Requirements Analysis

Smarter Balanced Assessment Consortium
Test Delivery System

Component: Test Spec Bank Level II

Contents

Revision History

Revision Description	Author/Modifier	Version	Date

Initial working version	Paul Krumrei	0.1	Aug 29 2013

Introduction

1. Terms and Definitions

Term	Definition
APIP	Accessible Portable Item Profile. A technical standard that focuses on accessibility in assessment items.
Asset	Multimedia (digital text, images, audio and video) associated with an item
Blueprint	The design for a test. The test blueprint indicates the number of test questions or points related to each competency on the test and the relative emphasis placed on each competency.
Field Test	Test made up of test items intended to develop and calibrate new assessments.
Grade Level	Grade or standard the item is designed for
Item	A question on a test. It may be composed of several parts including audio and visual files.
Item Author	A person or agency responsible for item creation.
Item Bank	A systems application that manages the storage and retrieval of assessment items, tracks item versioning and lineage, and provides a robust search and query capability that allows searching on all types of metadata.
Item Status	A term used to indicate how an item can be used. Some of the valid values are: - Pilot Test - Field Test - Operational

JSON	JavaScript Object Notation, a lightweight, text based, open standard designed for human-readable data interchange.
Pilot Test	A trial series of new or modified items given to a select group of students.
Retired Item	An item that will no longer be used for an assessment.
Rubric	a guide listing specific criteria for grading or scoring academic papers, projects, or tests
Runtime exception	An unanticipated condition for which no error handling exists but normal processing cannot continue
Source Item Bank	The Item Bank from which an item is pushed to a Test Item Bank
Test	An instrument or procedure that proposes a sequence of tasks to which a student is to respond. The results are then used to form measures to define the relative value of the trait to which the test refers.
XML	Extensible Markup Language, a set of rules for encoding documents in machine-readable form.

Component Description

The Architecture Report describes the Test Spec Bank component as follows:

This component is a repository for test specifications, blueprints and other data about tests such as the adaptive algorithm to be used during the test.

Regarding the Test Authoring component, the Architecture Report describes the following:

This component is a graphical interface used for creating test blueprints and specifications and manage the workflow. It will interact with the Test Item Bank component and the Test Spec Bank component.

The following diagram is excerpted from Figure 4.3 Component Logical Interfaces from the Architecture Report.
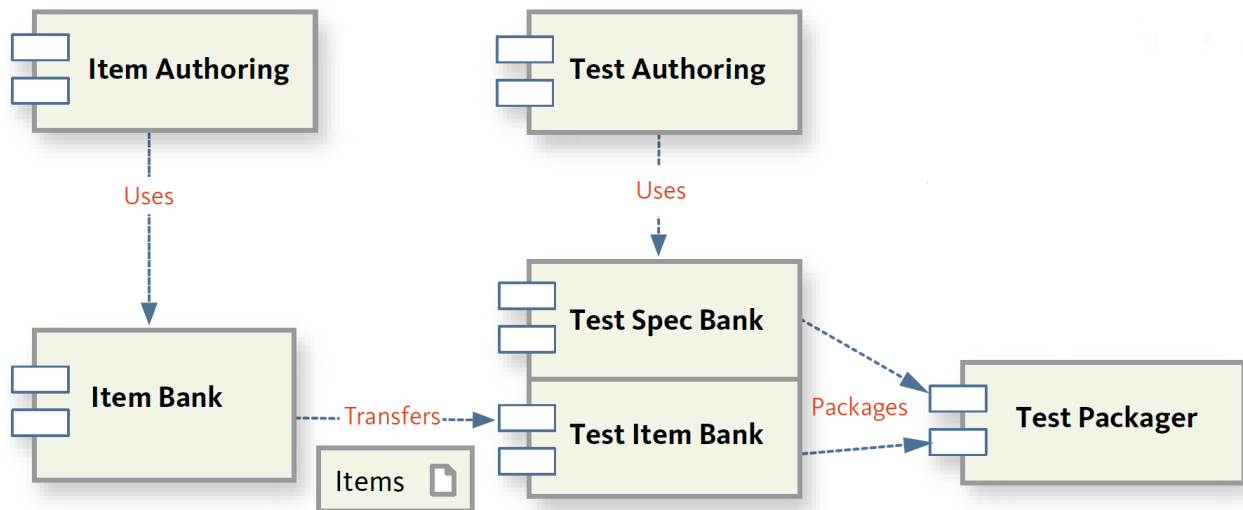
Figure 1. Excerpt from Component Logical Interfaces in Architecture Report

