHALL be non conforming.			
Notes				

Attributes	attrib	
attid	The identifier for the attribute.	
	Value	Description
	itm_att_Answer Key	The item rubric.
	itm_att_Cloze Answers	The item rubric for <i>Cloze</i> or <i>Word Builder</i> items.
	itm_att_Grade	Grade level for the item.
	itm_att_Item Format	Item format.
	itm_att_Item Point	The maximum number of points for the item.
	itm_att_Page Layout	The layout file that is used to render the item.
	itm_att_Response Type	The rendering of the item.
	itm_att_Strand	The content standard that the item is aligned to.
	itm_FTUse	A description of the item's use on a field test form.
	itm_OPUse	A description of the item's use on an operational test form.
	itm_item_desc	A description of the item.
	itm_item_id	The item number of the item.
	itm_item_subject	The subject of the item.
	stm_pass_id	The item number of the associated stimulus passage.

Additional details of each of the attributes are shown in Table 6. The table includes:

- The attribute id attid.
- An indication if the attribute is REQUIRED (☒) or OPTIONAL (☐)
- The value of the name element that corresponds to the attribute id.

- The value of the value element that corresponds to the attribute id.
- The value space of the value element.
- Notes and conformance criteria. The criteria (indicated with upper case letters) and notes (indicated with lower case roman numerals) are detailed after the table.

Table 6: Assessment Item Attributes

attid	☑/☐	name	value	value space	Notes
itm_att_Answer Key	☑	Item: Answer Key	Item rubric	xsd:string	A,B,C,D,i
itm_att_Cloze Answers	☐	Item: Cloze Answers	Item rubric	xsd:string	E,F,ii
itm_att_Grade	☑	Item: Grade	Item grade level	xsd:token	G,H,I,J
itm_att_Item Format	☑	Item: Item Format	Item format	xsd:token	K,L
itm_att_Item Point	☑	Item: Item Point	Any	xsd:string	iii
itm_att_Page Layout	☑	Item: Page Layout	Layout file	xsd:positiveInteger	M,N,O,iv,v
itm_att_Response Type	☑	Item: Response Type	Rendering code	xsd:token	P,Q,vi
itm_att_Strand	☐	Item: Strand	Standard	xsd:string	
itm_FTUse	☐	Fieldtest Use	Any	xsd:string	vii
itm_OPUse	☐	Operational Use	Any	xsd:string	viii
itm_item_desc	☑	Item: Item Description	Any	xsd:string	
itm_item_id	☑	Item: ITS ID	<i>Assessment Item</i> number	xsd:positiveInteger	R,S
itm_item_subject	☑	Item: Subject	Subject classifier: MATH, ELA or STUDENT HELP	xsd:token	ix
stm_pass_id	☐	Stim: ITS ID	Associated <i>Passage Item</i> number	xsd:positiveInteger	T,U

General conformance criteria are:

- 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.
- 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.

Specific conformance criteria referenced from Table 6 are:

- For an attid value of itm_att_Answer Key the value of the value element SHALL match the value of the format attribute of the item element converted to upper case (as shown in Table 7) if the value of the format attribute of the item element is not mc or ms.
- For an attid value of itm_att_Answer Key a value of the value element that does not match the value of the format attribute of the item element converted to upper case (as shown in Table 7) SHALL be non conforming if the value of the format attribute of the item element is not mc or ms.
- For an attid value of itm_att_Answer Key the value of the value element SHALL match the regular expression $\backslash a+(, \backslash a+)^*$ if the value of the format attribute of the item element is mc or ms.
- For an attid value of itm_att_Answer Key the value of the value element that does not match the regular expression $\backslash a+(, \backslash a+)^*$ SHALL be non conforming if the value of the format attribute of the item element is mc or ms.

- E. For an attid value of itm_att_Cloze Answers the value of the value element SHALL match the regular expression \d+(, \d+)*
- F. For an attid value of itm_att_Cloze Answers the value of the value element that does not match the regular expression \d+(, \d+)* SHALL be non conforming.
- G. For an attid value of itm_att_Grade the value of the value element SHALL match the regular expression (KG|01|1|02|2|03|3|04|4|05|5|06|6|07|7|08|8|09|9|10|11|12|NA).
- H. For an attid value of itm_att_Grade the value of the value element that does not match the regular expression (KG|01|1|02|2|03|3|04|4|05|5|06|6|07|7|08|8|09|9|10|11|12|NA) SHALL be non conforming.
- I. For an attid value of itm_att_Grade a value of the value element of NA SHALL only be used if the value of the format attribute of the item element is tut.
- J. For an attid value of itm_att_Grade a value of the value element of NA if the value of the format attribute of the item element is not tut SHALL be non conforming.
- K. For an attid value of itm_att_Item Format the value of the value element SHALL match the value of the format attribute of the item element converted to upper case (as shown in Table 7).
- L. For an attid value of itm_att_Item Format a value of the value element that does not match the value of the format attribute of the item element converted to upper case SHALL be non conforming (as shown in Table 7).
- M. For an attid value of itm_att_Page Layout the value of the value element SHALL match the values shown in Table 8 for each item type.
- N. For an attid value of itm_att_Page Layout a value of the value element that does not match the values shown in Table 8 for each item type SHALL be non conforming.
- O. For an attid value of itm_att_Page Layout a value of the value element that does not reference a rendering layout file SHALL be non conforming.
- P. For an attid value of itm_att_Response Type the value of the value element SHALL match the values shown in Table 9 for each item type.
- Q. For an attid value of itm_att_Response Type a value of the value element that does not match the values shown in Table 9 for each item type SHALL be non conforming.
- R. For an attid value of itm_item_id the value of the value element SHALL match the value of the id attribute of the item element.
- S. For an attid value of itm_item_id a value of the value element that does not match the value of the id attribute of the item element SHALL be non conforming.
- T. For an attid value of stm_pass_id the value of the value element SHALL match the value of the id attribute of the associatedpassage element.
- U. For an attid value of stm_pass_id a value of the value element that does not match the value of the id attribute of the associatedpassage item element SHALL be non conforming.

Additional notes referenced from Table 6 are:

- i. The value of the value attribute for the itm_att_Answer Key attribute is a rubric for a multiple choice item (the item format attribute value is MC) or a multiple select item (the item format attribute value is MS). The rubric is a comma separated list of letters. The meaning of the rubric is NOT SPECIFIED.
- ii. The rubric is a comma separated list of numbers. The meaning of the rubric is NOT SPECIFIED.
- iii. The form and meaning of the value of the value attribute for the itm_att_Item Point are NOT SPECIFIED.
- iv. How an itm_att_Page Layout value of the value element is converted to the name of the rendering layout file is NOT SPECIFIED.
- v. The list of values of the value attribute of itm_att_Page Layout MAY be extended in a future version of the Specification.
- vi. The list of values of the value attribute of itm_att_Response Type MAY be extended in a future version of the Specification.

- vii. The form and meaning of the value of the value attribute for the itm_FTUse attribute are NOT SPECIFIED.
- viii. The form and meaning of the value of the value attribute for the itm_OPUse attribute are NOT SPECIFIED.
- ix. The list of values of the value attribute of itm_item_subject MAY be extended in a future version of the Specification.

Table 7: Item Format to itm_item_Format Value Mapping

Item Format	itm_item_Format Value
EBSR	EBSR
eq	EQ
er	ER
gi	GI
ht	HT
mc	MC
mi	MI
ms	MS
nl	NL
pass	PASS
sa	SA
SIM	SIM
ti	TI
tut	TUT
wer	WER
wordlist	WORDLIST

Table 8: Item Format to itm_att_Page Layout Value Mapping

Item Format	itm_att_Page Layout Values
EBSR	21
eq	8, 21
er	1, 8, 21, 29
gi	8, 21, 22
ht	8, 21
mc	8, 21
mi	1, 8, 21
ms	8, 21
nl	8, 21
pass	
sa	8, 21
SIM	
ti	13
tut	
wer	21
wordlist	

Table 9: Item Format to itm_att_Response Type Value Mapping

Item Format	itm_att_Response Type Value
-------------	-----------------------------

Item Format	itm_att_Response Type Value
EBSR	EBSR
eq	EquationEditor
er	PlainText
gi	Grid
ht	HotText
mc	Vertical
	Stacked
mi	TableMatch
	MatchItem
ms	Vertical MS
nl	PlainText
pass	NA
sa	PlainText
SIM	NA
ti	TableInput
tut	NA
wer	HTMLEditor
wordlist	NA

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

Attributes	tutorial
id	Item number for the <i>Tutorial</i> 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	resourcelist			
Element Type	sequence			
Elements	Name	Multiplicity		
	resource	[1..*] {10}		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
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	<input checked="" type="checkbox"/>	xsd:token	
	id	<input checked="" type="checkbox"/>	xsd:positiveInteger	
	index	<input checked="" type="checkbox"/>	xsd:positiveInteger	
Extensions	<input checked="" type="checkbox"/>			
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	The 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 for the resource XML document are NOT SPECIFIED. Details MAY be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].			
	How or when the <i>Resource</i> 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
	tutorial	The resource is a <i>Tutorial</i> item. The <i>Tutorial</i> XML document structure is described separately.
	wordlist	The resource is a <i>Wordlist</i> item. The <i>Wordlist</i> XML document structure is described separately.
	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.	

Attributes	resource
index	The presentation order of the resource in the list of resources. The values need not be contiguous.

Element	MachineRubric
Description	The file name for the rubric used to machine score the item. The rubric format and structure is specific to the format of the <i>Assessment Item</i> .
Element Type	Empty
Elements	Name
	Multiplicity
None	
Attributes	Name
	Required
filename	
<input checked="" type="checkbox"/>	
xsd:string {4000}	
Data Type	
Default	
Extensions	<input checked="" type="checkbox"/>
Conformance	The value of the filename attribute SHALL reference an <i>Assessment Item Machine Rubric</i> XML document whose content is appropriate for the assessment item format.
	An element that contains a value of the filename attribute that references an <i>Assessment Item Machine Rubric</i> XML document whose content is not appropriate for the assessment item format SHALL be non conforming.
Notes	The <i>Assessment Item Machine Rubric</i> XML Document structure is defined separately.
	Different <i>Assessment Item Machine Rubric</i> XML document structures are used for different assessment item formats.
	The file location and naming convention for the <i>Machine Rubric</i> XML document 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 <i>Machine Rubric</i> XML document are NOT SPECIFIED. Details MAY be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].
	The Specification does not define the behavior if the file does not exist.

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 <i>Assessment Item</i> .
Element Type	Empty
Elements	Name
	Multiplicity
None	
Attributes	Name
	Required
filename	
<input checked="" type="checkbox"/>	
xsd:string {4000}	
Data Type	
Default	
Extensions	<input checked="" type="checkbox"/>
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 a value of the filename attribute that references a rendering specification XML document whose content is not appropriate for the assessment item format SHALL be non conforming.

Element	RendererSpec
Notes	The rendering specifications are defined separately for the different assessment item formats.
	Different rendering specifications are used for different assessment item formats.
	The file location and naming convention for the <i>Rendering Specification</i> XML document are NOT SPECIFIED. Details MAY be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].

Attributes	RendererSpec
filename	File name of the file containing the rendering specification.
	The file location and naming convention for the <i>Rendering Specification</i> XML document are NOT SPECIFIED. Details MAY be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].
	The Specification does not define the behavior if the file does not exist.

Element	gridanswerspace			
Description	The container for the <i>Grid Item Rendering Specification</i> XML document elements.			
Element Type	sequence			
Elements	Name	Multiplicity		
	The set of elements are documented separately in the <i>Grid Item Rendering Specification</i> XML document.			
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
Conformance	The gridanswerspace element SHALL be present only if the format attribute value is gi (grid item).			
	An element that contains the gridanswerspace element 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 sequence			
Elements	Name	Multiplicity		
	qti	[0..1]		
	rationaleoptlist	[0..1]		
	illustration	[0..1]		
	stem	[1]		
	rubriclist	[0..1]		
	optionlist	[0..1]		
	attachmentlist	[0..1]		
	apiAccessability	[0..1]		
Attributes	Name	Required	Data Type	Default
	language	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	xsd:language	
	version	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	xsd:string {100}	

Element	content			
	format	<input type="checkbox"/>	xsd:token	
	approvedversion	<input type="checkbox"/>	xsd:string {100}	
Extensions	<input checked="" type="checkbox"/>			
Conformance	An XML document with two or more content elements with the same value of the language attribute or of xml:lang SHALL be non conforming.			
	The value of the version attribute SHOULD match the value of the version attribute of the itemrelease element in the <i>Assessment Item Release XML</i> 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 SPECIFIED.			
	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 approvedversion attribute SHOULD match the value of the version attribute of the item element.			
	The behavior if the element that contains a value for the approvedversion attribute that does not match the value of the version attribute of the item element is NOT SPECIFIED.			
Notes	There is one content element instance for each language variant of the item.			

Attributes	content																														
language	<p>Language of the content.</p> <p>The value SHALL conform to [RFC 5646].</p> <p>The language attribute is a candidate TO BE DEPRECATED and replaced by xml:lang. The language attribute is REQUIRED. xml:lang MAY be used in addition to the language attribute.</p>																														
version	<p>The version identifier for the content of the item release.</p> <p>There are no constraints on the value of the attribute.</p> <p>A value is REQUIRED but not used. Any non null string MAY be used.</p> <p>The version attribute is a candidate TO BE DEPRECATED and removed. The attribute is REQUIRED.</p>																														
format	<p>The type of the item. A vocabulary of values.</p> <p>The value SHALL be one of the vocabulary values listed.</p> <table> <tr> <th>Value</th><th>Description</th></tr> <tr> <td>EBSR</td><td>Evidence-Based Selected Response item.</td></tr> <tr> <td>eq</td><td>Equation item.</td></tr> <tr> <td>er</td><td>Extended Response item.</td></tr> <tr> <td>gi</td><td>Grid item.</td></tr> <tr> <td>ht</td><td>Hot Text item.</td></tr> <tr> <td>mc</td><td>Multiple Choice item.</td></tr> <tr> <td>mi</td><td>Match Interaction item.</td></tr> <tr> <td>ms</td><td>Multi-Select item.</td></tr> <tr> <td>pass</td><td>Passage item.</td></tr> <tr> <td>nl</td><td>Natural Language item.</td></tr> <tr> <td>sa</td><td>Short Answer item.</td></tr> <tr> <td>SIM</td><td>Simulation item.</td></tr> <tr> <td>ti</td><td>Table Interaction item.</td></tr> <tr> <td>tut</td><td>Tutorial item.</td></tr> </table>	Value	Description	EBSR	Evidence-Based Selected Response item.	eq	Equation item.	er	Extended Response 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.
Value	Description																														
EBSR	Evidence-Based Selected Response item.																														
eq	Equation item.																														
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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.																														

Attributes	content	
	ver	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 SHOULD match the regular expression: \d+(\.\d+)?(\.\d+)?	

Element	qti			
Description	The container for IMS QTI XML document elements describing an <i>Assessment Item</i> .			
Element Type	QTI			
Elements	Name	Multiplicity		
	Any			
Attributes	Name	Required	Data Type	Default
	spec	<input checked="" type="checkbox"/>	xsd:token	
Extensions	<input checked="" type="checkbox"/>			
Conformance	The content of the subelements SHALL conform to the requirements for the itemBody element of [QTI 2.1 XML].			
	The behavior if the subelements do not conform to the requirements for the itemBody element of [QTI 2.1 XML] is NOT SPECIFIED.			
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	<input checked="" type="checkbox"/>			
Conformance	This element SHALL be used only for a multiple choice (the item format attribute value is MC) or a multiple select (the item format attribute value is MS) item.			
	An item that is not a multiple choice item (the item format attribute value is MC) or a multiple select item (the item format attribute value is MS) and includes the rationaleoptlist element SHALL be non conforming.			
Notes				

Element	rationale
Description	Justification for a response.
Element Type	sequence

Element	rationale			
Elements	Name	Multiplicity		
	name	[1]		
	val	[1]		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
Conformance	This element SHALL be used only for a multiple choice (the item format attribute value is MC) or a multiple select (the item format attribute value is MS) item.			
	An item that is not a multiple choice item (the item format attribute value is MC) or a multiple select item (the item format attribute value is MS) and includes the rationale element SHALL be non conforming.			
Notes				

Element	illustration
Description	Illustration associated with an element.
Element Type	HTML {16000}
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Conformance	The illustration content SHOULD conform to [XHTML 1.1].
Notes	How or when the <i>illustration</i> 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	<input checked="" type="checkbox"/>
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	<input checked="" type="checkbox"/>			
Conformance	The number of elements in rubric SHALL equal the number of elements in samplelist.			
	A rubriclist element that does not have the same number of elements for rubric and samplelist SHALL be non conforming.			

