IMS Question and Test Interoperability Overview

Version 2.1 Public Draft Specification

Document Name: IMS Question and Test Interoperability Overview

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Date Issued: 8 June 2006

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1. Question and Test Interoperability

The IMS Question & Test Interoperability (QTI) specification describes a data model for the representation of question (assessmentItem) and test (assessmentTest) data and their corresponding results reports. Therefore, the specification enables the exchange of this item, test, and results data between authoring tools, item banks, test constructional tools, learning systems, and assessment delivery systems. The data model is described abstractly, using [UML] to facilitate binding to a wide range of data-modeling tools and programming languages, however, for interchange *between* systems a binding is provided to the industry standard eXtensible Markup Language [XML] and use of this binding is strongly recommended. The IMS QTI specification has been designed to support both interoperability and innovation through the provision of well-defined extension points. These extension points can be used to wrap specialized or proprietary data in ways that allows it to be used alongside items that can be represented directly.

1.1. History of this Specification

An initial V0.5 specification was released for discussion in March 1999 and in November it was agreed to develop IMS Question & Test Interoperability v1.0 which was released as a public draft in February 2000 and as a final specification in May that year. The specification was extended and updated twice, in March 2001 and January 2002. By February of that year in excess of 6000 copies of the IMS QTI *1.x* specifications had been downloaded from the IMS website.

Since then, a number of issues of have been raised by implementers and reviewed by the QTI project team. Many of them were dealt with in an addendum, which defined version 1.2.1 of the specification and was released in March 2003. Some of the issues could not be dealt with this way as they required changes to the specification that would not be backwardly compatible or because they uncovered more fundamental issues that would require extensive clarification or significant extension of the specification to resolve.

Since the QTI specification was first conceived, the breadth of IMS specifications has grown and work on Content Packaging, Simple Sequencing, and most recently Learning Design created the need for a cross-specification review. This review took place during 2003 and a number of harmonization issues affecting QTI were identified. In September that year a project charter was agreed to address both the collected issues from *1.x* and the harmonization issues and to draft QTI V2.0. In order to make the work manageable and ensure that results were returned to the community at the earliest opportunity some restrictions were placed on the scope of the recommended work. Therefore, the QTI V2.0 release of the specification concentrated only on the individual assessmentItem and did not update those parts of the specification that dealt with the aggregation of items into sections and tests or the reporting of results. This QTI *2.1* release completes the update from *1.x* to *2.x* by replacing those remaining parts of the QTI specification.

1.2. Scope

The IMS QTI work specifically relates to content providers (that is, question and test authors and publishers), developers of authoring and content management tools, assessment delivery systems, and learning systems. The data model for representing question-based content is suitable for targeting users in learning, education, and training across all age ranges and national contexts.

2. Specification Use Cases

QTI is designed to facilitate interoperability between a number of systems that are described here in relation to the actors that use them.

Specifically, QTI is designed to:

- Provide a well documented content format for storing and exchanging *items* independent of the authoring tool used to create them.
- Support the deployment of item banks across a wide range of learning and assessment delivery systems.
- Provide a well documented content format for storing and exchanging *tests* independent of the test construction tool used to create them.
- Support the deployment of items, item banks, and tests from diverse sources in a single learning or assessment delivery system.
- Provide systems with the ability to report test results in a consistent manner.

