

# Sharing Assessment Information: Interoperability in Computer Based Assessment

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# Overview

- Open Technical Specifications for E-Learning from IMS
- IMS Question & Test Interoperability
- Assessment in TENCompetence



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# Why interoperability?

- Spreading costs of assessment development across delivery contexts
- Plug and play tooling
- Easing comparison of R&D results in the area of assessment



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# IMS

- IMS Global Learning Consortium, Inc
  - Non-profit organization
  - More than 50 Contributing Members and affiliates.
- Develops and promotes the adoption of open technical specifications for interoperable learning technology
- [www.imsglobal.org](http://www.imsglobal.org)
- Many specs derived from European work



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# IMS specifications

- Three documents
  - Information Model
  - Binding, XML used to date
  - Best Practice and Implementation Guide
  - Recent specs have added to this list, eg conformance guide, migration guide
- “if you build your software to be aware of these concepts, it will interoperate with other software built to be aware of the same concepts”



# IMS specifications

Date	Document	Status
2006-March 8	<a href="#">IMS Tools Interoperability Guidelines</a>	Version 1
2006-January 27	<a href="#">IMS Question and Test Interoperability</a>	Version 2.1 Public Draft Specification
2006-January 13	<a href="#">IMS General Web Services</a>	Version 1.0 Final Specification
2005-December-12	<a href="#">IMS Content Packaging</a>	Version 1.2 Public Draft Specification
2005-July-5	<a href="#">IMS ePortfolio</a>	Version 1.0 Final Specification
2005-March-1	<a href="#">IMS General Web Services</a>	Version 1.0.1 Public Draft Specification
2005-January-24	<a href="#">IMS Question and Test Interoperability</a>	Version 2.0 Final Specification
2005-January-17	<a href="#">IMS Learner Information Package</a>	Version 1.0.1 Final Specification
2004-November-1	<a href="#">IMS Content Packaging</a>	Version 1.1.4 Final Specification
2004-October-12	<a href="#">IMS ePortfolio</a>	Version 1.0 Public Draft
2004-August-30	<a href="#">IMS Resource List Interoperability</a>	Version 1.0 Final Specification
2004-August-23	<a href="#">IMS AccessForAll Meta-Data</a>	Version 1.0 Final Specification
2004-August-24	<a href="#">IMS Enterprise Services</a>	Version 1.0 Final Specification
2004-July-30	<a href="#">IMS Shareable State Persistence</a>	Version 1.0 Final Specification



# IMS QTI

- **Question & Test Interoperability**
  - Exchange of item, test and results data between authoring tools, item banks, test constructional tools, learning systems and assessment delivery systems
  - History
    - March 1999 v0.5
    - May 2000 v1.0
    - Extended and updated twice, in March 2001 and January 2002.
    - March 2003 v1.2.1
    - Review 2003: need for version 2.0



# IMS QTI v2

- QTI v2.0 January 2005
  - 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.
- QTI v2.1 (January 2006) release completes the update from 1.x to 2.x by replacing those remaining parts of the QTI specification.
- Now at *Public Draft*





