

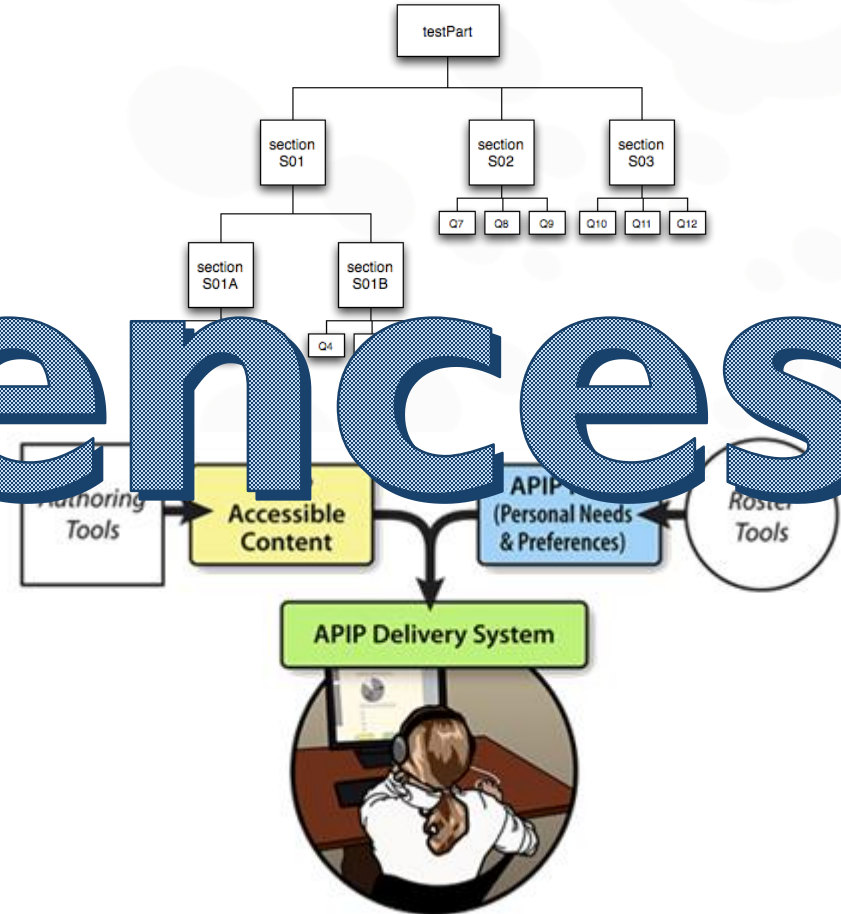
What's New in QTI 3?

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Know Your History...

- QTI 1.0
 - Released in 1999, no longer public
- QTI 1.2
 - Released in 2002, focus on semantics
 - Still in use for Common Cartridge 1.2 (popular with LMS)
- QTI 2.0
 - Released in 2005, new item model only
 - Based on HTML
 - Released in 2008, added HTML5 for print or printout
 - Includes (sub)stitutions, metadata, and multiple-choice
- QTI 2.1
 - Released in 2015
 - Added HTML5/ARIA, APIP, and Stimulus
 - Conformance test set still in progress, based on EBA Conformance Levels (Entry, Core, Advanced)
- APIP 1.x
 - Profile of QTI 2.x, focused on Accessibility
 - Using PNP: Personal Needs & Preferences
- QTI 3
 - Formerly known as aQTI
 - Merger of QTI 2.x and APIP

Experiences?



OAT Experience

- Different interpretations of QTI
 - Interaction rendering, rubrics
- Many custom extensions
 - Item types, adaptive testing
- Different versions and profiles of QTI
 - QTI 1.2, 2.X, APIP, PARCC, Dutch Exam Profile (DEP)
- Many claims of conformance
 - Lacking formal IMS certification
 - Conformance not granular enough

RICHARD III (TAKE 1)

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

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

Use the table below to select the missing words.

	winter	spring	summer	autumn
Word 1	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Word 2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Identify the missing words in this famous quote from Shakespeare's Richard III.

Now is the of our discontent

Made glorious by this sun of York;

And all the clouds that lour'd upon our house

In the deep bosom of the ocean buried.