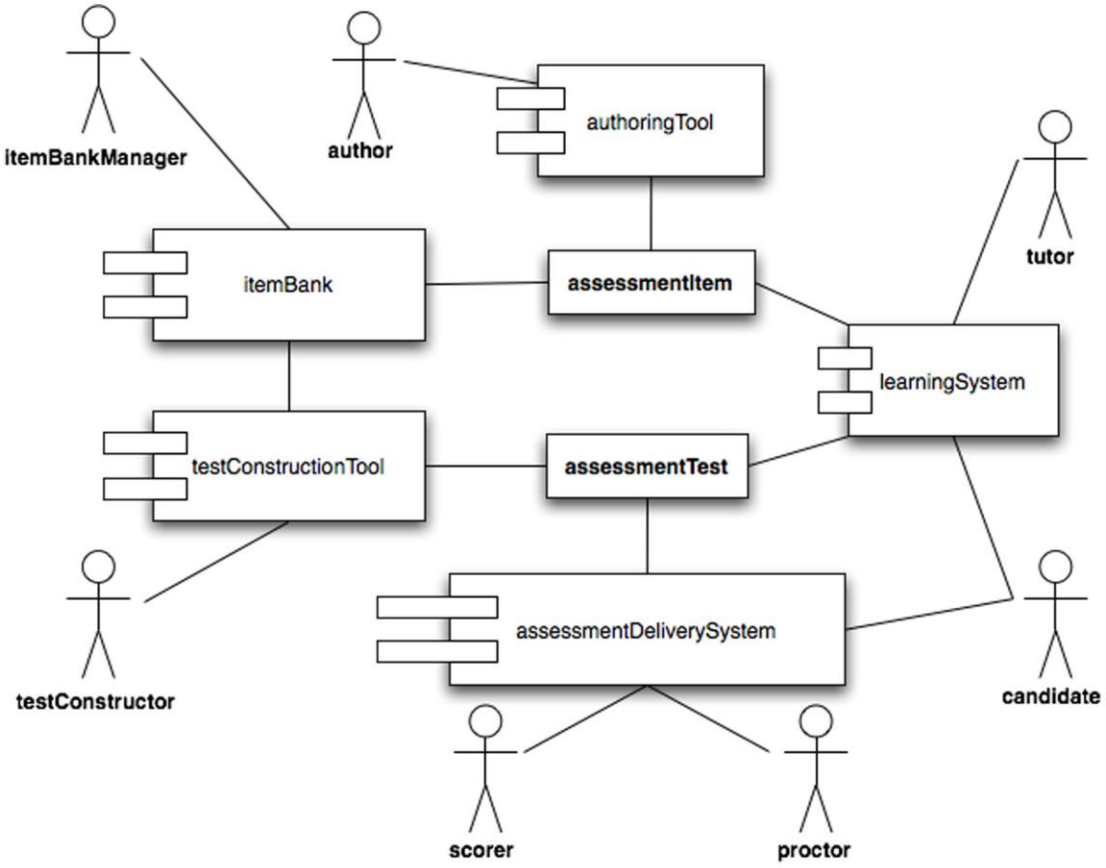

Figure 2.1 The Role of Assessment Tests and Assessment Items.

`authoringTool`

A system used by an author for creating or modifying an assessment item.

itemBank

A system for collecting and managing collections of assessment items.

testConstructionTool

A system for assembling tests from individual items.

assessmentDeliverySystem

A system for managing the delivery of assessments to candidates. The system contains a delivery engine for delivering the items to the candidates and scores the responses automatically (where applicable) or by distributing them to scorers.

learningSystem

A system that enables or directs learners in learning activities, possibly coordinated with a tutor. For the purposes of this specification a learner exposed to an assessment item as part of an interaction with a learning system (i.e., through formative assessment) is still described as a candidate as no formal distinction between formative and summative assessment is made. A learning system is also considered to contain a delivery engine though the administration and security model is likely to be very different from that employed by an assessmentDeliverySystem.

2.1. Use Case Actors

The set of roles identified in this specification have been reduced to a small set of abstract actors for simplicity. Typically, roles in real learning and assessment systems are more complex but, for the purposes of this specification, it is assumed that they can be generalized by one or more of the roles defined here.

author

The author of an assessment item. In simple situations an item may have a single author, in more complex situations an item may go through a creation and quality control process involving many people. In this specification we identify all of these people with the role of author. An author is concerned with the content of an item, which distinguishes them from the role of an itemBankManager. An author interacts with an item through an authoringTool.

itemBankManager

An actor with responsibility for managing a collection of assessment items with an itemBank.