# QTI 2.1 spec development team

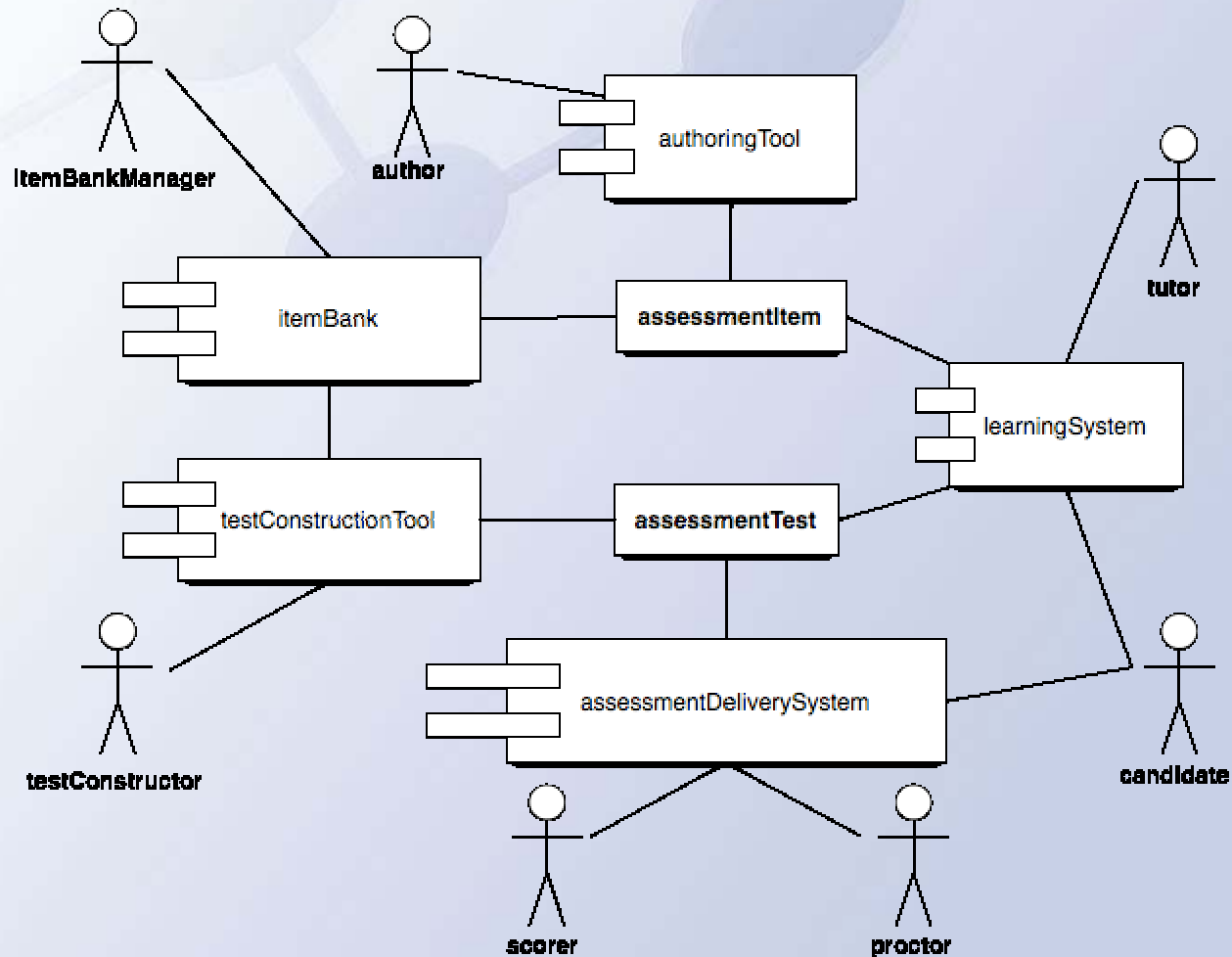
- University of Surrey, Question Mark, Pearson VUE, ETS, SURF, Cambridge Assessment, CETIS, ...
  - The Open University of the Netherlands participated in the QTI 2.0 team
- Now a few slides to give you a feel for QTI