Element	rubriclist
Notes	The structure is a collection of pairs of rubric and samplelist elements. There is a one-to-one correspondence between each item in rubric and samplelist.
	An optional index attribute has been added to the rubric and samplelist elements to align the pairs.

Element	rubric			
Description	The scoring rubric.			
Element Type	sequence			
Elements	Name	Multiplicity		
	name	[1]		
	val	[1]		
Attributes	Name	Required	Data Type	Default
	scorepoint	<input checked="" type="checkbox"/>	xsd:positiveInteger xsd:string {100}	
	index	<input type="checkbox"/>	xsd:positiveInteger	
Extensions	<input checked="" type="checkbox"/>			
Conformance	The value of the index attribute SHALL match the value of the index attribute of a samplelist element.			
	An element that contains a value of the index attribute that does not match the value of the index attribute of a samplelist element SHALL be non conforming.			
Notes	The name element holds the name of the rubric.			
	The val element holds the rubric text in [XHTML 1.1].			

Attributes	rubric
scorepoint	The number of points that can be awarded to the student.
	The value MAY be an empty string.
	If the value MAY only be interpreted as an integer only if the value is nonnegative.
index	The order of the rubric element within the rubriclist. The values need not be contiguous.
	The index attribute is used to align the ordering of rubric and samplelist elements.

Element	samplelist			
Description	Example responses that deserve certain item point values.			
Element Type	sequence			
Elements	Name	Multiplicity		
	sample	[0..*]		
Attributes	Name	Required	Data Type	Default
	minval	<input checked="" type="checkbox"/>	xsd:positiveInteger	
	maxval	<input checked="" type="checkbox"/>	xsd:positiveInteger	
	index	<input type="checkbox"/>	xsd:positiveInteger	
Extensions	<input checked="" type="checkbox"/>			
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.			
	The value of the index attribute SHALL match the value of the index attribute of a rubric element.			

Element	samplelist
	An element that contains a value of the index attribute that does not match the value of the index attribute of a rubric element SHALL be non conforming.
Notes	

Attributes	samplelist
minval	Minimum number of points awarded.
maxval	Maximum number of points awarded.
index	The order of the samplelist element within the rubriclist. The values need not be contiguous. The index attribute is used to align the ordering of rubric and samplelist elements.

Element	sample			
Description	Placeholder text for the description.			
Element Type	sequence			
Elements	Name	Multiplicity		
	name	[1]		
	samplecontent	[1]		
Attributes	Name	Required	Data Type	Default
	purpose	<input checked="" type="checkbox"/>	xsd:string {4000}	
	scorepoint	<input checked="" type="checkbox"/>	xsd:integer xsd:string {100}	
Extensions	<input checked="" type="checkbox"/>			
Notes				

Attributes	sample
purpose	The purpose of the sample.
scorepoint	The number of points that can be awarded to the student.
	The value MAY be an empty string.
	If the value MAY only be interpreted as an integer only if the value is nonnegative.

Element	samplecontent
Description	Placeholder text for the description.
Element Type	HTML {16000}
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
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			
	minChoices	<input type="checkbox"/>	xsd:nonNegativeInteger	
	maxChoices	<input type="checkbox"/>	xsd:nonNegativeInteger	
Extensions	<input checked="" type="checkbox"/>			
Conformance	<p>This element SHALL be used only for a multiple choice (the item format attribute value is MC) or a multiple select (the item format attribute value is MS) item.</p> <p>An item that is not a multiple choice item (the item format attribute value is MC) or a multiple select item (the item format attribute value is MS) and includes the optionlist element SHALL be non conforming.</p> <p>The value of minChoices SHALL not exceed the number of items in option.</p> <p>An element that contains a value of minChoices that exceeds the number of items in option SHALL be non conforming.</p> <p>The value of maxChoices SHALL be greater than or equal to the value of minChoices.</p> <p>An element that contains a value of maxChoices that is less than the value of minChoices SHALL be non conforming.</p> <p>The value of maxChoices SHALL not exceed the number of items in option.</p> <p>An element that contains a value of maxChoices that exceeds the number of items in option SHALL be non conforming.</p>			
Notes	A value of 0 for minChoices or maxChoices indicates any number of options is value.			

Attributes	option
minChoices	The minimum number of options that MUST be present.
maxChoices	The maximum number of options that MUST be present.

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
	None			
Extensions	<input checked="" type="checkbox"/>			
Notes	This element SHALL be used only for a multiple choice (the item format attribute value is MC) or a multiple select (the item format attribute value is MS) item.			

Element	feedback
Description	Content presented to the student when the associated option is selected.
Element Type	HTML {16000}
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Conformance	The feedback content SHOULD conform to [XHTML 1.1].
Notes	How or when the <i>feedback</i> content is presented to the student is NOT SPECIFIED.

Element	attachmentlist			
Description	Accessibility attachments associated with the item.			
Element Type	sequence			
Elements	Name	Multiplicity		
	attachment	[0..*] {100}		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
Notes	Used only to associate an ASL or Braille file with an item.			

Element	attachment			
Description	URI of an attachment included with an item.			
Element Type	Empty			
Elements	Name	Multiplicity		
	None			
Attributes	Name	Required	Data Type	Default
	id	<input checked="" type="checkbox"/>	xsd:string {4000}	
	type	<input checked="" type="checkbox"/>	xsd:token	
	subtype	<input type="checkbox"/>	xsd:token	
	filename	<input checked="" type="checkbox"/>	xsd:string {4000}	
Extensions	<input checked="" type="checkbox"/>			
Notes	The file location and naming convention for the attachment file are NOT SPECIFIED. Details MAY be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].			

Attributes	attachment	
id	An identifier that uniquely identifies the attachment.	
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	The attachment is a Braille Ready File (BRF).
	PRN	The attachment is a Print Ready Document (PRN).
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
	contracted	Braille contracted – the value is valid only for type Braille, BRF or PRN.
	uncontracted	Braille uncontracted – the value is valid only for type Braille, BRF or PRN.
	nemeth	Braille nemeth [Nemeth] – the value is valid only type Braille, BRF or PRN.
	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.
filename	File name of the file containing the attachment.	

Attributes	attachment
	The file location and naming convention for the attachment file are NOT SPECIFIED. Details MAY be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].
	The Specification does not define the behavior if the file does not exist.

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	<input checked="" type="checkbox"/>
Conformance	<p>HTML or other markup embedded in the string SHALL be ignored and treated as plain text.</p> <p>For an attribute element, the value of name SHALL correspond to the value of attid as shown in Table 6.</p> <p>An attribute element that contains a value of name that does not correspond to the value of attid as shown in Table 6 SHALL be non conforming.</p>
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	<input checked="" type="checkbox"/>
Conformance	<p>For an attribute element HTML or other markup embedded in the string SHALL be ignored and treated as plain text.</p> <p>For a rationale, rubric, scorepoint or option element content SHOULD conform to [XHTML 1.1].</p> <p>For an attribute element, the value of val SHALL correspond to the value of attid as shown in Table 6.</p> <p>An attribute element that contains a value of name that does not correspond to the value of attid as shown in Table 6 SHALL be non conforming.</p>
Notes	name is a subelement of several other elements (attribute, rationale, rubric, scorepoint, option). Except as noted in Conformance, the 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

Element	desc
Extensions	<input checked="" type="checkbox"/>
Conformance	HTML or other markup embedded in the string SHALL be ignored and treated as plain text.
Notes	

Passage Item XML Document Elements

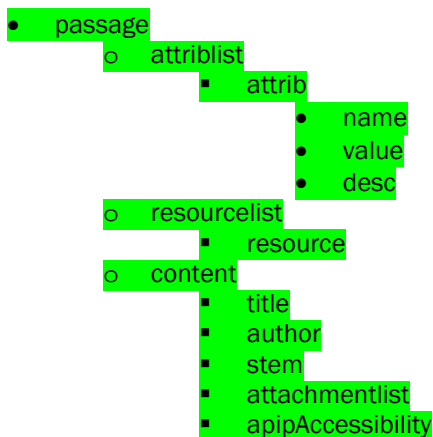
A *Passage Item* XML document holds the content for a stimulus passage that is presented to the student. A passage item is used with an assessment item and the *Passage Item* XML document is referenced from the associated passage element within the assessment item.

The XML elements for a *Passage Item* XML 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 element tree. The passage element is embedded in an itemrelease element.
- *Content elements* – the definition of elements used to describe the content, i.e., the stimulus, 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) and have common usage throughout the passage item. 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 graphical conventions described.



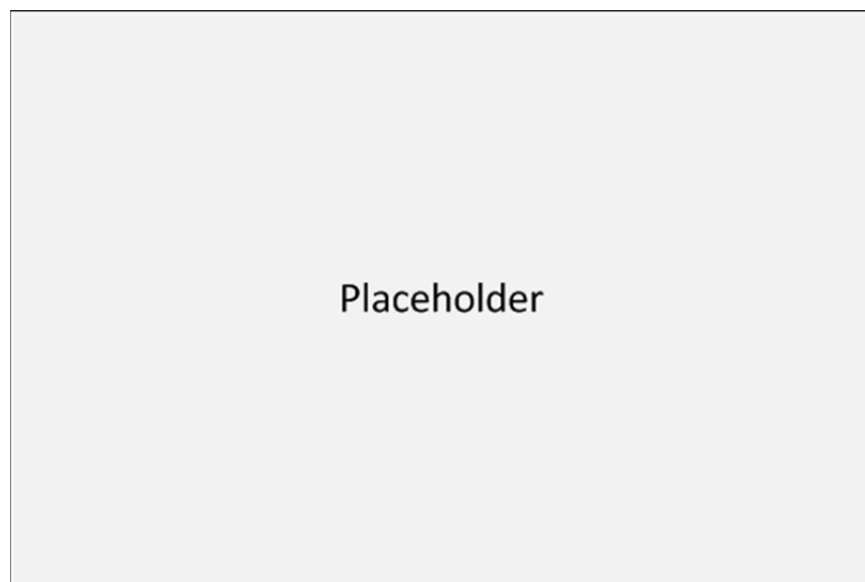


Figure 5: Passage Item XML Document Structure (Informative)

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
	format	<input type="checkbox"/>	xsd:token	
	id	<input checked="" type="checkbox"/>	xsd:positiveInteger	
	version	<input checked="" type="checkbox"/>	xsd:string {100}	
Extensions	<input checked="" type="checkbox"/>			
Notes	The format attribute has been added for alignment with the attributes of an <i>Assessment Item</i> . This permits a <i>Passage Item</i> to be treated as type of Assessment Item in a future version of the Specification.			
	How or when the <i>Passage Item</i> content is presented to the student is NOT SPECIFIED.			

Attributes	passage	
format	The type of the passage item. A vocabulary of values.	
	The value SHALL be one of the vocabulary values listed.	
	Value	Description
	pass	Passage item.
	The format attribute SHOULD NOT be used.	
id	Unique item number for the <i>Passage Item</i> .	
	The value of the item number SHALL be unique within the context of all items.	
	The value of the item number SHALL be $< 2^{31}-1$.	

Attributes	passage
	The 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 SHOULD match the regular expression: \d+(\.\d+)?(\.\d+)?

Element	attriblist			
Description	Attributes of a passage.			
Element Type	sequence			
Elements	Name	Multiplicity		
	attrib	[1..*] {100}		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
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]		
Attributes	Name	Required	Data Type	Default
	attid	<input checked="" type="checkbox"/>	xsd:token	
Extensions	<input checked="" type="checkbox"/>			
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 10.			
	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 10 SHALL be non conforming.			
Notes				

Attributes	attrib	
attid	The identifier for the attribute.	
	Value	Description
	stm_pass_desc	A description of the passage.
	stm_pass_id	The item number of the passage.
	stm_pass_subject	The subject of the passage.

Additional details of each of the attributes are shown in Table 10. The table includes:

- The attribute id attid.
- An indication if the attribute is REQUIRED (☒) or OPTIONAL (☐)
- The value of the name element that corresponds to the attribute id.
- The value of the value element that corresponds to the attribute id.
- The value space of the value element.
- Notes and conformance criteria. The criteria (indicated with upper case letters) and notes (indicated with lower case roman numerals) are detailed after the table.

Table 10: Passage Item Attributes

attid	☑/☐	name	value	value space	Notes
stm_pass_desc	☑	Stim: Description	Any	xsd:string	
stm_pass_id	☑	Stim: ITS ID	<i>Passage Item</i> number	xsd:positiveInteger	A,B
stm_pass_subject	☑	Stim: Subject	Subject classifier: MATH, ELA or STUDENT HELP	xsd:token	C,D,i

General conformance criteria are:

- 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.
- 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.

Specific conformance criteria referenced from Table 10 are:

- For an attid value of stm_pass_id the value of the value element SHALL match the id attribute of the passage element.
- For an attid value of stm_pass_id a value of the value element that does not match the id attribute of the passage element SHALL be non conforming.
- For an attid value of stm_pass_subject the value of the value element SHALL be the token MATH, ELA or STUDENT HELP.
- An element with an attid value of stm_pass_subject that has a value of the value element that is not MATH, ELA or STUDENT HELP SHALL be non conforming.

Additional notes referenced from Table 10 are:

- The list of values of the value attribute of stm_pass_subject MAY be extended in a future version of the Specification.

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:positiveInteger	

Element	resource
Extensions	<input checked="" type="checkbox"/>
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	The 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 for the resource XML document are NOT SPECIFIED. Details MAY be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].
	How or when the <i>Resource</i> 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
	tutorial	The resource is a <i>Tutorial</i> item. The <i>Tutorial</i> XML document structure is described separately.
	wordlist	The resource is a word list. The <i>Wordlist</i> XML document structure is described separately.
	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	The presentation order of the resource in the resource list. The values need not be contiguous.	

Content Elements

Element	content			
Description	Content of a passage.			
Element Type	sequence			
Elements	Name	Multiplicity		
	title	[1]		
	author	[0..1]		
	stem	[1]		
	attachmentlist	[0..1]		
	apipAccessibility	[0..1]		
Attributes	Name	Required	Data Type	Default
	language	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	xsd:language	
	version	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	xsd:string {100}	
	approvedversion	<input type="checkbox"/>	xsd:string {100}	
Extensions	<input checked="" type="checkbox"/>			

Element	content
Conformance	An XML document with two or more content elements with the same value of language or of xml:lang SHALL be non conforming.
	The value of the version attribute SHOULD match the value of the version attribute of the itemrelease element in the <i>Assessment Item Release</i> 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 SPECIFIED.
	The value of the approvedversion attribute SHOULD match the value of the version attribute of the passage element.
	The behavior if an element that contains a value for the approvedversion attribute that does not match the value of the version attribute of the passage element is NOT SPECIFIED.
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].
	The language attribute is a candidate TO BE DEPRECATED and replaced by xml:lang. The language attribute is REQUIRED. xml:lang MAY be used in addition to the language attribute.
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 DEPRECATED and removed. The attribute is REQUIRED.
approvedversion	Version identifier for the passage content.
	The value SHOULD match the regular expression: \d+(\.\d+)?(\.\d+)?

Element	title
Description	The description of the passage.
Element Type	HTML {4000}
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Conformance	The title content elements SHOULD conform to [XHTML 1.1].
Notes	How or when the title element 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	<input checked="" type="checkbox"/>
Conformance	The author content elements SHOULD conform to [XHTML 1.1].
Notes	The element MAY be empty.

Element	author
	How or when the author element 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	<input checked="" type="checkbox"/>
Conformance	The stem content SHOULD conform to [XHTML 1.1].
Notes	How or when the stem element content is presented to the student is NOT SPECIFIED.

Element	attachmentlist			
Description	Accessibility attachments associated with the passage.			
Element Type	sequence			
Elements	Name	Multiplicity		
	attachment	[0..*] {100}		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
Notes	Used only to associate an ASL or Braille file with a passage.			

