

Component Test Plan

for

SBAC-11 Test Item Bank

Version 2.3

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Revision History

Date	Version	Description	Author
01/11/2013	1.0	Initial Draft	Russ Hammond
01/14/2015	2.0	Updates to template layout, content	Russ Hammond
1/16/2013	2.1	Section IV.2 – added version numbers	Russ Hammond
1/16/2013	2.2	Section VI – Acceptance criteria	Russ Hammond
1/20/2013	2.3	Added scenarios to requirements in Section VI – Acceptance criteria	Russ Hammond
1/31/2013	2.4	Review and Summary	Ryan Marinello

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I. Purpose

The purpose of this document is to describe the testing approach and scenarios applied to the tested component.

II. Component: Test Item Bank

The Test Item Bank component is responsible for storage and retrieval of items ready for inclusion on Field or Operational tests. The component has no user interface. Consumers of the services of the Test Item Bank will be:

- 1) Item Authoring: Item Authors will push items from the Item Bank to the Test Item Bank to be stored.
- 2) Test Authoring: Test Authors will query the items in the Test Item Bank to prepare tests.
- 3) Test Packager: The Test Packager will query the Test Item Bank for items to be included in a Test Package.

III. Scope of Testing

This plan focuses on verification and validation testing of the Test Item Bank component.

1. Verification Testing

Verification testing will cover the functional testing of requirements.

Requirement Document	Document Name	Location	Version
Level I Requirements	DRC SBAC11 Requirements - Test Item Bank Level I	Knowledge Tree -> High Level Requirements -> DRC	0.1
Level II Requirements	DRC SBAC11 Requirements - Test Item Bank Level II	Knowledge Tree -> Requirements -> Level II Requirements	0.3

2. Validation Testing

Validation testing will cover scenario testing.

Scenario	Script
Display Test Item Bank API	1. Display the Test Item Bank API
Importing Items	2. Import by HTTPS 3. Import by SFTP 4. Import of single items 5. Import of multiple items
Storage of Items and Related	1. Creation of searchable metadata

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Resources	<ol style="list-style-type: none"> Item version maintained Ability to maintain connection between items and related resource files Resources used by a single item Resources shared by multiple items
Queries of the Stored Items	<ol style="list-style-type: none"> Request a specific item and version for Test Packaging Request a specific item and version for Test Authoring Request a specific item for Test Authoring and return the latest version Search items by a limited set of metadata for Test Authoring

IV. Test Strategy

1. Test Tools

Tools may be used to:

- Manipulate or create test data
- Determine test pass/fail criteria in an automated fashion
- Document requirements to traceability

2. Test Environment

The DRC test environment is located at DRC and supported by the development team. The environment uses the following software, tools and frameworks:

Tool, Framework, Software, etc.	Category	Version
Java	Programming Language	1.6
Spring Framework	Framework	3.2
MongoDB	Database	2.0
CloudFoundry	Platform	Ubuntu 10.04
Servlets	Platform	2.5
Advanced Rest Client Google Chrome	Testing tool	3.1.1
FileZilla	Testing Tool – SFTP	3.6.0.2

3. Test Interface

The Test Item Bank has no user interface, therefore a REST client will be used to perform the tests. Instructions for performing the tests will be included in the test scripts.

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V. Test Deliverables

The table below lists the deliverables providing proof of testing.

Document Name	Type
Test Plan (this document)	PDF
Test Results (this document)	PDF
Test Scripts	PDF
Test Dashboard (this document)	PDF
Test Report (this document)	PDF

VI. Acceptance Criteria

The Test Item Bank component has dependencies on services and additional components which do not yet exist. Limitations are captured and traceable to the requirements in the backlog, which is a deliverable item along with this document. Consequently, the goal of testing is not to completely demonstrate that currently documented requirements have been exactly met; rather, the goal is to demonstrate that the delivered Test Item Bank component fulfills the basic purpose of the component and can be enhanced or modified as requirements are discovered and finalized.