testConstructor

The role of test constructor is to create tests (test forms) from individual items. The items are typically drawn from an item bank.

proctor

A person charged with overseeing the delivery of an assessment. Often referred to as an invigilator. For the purposes of this specification a proctor is anyone (other than the candidate) who is involved in the delivery process but who does not have a role in assessing the candidate's responses.

scorer

A person or external system responsible for assessing the candidate's responses during assessment delivery. Scorers are optional, for example, many assessment items can be scored automatically using response processing rules defined in the item itself.

tutor

Someone involved in managing, directing, or supporting the learning process for a learner but who is not subject to (the same) assessment.

candidate

The person being assessed by an assessment test or assessment item.

3. Structure of this Specification

The specification is spread over a number of documents:

- Implementation Guide: A document that takes you through the data models by example. The best starting point for readers who are new to QTI and want to get an idea of what it can do.

- Assessment Test, Section, and Item Information Model: The reference guide to the main data model for assessment tests and items. The document provides detailed information about the model and specifies the requirements of delivery engines and authoring systems.
- Meta-data and Usage Data: A document that describes a profile of the IEEE Standard for Learning Object Metadata [LOM] data model suitable for use with assessment tests and items and a separate data model for representing usage data (i.e., item statistics). This document will be of particular interest to developers and managers of item banks and other content repositories, and to those who construct assessments from item banks.
- Results Reporting: A reference guide to the data model for result reporting. The document provides detailed information about the model and specifies the associated requirements on delivery engines.
- Integration Guide: A document that describes the relationship between this specification and other related specifications such as IMS Content Packaging [IMS_CP], IMS Simple Sequencing [IMS_SS], and IMS Learning Design [IMS_LD].
- XML Binding: A document describing the way the data models have been bound to [XML].
- Conformance Guide: A document that describes conformance requirements and provides a data model for the construction of QTI profiles including a predefined profile that replaces the QTI Lite specification [QTI_LITE] released as part of version 1. This document is currently unchanged but an updated version will be published with the final release of the specification.
- Migration Guide: A document aimed at people familiar with version *1.x*. It takes you through the main changes that have been made to the data model and includes an alphabetical listing of version 1 elements providing detailed information about how the same information is represented in version 2.

4. References

IMS_CP
IMS Content Packaging Specification, Version 1.1.3
IMS_LD
IMS Learning Design Specification, Version 1.0
Published: 2003-01
IMS_SS
IMS Simple Sequencing Specification, Version 1.0
Published: 2003-03
LOM
IEEE 1484.12.1-2002 Standard for Learning Object Meta-data (LOM)
QTI_LITE
QTI Lite
UML
OMG Unified Modeling Language Specification, Version 1.4
Published: 2001-09
XML
Extensible Markup Language (XML), Version 1.0 (second edition)
Published: 2000-10

About This Document

Title	IMS Question and Test Interoperability Overview
Editors	Steve Lay (Cambridge Assessment), Pierre Gorissen (SURF)
Version	Public Draft v2.1
Version Date	8 June 2006
Status	**Public Draft Specification**
Summary	This document describes the QTI Overview specification.
Revision Information	8 June 2006
Purpose	This document has been approved by the IMS Technical Board and is made available for public review and comment.
Document Location	

List of Contributors

The following individuals contributed to the development of this document:

Name	Organization
Dick Bacon	University of Surrey
Niall Barr	Question Mark
Lance Blackstone	Pearson VUE
Jeanne Ferrante	ETS
Pierre Gorissen	SURF
Regina Hoag	ETS
Gopal Krishnan	Pearson VUE
Steve Lay	Cambridge Assessment
Rowin Young	CETIS

Revision History

Version No.	Release Date	Comments
Base Document 2.1	14 October 2005	The first version of the QTI v2.1 specification.
Public Draft 2.1	9 January 2006	The Public Draft v2.1 of the QTI specification.
Public Draft 2.1 (revision 2)	8 June 2006	The Public Draft v2.1 (revision 2) of the QTI specification.