Element	attachment			
Description	URI of an attachment included with the passage.			
Element Type	Empty			
Elements	Name	Multiplicity		
	None			
Attributes	Name	Required	Data Type	Default
	id	<input checked="" type="checkbox"/>	xsd:string {4000}	
	type	<input checked="" type="checkbox"/>	xsd:token	
	subtype	<input type="checkbox"/>	xsd:token	
	filename	<input checked="" type="checkbox"/>	xsd:string {4000}	
Extensions	<input checked="" type="checkbox"/>			
Notes	The file location and naming convention for the attachment file are NOT SPECIFIED. Details MAY be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].			

Attributes	attachment	
id	An identifier that uniquely identifies the attachment.	
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	The attachment is a Braille Ready File (BRF).

Attributes	attachment	
	PRN	The attachment is a Print Ready Document (PRN).
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
	contracted	Braille contracted – the value is valid only for type Braille, BRF or PRN.
	uncontracted	Braille uncontracted – the value is valid only for type Braille, BRF or PRN.
	nemeth	Braille nemeth [Nemeth] – the value is valid only for type Braille, BRF or PRN.
	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.
filename	File name of the file containing the attachment.	
	The file location and naming convention for the attachment file are NOT SPECIFIED. Details MAY be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].	
	The Specification does not define the behavior if the file does not exist.	

Shared Elements

Element	name
Description	Human readable name of an attribute.
Element Type	xsd:string {4000}
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Conformance	HTML or other 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 10.
	For an attribute element, a value of name that does not correspond to the value of attid as shown in Table 10 SHALL be non conforming.
Notes	

Element	val
Description	Value of an attribute.
Element Type	xsd:string {4000}
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Conformance	For an attribute element, the value of val SHALL correspond to the value of attid as shown in Table 10.
	For an attribute element, a value of name that does not correspond to the value of attid as shown in Table 10 SHALL be non conforming.

Element	val
Notes	

Element	desc
Description	Human readable description of an attribute.
Element Type	xsd:string {4000}
Value	<i>Any</i>
Default	<i>None</i>
Extensions	<input checked="" type="checkbox"/>
Conformance	HTML or other markup embedded in the string SHALL be ignored and treated as plain text.
Notes	

Tutorial XML Document Elements

A *Tutorial* XML document holds the content for a tutorial that is presented to the student. A tutorial is used with an assessment item and the *Tutorial* XML document is referenced from the tutorial element within the assessment item.

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. Most features of an *Assessment Item* XML document MAY be used in a *Tutorial* XML document. Additional conformance constraints apply to some of the elements.

To use a tutorial in an assessment item, the assessment item will contain a reference to 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 document. Table 11 indicates which of the assessment item elements are used for a tutorial item.

- ☒ indicates that the element SHALL be present in a tutorial. A *Tutorial* XML document that does not contain the element SHALL be non conforming.
- ☒ indicates that the element SHALL NOT be present in a tutorial. A *Tutorial* XML document that contains the element SHALL be non conforming.
- ☐ indicates that the element is OPTIONAL in a tutorial.
- The Notes describe additional behavior and conformance constraints.

Table 11: Assessment Item Attributes Used in a Tutorial

Element	Req'd	Notes
item	<input checked="" type="checkbox"/>	The value of the format attribute SHALL be tut.
associatedpassage	<input type="checkbox"/>	Typically omitted. Ignored if present.
attriblist	<input type="checkbox"/>	The <i>Tutorial Item</i> MAY use the same attributes as an <i>Assessment Item</i> .
tutorial	<input checked="" type="checkbox"/>	A <i>Tutorial Item</i> SHALL NOT include a tutorial element.
resourcelist	<input type="checkbox"/>	Typically an empty element in a <i>Tutorial Item</i> . Ignored if present.
statistic	<input type="checkbox"/>	Typically an empty element in a <i>Tutorial Item</i> . Ignored if present.
MachineRubric	<input type="checkbox"/>	If present the MachineRubric element SHALL be ignored.
RendererSpec	<input type="checkbox"/>	Typically an empty element in a <i>Tutorial Item</i> . Ignored if present.
gridanswerspace	<input checked="" type="checkbox"/>	A <i>Tutorial Item</i> SHALL NOT include a gridanswerspace element.
content	<input checked="" type="checkbox"/>	
qti	<input type="checkbox"/>	Typically omitted. Ignored if present.
rationaloptlist	<input type="checkbox"/>	Typically an empty element in a <i>Tutorial Item</i> . Ignored if present.
illustration	<input type="checkbox"/>	
stem	<input checked="" type="checkbox"/>	
rubriclist	<input type="checkbox"/>	Typically an empty element in a <i>Tutorial Item</i> . Ignored if present.
optionlist	<input type="checkbox"/>	Typically an empty element in a <i>Tutorial Item</i> . Ignored if present.
attachmentlist	<input type="checkbox"/>	
apipAccessibility	<input type="checkbox"/>	

Tutorial Elements

The tutorial elements are identical to the assessment item elements. Additional constraints are as described in Table 11.

Refer to the assessment item elements for the full description of the elements.

Wordlist XML Document Elements

A *Wordlist* XML document holds the content for a wordlist (thesaurus and glossary definitions) type of resource. A wordlist is used with an assessment item and the *Wordlist* XML document is referenced from the resource element within the assessment item.

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

The item element contains a single keywordList element. The keywordList element contains multiple keywords. Each keyword includes the description of the keyword, potentially including multiple glosses in different languages.

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 graphical conventions described.

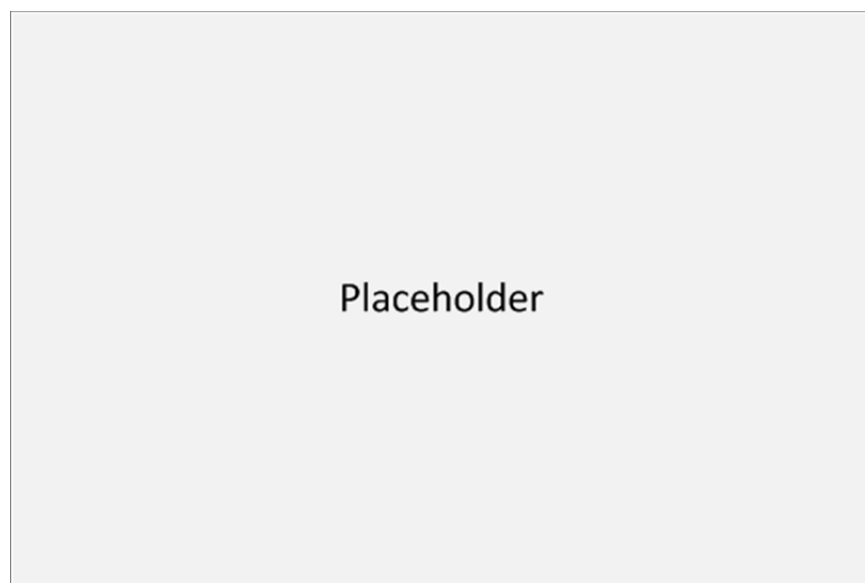
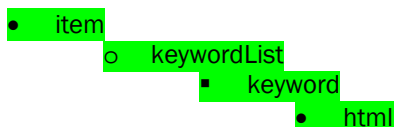


Figure 6: Wordlist XML Document Structure (Informative)

Wordlist Elements

Element	item			
Description	An item container for a <i>Wordlist</i> item.			
Element Type	sequence			
Elements	Name	Multiplicity		
	keywordList	[1]		
Attributes	Name	Required	Data Type	Default
	format	<input type="checkbox"/>	xsd:token	
	type	<input type="checkbox"/> <input checked="" type="checkbox"/>	xsd:token	
	id	<input checked="" type="checkbox"/>	xsd:positiveInteger	
	version	<input checked="" type="checkbox"/>	xsd:string {100}	
	None			
Extensions	<input checked="" type="checkbox"/>			
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 DEPRECATED and replaced by the format attribute. Until the type attribute IS DEPRECATED the type attribute SHOULD be used instead of using the format attribute.			
	How or when the <i>Wordlist</i> 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.
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 type attribute is a candidate TO BE DEPRECATED and replaced by the format attribute.	
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 $< 2^{31}-1$.	
	The 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 SHOULD match the regular expression: <code>\d+(\.\d+)?(\.\d+)?</code>	

Element	keywordList			
Description	The list of keywords in a <i>Wordlist</i> .			
Element Type	sequence			
Elements	Name	Multiplicity		
	keyword	[1..*] {1000}		
Attributes	Name	Required	Data Type	Default
	None			

Element	keywordList
Extensions	<input checked="" type="checkbox"/>
Notes	

Element	keyword			
Description	A keyword in a <i>Wordlist</i> .			
Element Type	sequence			
Elements	Name	Multiplicity		
	html	[1..*] {1000}		
Attributes	Name	Required	Data Type	Default
	text	<input checked="" type="checkbox"/>	xsd:string {1000}	
	index	<input checked="" type="checkbox"/>	xsd:positiveInteger	
Extensions	<input checked="" type="checkbox"/>			
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	The definition for the keyword. The listType and listCode attributes define the type of definition.			
Element Type	HTML {4000}			
Elements	Name	Multiplicity		
	None			
Attributes	Name	Required	Data Type	Default
	listType	<input checked="" type="checkbox"/>	xsd:token	
	listCode	<input checked="" type="checkbox"/>	xsd:token	
Extensions	<input checked="" type="checkbox"/>			
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 one-to-one as shown in Table 12.			
	An element that contains a listType attribute and a listCode attribute that do not align as shown in Table 12 SHALL be non conforming.			
	Each listType/listCode attribute value pair SHALL appear only once per keyword. A keyword that repeats the listType/listCode attribute value pair SHALL be non conforming.			
	An element that includes an xml:lang attribute that does not correspond to the language of the listType/listCode attribute value pair SHALL be non conforming.			
Notes	The valid values for listType and listCode MAY be extended in a future version of the Specification.			
	Table 12 lists the language codes (used for xml:lang) for the listType/listCode attribute value pairs.			

Attributes	html
listType	The type of entry for the keyword.
	The value SHALL be one of the vocabulary values listed in Table 12.

Attributes	html
	The value SHALL correspond to the associated value of the listType attribute as shown in Table 12.
listCode	The code of the type of entry for the keyword.
	The value SHALL be one of the vocabulary values listed in Table 12.
	The value SHALL correspond to the associated value of the listCode attribute as shown in Table 12.

Table 12: Glossary Entry Types and Codes

Keyword Entry Type (listType)	Keyword Entry Code (listCode)	xml:lang
glossary	TDS_WL_Glossary	
thesaurus	TDS_WL_THES	
arabicGlossary	TDS_WL_ArabicGloss	ar
cantoneseGlossary	TDS_WL_CantoneseGloss	zh-HK
esnGlossary	TDS_WL_ESNGlossary	es
koreanGlossary	TDS_WL_KoreanGloss	ko
mandarinGlossary	TDS_WL_MandarinGloss	zh, zh-CN, zh-TW
punjabiGlossary	TDS_WL_PunjabiGloss	pa
russianGlossary	TDS_WL_RussianGloss	ru
tagalGlossary	TDS_WL_TagalGloss	tl
ukrainianGlossary	TDS_WL_UkrainianGloss	uk
vietnameseGlossary	TDS_WL_VietnameseGloss	vi
???	TDS_WL0	

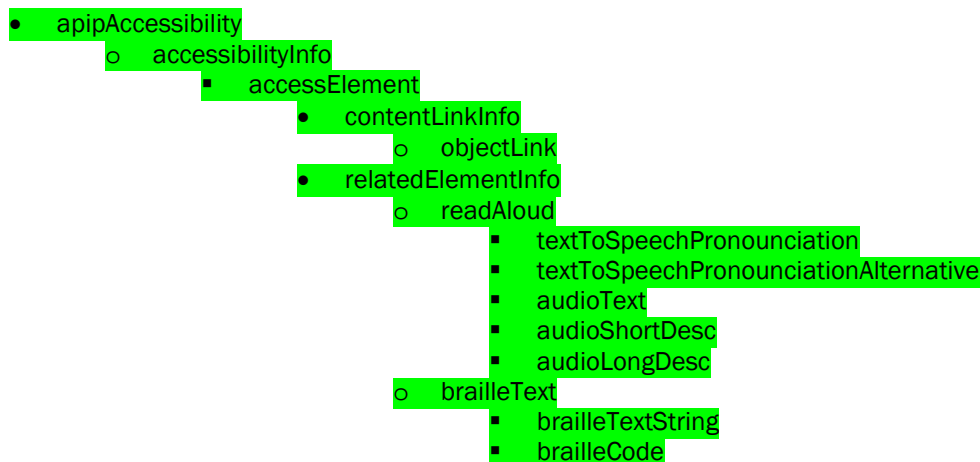
Assessment Item Accessibility XML Document Elements

An *Assessment Item Accessibility* XML document holds accessibility content (e.g., Braille alternative content). Accessibility content is used with an assessment item (including a tutorial) or a passage item and is referenced from the `apipAccessibility` element within the assessment item or passage item.

The assessment item accessibility elements consist of a single root XML element, the `apipAccessibility` element. The element and its subelements describe the accessibility features of an assessment item. The accessibility elements appear inline within the content elements of an assessment item (including a tutorial) 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 graphical conventions described.



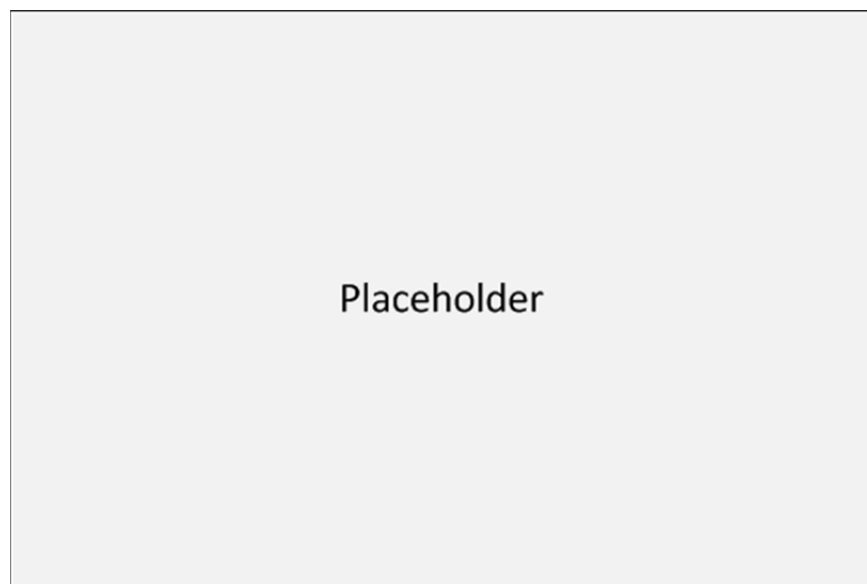


Figure 7: Assessment Item Accessibility XML Document Structure (Informative)

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	<input checked="" type="checkbox"/>			
Notes	While the element name includes “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	<input checked="" type="checkbox"/>			
Notes				

Element	accessElement
Description	Accessibility information for an item.

Element	accessElement			
Element Type	sequence			
Elements	Name	Multiplicity		
	contentLinkInfo	[1]		
	relatedElementInfo	[1]		
Attributes	Name	Required	Data Type	Default
	identifier	<input checked="" type="checkbox"/>	xsd:string {4000}	
Extensions	<input checked="" type="checkbox"/>			
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		
	objectLink	[1]		
Attributes	Name	Required	Data Type	Default
	itsLinkIdIdentifierRef	<input checked="" type="checkbox"/>	xsd:string {4000}	
	type	<input checked="" type="checkbox"/>	xsd:token	
Extensions	<input checked="" type="checkbox"/>			
Notes				

Attributes	contentLinkInfo	
itsLinkIdIdentifierRef	Placeholder text for the narrative description of the value space of the attribute for the element.	
type	Placeholder text for the narrative description of the value space of the attribute for the element.	
	Value	Description
	Equation	Placeholder text for the description of the value, its semantics and its behavior.
	Text	Placeholder text for the 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	<input checked="" type="checkbox"/>	
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	<input checked="" type="checkbox"/>			
Notes				

Element	readAloud			
Description	Pronunciation text for text-to-speech.			
Element Type	sequence			
Elements	Name	Multiplicity		
	textToSpeechPronunciation	[1]		
	textToSpeechPronunciationAlternate	[0..1]		
	audioText	[0..1]		
	audioShortDesc	[0..1]		
	audioLongDesc	[0..1]		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
Notes	The accessibility profile will determine which of the alternatives will be used in which situation.			