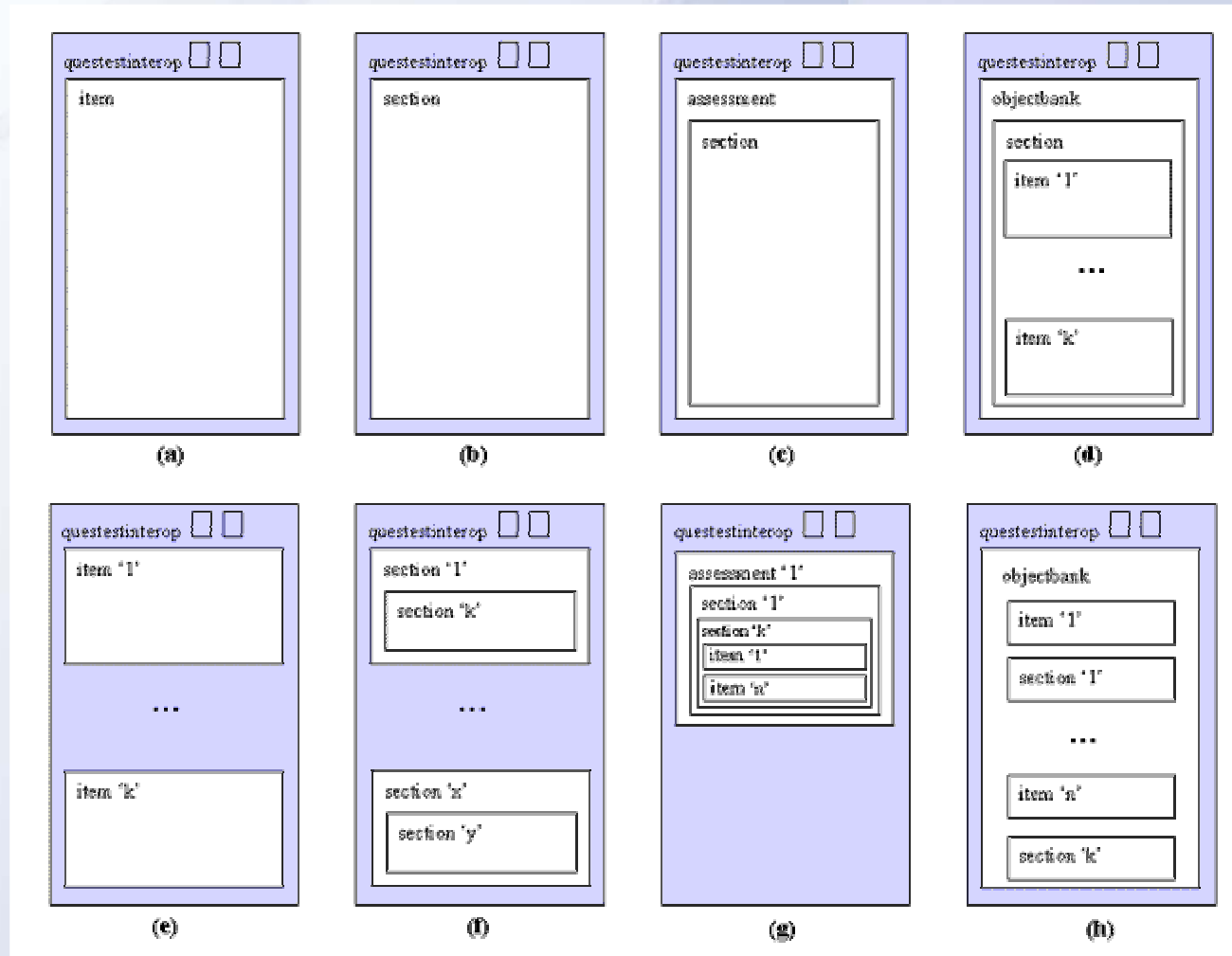
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# Actors and Components



# Items, Sections, Assessments



# Simple choice

http://www.imsglobal.org/question/qti\_v2p1pd/examples/items/choice.xml - Microsoft Internet Explorer

```
<?xml version="1.0" encoding="UTF-8" ?>
<!-- This example adapted from the PET Handbook, copyright University of Cambridge ESOL Examinations -->
- <assessmentItem xmlns="http://www.imsglobal.org/xsd/imsqti_v2p1"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.imsglobal.org/xsd/imsqti_v2p1 imsqti_v2p1.xsd" identifier="choice"
  title="Unattended Luggage" adaptive="false" timeDependent="false">
- <responseDeclaration identifier="RESPONSE" cardinality="single" baseType="identifier">
  - <correctResponse>
    <value>ChoiceA</value>
  </correctResponse>
  </responseDeclaration>
- <outcomeDeclaration identifier="SCORE" cardinality="single" baseType="integer">
  - <defaultValue>
    <value>0</value>
  </defaultValue>
  </outcomeDeclaration>
- <itemBody>
  <p>Look at the text in the picture.</p>
  - <p>
    
  </p>
- <choiceInteraction responseIdentifier="RESPONSE" shuffle="false" maxChoices="1">
  <prompt>What does it say?</prompt>
  <simpleChoice identifier="ChoiceA">You must stay with your luggage at all times.</simpleChoice>
  <simpleChoice identifier="ChoiceB">Do not let someone else look after your luggage.</simpleChoice>
  <simpleChoice identifier="ChoiceC">Remember your luggage when you leave.</simpleChoice>
  </choiceInteraction>
</itemBody>
<responseProcessing
  template="http://www.imsglobal.org/question/qti_v2p0/rptemplates/match_corre
</assessmentItem>
```

