Providing a decade of interoperable assessment, IMS Question and Test Interoperability is a widely used specification for managing and sharing assessment material. Now that we are near the release of the final version of QTI v2.1 this paper provides an overview of the specification, outlining some of the key features of QTI v2.1 and its value for developers and educators. The intended audience for this paper is managers, learning technologists and developers interested in online and electronic assessment and new to QTI.

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IMS Question and Test Interoperability v2.1

A Briefing Paper
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Introduction

One of the earliest of the IMS specifications, QTI v1 offered a standardised way of representing assessment material that enabled the exchange of content between systems and organisations and promised greater longevity and permanence of content that was formerly at risk of being locked inside proprietary formats.

The release of QTI v2.1 represents a major landmark in the history of the specification. Combining significant revisions from v1 identified after extensive real-world use and alterations to bring it more closely into line with more recent IMS specifications and policy, 2.1 offers a much more useable and pragmatic specification.

What is IMS Question and Test Interoperability?

IMS Question and Test Interoperability (QTI) is a technical specification designed to make it easier to transfer assessment information between different compliant systems. This information can be both assessment content itself, and related information such as scores, outcomes and grades, and associated metadata.

QTI uses extensible markup language (XML) tags to record information about assessments and assessment results. Each tag is defined within the QTI data model, offering a wide range of question types as well as the ability for developers to add bespoke items by extending the specification according to its guidance.

Within QTI, assessment content is separated into individual items (an item is a question together with related information such as rubric, scoring instructions, layout, hints and feedback) and assessments, which contain one or more items and may be organised into subsections. Metadata about the item or assessment is defined in a profile that complies with the IEEE LOM standard. Instructions on packaging this content in accordance with IMS Content Packaging are also provided.

An assessment delivery system may be compliant with the specification either directly, by processing and running QTI files themselves, or indirectly, by supporting the translation of QTI into or out of a proprietary format.

IMS Common Cartridge incorporates profiles of both IMS v1.2.1 and v2.1, enabling the use of interoperable assessment content within these more general content packages.

History and present

QTI v1.0 was released in May 2000, one of the very first IMS specifications to be produced. Although well received and adopted by a number of developers, its position so early within the IMS specification development cycle meant that it gradually became out of step with the rest of IMS's specifications that emerged, particularly with respect to metadata management and packaging.

Version 2.0 was released in January 2005, offering a substantial and very timely revision of the specification, bringing it into line with the rest of the suite of IMS specifications. As 2.0 only covered the item level, and not the construction of full assessments or sections, work immediately began on v2.1. After a prolonged period of development and testing involving developers from a wide range of institutions and organisations worldwide, it underwent a public interoperability demonstration at the IMS Quarterly meeting in Koblenz, Germany, in Summer 2010.
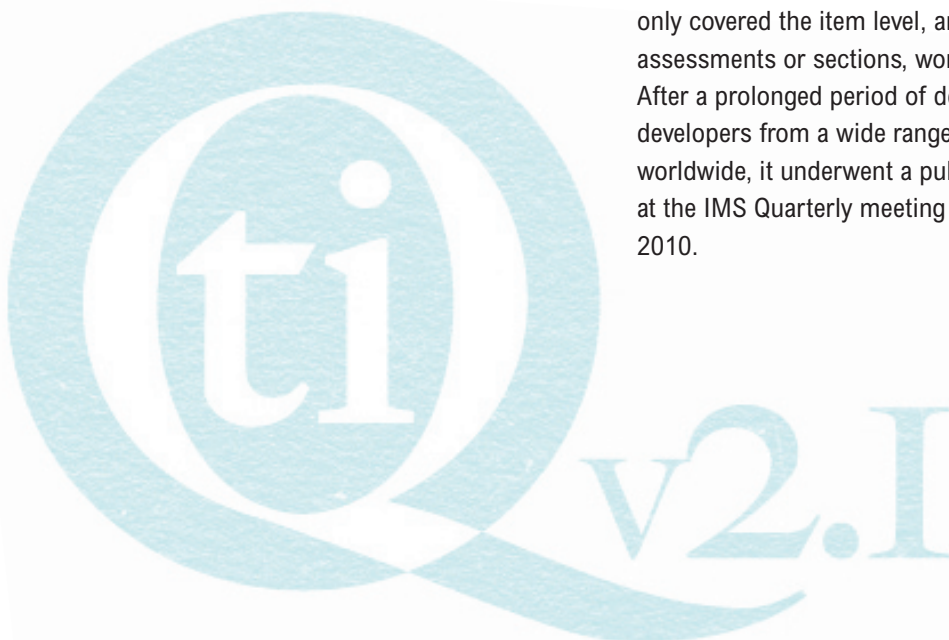
OUTLINE OF THE SPECIFICATION