The following process flow diagram from the Architecture Report illustrates the Test Spec Bank's function in the process flow from Item Bank to Test Delivery.
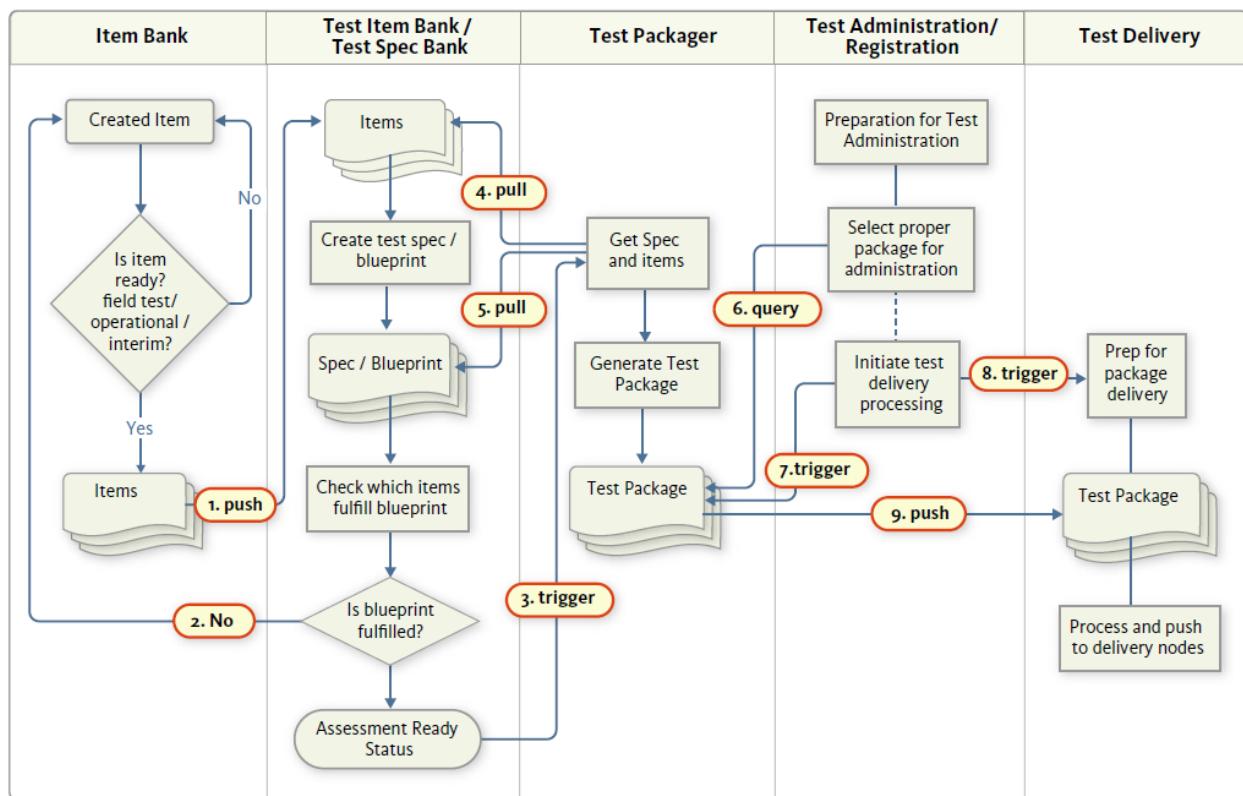

Figure 2. Architecture Report Figure 8.1.1 Item Bank to Test Delivery

Key Functions

The following are the key functions of the Test Spec Bank are:

1. The repository of test specification and test specification workflow information

2. The back end for the Test Authoring component that creates the test specifications and implements the workflow
3. Provides REST APIs for query and retrieval of test specifications and workflow information to the Test Packager for creation of test packages that:
   a. Only contain test specifications,
   b. Only contain test specifications and item metadata, or
   c. Contain test specifications, item metadata and item content*
4. Provides facilities for the Test Authoring component to directly access the Test Spec Bank data store to query, retrieve and store test specifications and workflow information, ensuring that Test Spec Bank public APIs are read-only
5. Has no user interface of its own, only read-only REST APIs and access to the persistence layer for Test Authoring

*creation of test packages are the responsibility of the Test Packager component

Deployment

The Test Spec Bank is deployed as part of an Assessment Creation and Management group. At a minimum, the Test Authoring, Test Spec Bank, Test Item Bank and Test Authoring components must be deployed together. Item Authoring and Item bank can be optionally deployed with other remaining Assessment Creation and Management components.

Client Components

The following are the client components of the Test Spec Bank:

1. Test Authoring

The Test Spec Bank is the back end of the Test Authoring component. The Test Authoring component provides the user interface for the interactive creation and editing of test specifications. It utilizes the interfaces exposed by the Test Spec Bank for direct access to the persistent store to create, query, store and retrieve test specifications and workflow information.

2. Test Packager

The Test Packager utilizes the REST interfaces exposed by the Test Spec Bank to query and retrieve test specifications and workflow information. The Test Packager should only retrieve test specifications whose workflow information marks them as ready to extract for each of the test package functions (Registration, Scoring, Reporting, and Administration).

The Test Packager may combine test specifications with item metadata and/or content to create test packages as appropriate for their intended purpose.

Assumptions

	Assumption	Comments

1.	This DTD provides additional definitive requirements about the structure and content of test specifications, and is considered part of these requirements. For this reason, details contained in the DTD shall not be repeated here. Please refer to the DTD for additional guidance on the structure and content of test specifications.	
2.	Test Spec Bank only has Test Authoring/Packager as a client.	
3.	Test Authoring is responsible for validation consistent, complete and ready for promotion.	
4.	Test Specs cannot be promoted to the next workflow level unless the test specs pass validation and Test Authoring deems them	
5.	The Test Packager will be aware of the validation state/workflow status of the test specs. It should not extract test spec before they are deemed ready for extraction	
6.	Test Packager should be a function of Test Authoring rather than a separate application.	
7.	Blueprint is part of a test specification	
8.	Test Authoring will be concerned with this workflow, and the Test Packager will not attempt to extract packages unless the test specs (and potentially items) are at the appropriate level in the workflow.	
9.	Test Authoring component is responsible for transitioning the spec between states, and where are the rules for each state defined/enforced	
10.	Test Spec Bank would simply track the state of the specification as it pertains to the workflow, but support for state transitions/rule enforcement, would be owned by the authoring system.	
11.	Test Authoring is responsible for versioning and workflow	

Requirements are numbered according to the following convention:

1) RFP.## - a requirement from the RFP
2) RADTIB.## - a requirement from the detailed requirements from RFP-11 or the Architecture document
3) PRTIB.## - a requirement from the Proposal

Requirements

Source.ID	Requirement	Category	Priority	Comments
RFP 8	Test Specifications shall be in the form of an XML document	Data Format		
RADTIB 1	The XML structure of Test Specifications is specified in an accompanying DTD called **testpackage.dtd.**	Data Management		
RADTIB 2	The Test Spec Bank will allow storage and retrieval of the following types of test specifications: ● **Registration:** for Test Registration/Administration components ● **Scoring:** for Test Scoring component (currently not defined in the architecture) ● **Reporting:** for the Data Warehouse and Reporting components ● **Administration:** for the Test Delivery component	Data Management		Each type of test specification is targeted at different components by including only the sub-parts that each component requires in the DTD called *testpackage.dtd.*
RADTIB 2.2	Complete a superset of all test specifications for: ● **Registration** ● **Scoring** ● **Reporting** ● **Administration**	Data Management		
RADTIB 3	The Test Specification Sub-Part matrix below describes the test specification sub-parts for each type of test specification.			
RADTIB 4	The Test Spec Bank shall support versioning of test			