Element	textToSpeechPronunciation			
Description	String containing pronunciation directives.			
Element Type	xsd:string {16000}			
Value	Any			
Default	None			
Extensions	<input checked="" type="checkbox"/>			
Conformance	Phonetic spelling, if present, SHALL conform to the International Phonetic Alphabet (IPA) [IPA].			
	An element that contains phonetic spelling that is not valid IPA SHALL be non conforming.			
Notes	The string MAY contain both plain text and phoneme spelling.			

Element	textToSpeechPronunciationAlternative			
Description	Alternative string containing pronunciation directives.			
Element Type	xsd:string {16000}			
Value	Any			
Default	None			
Extensions	<input checked="" type="checkbox"/>			
Conformance	Phonetic spelling, if present, SHALL conform to the International Phonetic Alphabet (IPA) [IPA].			

Element	textToSpeechPronunciationAlternative
	An element that contains phonetic spelling that is not valid IPA SHALL be non conforming.
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	<input checked="" type="checkbox"/>
Conformance	Phonetic spelling, if present, SHALL conform to the International Phonetic Alphabet (IPA) [IPA].
	An element that contains phonetic spelling that is not valid IPA SHALL be non conforming.
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	<input checked="" type="checkbox"/>
Conformance	Phonetic spelling, if present, SHALL conform to the International Phonetic Alphabet (IPA) [IPA].
	An element that contains phonetic spelling that is not valid IPA SHALL be non conforming.
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	<input checked="" type="checkbox"/>
Conformance	Phonetic spelling, if present, SHALL conform to the International Phonetic Alphabet (IPA) [IPA].
	An element that contains phonetic spelling that is not valid IPA SHALL be non conforming.
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]		

Element	brailleText			
	brailleCode	[0..1]		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
Notes				

Element	brailleTextString			
Description	Modified text for Braille display or embossers.			
Element Type	xsd:string {16000}			
Value	Any			
Default	None			
Extensions	<input checked="" type="checkbox"/>			
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	<input checked="" type="checkbox"/>	xsd:token	
Extensions	<input checked="" type="checkbox"/>			
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.
		What other values.

Grid Item Rendering Specification XML Document Elements

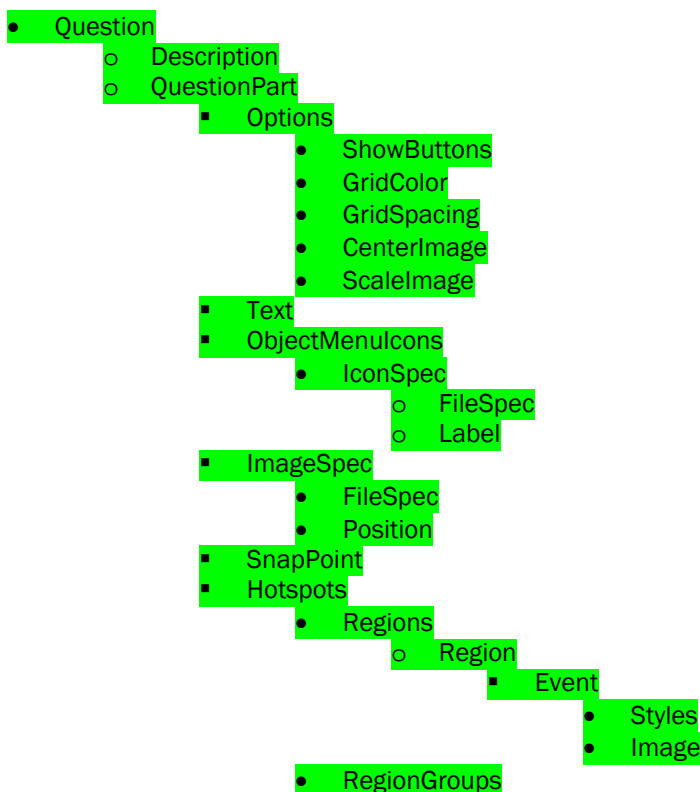
A *Grid Item Rendering Specification* XML document holds the rendering configuration settings for a grid type of assessment item. The grid item rendering specification is a type of rendering specification. The grid item rendering specification is referenced from the gridanswerspace element within a grid type of assessment item and is stored inline in the gridanswerspace element.

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

- *Grid Question elements* – the definition of elements used to describe the grid rendering. A single Question element is the top-level element in the document. The Question element is embedded in a gridanswerspace element.
- *Preset Answer elements* – the definition of elements used to describe the initial or preset answer component on the grid. A single PreSetAnswerPart element is embedded as a top-level element in the Question element.
- *Shared elements* – the definition of simple, common XML elements that are subelements of various other elements (i.e., FileSpec, Label) and have common usage throughout the rendering specification. 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 graphical conventions described.



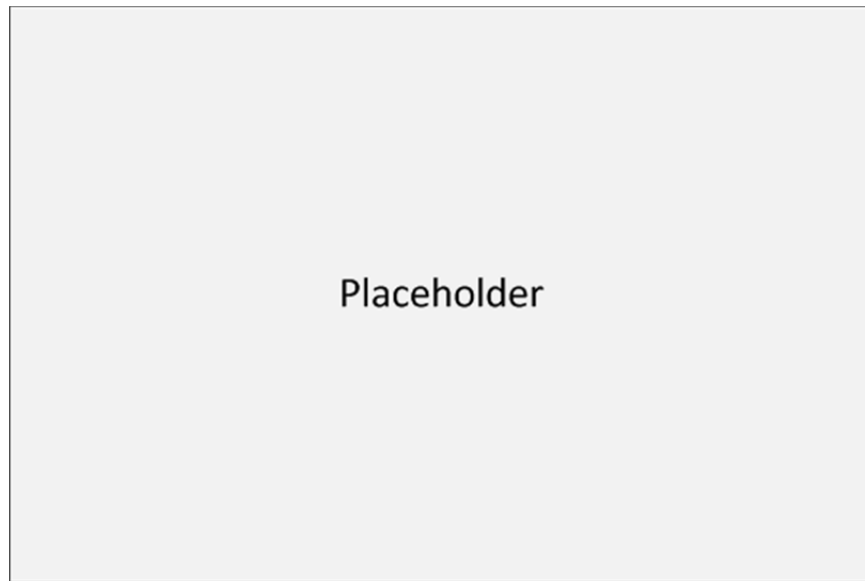
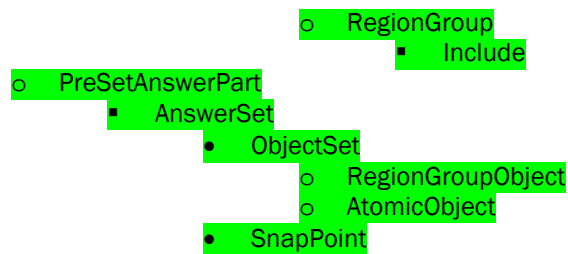


Figure 8: Grid Item Rendering Specification XML Document Structure (Informative)

The rendering space conventions are illustrated in Figure 9 (normative).

Items are displayed on the canvas. The canvas is covered by a set of grid lines, with equal spacing the in X and Y directions. The origin of display is the upper left-hand corner of the canvas. However, the preset answer data uses a coordinate system with an origin at the lower left-hand corner of the canvas.

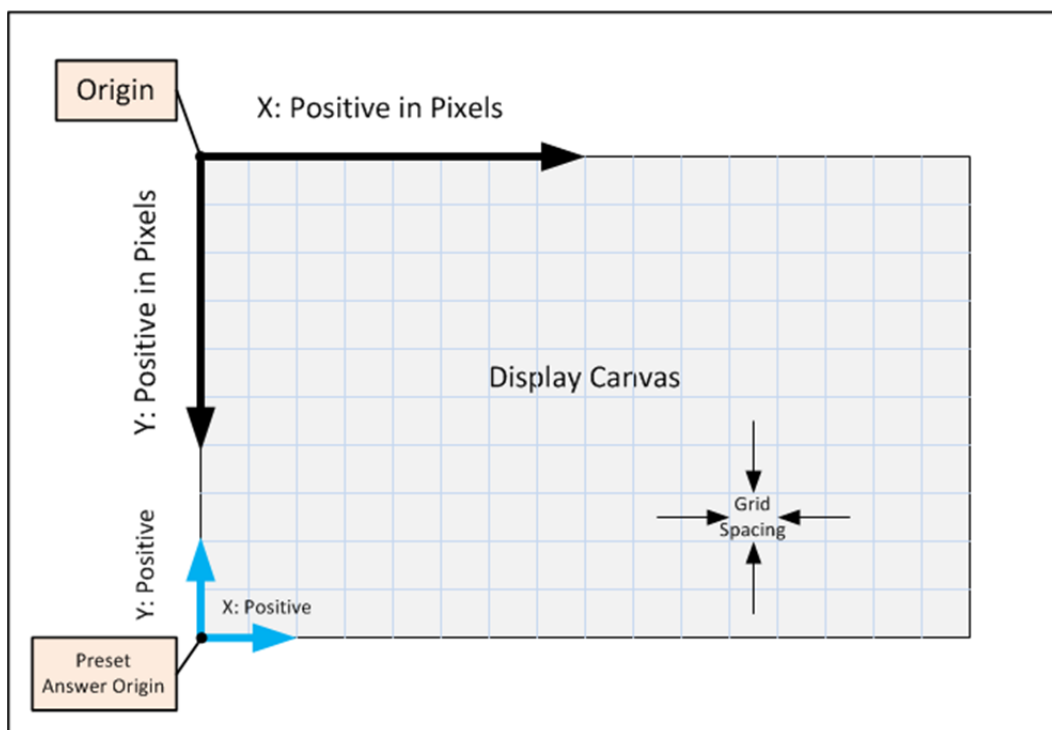


Figure 9: Grid Rendering Space Conventions (Normative)

Grid Question Elements

Element	Question			
Description	Rendering for a graphic response item.			
Element Type	sequence			
Elements	Name	Multiplicity		
	Description	[1]		
	QuestionPart	[1]		
	PreSetAnswerPart	[0..1]		
Attributes	Name	Required	Data Type	Default
	id	<input type="checkbox"/>	xsd:positiveInteger	
	version	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	xsd:string {100}	
Extensions	<input checked="" type="checkbox"/>			
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 that 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 <i>Assessment Item Release</i> 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 SPECIFIED.			
Notes				

Attributes	Question
id	Unique item number for the item.

Attributes	Question
	The value SHALL match the id of the item.
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 DEPRECATED and removed. The attribute is REQUIRED.

Element	Description
Description	Human readable description of the question.
Element Type	xsd:string {4000}
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Conformance	HTML or other markup embedded in the string SHALL be ignored and treated as plain text.
Notes	The content is metadata and is only used in item development.

Element	QuestionPart			
Description	Rendering description for a graphic response item.			
Element Type	sequence			
Elements	Name	Multiplicity		
	Options	[1]		
	Text	[0..1] <input checked="" type="checkbox"/>		
	ObjectMenuIcons	[0..1]		
	ImageSpec	[0..*]		
	SnapPoint	[0..1]		
	HotSpots	[0..1]		
Attributes	Name	Required	Data Type	Default
	id	<input checked="" type="checkbox"/>	xsd:string {4000}	
Extensions	<input checked="" type="checkbox"/>			
Notes	The text element is a candidate TO BE DEPRECATED and removed.			

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]		

Element	Options			
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
Notes				

Element	ShowButtons	
Description	List of buttons on the toolbar.	
Element Type	xsd:string {4000}	
Value	The value SHALL be zero or more of the vocabulary values listed.	
	Value	Description
	arrow	Add an arrow between points, pointing forward.
	arrw2	Add a double headed arrow between points.
	circle	Placeholder text for description.
	connect	Add a line between points.
	dash	Placeholder text for description.
	delete	Delete an object from the canvas.
	move	Placeholder text for description.
	point	Add a point to the canvas.
	The value MAY BE empty.	
	If the value is not empty, the value SHALL match the regular expression (arrow arrw2 circle connect dash delete move point){, (arrow arrw2 circle connect dash delete move point)}*	
Default	None	
Extensions	<input checked="" type="checkbox"/>	
Notes	The value is a comma separated set of button names. Any of the button names may appear in any order. Valid button names are: move, delete, point, connect, arrow, arrw2, dash, circle	
	If the value is empty, the toolbar is hidden and only the move option is available.	

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
	LightBlue	Grid lines SHALL be displayed in LightBlue, RGB Hex code #ADD8E6
	None	Grid lines SHALL NOT be displayed.
Default	None	
Extensions	<input checked="" type="checkbox"/>	
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 <i>None</i> (in italics) used in the Specification when a value does not exist.	

Element	GridSpacing
Description	Spacing between grid lines, in pixels.

Element	GridSpacing
Element Type	xsd:string {100}
Value	The value SHALL match the regular expression \d+(,(Y N))?
Default	None
Extensions	<input checked="" type="checkbox"/>
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.
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	Text on the canvas.
Element Type	xsd:string {100}
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Notes	The element SHOULD be empty. If a value is present, it is not used.
	The element is a candidate TO BE DEPRECATED and removed.

Element	ObjectMenuIcons			
Description	Images to appear on the palette.			
Element Type	sequence			
Elements	Name	Multiplicity		
	IconSpec	[1..*] {100}		

Element	ObjectMenuIcons			
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
Notes	The icon images are placed on the palette in the order specified.			

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
	index	<input type="checkbox"/>	xsd:positiveInteger	
Extensions	<input checked="" type="checkbox"/>			
Notes	The file location and naming convention for the image file are NOT SPECIFIED. Details MAY be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].			
	There are no constraints on an icon.			

Attributes	IconSpec
index	The display order of the icons on the palette. The values need not be contiguous.

Element	ImageSpec			
Description	Background graphic to be rendered on the item canvas.			
Element Type	sequence			
Elements	Name	Multiplicity		
	FileSpec	[1]		
	Position	[1]		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
Notes	The file location and naming convention for the image file 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	<input checked="" type="checkbox"/>
Notes	The value is a nonnegative integer for the <i>x</i> position, followed by a comma (, , ,) and a nonnegative integer for the <i>y</i> position.

Element	Position
	The origin of the coordinate system is the upper left hand corner of the canvas. The position places the background image relative to origin of the canvas. X and Y denote the position of the upper left hand corner of the background image relative to the origin of the canvas. 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	<input checked="" type="checkbox"/>
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	<input checked="" type="checkbox"/>			
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	<input checked="" type="checkbox"/>			
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	<input checked="" type="checkbox"/>	xsd:string {4000}	

Element	Region			
	shape	<input checked="" type="checkbox"/>	xsd:token	
	coords	<input checked="" type="checkbox"/>	xsd:string {4000}	
Extensions	<input checked="" type="checkbox"/>			
Notes	The shape and coords attributes are patterned after the shape and coords attributes of the HTML area element.			

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 values SHALL be nonnegative. The values SHALL NOT exceed the size of the canvas. The lower right-hand corner values SHALL NOT be less than the upper left-hand corner values. 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 values SHALL be nonnegative. The values SHALL NOT exceed the size of the canvas. The value SHALL match the regular expression: \d+,\d+,\d+
	poly	An arbitrarily 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 values SHALL be nonnegative. The values SHALL NOT exceed the size of the canvas. There SHALL be at least 3 pairs of values. The maximum number of pair is NOT SPECIFIED. The behavior if the number of pairs exceeds the maximum number of pairs is NOT SPECIFIED. The value SHALL match the regular expression: \d+,\d+,\d+,\d+,\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	<input checked="" type="checkbox"/>	xsd:token	
Extensions	<input checked="" type="checkbox"/>			
Notes	The minimum time for the input cursor to be stationary to consider the event to be “dwell” is NOT SPECIFIED.			
	When the specified event occurs in the region, the style and image are applied to the region.			