Improvements in QTI 2.2

- Introduced HTML5, Shared Stimulus, Sections as separate entities
- Introduced Conformance Certification Levels
 - Level 1: Entry
 - Level 2: Core
 - Level 3: Advanced
- Introduced best practices for extensions
 - Portable Custom Interaction (PCI) to enable Technology Enhanced Items (TEI)
 - Standard on Computer Adaptive Testing (CAT)

FEATURE	SUMMARY	Total number entries/support	Test column for analysis	QTI 2.1 LEVEL OVERVIEW			QTI 2.2 LEVEL OVERVIEW		
				level 1	level 2	level 3	level 1	level 2	level 3
Interactions		44	21						
Q1 Associate Interaction	42	19	N	X	X	R	X	X	R
Q2 Choice Interaction	42	42	Y	R	R	R	R	R	R
Q3a Custom Interaction (LTI)	42	15	N	X	X	R	e	e	e
Q3b Custom Interaction (PCI)	34	10	N	X	X	X	e	e	e
Q4 Drawing Interaction	42	4	N	X	X	X	X	X	X
Q5 End Attempt Interaction	42	12	N	X	X	X	X	X	X
Q6 Extended Text Interaction	42	39	Y	R	R	R	R	R	R
Q7 Gap Match Interaction	42	29	Y	X	R	R	X	R	R
Q8 Graphic Associate Interaction	42	13	N	X	X	R	X	X	R
Q9 Graphic Gap Match Interaction	42	31	Y	X	R	R	X	R	R
Q10 Graphic Order Interaction	42	22	Y	X	X	R	X	R	R
Q11 Hot-spot Interaction	42	38	Y	X	R	R	X	R	R
Q12 Hot-text Interaction	42	31	Y	X	R	R	X	R	R
Q13 Inline Choice Interaction	42	37	Y	X	R	R	X	R	R
Q14 Match Interaction	42	31	Y	X	R	R	X	R	R
Q15 Media Interaction	42	10	N	X	X	R	X	X	R
Q16 Order Interaction	42	28	Y	X	R	R	X	R	R
Q17 Position Object Interaction	42	13	N	X	X	R	X	X	R
Q18 Selection Point Interaction	42	17	N	X	X	R	X	X	R
Q19 Slider Interaction	42	10	N	X	X	R	X	X	R
Q20 Text Entry Interaction	42	39	Y	R	R	R	R	R	R
Q21 Upload Interaction	42	19	N	X	X	R	X	X	R
Q22 Custom Interaction (proprietary)	42	23	Y	X	X	R	e	e	e

Portable Custom Interactions (PCI)

$\sqrt{\quad}$	x/y	x^n	log	ln
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$$\frac{\sqrt{b^2 - 4ac}}{23 + \sqrt{25}}$$

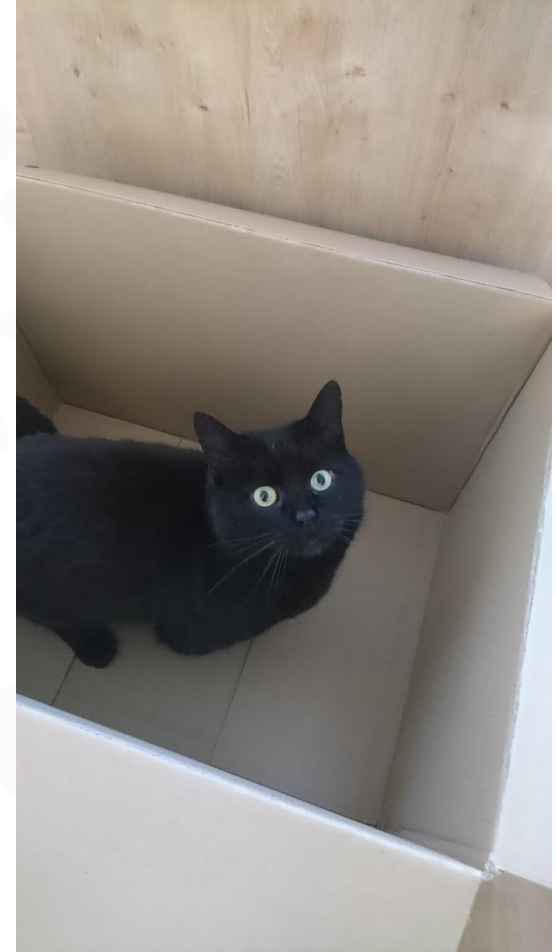
- Best practice on how to define “Custom Interactions” in QTI
- One-off vs. Generic types
 - One-item type, e.g. very specific simulation
 - Generic type, e.g. likert
 - Potential candidate for future standardization in QTI
- Relatively new specification
 - Candidate final released in 2013
 - Change proposals in 2014, 2015
 - PCI 1.0 Candidate Final released in 2017