	specifications.			
RADTIB 5	The Test Spec Bank shall support a workflow for test specifications that includes: ● **Workflow level** ● **Review comments** ● **Appropriate approvals**			Test Authoring is responsible for versioning and workflow. Test Authoring is responsible for validation. Test Specs cannot be promoted to the next workflow level unless the test specs pass validation and Test Authoring deems them consistent, complete and ready for promotion. The Test Packager would have to be aware of the validation state/workflow status of the test specs. It should not extract test spec before they are deemed ready for extraction
RADTIB 6	The Test Spec Bank provides REST APIs to store and retrieve test specifications on behalf of client components.	API		
RADTIB 7	The Test Spec Bank APIs accept and provide test specifications in XML format that conforms to the accompanying testpackage.dtd.	API		
RADTIB 8	The Test Spec Bank provides APIs for search queries for test specifications: ● **Browse** ● **Search** ● **Query** ● **Extract** ● **Store capability**.	API		Scoring package needs completed scoring rules Reporting package needs reporting measures The "Administration" package requires the greatest level of maturity and requires fully defined segments (including complete sub-elements such as forms and item pools) as well as requiring complete item content and assets which are not shown here because this is a property of the Test Item Bank.
RADTIB 9	The Test Spec Bank will provide ● **Performance** ● **Metrics**	Monitor and Alerting		I defer this to the Level II requirements. As previously agreed, MnA as not for workflow

	• **Error logging** • **Work flow alerts** to the monitoring and alerting component, using the framework specified in the Monitoring and Alerting component.			Notifications, only for "I'm in trouble" notifications. I leave DRC to define these. Since workflow alerts are off the table, only the architect knows what constitutes an "I'm in trouble" alert for the component and what those events are.
RADTIB10	Test Spec Bank will allow access for Test Packager and Test Authoring to: • Browse the Test Spec Bank (same data access code) • Browse the Test Item Bank, enumerate items and extract item metadata (same data access code) • Understand the same workflow and level of completeness and consistency • Extract Test Specs from the Test Spec Bank			
RADTIB11	Package Test Specs into a package with a QTI manifest file			Extract item content and assets and create a package that includes Test Specs and a QTI manifest file
RADTIB12	The XML generated by packager will be valid per the DTD			

User Interface Components

As described above, the Test Spec Bank is a repository of test specifications and does not require a user interface. It only exposes REST APIs to client components.

Data Transfer Listing

The Test Spec Bank interfaces consume and provide test specifications that conform to the accompanying DTD called *testpackage.dtd.*

Component Providing the Interface	Component Consuming the Interface	Input Data	Output Data	Data Format	Data Standard	Transfer Method	Notes/Description

Test Authoring (store)	Test Spec Bank	Test Specifications	Success code				
Test Authoring (retrieve)	Test Spec Bank	Test specification identifiers(s)	Test Specifications				
Test Packager(retrieve)	Test Spec Bank	Test specification identifiers(s)	Test Specifications				

Data and Data Relationships

The following table describes the test specification components targets and the test specification sub-parts that comprise them. Also shown are the components for which each flavor of test specifications are targeted. (example Table 2)

Test Specification Component Targets	For Test Registration and Test Administration components	For Test Scoring components	For the Data Warehouse and Reporting components	For the Test Delivery component	A superset package
Test Specification Sub-Part	Registration	Scoring	Reporting	Administration	Complete
testblueprint		☐	☐	☐	☐
poolproperty	☐			☐	☐
itempool		☐	☐	☐	☐
testform		☐	☐	☐	☐
adminsegment				☐	☐
performancelevels		☐	☐		☐
scoringrules		☐			☐
reportingmeasures			☐		☐
comment	☐			☐	☐
registrationform	☐				
registrationsegment	☐				

Table 2

Security

Q&A Section This section is for screenshots and questions during development