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	<input checked="" type="checkbox"/>	xsd:string {100}	
	fill-opacity	<input checked="" type="checkbox"/>	xsd:float	
	stroke	<input checked="" type="checkbox"/>	xsd:string {100}	
	stroke-dasharray	<input checked="" type="checkbox"/>	xsd:string {1000}	
	stroke-opacity	<input checked="" type="checkbox"/>	xsd:float	
	stroke-width	<input checked="" type="checkbox"/>	xsd:integer	
Extensions	<input checked="" type="checkbox"/>			
Conformance	Fill and stroke colors SHALL conform to [SVG 1.1] and [CSS 2].			
	An element that contains fill and stroke colors that is not valid [SVG 1.1] and [CSS 2] SHALL be non conforming.			
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}) or it SHALL match one of the named CSS colors.
fill-opacity	The opacity of the region.
	The value SHALL be between 0.0 and 1.0, inclusive. 0.0 is transparent. 1.0 is opaque.

Attributes	Styles
	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. The value SHALL match the regular expression <code>#([0-9a-fA-F]{3} [0-9a-fA-F]{6})</code> or it SHALL match one of the named CSS colors.
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 <code>(\d+,\d+(\,\d+,\d+)* \0)</code> The value MAY be empty.
stroke-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 empty.
stroke-width	The width of the outline of the region in pixels.

Element	Image			
Description	Graphic displayed in the region when an event occurs.			
Element Type	Empty			
Elements	Name	Multiplicity		
	None			
Attributes	Name	Required	Data Type	Default
	src	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	xsd:string {4000}	
	x	<input checked="" type="checkbox"/>	xsd:nonnegativeInteger	
	y	<input checked="" type="checkbox"/>	xsd:nonnegativeInteger	
Extensions	<input checked="" type="checkbox"/>			
Conformance	The value of x SHALL NOT exceed the size of the canvas.			
	The value of y SHALL NOT exceed the size of the canvas.			
Notes	The file location and naming convention for the image file 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 for the image file are NOT SPECIFIED. Details MAY be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].		
	The Specification does not define the behavior if the file does not exist.		
	The test client SHALL support the following media types:		
	Name	Media Type	Default File Extension
	GIF	No IANA registered type	.gif
	JPEG	No IANA registered type	.jpg
PNG	image/png	.png	

Attributes	Image
	The scr attribute is a candidate TO BE DEPRECATED and replaced by a filename attribute for consistency with other elements and attributes. The attribute is REQUIRED.
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			
Elements	Name	Multiplicity		
	RegionGroup	[1..*] {100}		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
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	<input checked="" type="checkbox"/>	xsd:nonNegativeInteger	
	min	<input checked="" type="checkbox"/>	xsd:nonNegativeInteger	
	name	<input checked="" type="checkbox"/>	xsd:string {4000}	
Extensions	<input checked="" type="checkbox"/>			
Notes				

Attributes	RegionGroup
max	The maximum number of regions in the group that can be selected to trigger the event.
	The value SHALL NOT exceed the number of regions in the group.
	A value of 0 implies that no regions are required to be selected.
min	The minimum number of regions in the group that MUST be selected to trigger the event.
	The value SHALL NOT exceed max.
	A value of 0 implies that no regions are required to be selected.
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

Element	Include			
	region	<input checked="" type="checkbox"/>	xsd:string {4000}	
Extensions	<input checked="" type="checkbox"/>			
Conformance	The value for the region attribute SHALL match a name attribute of a region element for the item.			
	An element that contains a value for the region attribute that does not match a name attribute of a region element for the item SHALL be non conforming.			
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.			

Preset Answer Elements

Element	PreSetAnswerPart			
Description	Answer components included in the original question rendering.			
Element Type	sequence			
Elements	Name	Multiplicity		
	AnswerSet	[0..1]		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
Notes	The element MAY be empty.			

Element	AnswerSet			
Description	Response to an item included in the original question rendering.			
Element Type	sequence			
Elements	Name	Multiplicity		
	ObjectSet	[1]		
	SnapPoint	[0..1]		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
Notes				

Element	ObjectSet			
Description	Object on the grid.			
Element Type	sequence			
Elements	Name	Multiplicity		
	RegionGroupObject	[0..*] {100}		
	AtomicObject	[0..*] {100}		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
Notes	The element MAY be empty.			

Element	RegionGroupObject			
Description	Placeholder for the description.			
Element Type	Any??			
Elements	Name	Multiplicity		
	Any??			
Attributes	Name	Required	Data Type	Default
	Any??			
Extensions	<input checked="" type="checkbox"/>			
Notes				

Element	AtomicObject			
Description	An object on the canvas.			
Element Type	xsd:string {4000}			
	The value is {objectname(xposition,yposition)}			
	The value SHALL match the regular expression \{.+\\(\\d+,\\d+\\)\\}\$			
Elements	Name	Multiplicity		
	None			
Attributes	Name	Required	Data Type	Default
	region	<input type="checkbox"/>	xsd:string {4000}	
Extensions	<input checked="" type="checkbox"/>			
Conformance	The value of objectname in the string SHALL match the value of a Label element of an IconSpec element.			
	A value of objectname in the string that does not match the value of a Label element of an IconSpec element SHALL be non conforming.			
Notes	The Y coordinate is measured upward from the lower left hand corner of the canvas. This is not the same coordinate system used to place other objects on the canvas.			

Attributes	AtomicObject
region	Placeholder for the description.

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	<input checked="" type="checkbox"/>
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 (, , ,).
	The element MAY be empty.

Shared Elements

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 for the image file are NOT SPECIFIED. Details MAY be provided in an item packaging profile, e.g., [SBAC Packaging 1.4].		
	The Specification does not define the behavior if the file does not exist.		
	The test client SHALL support the following media types:		
	Name	Media Type	Default File Extension
	GIF	No IANA registered type	.gif
	JPEG	No IANA registered type	.jpg
	PNG	image/png	.png

Element	Label
Description	Label for an image.
Element Type	xsd:string {4000}
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Conformance	HTML or other markup embedded in the string SHALL be ignored and treated as plain text.
Notes	The label is used as an identifier for the image in the rubric.

Equation Editor Configuration XML Document Elements

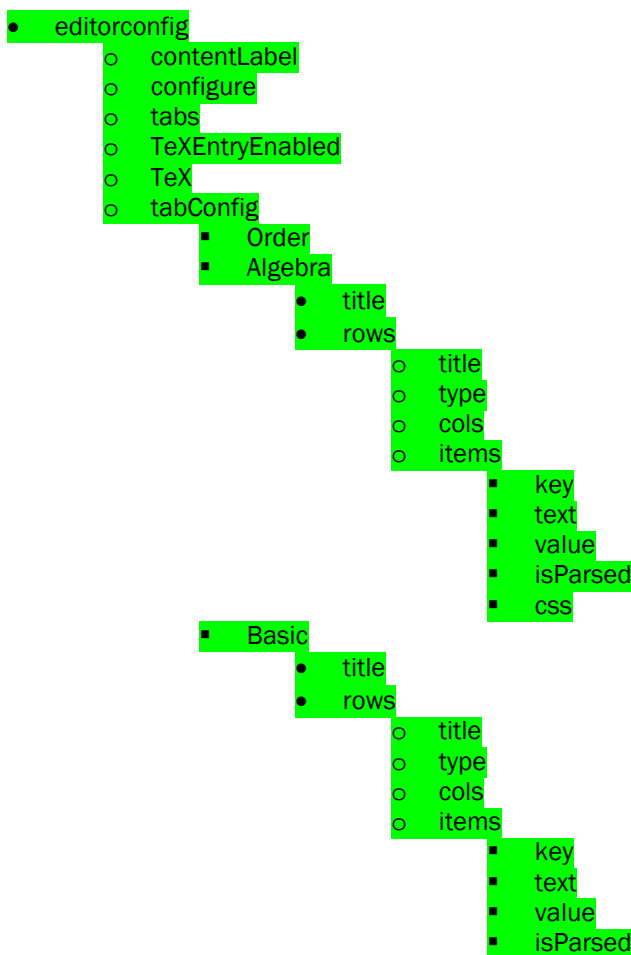
An *Equation Editor Configuration* XML document holds the configuration settings for the equation editor that is presented to the student with an equation type of assessment item. The equation editor configuration is a type of rendering specification. The equation editor configuration is referenced from the *RendererSpec* element within an equation type of assessment item.

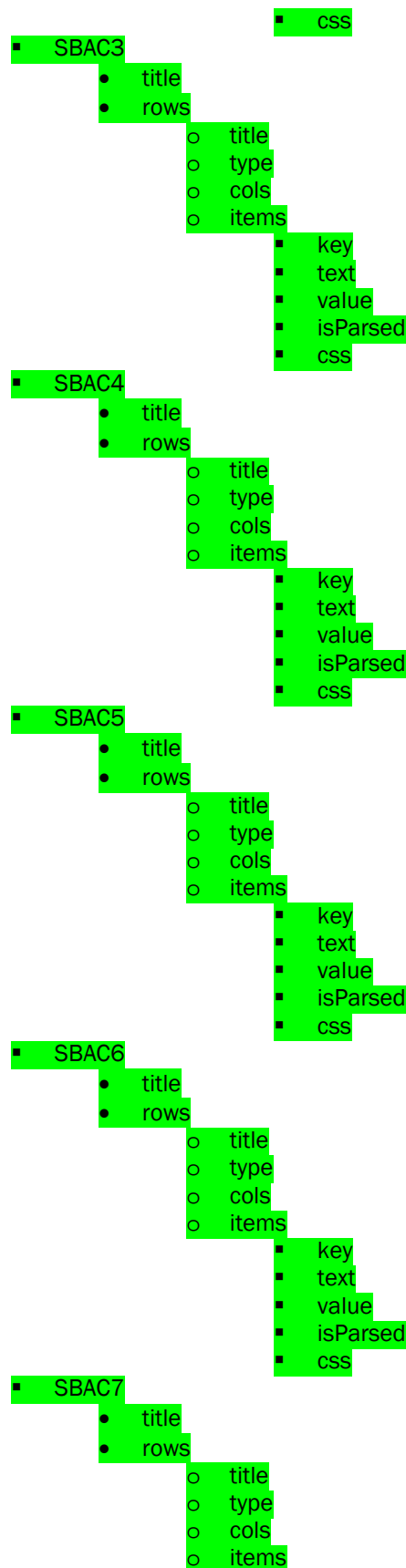
The XML elements for an equation editor configuration document are detailed in three groups:

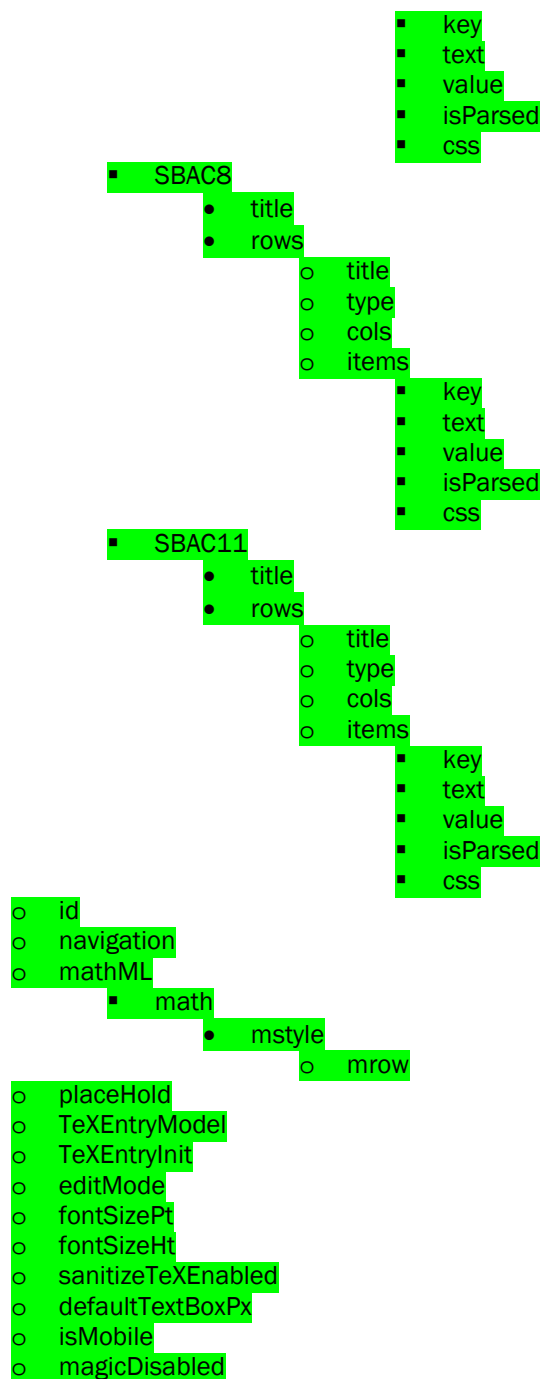
- *Equation Editor Configuration elements* – the definition of elements used to describe the equation editor configuration. A single *editorconfig* element is the root element of the element tree.
- *Tabbed Entry elements* – the definition of elements used to describe rows and columns of tabbed entry 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 10 (informative).

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







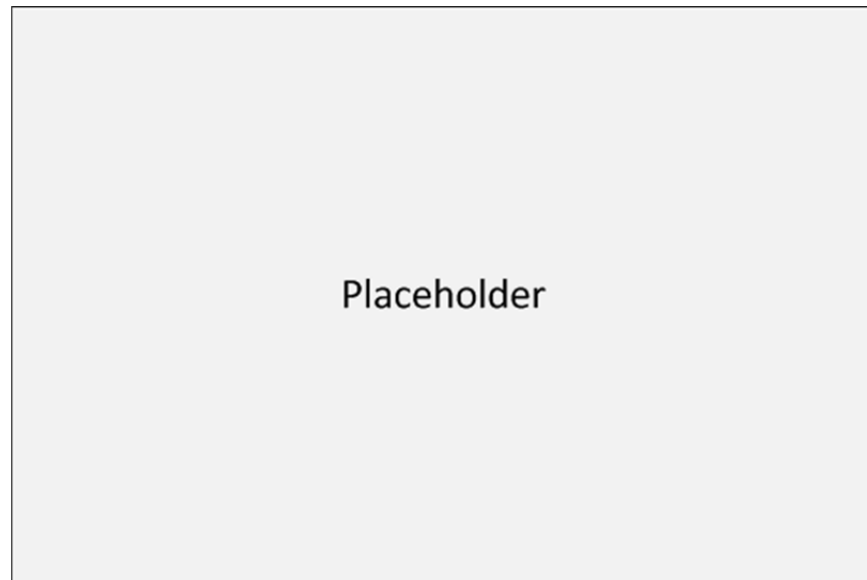


Figure 10: Equation Editor Configuration XML Document Structure (Informative)

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	[0..1] <input checked="" type="checkbox"/>		
	navigation	[1]		
	mathML	[1..*]		
	placeHold	[1]		
	TeXEntryMode	[1]		
	TeXEntryInit	[1]		
	editMode	[1]		
	fontSizePt	[0..1] <input checked="" type="checkbox"/>		
	fontSizeHt	[0..1] <input checked="" type="checkbox"/>		
	sanitizeTeXEnabled	[0..1]		
	defaultTextBoxPx	[0..1]		
	isMobile	[0..1]		
	magicDisabled	[0..1] <input checked="" type="checkbox"/>		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
Notes	The id element is OPTIONAL. It is a candidate TO BE DEPRECATED and removed. The element MAY be used.			

Element	editorconfig
	The fontsizePt element is OPTIONAL. It is a candidate TO BE DEPRECATED and removed. The element MAY be used.
	The fontsizeHt element is OPTIONAL. It is a candidate TO BE DEPRECATED and removed. The element MAY be used.

Element	contentLabel
Description	Text to be displayed above the equation editor input box entry form .
Element Type	xsd:string {4000}
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Conformance	HTML or other 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 authoring tool or the rendering engine.	
Element Type	xsd:boolean	
Value	Value	Description
	true	The item configuration data SHALL be displayed.
	false	The item configuration data SHALL NOT be displayed.
Default	None	
Extensions	☒	
Notes	A value of true is ignored by the rendering engine. Configuration data is not displayed by the rendering engine.	