## UNATTENDED LUGGAGE

Look at the text in the picture.

**NEVER LEAVE  
LUGGAGE  
UNATTENDED**

What does it say?

- |  |                       |
|--|-----------------------|
| You must stay with your luggage at all times.    | <input type="radio"/> |
| Do not let someone else look after your luggage. | <input type="radio"/> |
| Remember your luggage when you leave.            | <input type="radio"/> |

# Text Entry

http://www.imsglobal.org/question/qtiv2p1pd/examples/items/text\_entry.xml - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Print Mail New Tab

Address http://www.imsglobal.org/question/qtiv2p1pd/examples/items/text\_entry.xml Go Links >>

```
<?xml version="1.0" encoding="UTF-8" ?>
- <assessmentItem xmlns="http://www.imsglobal.org/xsd/imsqti_v2p1"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.imsglobal.org/xsd/imsqti_v2p1 imsqti_v2p1.xsd"
  identifier="textEntry" title="Richard III (Take 3)" adaptive="false" timeDependent="false">
- <responseDeclaration identifier="RESPONSE" cardinality="single" baseType="string">
  - <correctResponse>
    <value>York</value>
  </correctResponse>
  - <mapping defaultValue="0">
    <mapEntry mapKey="York" mappedValue="1" />
    <mapEntry mapKey="york" mappedValue="0.5" />
  </mapping>
</responseDeclaration>
<outcomeDeclaration identifier="SCORE" cardinality="single" baseType="float" />
- <itemBody>
  <p>Identify the missing word in this famous quote from Shakespeare's Richard III </p>
  - <blockquote>
    - <p>
      Now is the winter of our discontent
      <br />
      Made glorious summer by this sun of
      <textEntryInteraction responseIdentifier="RESPONSE" />
      ;
      <br />
      And all the clouds that lour'd upon our house
      <br />
      In the deep bosom of the ocean buried.
    </p>
  </blockquote>
</itemBody>
<responseProcessing
  template="http://www.imsglobal.org/question/qti_v2p1/rptemplates/map_response" />
</assessmentItem>
```

Done Internet

## RICHARD III (TAKE 3)

Identify the missing word in this famous quotation from Shakespeare's Richard III.

Now is the winter of our discontent  
Made glorious summer by this sun of  ;  
And all the clouds that lour'd upon our house  
In the deep bosom of the ocean buried.

# Slider

http://www.imsglobal.org/question/qtiv2p1pd/examples/items/slider.xml - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Print Mail New Folder Open Recent Help

Address http://www.imsglobal.org/question/qtiv2p1pd/examples/items/slider.xml Go Links >>

```
<?xml version="1.0" encoding="UTF-8" ?>
- <assessmentItem xmlns="http://www.imsglobal.org/xsd/imsqti_v2p1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://www.imsglobal.org/xsd/imsqti_v2p1 imsqti_v2p1.xsd" identifier="slider" title="Jedi
Knights" adaptive="false" timeDependent="false">
- <responseDeclaration identifier="RESPONSE" cardinality="single" baseType="integer">
- <correctResponse>
<value>16</value>
</correctResponse>
- <mapping defaultValue="0">
<mapEntry mapKey="12" mappedValue="0.5" />
<mapEntry mapKey="13" mappedValue="0.5" />
<mapEntry mapKey="14" mappedValue="1.0" />
<mapEntry mapKey="15" mappedValue="1.0" />
<mapEntry mapKey="16" mappedValue="1.0" />
<mapEntry mapKey="17" mappedValue="1.0" />
<mapEntry mapKey="18" mappedValue="1.0" />
<mapEntry mapKey="19" mappedValue="0.5" />
<mapEntry mapKey="20" mappedValue="0.5" />
</mapping>
</responseDeclaration>
<outcomeDeclaration identifier="SCORE" cardinality="s
- <itemBody>
- <p>
Much to the dismay of Star Wars fans, the 200
<i>Jedi Knights</i>
as having no religion. In fact, the
<i>Jedi</i>
accounted for more than 4% of this group!
</p>
- <sliderInteraction responseIdentifier="RESPONSE" lo
<prompt>In total, what percentage of the UK population do you think were eventually classied as having no
religion?</prompt>
</sliderInteraction>
</itemBody>
<responseProcessing template="http://www.imsglobal.org/question/qti_v2p1/rptemplates/map_response" />
</assessmentItem>
```