Source.ID	Requirement	Comments	Results
RFP.9	Test Item Bank Component meets requirements detailed in the SBAC IT Systems Architecture (Appendix C). The detailed requirements below should cover the requirements from Appendix C.	Covered by requirements below	
RADTIB.1	<p>The Test Item Bank is responsible for the storage and retrieval assessment items along with their assets and metadata. The Test Item Bank is required to store the following types of data associated to items.</p> <ul style="list-style-type: none"> • APIP Item Information • Item authoring details • Graphics • Scoring rubrics • Usage information and statistics • Version details • Help content • Audio files • Video files <p>Some of this content may be associated to the items within zip folders with the</p>	Covered by collection of requirements under RADTIB.1	

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	file paths contained in the APIP XML.		
RADTIB.1.1	<p>The Test Item Bank will store assessment items and the following data associated to an item:</p> <ul style="list-style-type: none"> • APIP Item Information • Item authoring details • Graphics • Scoring rubrics • Usage information and statistics • Version details • Help content • Audio files • Video files <p>Some of this content may be associated to the items within zip folders with the file paths contained in the APIP XML.</p>	<p>Scenario 2 – Import Test Items</p> <p>See individual scripts for tests</p>	Test Passed
RADTIB.1.1.1	The Test Item Bank must allow a single item to be inserted.	Script 2.1, 2.2	Test Passed
RADTIB.1.1.2	The Test Item Bank must allow collections of items to be inserted.	Script 2.3	Test Passed
RADTIB.1.1.3	The Test Item Bank must be able to accept single items transferred via HTTPS.	Script 2.1	Test Passed
RADTIB.1.1.4	The Test Item Bank must be able to import items from an SFTP site	Script 2.2	Test Passed
RADTIB.1.2	<p>Any item to be added to the Test Item Bank must provide the following metadata:</p> <ul style="list-style-type: none"> • Item Type • Item Identifier • Item Version • Item Status (operational, field test) • Item Keywords • Grade (3, 4, 5, etc.) • Subject (Math, English) • Subjectcategory (geometry, arithmetic, etc.) • Author • Source • Itemdifficulty <p>If an item is to be inserted but does not contain all of the above metadata, an alert message will be logged that identifies the Test Item Bank, the source Item Bank and all of the existing item metadata listed above with the message “Item cannot be added. Missing metadata”.</p>	Script 2.4	Test Passed
RADTIB.1.3	Test Item Bank must timestamp inserted items and storage of the ID of	Script 2.1, 2.2, 2.3	Test Passed

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	the source Item Bank to provide an audit trail.		
RADTIB.1.4	Test Item Bank must generate an alert that indicates items were added to the Test Item Bank. The log message should identify the Test Item Bank, the number of items added, the ID of the source Item Bank, and the message “Item(s) added to Test Item Bank”.	Script 2.1, 2.2, 2.3	Test Passed
RADTIB.1.5	If a database error occurs when adding a test item, an alert message will be generated. The message will identify the Test Item Bank, the Item ID, and the database error code and message.	Script 2.11	Test Passed
RADTIB.1.6	If an item file to be imported cannot be opened, generate an alert message which identifies the file name, the Test Item Bank and the message “Invalid file format”.	Script 2.5	Test Passed
RADTIB.1.7	If an item file to be imported has no manifest file, generate an alert message which identifies the file name, the Test Item Bank and the message “No Manifest File.”	Script 2.6	Test Passed
RADTIB.1.8	If an item to be imported is missing a referenced resource file, do not add the item to the Test Item Bank. Generate an alert that identifies the item, the missing resource, and the Test Item Bank, with the message “Item Resource Missing”.	Script 2.7	Test Passed
RADTIB.1.9	If an item to be imported has no corresponding metadata file, do not add the item to the Test Item Bank. Generate an alert that identifies the item and the Test Item Bank, with the message “Item Missing Metadata File.”	Script 2.9	Test Passed
RADTIB.1.10	If multiple items in an import file share a common resource file, the association of items to the resource must be retained.	If a query returns the item’s content, it must include the shared resource. See RADTIB.4.1 Script 3.2, 3.3	Test Passed
RADTIB.2	The Test Item Bank will provide an interface that accepts items that have been marked operational or field test ready by the Item Bank (RFP #7).	Script 2.8	Test Passed
RADTIB.2.1	Test Item Bank will reject the addition of any item which is not marked operational or field test ready. An alert message will be logged that identifies	Script 2.8	Test Passed