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	

Element	TeXEntryEnabled
Extensions	<input checked="" type="checkbox"/>
Notes	

Element	TeX
Description	TeX element to be displayed in the input box.
Element Type	xsd:string {16000}
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Conformance	The value SHALL be a valid [TeX] element. A value that is not a valid [TeX] element SHALL be non conforming.
Notes	

Element	id
Description	Identifier of the equation editor item.
Element Type	xsd:integer
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Notes	The element is not used. If present, the element is ignored. The element is a candidate TO BE DEPRECATED and removed.

Element	navigation						
Description	Controls the display of the equation input tool cursor navigation buttons.						
Element Type	xsd:boolean						
Value	<table> <tr> <th>Value</th><th>Description</th></tr> <tr> <td>true</td><td>The navigation buttons SHALL be displayed.</td></tr> <tr> <td>false</td><td>The navigation buttons SHALL NOT be displayed.</td></tr> </table>	Value	Description	true	The navigation buttons SHALL be displayed.	false	The navigation buttons SHALL NOT be displayed.
Value	Description						
true	The navigation buttons SHALL be displayed.						
false	The navigation buttons SHALL NOT be displayed.						
Default	None						
Extensions	<input checked="" type="checkbox"/>						
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	<input checked="" type="checkbox"/>
Conformance	The value SHALL be valid [TeX] content. A value that is not a valid [TeX] element SHALL be non conforming.
Notes	

Element	TeXEntryMode
Description	User entered [TeX] input allowed.

Element	TeXEntryMode	
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	<input checked="" type="checkbox"/>	
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	Direct TeX input permitted.
	None	Direct TeX input not permitted. Only input keys may be used.
	Vim	VI Editor commands [Vim] may be used.
Default	None	
Extensions	<input checked="" type="checkbox"/>	
Notes	A valid value is the character literal None. This is not the metavalue <i>None</i> (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
	APPENDUPDATE	Append input to the end of the preset equation text. The preset equation text is not changed.
	INSERT	Insert text. Ignore any text selection.
	REPLACE	Replace selected text with input.
Default	None	
Extensions	<input checked="" type="checkbox"/>	
Notes	Backspace (CTRL-H, #008) is not a valid input character.	

Element	fontSizePt
Description	Font size in points.
Element Type	xsd:double, minExclusive=0
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Notes	The element is not used. If present, the element is ignored.
	The element is a candidate TO BE DEPRECATED and removed.

Element	fontSizeHt
Description	Font size.
Element Type	xsd:float, minExclusive=0
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Notes	The element is not used. If present, the element is ignored.
	The element is a candidate TO BE DEPRECATED and removed.

Element	sanitizeTeXEnabled	
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.
	false	ASCII math strings SHALL NOT be typeset using TeX.
Default	None	
Extensions	<input checked="" type="checkbox"/>	
Notes		

Element	defaultTextBoxPx
Description	Default width of the editor input box in pixels.
Element Type	xsd:positiveInteger
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Notes	The implementation MAY impose constraints on the maximum and minimum value of defaultTextBoxPx. 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

Element	magicDisabled	
	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	<input checked="" type="checkbox"/>	
Notes	The logic of using true to mean <i>is not used</i> and false to mean <i>is used</i> is a potential source of error.	
	The element is a candidate TO BE DEPRECATED and replaced by an element with a more meaningful name. The element MAY be present.	

Table Layout Elements

Element	tabConfig			
Description	Configuration for each input panel tab.			
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	<input checked="" type="checkbox"/>			
Conformance	Only one of the subelements from the group Algebra, Basic, SBAC3, SBAC4, SBAC5, SBAC6, SBAC7, SBAC8, SBAC11 SHALL appear.			
	A tabconfig element that contains more than one subelement from the group Algebra, Basic, SBAC3, SBAC4, SBAC5, SBAC6, SBAC7, SBAC8, SBAC11 SHALL be non conforming.			
Notes				

Element	Order	
Description	Table order.	
Element Type	xsd:string {100} xsd:token	
Value	The value SHALL be one of the vocabulary values listed.	
	Value	Description
	Basic	
	Algebra	
	SBAC3	
	SBAC4	

Element	Order	
	SBAC5	
	SBAC6	
	SBAC7	
	SBAC8	
	SBAC11	
Extensions	<input checked="" type="checkbox"/>	
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	<input checked="" type="checkbox"/>			
Conformance	If the element is present, the value of the Order element SHALL BE Algebra.			
	An element with a value of Order element that is not Algebra SHALL be non conforming.			
Notes	The table layout and content specification is NOT SPECIFIED.			

Element	BASIC			
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	<input checked="" type="checkbox"/>			
Conformance	If the element is present, the value of the Order element SHALL BE Basic.			
	An element with a value of Order element that is not Basic SHALL be non conforming.			
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	<input checked="" type="checkbox"/>			
Conformance	If the element is present, the value of the Order element SHALL BE SBAC3.			

Element	SBAC3
	An element with a value of Order element that is not SBAC3 SHALL be non conforming.
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	<input checked="" type="checkbox"/>			
Conformance	If the element is present, the value of the Order element SHALL BE SBAC4.			
	An element with a value of Order element that is not SBAC4 SHALL be non conforming.			
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	☑			
Conformance	If the element is present, the value of the Order element SHALL BE SBAC5.			
	An element with a value of Order element that is not SBAC5 SHALL be non conforming.			
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		
	title	[1]		
	rows	[1..*] {1000}		
Attributes	Name	Required	Data Type	Default
	None			
Extensions	☑			
Conformance	If the element is present, the value of the Order element SHALL BE SBAC6.			
	An element with a value of Order element that is not SBAC6 SHALL be non conforming.			
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	<input checked="" type="checkbox"/>			
Conformance	If the element is present, the value of the Order element SHALL BE SBAC7.			
	An element with a value of Order element that is not SBAC7 SHALL be non conforming.			
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	<input checked="" type="checkbox"/>			
Conformance	If the element is present, the value of the Order element SHALL BE SBAC8.			
	An element with a value of Order element that is not SBAC8 SHALL be non conforming.			
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	<input checked="" type="checkbox"/>			
Conformance	If the element is present, the value of the Order element SHALL BE SBAC11.			
	An element with a value of Order element that is not SBAC11 SHALL be non conforming.			
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	<input checked="" type="checkbox"/>
Conformance	HTML or other markup embedded in the string SHALL be ignored and treated as plain text.
Notes	How or when the title element 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	<input checked="" type="checkbox"/>			
Conformance	If the value of the type element is grid, the cols element is REQUIRED.			
	An element that contains a type element with a value of grid and does not contain the be non conforming.element SHALL be non conforming.			
Notes	The items images are placed in the row in the order specified.			

Element	title
Description	Title of the row.
Element Type	xsd:string {4000}
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Conformance	HTML or other markup embedded in the string SHALL be ignored and treated as plain text.
Notes	How or when the title element 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.	
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 grid input area.
Element Type	xsd:positiveInteger
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Notes	The maximum number of columns is NOT SPECIFIED.

Element	items			
Description	Individual input element in a row in the input area description.			
Element Type	sequence			
Elements	Name	Multiplicity		
	ANY?			
	key	[1]		
	text	[0..1]		
	value	[1]		
	isParsed	[0..1]		
	css	[0..1]		
Attributes	Name	Required	Data Type	Default
	index	<input type="checkbox"/>	xsd:positiveInteger	
Extensions	<input checked="" type="checkbox"/>			
Notes				

Attributes	items
index	The display order of the items. The values need not be contiguous.

Element	key
Description	Identifier for a keyboard key.
Element Type	xsd:string {1000}
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Notes	

Element	text
Description	Label that is displayed for a keyboard key.
Element Type	xsd:string {1000}
Value	Any
Default	None
Extensions	<input checked="" type="checkbox"/>
Notes	

Element	value
Description	Value that is entered into the input field when the corresponding key is pressed.
Element Type	xsd:string {1000}
Value	Any

Element	value
Default	<i>None</i>
Extensions	<input checked="" type="checkbox"/>
Conformance	The value SHALL be valid [TeX] content.
	A value that is not a valid [TeX] element SHALL be non conforming.
Notes	

Element	isParsed	
Description	Specification of how the element is displayed by the test client.	
Element Type	xsd:boolean	
Value	Value	Description
	true	The value of the text element is displayed on the button.
	false	The value of the value element is converted to Unicode which is displayed on the button.
Default	None	
Extensions	<input checked="" type="checkbox"/>	
Notes	If the element is omitted, the test client SHALL behave as if the value is false.	

Element	css
Description	CSS directives for the visual appearance of the key.
Element Type	xsd:string {4000}
Value	<i>Any</i>
Default	<i>None</i>
Extensions	<input checked="" type="checkbox"/>
Conformance	The value SHALL conform to [CSS 2].
	A value that is not a valid [CSS 2] SHALL be non conforming.
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	<input checked="" type="checkbox"/>			
Conformance	The content of the math element SHALL conform to [MathML].			
	A value that is not a valid [MathML] SHALL be non conforming.			
Notes	There is one math element for each input box.			
	All of [MathML] is supported.			

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 item's 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.

Assessment Item Usage Statistics Elements

Note: Details of the statistic elements MAY be included in a future version of the Specification.

Element	statistic			
Description	Assessment item usage statistics.			
Element Type	sequence			
Elements	Name	Multiplicity		
	<i>To be defined in a future version of the Specification.</i>			
Attributes	Name	Required	Data Type	Default
	None			
Extensions	<input checked="" type="checkbox"/>			
Conformance	The content of a non-empty statistic element SHALL be ignored.			
Notes	The element is normally empty (<statistic />) when authoring an item or before the item has been used.			
	An empty statistic 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*. Different types of assessment items use different machine rubrics as shown in Table 13.

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.

For any 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.

The Specification does not define the behavior if the external referenced XML document does not exist.

Table 13: Assessment 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 and the structure of the XML document for the machine rubrics 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 that are documented as part of the individual 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 SHALL 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 14.

Table 14: XML Schemata Specification Versions

Schemata	Specification Version	XML Schema Version
<i>Assessment Item Release</i> XML document	1.0.0	SAAIF IR v1p0
<i>Assessment Item</i> XML document	1.0.0	SAAIF AI v1p0
<i>Passage Item</i> XML document	1.0.0	SAAIF PI v1p0
<i>Tutorial</i> XML document	1.0.0	SAAIF TUT v1p0
<i>Wordlist</i> XML document	1.0.0	SAAIF WL v1p0
<i>Grid Item Rendering Specification</i> XML document	1.0.0	SAAIF GR v1p0

<i>Equation Editor Configuration XML document</i>	1.0.0	SAAIF EE v1p0
<i>Assessment Item Usage Statistics XML document</i>	1.0.0	SAAIF STAT v1p0
<i>Assessment Item Machine Rubric XML document</i>	1.0.0	SAAIF 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 15. Corresponding file extensions are also shown in the table.

Table 15: XML Document Media Types

Document	Name	Subtype	Ext
<i>Assessment Item Release XML document</i>	application	vnd.smarterapp.assessmentitemrelease+XML	.xml
<i>Assessment Item XML document</i>	application	vnd.smarterapp.assessmentitem+XML	.xml
<i>Passage Item XML document</i>	application	vnd.smarterapp.passageitem+XML	.xml
<i>Tutorial XML document</i>	application	vnd.smarterapp.tutorial+XML	.xml
<i>Wordlist XML document</i>	application	vnd.smarterapp.assessmentitem+XML	.xml
<i>Grid Item Rendering Specification XML document</i>	application	vnd.smarterapp.griditemrenderingspec+XML	.xml
<i>Equation Editor Configuration XML document</i>	application	vnd.smarterapp.equationeditorconfig+XML	.xml
<i>Assessment Item Usage Statistics XML document</i>	application	vnd.smarterapp.useagestatistics+XML	.xml
<i>Assessment Item Machine Rubric XML documents</i>	application	vnd.smarterapp.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 15, 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 16. Corresponding file extensions are also shown in the table.

Table 16: Attachment Media Types

Document	Name	Subtype	Ext
<i>ASL STEM</i>	???	vnd.smarterapp.???	???
<i>ASL Option A</i>	???	vnd.smarterapp.???	???
<i>ASL Option B</i>	???	vnd.smarterapp.???	???

<i>ASL Option C</i>	???	vnd.smarterapp.???	???
<i>Braille Contracted</i>	text	vnd.smarterapp.braille	.brf
<i>Braille Contracted</i>	text	vnd.smarterapp.braille	.prn
<i>Braille Nemeth</i>	text	vnd.smarterapp.braille	.brf
<i>Braille Nemeth</i>	text	vnd.smarterapp.braille	.prn
<i>Braille Uncontracted</i>	text	vnd.smarterapp.braille	.brf
<i>Braille Uncontracted</i>	text	vnd.smarterapp.braille	.prn

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 16, 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. Consumers 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.

Assessment items include elements that refer to other files. Consumers need to be aware that the Specification does not define the behavior if the referenced file does not exist

The assessment item subelements of the rubriclist element are ordered pairs. The grid element IconSpec and the equation editor configuration item elements are also ordered. Within the XML Post Schema Validation Infoset (PSVI), the order of elements MAY NOT be preserved. Additional optional index attributes have been added to these elements to define order. Consumers need to be aware that the order of values cannot be determined in the PSVI if the index attributes are not present.

XML Document Conformance

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

- SHOULD conform to [XHTML 1.1].

Any XML element that contains Cascading Style Sheet content:

- SHALL conform to [CSS 2].

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 DEPRECATED XML elements in the XML document.
- SHOULD NOT include any IS DEPRECATED 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 DEPRECATED or TO BE DEPRECATED XML elements.
- SHALL accept and process an XML document with any IS DEPRECATED or TO BE DEPRECATED 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 minimum 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 item XML documents MAY include arbitrary text strings and structured markup.

Producers including assessment item elements 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

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Definitions

Assessment Item: Definition TBC.

Associated Passage: The stimulus content for an assessment item. The associated passage content is stored in a passage item. See also: *Passage Item*.

Attachment: Definition TBC.

Canvas: Definition TBC – need to differentiate from Grid.

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

Dwell: The input cursor remains stationary over an item for a minimum period of time.

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 tab panels.

Equation Editor Configuration: Attributes and values that specify the configuration of the *equation editor*. An *Equation Editor Configuration* XML document describes the equation editor configuration.

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

Grid: Definition TBC – need to differentiate from Canvas.

Grid Item Rendering Specification: The rendering configuration settings for a grid type of assessment item.

Illustration: Definition TBC.

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

Machine Rubric: The definition and rules describing how an assessment item is automatically graded and scored. Only certain types of assessment items MAY be automatically graded. A *Machine Rubric* XML document describes the rubric.

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

Palette: Definition TBC.

Passage Item: An assessment item that contains a stimulus.

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

Rendering Specification: A collection of attributes and values that describe how a particular type of assessment item is displayed or rendered by the *test client* when the item is presented to the student. A *Rendering Specification* XML document describes the rendering.

Resource: A type of auxiliary content for an assessment item, such as a *wordlist*. A specific variant of an *Assessment Item* XML document is defined for each type of resource.

Rubric: The definition and rules describing how an assessment item is graded and scored.

Snap Behavior: Definition TBC.

Stem: Directions to the student for an assessment item.

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: Software agent that presents and renders a test form including assessment items and handles student interactions.

Tutorial: A *Tutorial* XML document holds the tutorial. The *Tutorial* XML document is a type of *Assessment Item* XML document.

User Focus: Definition TBC.

Wordlist: A type of *resource* containing a list of thesaurus and multi-lingua glossary definitions. A *Wordlist* XML document holds the content. The *Wordlist* XML document is a variant of an *Assessment Item* XML document.

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
HTML	Hypertext Markup Language
IANA	Internet Corporation for Assigned Names and Numbers
IPA	International Phonetic Alphabet
PSVI	Post Schema Validation Infoset
SAAIF	SmarterApp Assessment Item Format
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.

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[Vim] Vim Editor.
[<http://www.vim.org/>]

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.

The examples use the sample schemata provided.