The image displays a grid of 12 interactive HTML5 maquettes (PCI) for various subjects. Each maquette includes a title, a brief description, and a URL. The maquettes are:

- PCI Générateur avec image et logo intégrable**: Version avancée du PCI générateur avec gestion des images. Les images gérées sont celles prises en charge par le javascript / le CSS et le logo de la PCI. <http://www.wiqid.fr/pcigen/>
- Maquette Berthold – Animation interactive HTML5 pour PCI**: Animation interactive en HTML5 adaptée après en PCI TAO. <http://wiqid.fr/depp/berthold/>
- Maquette HTML5 Raphaël JS pour Volcanisme (PCI)**: Maquette pour la PCI Volcanisme – Manipulation labo faite en classe. <http://wiqid.fr/depp/volcanisme/>
- Combi-defilé infini décor-Maquette HTML5**: Essai animation pour PCI. <http://wiqid.fr/depp/vitesse/>
- SVT Item : intestin – maquette HTML5**: Schéma interactif explicatif du fonctionnement de l'intestin et flux sanguin. <http://www.wiqid.fr/depp/intestin/>
- Maquette HTML5 pour PCI Lampe double – Electricité**: Animation interactive démonstration du va et vient. <http://wiqid.fr/depp/lampedouble/>
- Maquette HTML5 pour le SVT – Lentilles – étude de la croissance – Tableau et Grapheur intégrés**: Cette PCI intègre un grapheur et un tableur. <http://wiqid.fr/depp/lentilles/>
- Etude HTML5 – Physique – Math – les balances**: Simulation des balances – proposition d'exercice pour résoudre des équations. <http://www.wiqid.fr/depp/mobile/>

Standard on CAT

- Workgroup established May 2016
 - Members include Elsevier, Pearson, ACT, Pacific Metrics, PCG, PARCC
- Problem: many CATs, all proprietary and tightly coupled to delivery systems
 - But similar strategies in interfacing: what's the next item to present?
- Goal: interoperability of adaptive tests (content) and broader use of algorithms
 - Algorithm: content or a service?
 - At least be able to use algorithms in multiple systems and vice versa
- Solution: treat CAT engine as a Black Box, define best practices (like PCI), including:
 - QTI Extension: how to reference adaptive algorithms and required data
 - CAT Engine API: methods for interacting with adaptive algorithms
- VI.0: later refinement required
 - Additional (bilateral) agreements still necessary