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	the Test Item Bank, the rejected item ID and the ID of the source Item Bank with the message “Item cannot be added. Item not in ready status”.		
RADTIB.3	The Test Item Bank requires the ability to track versions of items that have been used on assessments including lineage.	Script 3.4	Test Passed
RADTIB.3.1	The Test Item Bank will not allow the deletion of any version of an item.	No API offered by the component to delete	
RADTIB.3.2	When queried without a specified version, the Test Item Bank will provide the latest version of an item.	Script 4.1, 4.5, 4.7	Test Passed
RADTIB.3.3	If an item to be added has an id matching an item already in the Test Item Bank and the version number of the item to be added is not greater than the existing item, the item will be rejected, and an alert will be issued. The alert message will identify the Test Item Bank, source Item Bank and item ID for the rejected item, with the message “Item cannot be added. Version number incompatible with Test Item Bank.”	Script 3.4	Test Passed
RADTIB.4	The Test Item Bank will provide queries and functionality allowing future Test Authoring and Test Packaging components to query the correct versions of items for assessments The Test Item Bank will interface with the Test Packaging component with the suggested input and output details.	See requirements below for related scripts	
RADTIB.4.1	The Test Item Bank will provide a query functionality which will require the item ID, item version, and destination for the exported item. The query will return the requested item in APIP format and any associated resource files.	Script 4.2, 4.3	Test Passed
RADTIB.4.2	The query functionality provided to Test Authoring will return the latest version of an item. The query must allow searching by the following metadata: - Item ✓ Item Type ✓ Item Identifier ✓ Item Status (operational,	Script 4.1, 4.5, 4.7	Test Passed

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	<ul style="list-style-type: none"> field test) ✓ Item Keywords - Item Standards <ul style="list-style-type: none"> ✓ Grade (3, 4, 5 etc..) ✓ Subject (Math, Science and Technology etc...) ✓ Subject subject category (geometry, arithmetic, and algebra etc...) - Item Statistics <ul style="list-style-type: none"> ✓ Item Difficulty - Item Author <ul style="list-style-type: none"> ✓ Author ✓ Source (teacher or consortium created etc...) <p>The result of the query will return a URI that can be used to retrieve the item and the values of all searchable metadata for the item.</p>		
RADTIB.4.3	When the Test Item Bank is queried, a log record will be written. The log record will identify the Test Item Bank, contain the search criteria and the number of records found matching the query. The message will also identify the time required to complete the query.	Scripts 4.1 – 4.7	Test Passed
RADTIB.4.4	If a query of the Test Item Bank does not complete successfully, an error message will be logged. The message will identify the Test Item Bank, contain the search criteria and the database error code and message.	Script 4.8	Test Passed
RADTIB.5	<p>The Test Item Bank will provide robust search and query capabilities of items that are ready to be presented on tests for the Smarter Balanced system.</p> <ul style="list-style-type: none"> • The component will use RESTful APIs for all interfaces • The component will leverage XML or JSON formatted messaging for interactions through the API interfaces <p>CLARIFICATION: The Test Item Bank will allow searches to be</p>	<p>Clarification: The component will use either XML or JSON, but not both.</p> <p>See RADTIB.4.2 for the list of searchable metadata.</p>	Test Passed

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	performed on the metadata items listed in RADTIB.4.2.		
RADTIB.6	<p>The Test Item Bank will provide search capabilities on item details limited to 10 fields.</p> <ul style="list-style-type: none"> • Item Status (Operational, Field Test, etc.) • Item Type (Multiple Choice, Constructed Response, Hot Spot, Cloze, etc.) • Standards • Grade • Content Area • Statistics (Item Difficulty, IRT values, p-value, etc.) We need to confirm with Smarter Balanced which fields they would like to search for related to statistics • Item Authoring Information (Author, Source, etc.) We need to confirm with Smarter Balanced which fields they would like to search for related to authoring information • Timestamps and Versions 	RADTIB.6 is superseded by RADTIB.4.2	Test results see RADTIB.4.2
RADTIB.7	The search criteria should be stored separately from the APIP XML storage to optimal performance. The search criteria may need to be parsed from the APIP XML during the import process.	Script 2.1, 2.2, 2.3	Test Passed
RADTIB.8	The Test Item Bank requires item authoring information from the Item Bank during the import process. The Item Bank needs to supply authoring information, such as the user who created the item, status (operational, field test, etc.), timestamps, etc.	Superseded by RADTIB. 1.2. This is an Item Bank requirement.	Test results see RADTIB.1.2
RADTIB.9	The Test Item Bank requires that the Item Bank component supply all of the items usage and statistical information that will be required for the purpose of Test Delivery and Test Assessment creation.	This is an Item Bank requirement. (not in scope)	
PRTIB.1	The Test Item Bank component will provide performance metrics, error logging, and work flow should send alert to the future monitoring and alerting component, using the framework specified in the Monitoring and Alerting component.	Clarification: Fulfilling a blueprint is a Test Authoring function. (not in scope) See the following requirements for	