The QTI specification is comprised of nine documents:

● **OVERVIEW:** outlines the history of the specification and establishes the scope of this particular version, with illustrative use cases.

● **ASSESSMENT TEST, SECTION AND ITEM INFORMATION MODEL:** provides the abstract description of concepts, relationships and rules of QTI items, sections and tests.

● **XML BINDING:** provides an XML Schema and optional DTD (document type definition) against which QTI must validate.

● **RESULTS REPORTING:** describes how results and outcomes information should be handled and exchanged.

● **IMPLEMENTATION GUIDE:** provides examples of QTI v2.1 as illustrative demonstrations of how the specification may (but not must) be implemented.

● **INTEGRATION GUIDE:** explains how QTI v2.1 can be used with IMS Content Packaging, IMS Learning Design, IMS Simple Sequencing and IEEE CMI (Data Model for Content Object Communication).

● **CONFORMANCE GUIDE:** provides profiles against which tool developers can measure the interoperability of their product.

● **META-DATA AND USAGE DATA:** provides an extended application profile of IEEE LOM to enable the description and discovery of assessment material.

● **MIGRATION GUIDE:** offers detailed guidance on converting content from v1.x to v2.1.

History and present

Deployment of assessment software or an assessment management system which supports interoperability standards has a number of advantages:

• Transferability of content between systems, allowing access to a much larger amount of potential content developed by subject experts in other institutions or by professional content vendors.

• Durability and longevity of content and results information through avoiding content lock-in when working with an assessment delivery, assessment management or content system vendor.

• Efficiency in the development process by avoiding "reinventing the wheel".

• Engagement with a wide community of practice.

Although QTI has been around for a decade, v2.1 represents a significant new release and it will take time for there to be a wide range of implementations. However, there are already a number of both open source and commercial products available which have implemented the public draft, while integration with VLEs such as Moodle brings QTI to a significantly wider audience. Finally, a QTI migration tool is available which converts QTI 1.x content to v2.0 content packages which may then be imported by 2.1 systems. A list of available resources is located under Further Reading section.

Criticisms and concerns

Some potential or former users of QTI have expressed reservations about the use of the specification, and may have encountered problems in developing or sharing content. It is important to recognise the limitations of the specification: specification development activity is almost invariably reactive, responding to developments in assessment practice and codifying innovations developed by practitioners, rather than proactively developing new techniques. It is therefore inherently conservative, reflecting general practice rather than innovative outliers, and represents a convergence of divergent practices towards a single model. QTI v2.x overcomes this to some extent by providing guidance on how unique question types can be integrated in individual implementations of the specification.

In addition, IMS do not yet have a testing process in place to evaluate vendors' claims of conformance beyond the limited profiles of QTI contained within Common Cartridge and Basic Learning Tools Interoperability. However, this will change with the release of the final version and inclusion of QTI v2.1 within the IMS Conformance Programme.

The long development period of the specification and the gradual changes to it may mean that some formerly "compliant" systems are now less (or more) so. With the specification finally available in a fixed and approved form, more stable releases should become available that erase anomalies of interpretation.

Nevertheless, given the financial and time cost of developing and quality assuring assessment materials, the benefit of doing so in an interoperable format is considerable, and QTI offers a very viable means of doing so.

FURTHER READING:

IMS Question and Test Interoperability: http://www.imsglobal.org/question/index.html

List of assessment tools, projects and resources: http://wiki.cetis.ac.uk/Assessment_tools,_projects_and_resources

Wikipedia QTI entry: http://en.wikipedia.org/wiki/QTI

CETIS Assessment topic page: http://jisc.cetis.ac.uk/topic/assessment

IMS QTI discussion forum: http://www.imsglobal.org/community/forum/categories.cfm?catid=52