CAT Engine API

Initialize Adaptive Section

POST /section

Loop each Examinee taking this Adaptive Section

POST /

Loop each Adaptive Stage until NextItems is empty

POST /

End Examinee Session

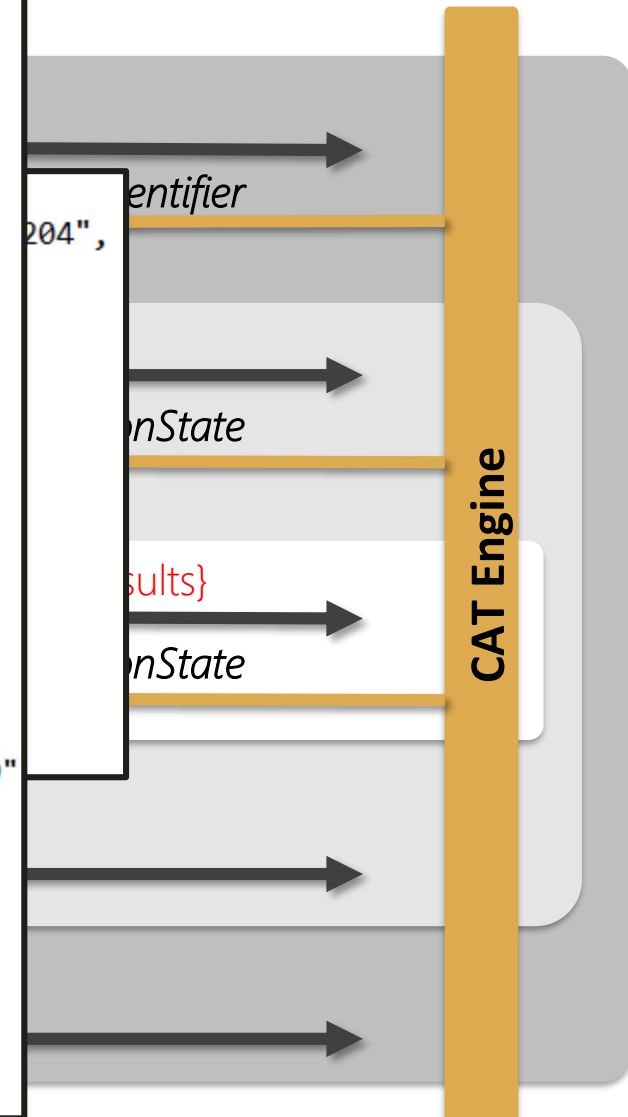
DELETE/section

Terminate Adaptive Section

DELETE/section

Test Delivery Applications

```
{
  "nextItems": {
    "itemIdentifiers": [
      "i15211315996386709",
      "i15211315856879705",
      "i15211323318070748"
    ],
    "stageLength": 1
  },
  "assessmentResult": {
    "context": null,
    "testResult": {
      "identifier": null,
      "datestamp": null,
      "outcomeVariables": [
        {
          "identifier": "CURRENT_THETA",
          "cardinality": null,
          "baseType": null,
          "view": null,
          "masteryValue": null,
          "value": [
            {
              "fieldIdentifier": null,
              "baseType": "float",
              "value": "0.4773142016602239"
            }
          ]
        }
      ]
    }
  },
  "itemResult": null,
  "sessionState": "eyJhZG"
}
```



Next: QTI 3.0

- The issue with exchanging items preserving CSS is this could lead to consistency issues in item rendering and overall test taker experience.
- To address this, the QTI 3 introduces the concept of the “Shared Vocabulary” to push the envelope of exchanging presentation information even further. It allows assessment delivery engines to **preserve their own style guides**, but still **honor the demands of the item authors** in a more granular way.

QTI 3 Highlights

- Remodel of APIP elements
 - Cards & catalogs
 - Extended ARIA support
- Web components friendly syntax
 - Closer to implementation
- Shared Vocabularies
 - CSS classes & data-attributes
- Integration of PCI and CAT best practices
 - Native elements, not extensions
- Originally only item model
 - Expanded to Tests too...
- Last version of QTI?

```
<?xml version="1.0" encoding="UTF-8"?>
<qti-assessment-item xmlns="http://www.imsglobal.org/xsd/imsqtiasi_v3p0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.imsglobal.org/xsd/imsqtiasi_v3p0 http://www.imsglobal.org/xsd/imsqtiasi_v3p0.xsd">
  <qti-response-declaration identifier="RESPONSE" cardinality="multiple" base-type="identifier">
    <qti-correct-response>
      <qti-value>H</qti-value>
      <qti-value>0</qti-value>
    </qti-correct-response>
    <qti-mapping lower-bound="0" upper-bound="2" default-value="-2">
      <qti-map-entry map-key="H" mapped-value="1"/>
      <qti-map-entry map-key="0" mapped-value="1"/>
      <qti-map-entry map-key="Cl" mapped-value="-1"/>
    </qti-mapping>
  </qti-response-declaration>
  <qti-outcome-declaration identifier="SCORE" cardinality="single" base-type="float"/>
  <qti-item-body>
    <qti-choice-interaction response-identifier="RESPONSE" shuffle="true" max-choices="0">
      <qti-prompt>Which of the following elements are used to form water?</qti-prompt>
      <qti-simple-choice identifier="H" fixed="false">Hydrogen</qti-simple-choice>
      <qti-simple-choice identifier="He" fixed="false">Helium</qti-simple-choice>
      <qti-simple-choice identifier="C" fixed="false">Carbon</qti-simple-choice>
      <qti-simple-choice identifier="O" fixed="false">Oxygen</qti-simple-choice>
      <qti-simple-choice identifier="N" fixed="false">Nitrogen</qti-simple-choice>
      <qti-simple-choice identifier="Cl" fixed="false">Chlorine</qti-simple-choice>
    </qti-choice-interaction>
  </qti-item-body>
  <qti-response-processing template="https://www.imsglobal.org/question/qti_v3p0/rptemplates/map_response.xml"/>
</qti-assessment-item>
```