Done Internet

## JEDI KNIGHTS

Much to the dismay of Star Wars fans, the 2001 UK national census classified people who identified themselves as *Jedi Knights* as having no religion. In fact, the *Jedi* accounted for more than 4% of this group!

In total, what percentage of the UK population do you think were eventually classified as having no religion?



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# Implementations?

- Good overview of tool support is <http://assessment.cetis.ac.uk/External%20links>
- Commercial support
  - Question Mark Perception
  - Respondus
  - Report looking at support from tools:  
<http://www.fontyspublicaties.nl/show.cgi?did=3304>
- Moodle also has QTI import/export
- JISC project APIS Open source QTI v2.0 assessment rendering engine.



# But ...

- Movement
  - **away from** massive, standardized, summative testing with multiple choice questions based on knowledge acquisition.
  - **towards** assessment integrated in learning and instruction, process-based, with student involvement.
- Need for broader view incorporating:
  - assessment process (which steps are to be carried out and by whom)
  - rationale (what is being tested and how)





# eLearning R&D at OUNL (1)

- R&D on Educational Modelling Language, 2000
  - Used as foundation for IMS Learning Design, 2003
- IMS Learning Design is used to model units of learning
  - A unit of learning (UoL) is any delimited piece of education or training, such as a course, a module, a lesson, etc. More than just a collection of ordered resources to learn – includes activities, assessments, services and support facilities provided by teachers, trainers and other staff members.
- Model who does what, when, with whom and using which learning objects and services



# eLearning R&D at OUNL (2)

- Interest in integration of learning and assessment
  - Formative as well as summative assessment
  - Work on integrating IMSLD and IMSQTI
- Interest in new forms of assessment
  - Peer assessment, portfolio assessment
  - New 6<sup>th</sup> Framework project



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# LD+QTI learning scenarios (1)

- Single learner scenarios:
  - Want to check the learner's level of understanding before starting a course (intake assessment);
  - Want to check whether a concept has been learned before allowing the learner to progress;
  - Want to provide a high level of feedback in a module to keep motivation high;
  - Want to end a course with an examination;



# LD+QTI learning scenarios (2)

- Multi learner scenarios:
  - Want to have individuals' answers be revealed to a group to promote discussion and learning;
  - Want to arrange for peer assessment;
  - Want to divide a set of students into several groups of more-or-less equally able students;
  - Want to divide a group of students into groups with individuals of differing levels of ability;
  - Want to give the best/worst performer in a group a particular role in a learning design;



[www.tencompetence.org](http://www.tencompetence.org)



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**6<sup>th</sup> Framework IST Technology  
Enhanced Learning Project (2006-2010)**

# Assessment Modelling work in TENCompetence

- One of the project aims is to develop:
  - New innovative pedagogical approaches, assessment models and organisational models for lifelong competence development, supported by the TENCompetence technical and organizational infrastructure.
  - **Develop** a formal specification **model and supporting tools** that combines **new assessment types** and the ones included in the IMS QTI.
    - Based on some initial work carried out by OUNL and CITO
    - Results to be used to augment QTI



# Final thoughts

- IMS QTI is an open technical specification for the exchange of testing data
- Newer forms of assessment require additional modelling work
  - Being addressed in the TENCompetence project



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