Assessment Item Example

The 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>
<input checked="" type="checkbox"/>	Example Validated: not validated
	XML: <input checked="" type="checkbox"/> Schema: <input checked="" type="checkbox"/>

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](#)

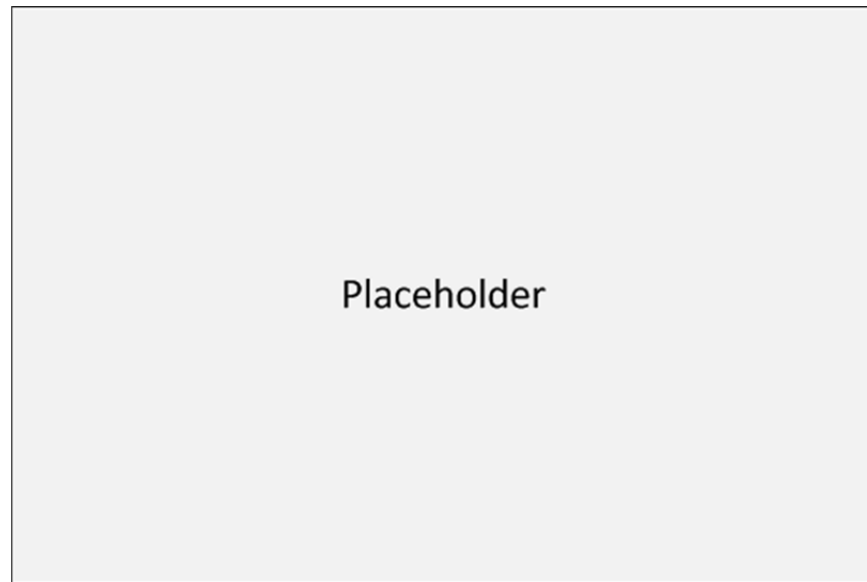


Figure A.1: Assessment Item Example Rendering

Passage Item Example

The 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>
<input checked="" type="checkbox"/>	Example Validated: not validated
	XML: <input checked="" type="checkbox"/> Schema: <input checked="" type="checkbox"/>

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](#)

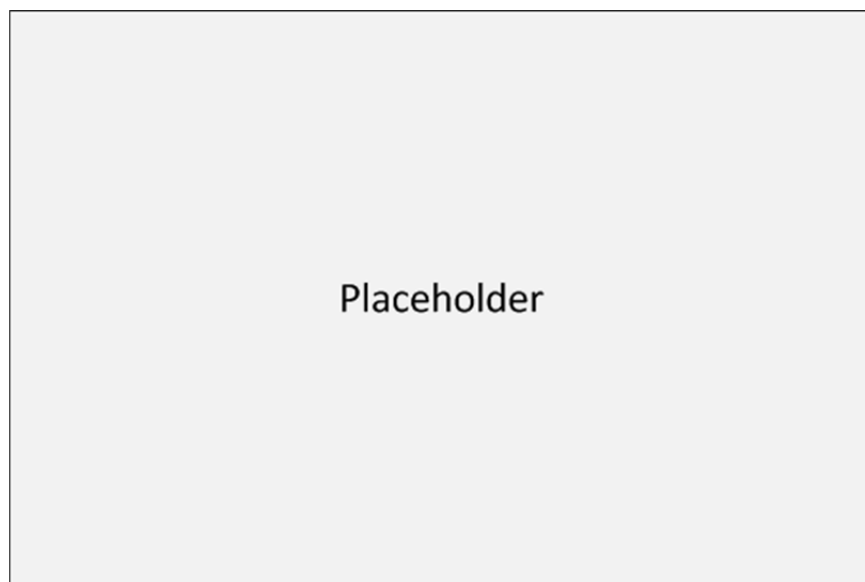


Figure A.2: Passage Item Example Rendering

Tutorial Example

The 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="tut"
08	id="a5a048bdf90245deb185c2cf2cdb5ce6S"
09	version="1.0"
10	>
11	...
12	</item>
<input checked="" type="checkbox"/>	Example Validated: not validated
	XML: <input checked="" type="checkbox"/> Schema: <input checked="" type="checkbox"/>

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](#)

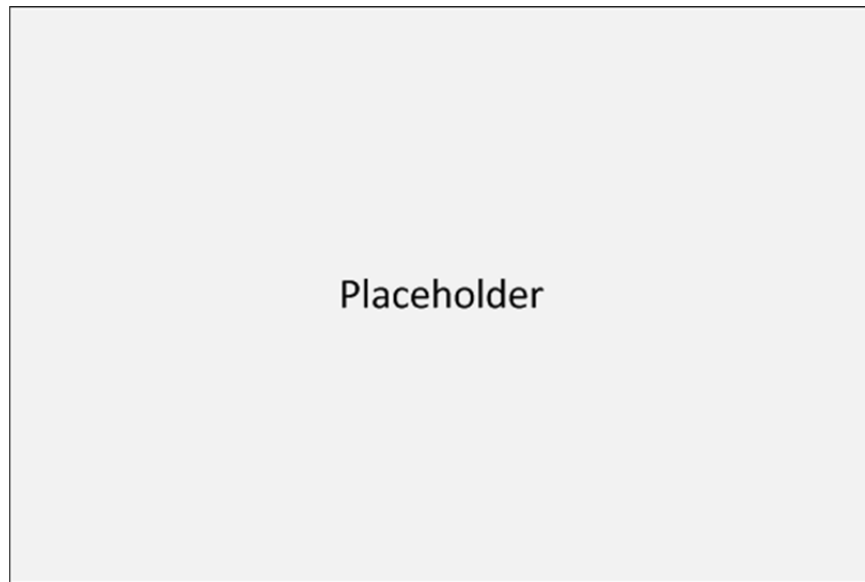


Figure A.3: Tutorial Example Rendering

Wordlist Example

The 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="wordlist"
08	id="a5a048bdf90245deb185c2cf2cdb5ce6S"
09	version="1.0"
10	>
11	...
12	</item>
<input checked="" type="checkbox"/>	Example Validated: not validated
	XML: <input checked="" type="checkbox"/> Schema: <input checked="" type="checkbox"/>

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](#)

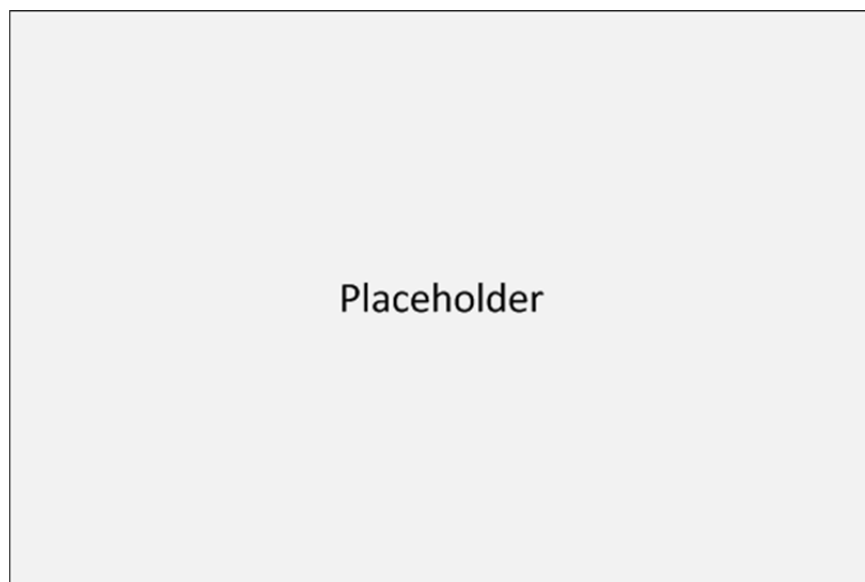


Figure A.4: Wordlist Example Rendering

Grid Item Rendering Specification Example

The 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	<item
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	format="gi"
08	id="677a8bc7157443b0a6d8342105abd1e9"
09	version="1.0"
10	>
11	...
12	</question>
<input checked="" type="checkbox"/>	Example Validated: not validated
	XML: <input checked="" type="checkbox"/> Schema: <input checked="" type="checkbox"/>

In the example:

- Lines 00-09: 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](#)

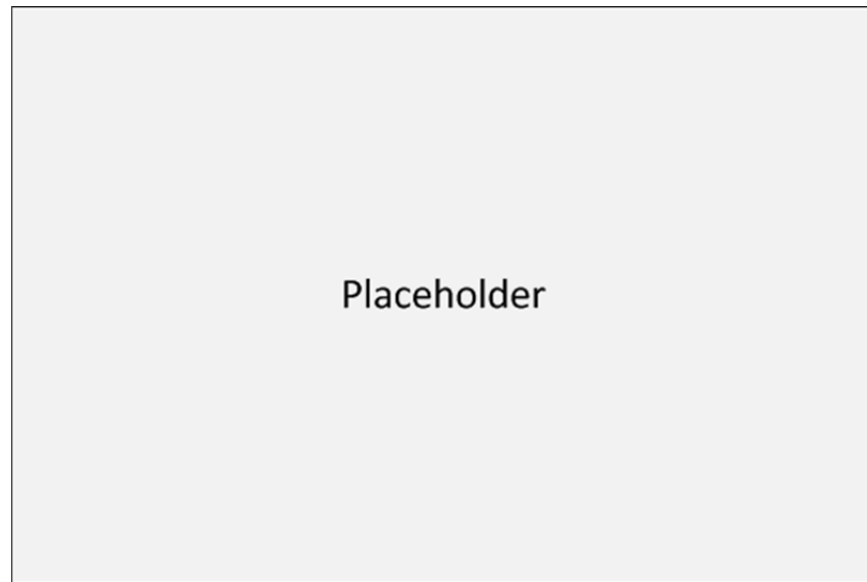


Figure A.5: Grid Item Rendering Specification Example Rendering

Equation Editor Configuration Example

The example shows the XML document for an equation editor configuration. The corresponding Equation type assessment item that uses the equation editor is not shown. [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>
<input checked="" type="checkbox"/>	Example Validated: not validated
	XML: <input checked="" type="checkbox"/> Schema: <input checked="" type="checkbox"/>

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](#)

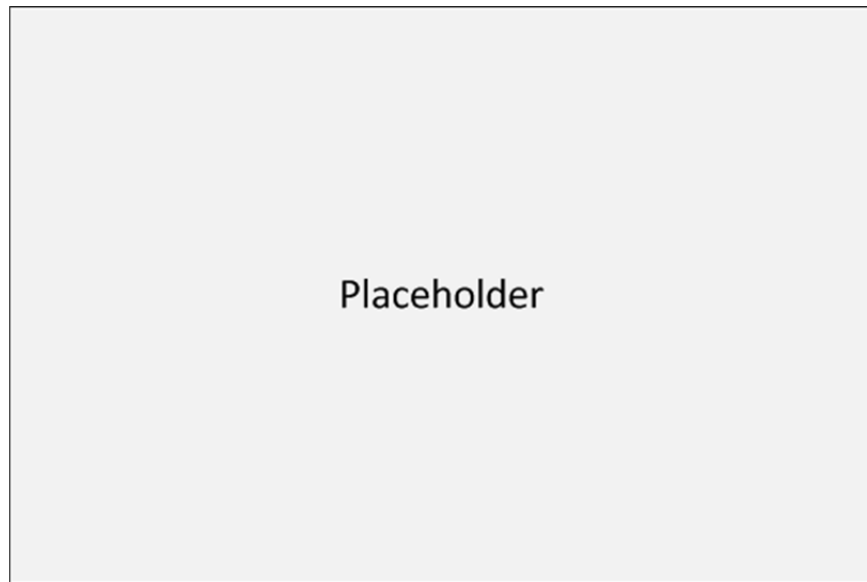


Figure A.6: Equation Editor Configuration Example Rendering

Annex: XML Representation Design Decisions

Note: This section is informative.

General Document Design Decisions

Naming Conventions: The XML element and attribute names follow the original source AIR format. The styles of the names are thus inconsistent; some are lower case, some are lower camel case and some are upper camel case. Deprecating element names and replacing them with equivalent elements using lower camel case names would have the least impact to harmonize element name style. Changing names is deferred until a future version of the Specification.

Default Values: OPTIONAL elements and attributes do not have default values. To avoid the possibility of default values not being provided, they are not used throughout (Schema validation is NOT REQUIRED and thus other means of providing default values is needed).

Lengths/Sizes: Minimum string lengths and the minimum number of elements with multiplicity of [0..*] or [1..*] are selected to support most cases (~99%+).

- Strings used to hold major content blocks, such as item stems, have a minimum length of 64,000 characters. This should accommodate most item core content.
- Strings used to hold most content (e.g., with embedded markup) have a minimum length of 16,000 characters. This should accommodate most marked up content.
- Strings used to hold simple content (no markup) have a minimum length of 4,000 characters.
- Strings used to hold labels, names, identifiers, etc., have a minimum length of 4,000 characters. This will accommodate most URLs and URIs should these elements be treated as resources.
- Strings used to hold version numbers have a minimum length of 100 characters.
- Strings used to hold specific character strings defined by regular expressions are sized to the exact requirements of the pattern.
- Collections of subelements have a minimum collection size of 100 elements.
- Collections of alternatives (encoding or language variants) have a minimum collection size of 10 alternatives.
- Integers support values with a minimum range $[-2^{31}-1..2^{31}-1]$ (32 bit signed).

Item Numbers: Item numbers (item identifiers $[1..2^{31}-1]$.) are defined to be unique across all assessment items, i.e., the context is essentially global.

Identifier Uniqueness: Most identifiers are defined to be unique across all assessment items, i.e., the context is essentially global. This eliminates any potential conflict in creating and mixing items from different sources. Identifiers for parts of data that are strictly limited to the context of a single item need only be unique within the context of the item. A smaller context within an item is not used to eliminate any potential identifier conflicts within an item.

Extension Points: Well defined types and elements do not require extensibility. All other elements include extensibility points. In general, all simple elements and types do not include extensibility points. The default is to include extensibility.

Deprecated Elements: The original AIR element and attribute names are retained for backward compatibility. New elements with the same purpose, typically to address naming or data type/value space issues, are added as needed. The related original AIR element is tagged IS DEPRECATED or TO BE DEPRECIATED.

Versioning: Versioning numbers have three parts: a major and a minor version for Specification and XML documents, and a sub version only for changes that do not impact XML documents.

General Schema Design Decisions

While specific schemata are NOT REQUIRED, the sample schemata are designed using common best practices in schema design.

Namespaces: Each schema is defined in its own namespace. This permits documents using different namespaces to be used together (some of the document types use the same element name for different concepts).

Namespaces are URLs that follow a versioning naming convention. The root of the namespace name is the Smarter App domain. This is followed by a path denoting the location of the schemata and the individual versioned name for each namespace based on the document type.

Namespaces for the sample schemata are listed in Table A.1.

Table A.1: XSD Schema Namespaces

Schema	Version	Namespace
<i>Assessment Item Release</i>	1.0.0	http://www.smarterapp.org/xsd/assessmentitemrelease_v1p0.xsd
<i>Assessment Item</i>	1.0.0	http://www.smarterapp.org/xsd/assessmentitem_v1p0.xsd
<i>Passage Item</i>	1.0.0	http://www.smarterapp.org/xsd/passageitem_v1p0.xsd
<i>Tutorial</i>	1.0.0	http://www.smarterapp.org/xsd/tutorial_v1p0.xsd
<i>Wordlist</i>	1.0.0	http://www.smarterapp.org/xsd/wordlist_v1p0.xsd
<i>Grid Item Rendering Specification</i>	1.0.0	http://www.smarterapp.org/xsd/griditemrenderingspec_v1p0.xsd
<i>Equation Editor Configuration</i>	1.0.0	http://www.smarterapp.org/xsd/equationeditorconfig_v1p0.xsd
<i>Assessment Item Usage Statistics</i>	1.0.0	http://www.smarterapp.org/xsd/usagestatistics_v1p0.xsd
<i>Assessment Item Machine Rubric</i>	1.0.0	http://www.smarterapp.org/xsd/machinerubric_v1p0.xsd

Target Namespace: Each schema is defined to have a target namespace.

Default Namespace: Each schema uses the target namespace as the default namespace. Not qualifying all elements reduces namespace clutter, but when different schemata are combined some elements will be namespace qualified while others will not.

Name and Attribute Qualification: All element names SHOULD be namespace qualified. All element attributes SHOULD NOT be qualified.

Types versus Elements: Types are created for all elements (either simple or complex types as needed). All document elements are defined using these defined types. Providing types maximizes flexibility and reuse.

Design Pattern: All types (simple and complex) are defined as global. The root elements of the document (typically only one) are defined as global. All other elements are defined as local elements

within the global root. This pattern defines a set of reusable types. Limiting the number of global elements limits the number of valid documents forms to the number of root elements.