QTI 3 Shared Vocabulary

- Predefined styles/behaviors
 - On interactions
 - E.g. choice labels, stacking, widths, heights placement, messages
 - On item layout/structure
 - E.g. X column layout, emphasis
 - On text formatting
 - E.g. text underline, vertical/horizontal alignment

Example: Demonstrates class="qti-labels-upper-alpha"

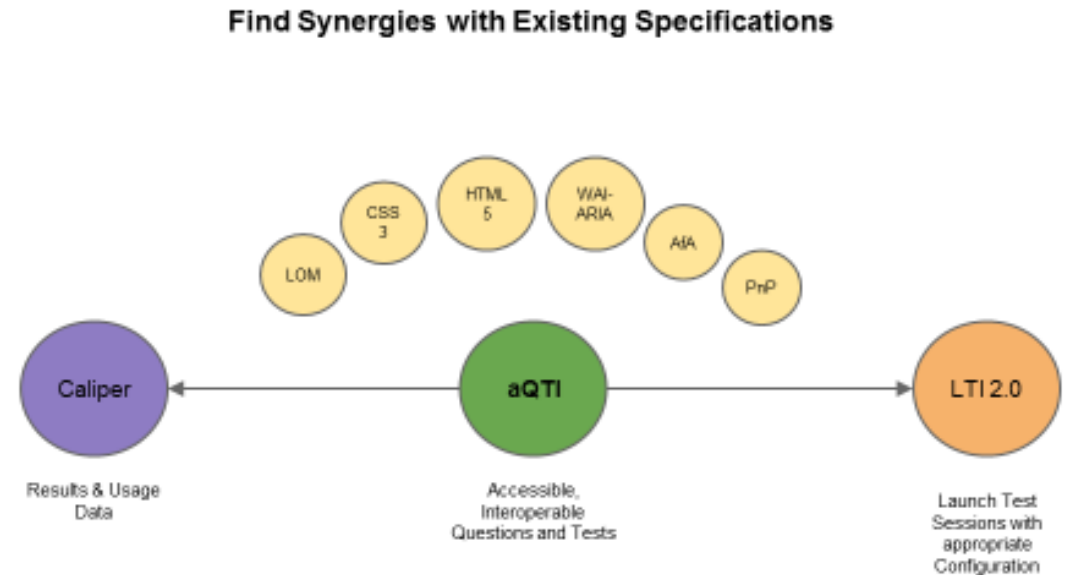
```
0000 <qti-choice-interaction class="qti-labels-upper-alpha" max-choices="1"
0001 response-identifier="RESPONSE">
0002   <qti-simple-choice identifier="ChoiceA">You must stay with your luggage at all
0003   times.</qti-simple-choice>
0004   <qti-simple-choice identifier="ChoiceB">Do not let someone else look after your
0005   luggage.</qti-simple-choice>
0006   <qti-simple-choice identifier="ChoiceC">Remember your luggage when you
0007   leave.</qti-simple-choice>
0008 </qti-choice-interaction>
```

Expected Rendering: Visual labels are uppercase alphabetic

- A You must stay with your luggage at all times.
- B Do not let someone else look after your luggage.
- C Remember your luggage when you leave.

Synergies with Existing (IMS) Specifications

- CASE
 - Curriculum & Academic Standards Exchange
 - Aligning standards
 - Included in QTI 3 manifest
- Caliper
 - Learning Analytics
 - Updated Assessment Metric Profile by QTI Working Group (in progress)
- Standard on Proctoring
 - Leveraging LTI Advantage to integrate remote proctoring solutions



Next Steps

- QTI 2.2: November 2018
 - Completing Level 1 & 2 Conformance Certification suites
- QTI 3: November 2018
 - Draft Documentation
 - Draft Conformance Certification
 - Draft Specification release
- Get involved too!
 - Join IMS Europe, APSC or IMS (Technical) Working Groups!



Thank You!

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