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	<p>Metrics:</p> <ul style="list-style-type: none"> • Performance statistics for queries for searching the Test Item Bank • Performance statistics for inserting items into the Test Item Bank (RFP #7) • Performance statistics for export interfaces to Test Packaging <p>Errors:</p> <ul style="list-style-type: none"> • Database transaction errors • API Interface errors (Request/Response) <p>Alerts:</p> <ul style="list-style-type: none"> • Not enough items available to fulfill a blueprint or specification is raised when a user runs the query to automatically select items for a test with a specific blueprint or specification • New items are available is raised when new items are released from the Item Bank to the Test Item Bank 	<p>monitoring and alerting:</p> <ul style="list-style-type: none"> • RADTIB.1.4 • RADTIB.1.5 • RADTIB.2.1 • RADTIB.3.3 • RADTIB.4.3 • RADTIB.4.4 	
PRTIB.1.1	Not able to cause Runtime exceptions will be written to the future Monitoring and Alerting component.	Script 3.5	Test Passed

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VII. Test Dashboard

Component	Test No.	Test Case Scenarios			Tests Fulfilled		Build in QA	Expected Delivery
SB-11-Test Item Bank (TIB)			In Progress		Pass	Fail	v0.0.1	January 31,2013
	Script1.1	Display component /api			1	0		
	Script2.1	Single Item import - HTTPS			1	0		
	Script2.2	Single Item import - SFTP			1	0		
	Script2.3	Multiple Items import -SFTP			1	0		
	Script2.4	Import Missing Required metadata -SFTP			1	0		
	Script2.5	Import Unreadable file -SFTP			1	0		
	Script2.6	Import Missing Manifest file - SFTP			1	0		
	Script2.7	Import Item Missing Resource -SFTP			1	0		
	Script2.8	Import Item with Wrong Status - SFTP			1	0		
	Script2.9	Import Item Missing Metadata File - SFTP			1	0		
	Script2.10	Import file where all items fail to load - SFTP			1	0		
	Script2.11	Import file that returns a database error - SFTP/ HTTPS			1	0		
	Script3.1	Store Item with Single Resource			1	0		
	Script3.2	Parse & Store items sharing a common Resource file - SFTP			1	0		
	Script3.3	Parse & Store Valid items sharing a common Resource file part II- SFTP			1	0		
	Script3.4	Item version less than or equal to existing item rejection test - SFTP			1	0		
	Script3.5	Monitoring and alerting component test			1	0		
	Script4.1	Query by item ID			1	0		
	Script4.2	Query by item ID and latest item version			1	0		
	Script4.3	Query by item ID and old item version			1	0		
	Script4.4	Query by item ID (non-existent item)			1	0		
	Script4.5	Query by searchable metadata for a set of items, single criteria = match found			1	0		
	Script4.6	Query by searchable metadata for a set of items, single criteria = no matches			1	0		
	Script4.7	Query by searchable metadata for a set of items, multiple criteria			1	0		
	Script4.8	Query by searchable metadata for a set of items, database unreachable			1	0		

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VIII. Executive Test Summary

Our Testing objective was to prove the Test Item Bank as a single component was capable to execute level I and level II requirements received. Any test scripts created in addition to the received examples were based on the original examples in accordance with APIP metadata standards. The community of technology involved in testing efforts mainly utilized the /api and a REST client to manually execute positive test scenarios.

Test coverage focused on the required functional areas covered in the test plan. Test Item Bank for testing purposes also has an external dependency to an SFTP tool, we used FileZilla with a secure account for file import and export test functionality.

Test Equipment / Tools – intel core i5 laptops accessing the /api and using either Fire Fox, IE or Chrome browsers and their respective REST client plugins.

Test items included – metadata following APIP/QTI for

- ItemType = metadata file: SYSTEM_ItemType
- Version = metadata file: SYSTEM_ItemVersion
- Keywords = metadata file: SYSTEM_ItemKeywords
- Grade = metadata file: SYSTEM_Grade
- Subject = metadata file: SYSTEM_Subject
- SubjectCategory = metadata file: SYSTEM_ItemSubcategory
- Status = metadata file: SYSTEM_Status
- Author = metadata file: SYSTEM_Author
- ItemDifficulty = metadata file: SB_Difficulty
- Source = metadata file: SYSTEM_Source

Defect discoveries found during testing were quickly reported, managed and fixed in JIRA.

The heuristic test strategy, a simple model was used considering the requirements, tests, and environment and product elements.

Validation of the Test Item Bank component tests show it has good reliability, usability, and capability for expected additional future component dependencies.