Default Values: Default values are not assigned in the schema for OPTIONAL elements and attributes. While schema validation is RECOMMENDED, it is NOT REQUIRED. Thus assuming the default value comes from the schema is unreliable and other means of providing default values is REQUIRED which leads to increased processing complexity and the decision not to include defaults in a schema.

Tokens: Token elements include restrictions on the value space, i.e., the simple xsd:string type is not used directly. Restrictions help limit the possibility of inserting malicious code in a string.

Extension Points: When allowed, element extensions are defined in a different namespace via including `<xsd:any namespace="##other" processcontent="lax" />` in the element definition. Use of "##other" requires extensions be at the end of an element. Elements from other namespaces need not be validated (validation is "lax").

Schema Versioning: Schema namespaces and locations encode the schema major and minor version in the namespace or location. The use of the pattern `v\d{1}p\d{1}` to encode the version number in the schema name and locations follows the convention used by IMS. Different specification or schemata versions have different values of namespace and schema location.

Schemata include the `xsd:schema` version attribute. The values pattern combines the string SAAIF, a designator for the document type and the document type version number. Different specification or schemata versions have different values for the schema version attribute.

The schemata define an additional OPTIONAL `schemaversion` attribute on each root element of type `xsd:token` that contains the specification version number. The value of the `schemaversion` in a document SHOULD align with the schema version of the XSD.

Documentation: Annotation elements are used to document the schemata.

A sample schema header illustrating the schema design decisions is shown in Code Listing A.7.

Code Listing A.7: Sample Schema Header

00	<code><?xml version="1.0" encoding="UTF-8"?></code>
01	<code><xsd:schema</code>
02	<code> targetNamespace="http://www.smarterapp.org/xsd/assessmentitem_v1p0.xsd"</code>
03	<code> xmlns="http://www.smarterapp.org/xsd/assessmentitem_v1p0.xsd"</code>
04	<code> xmlns:xsd="http://www.w3.org/2001/XMLSchema"</code>
05	<code> version="SAAIF XX 1.0"</code>
06	<code> elementFormDefault="qualified"</code>
07	<code> attributeFormDefault="unqualified"></code>
08	<code> <xsd:annotation></code>
09	<code> <xsd:documentation xml:lang="en-US"></code>
10	<code> Copyright &copy; 2014, Copyright holder. This schema may be used under the Creative Commons Attribution-</code>
11	<code> ShareAlike 4.0 International License (CC BY-SA 4.0) [http://creativecommons.org/licenses/by-sa/4.0/].</code>
12	<code> </xsd:documentation></code>
13	<code> </xsd:annotation></code>
14	<code> ...</schema></code>
<input checked="" type="checkbox"/>	Example Validated: not validated
	XML: <input checked="" type="checkbox"/> Schema: <input checked="" type="checkbox"/>

Assessment Item Release XML Document and Schema Design Decisions

The *Assessment Item Release* XML document is not essential for item representation or exchange and use by non AIR systems. It has been retained for compatibility. The *Assessment Item Release* XML document is a candidate TO BE DEPRECATED and removed in a future version of the Specification.

A producer MAY create an *Assessment Item* XML document or a *Passage Item* XML document without the *Assessment Item Release* XML container document and wrap the *Assessment Item* XML document or *Passage Item* XML document with the *Assessment Item Release* XML container document when exchanged with an AIR system that requires the *Assessment Item Release* XML container document.

A consumer that does not require the *Assessment Item Release* XML container document MAY extract the contained *Assessment Item* XML document or *Passage Item* XML document and discard the *Assessment Item Release* XML container document.

The version attribute is REQUIRED but not used. Thus there are no constraints on the value of the attribute. The attribute is a candidate TO BE DEPRECATED and removed in a future version of the Specification.

Since the *Assessment Item Release* XML document is a candidate TO BE DEPRECATED, extensions are not permitted.

Assessment Item XML Document and Schema Design Decisions

The format and type attributes of the item element both serve the same purpose. Having two similar attributes is a legacy artifact of the AIR format. Both are retained for compatibility. The value space of the format attribute contains all values for both the format and type attributes to allow the type attribute TO BE DEPRECATED and replaced by the format attribute.

The format attribute value pass is reserved for future use to model passages directly as an *Assessment Item*.

The associatedpassage element contains an item number of the corresponding passage item. How to obtain the passage item or how to select from multiple versions of the passage item with the same item number is missing from the AIR design. A design change to convert the associatedpassage element to an empty element and add a filename attribute or other unique identifier attribute that can be used to obtain the appropriate version of the passage item is a potential change to the element in a future version of the Specification.

Some of the attriblist attributes are *Assessment Item* metadata. The attriblist element is retained for compatibility. Item metadata SHOULD NOT be maintained with the item but with the SBAC item metadata [SBAC Packaging 1.4]. Some attributes MAY be deprecated in a future version of the specification.

The tutorial element id attribute contains an item number of the corresponding *Tutorial*. How to obtain the *Tutorial* or how to select from multiple versions of the *Tutorial* with the same item number is missing from the AIR design. A design change to convert the tutorial element to add a filename attribute or other unique identifier attribute that can be used to obtain the appropriate version of the *Tutorial* is a potential change to the element in a future version of the Specification.

The resource element id attribute contains an item number of the corresponding resource. How to obtain the resource or how to select from multiple versions of the resource with the same item number is missing from the AIR design. A design change to convert the resource element to add a filename attribute or other unique identifier attribute that can be used to obtain the appropriate version of the resource is a potential change to the element in a future version of the Specification.

The resource element type attribute corresponds to the item format. The attribute name has not been changed from type to format.

A *Wordlist* is the only type of resource currently used. A *Tutorial* could be modeled as a resource. The vocabulary for the resource element type attribute includes the value of tutorial as a reserved entry to permit the tutorial element TO BE DEPRECATED and replaced by the resource element in a future version of the Specification.

The original AIR design permitted a MachineRubric to be held in an external file or stored inline within the MachineRubric element. The design has been simplified and a MachineRubric SHALL be stored in an external file.

The original AIR design permitted a RendererSpec to be held in an external file or stored inline within the RendererSpec element. The design has been simplified and a RendererSpec SHALL be stored in an external file.

The gridanswerspace holds an inline rendering specification for a grid item. Eliminating the gridanswerspace element and using the RendererSpec element to reference an external file containing the rendering specification for a grid item is a potential change to the gridanswerspace element in a future version of the Specification.

The version attribute of the content element aligns with the version attribute of the itemrelease element. There are no constraints on the value of the attribute. The version attribute of the content element is a candidate TO BE DEPRECATED and removed in a future version of the specification when the itemrelease element is DEPRECATED.

The original AIR design permitted an illustration to be held in an external file or stored inline within the illustration element. The design has been simplified and an illustration SHALL be stored inline within an illustration element.

The original AIR design permitted the stem to be held in an external file or stored inline within the illustration element. The design has been simplified and the stem SHALL be stored inline within a stem element.

Within the rubriclist element, the rubric and samplelist subelements are paired one to one following the ordering of the subelement instances. In the PSVI, the ordering of the input MAY NOT be preserved. An additional index attribute has been added to both the rubric and samplelist subelements to specify order.

The original AIR design included mixed XML content within the content element. Mixed content is not used. The design has been simplified and mixed content is not permitted.

The original AIR design included an annotation element. The annotation element is not used. The element is not included in the model.

The original AIR design included concept, es and himi elements. The concept, es and himi elements are not used. These elements are not included in the model.

Passage Item XML Document and Schema Design Decisions

The *Passage Item* is modeled with a specific root element – *passage*. The subelements are a subset of the *Assessment Item* elements. The passage item could be converted to an *Assessment Item* with a format attribute of *passage* in a future version of the Specification.

The format attribute value *pass* has been added for future use to model passages directly as an *Assessment Item*.

Some of the attriblist attributes are *Passage Item* metadata. The attriblist element is retained for compatibility. Item metadata SHOULD NOT be maintained with the item but with the SBAC item metadata [SBAC Packaging 1.4]. Some attributes MAY be deprecated in a future version of the specification.

The resource element id attribute contains an item number of the corresponding resource. How to obtain the resource or how to select from multiple versions of the resource with the same item number is missing from the AIR design. A design change to convert the resource element to add a filename attribute or other unique identifier attribute that can be used to obtain the appropriate version of the resource is a potential change to the element in a future version of the Specification.

The resource element type attribute corresponds to the item format. The attribute name has not been changed from type to format.

The version attribute of the content element aligns with the version attribute of the itemrelease element. There are no constraints on the value of the attribute. The version attribute of the content element is a candidate TO BE DEPRECATED and removed in a future version of the Specification when the itemrelease element is DEPRECATED.

The Passage Item does not include usage statistics. If the item is converted into a special type of assessment item, the list of assessment items not used SHOULD include the statistics element.

Tutorial XML Document and Schema Design Decisions

Since a *Tutorial XML* document is an *Assessment Item XML* document, there are no specific design decisions.

Wordlist XML Document and Schema Design Decisions

The format and type attributes of the item element both serve the same purpose. Having two similar attributes is a legacy artifact of the AIR format. The format attribute has been added to an item. The value space of the format attribute contains all values for the type attributes to allow the type attribute TO BE DEPRECATED and removed in a future version of the Specification to align the modeling of formats and types across all assessment items.

Assessment Item Accessibility XML Document and Schema Design Decisions

The *apiAccessability* element has no attributes and only includes the *AccessabilityInfo* element which also has no attributes and only includes the *accessElement* element. There are three levels of

elements where it appears only two are needed. One of the levels of element nesting could be eliminated. The three levels of element nesting are retained for compatibility.

Grid Item Rendering Specification XML Document and Schema Design Decisions

The original AIR design included the ScoreEngineVer attribute for the Question element. The attribute is not used. The attribute is not included in the model.

The Question element version attribute is not used and is candidate to be TO BE DEPRECATED and removed in a future version of the Specification. Until deprecated, the attribute is REQUIRED.

The text element is not used and is candidate to be TO BE DEPRECATED and removed in a future version of the Specification. Until deprecated, the element MAY be used. If used, it is ignored.

The images specified by IconSpec are to be placed in the order specified. In the PSVI, the ordering of the input MAY NOT be preserved. An additional index attribute has been added to the element to specify order.

The filename of an image is specified by the scr attribute. Other filenames are specified using a filename attribute or filename element. The scr attribute is a candidate TO BE DEPRECATED and removed in a future version of the Specification and replaced by a filename attribute.

The original AIR design included a recursive Question element within the PreSetAnswerPart element. The design was developed to store both a set of default rendering information created during item authoring and a set of student responses. Student responses are not included in the Specification. To simplify the design, the recursive nesting has been eliminated and the Question and QuestionPart elements are not included in the PreSetAnswerPart element.

Equation Editor Configuration XML Document and Schema Design Decisions

The original AIR design allowed all of the subelements of the editorconfig element to appear in any order. The design has been simplified and the element order is fixed.

The id, fontsizePt and fontsizeHt elements are not used or their values are ignored. These elements are candidates to be TO BE DEPRECATED and removed in a future version of the Specification. Until deprecated, the elements MAY be used.

The name of the magicDisabled element is has no inherit meaning. The element is a candidate to be TO BE DEPRECATED and replaced in a future version of the Specification by a more meaningful name. Until deprecated, the element MAY be used.

Assessment Item Usage Statistics XML Document and Schema Design Decisions

Note: No additional design decisions are included. The *Assessment Item Usage Statistics XML* document specification is not included in the Specification.

Assessment Item Machine Rubric XML Document and Schema Design Decisions

Machine rubrics XML files have been assigned an .XML file name extension and corresponding MIME type. Existing items MAY use a file name extension that is specific to the type of the machine rubric.

Note: No additional design decisions are included. The *Assessment Item Machine Rubric XML* document specification is not included in the Specification.

Annex: XML Schemata

Note: This section is informative.

XML Schema Definitions (XSDs) [XSD 1] MAY be used to describe part of the XML document model for assessment items. An XSD is insufficient to represent the entire document model. The schemata are insufficient to determine if an XML document is fully conformant to the Specification. 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. A conformant XML document need not use these specific schemata. These schemata are informative.

The sample schemata are available on the web at the URIs listed in Table A.2.

Table A.2: XSD Schema Locations

Schema	Version	Schema Location
<i>Assessment Item Release</i>	1.0.0	http://www.smarterapp.org/xsd/assessmentitemrelease_v1p0.xsd
<i>Assessment Item</i>	1.0.0	http://www.smarterapp.org/xsd/assessmentitem_v1p0.xsd
<i>Passage Item</i>	1.0.0	http://www.smarterapp.org/xsd/itempassage_v1p0.xsd
<i>Tutorial</i>	1.0.0	http://www.smarterapp.org/xsd/tutorial_v1p0.xsd
<i>Wordlist</i>	1.0.0	http://www.smarterapp.org/xsd/wordlist_v1p0.xsd
<i>Grid Item Rendering Specification</i>	1.0.0	http://www.smarterapp.org/xsd/griditemrenderingspec_v1p0.xsd
<i>Equation Editor Configuration</i>	1.0.0	http://www.smarterapp.org/xsd/equationeditorconfig_v1p0.xsd
<i>Assessment Item Usage Statistics</i>	1.0.0	http://www.smarterapp.org/xsd/usagestatistics_v1p0.xsd
<i>Assessment Item Machine Rubric</i>	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) MAY be used to describe part of the XML document model for assessment items. A DTD is insufficient to represent the entire document model. DTDs are insufficient to determine if an XML document is fully conformant to the Specification. Different DTDs can be equivalent.

An XML document that uses a DTD SHOULD include a DOCTYPE element referencing or including the appropriate DTD.

A future version of the Specification MAY include an informative set of DTDs. These DTDs SHALL conform to the Specification. An XML document that uses these DTDs conforms to part of the Specification. A conformant XML document need not use these specific DTDs.

Table A.3: DTD Locations

DTD	Version	Future DTD Location
<i>Assessment Item Release</i>	1.0.0	http://www.smarterapp.org/dtd/assessmentitemrelease_v1p0.dtd
<i>Assessment Item</i>	1.0.0	http://www.smarterapp.org/dtd/assessmentitem_v1p0.dtd
<i>Passage Item</i>	1.0.0	http://www.smarterapp.org/dtd/itempassage_v1p0.dtd
<i>Tutorial</i>	1.0.0	http://www.smarterapp.org/dtd/tutorial_v1p0.dtd
<i>Wordlist</i>	1.0.0	http://www.smarterapp.org/dtd/wordlist_v1p0.dtd
<i>Grid Item Rendering Specification</i>	1.0.0	http://www.smarterapp.org/dtd/griditemrenderingspec_v1p0.dtd
<i>Equation Editor Configuration</i>	1.0.0	http://www.smarterapp.org/dtd/equationeditorconfig_v1p0.dtd
<i>Assessment Item Usage Statistics</i>	1.0.0	http://www.smarterapp.org/dtd/usagestatistics_v1p0.dtd
<i>Assessment Item Machine Rubric</i>	1.0.0	http://www.smarterapp.org/dtd/machinerubric_v1p0.dtd

Once developed, the DTDs will be available for download or for direct references from an XML document using the DOCTYPE element.

Multiple versions of each DTD MAY exist, with the DTD location following the DTD versioning and naming 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

DTD names and locations encode the DTD major and minor version in the location. The use of the pattern `v\d{1}p\d{1}` to encode the version number in the DTD name and locations follows the convention used by IMS and parallels the convention used to identify versions of schemata. Different specification or DTD versions have different values of the DTD name and DTD location.

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.

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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.
20140411	0.65	DR, JD, DL	Incorporate additional AIR information on element descriptions. Editorial updates. Technical revisions and clarifications throughout.
20140422	0.70	DR	Editorial updates. Technical revisions and clarifications throughout. Editorial review. Prerelease.
20140602	0.75	DR, JD, DL	Incorporate additional AIR information on element descriptions. Editorial updates. Technical revisions and clarifications throughout. Change from SBAIF to SAAIF Prerelease.
2014xxxx	0.xx		Incorporate additional AIR information on element descriptions. Editorial updates. Technical revisions and clarifications throughout. Editorial review. Prerelease.
2014xxxx	0.xx		Project Draft.
2014xxxx	1.0		Incorporate updates from feedback. Incorporate updates from XSD development. V1.0 public release.

