Smarter Balanced Applications Deployment and Technology Certification Overview

v1.0—April 11, 2014

States are responsible for deploying and operating the Smarter Balanced Assessment Delivery System. In many cases they will contract for system services. This brief is to inform state assessment organizations and their contractors about their technology deployment. This framework applies to both summative and interim assessments. States have additional responsibilities for implementing the assessment that are not described in this document (e.g., help desk services, training, state accountability reporting, and peer review for nonstandard implementation).

Assessment Technology Platform

The following system components, which collectively form the assessment technology platform, are in development through contracts with several vendors.

- **Item Authoring:** A tool for the creation of new assessment items and for managing the workflow involved in reviewing the items, specifying and creating accessibility resources, and approving them for use in Smarter Balanced assessments.
- **Test Item Bank and Test Packager:** A storage service that maintains the collection of Smarter Balanced assessment items and other assessment items, including metadata that indicates learning objectives to which the items are aligned, difficulty calibration data, usage data, and so forth. This component includes test authoring and a test packager that collects a test definition and a set of assessment items into a test package for use within an assessment delivery system.
- **Assessment Delivery System:** A set of web applications that manage the registration of students for tests, the delivery of those tests to the students, scoring of test items, integration of item scores into an overall test score, and delivery of scores to the Data Warehouse.
- **Data Warehouse and Reporting:** A comprehensive storehouse of all Smarter Balanced test registrations and results and a system to generate reports on or extracts of that data.
- **Secure Browser:** A special web browser that limits student access to authorized applications for the duration of the test and also facilitates use of accessibility resources.
- **Digital Library:** A library of teacher-facing digital instructional materials with an emphasis on formative activities.
- **Shared Services:** A set of support services that are shared among the other components. These include a Portal, Core Standards, Single Sign-On, Permissions, Program Management, and Monitoring and Alerting.

In September 2014, the completed system components will be delivered to Smarter Balanced. At that time, the source code will be released on SmarterApp.org under open licenses. Smarter Balanced will manage maintenance and future enhancements to the components as an open-source project.

Operationally, Smarter Balanced will deploy and operate the Item Authoring, Test Item Bank, Data Warehouse, Reporting and Digital Library services. Secure browsers will be made available for prominent hardware and software platforms. **States are responsible for deploying and operating the Smarter Balanced Assessment Delivery Systems.** Smarter Balanced expects that most states will procure assessment delivery services from independent vendors. Any platform used to deliver Smarter Balanced assessments should be certified to deliver assessment items with authenticity, score items and tests properly, and deliver assessment results to the Smarter Balanced Data Warehouse according to specifications.
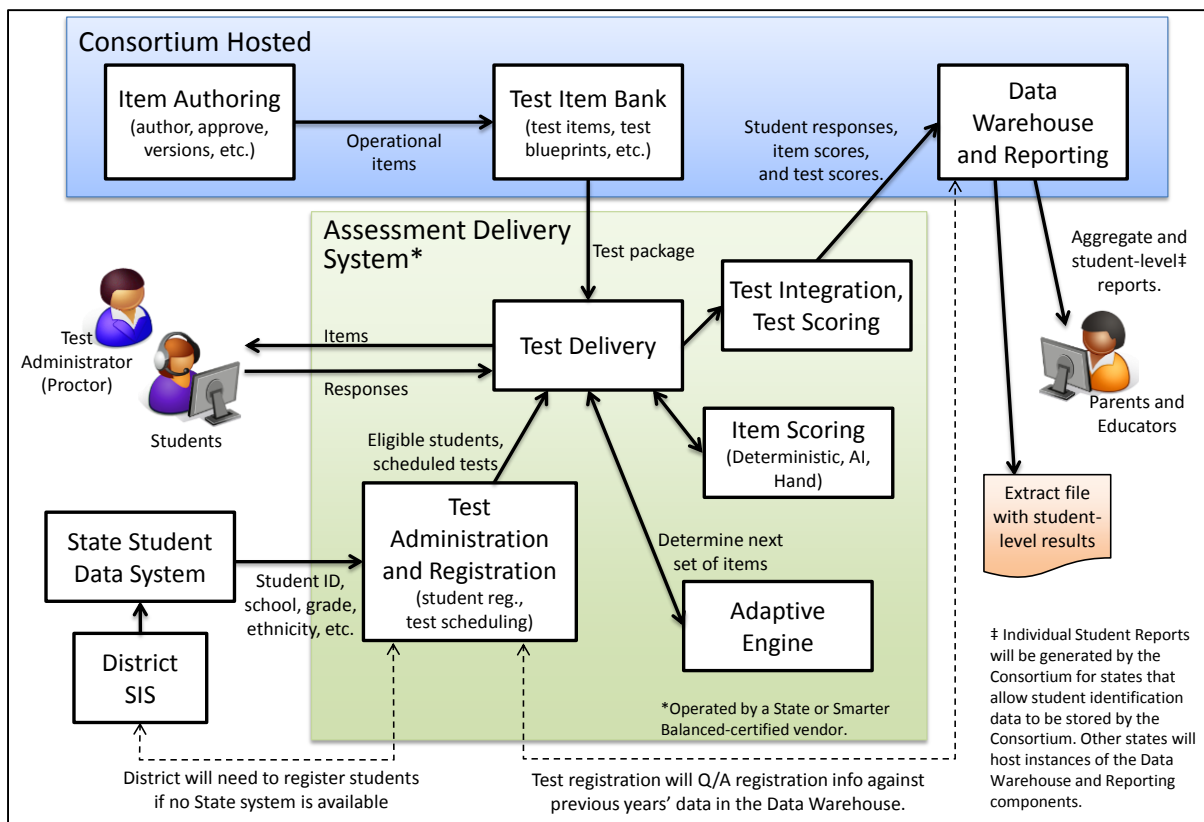
The source code for the Assessment Delivery System provided by Smarter Balanced does not include a human scoring module. States or their vendors will need to add this functionality, as certain items in the summative assessments require hand-scoring.

States may elect to operate their own data warehouses in addition to the one operated by Smarter Balanced. States have the option to not transmit student identity information (name and birthdate) to Smarter Balanced; however, the balance of test result data must be transmitted. Those states that withhold student identity information will have to operate their own data warehouses in order to provide individual student reports to parents and authorized educators.

In building a certified solution, it is expected that most states and vendors will choose one of the following three options:

1. **Use the Smarter Balanced open-license system.** In this option, a vendor will deploy and support the open-license system developed by Smarter Balanced. States or vendors may make small changes to meet unique state needs.
2. **Adapt an existing assessment delivery system using Smarter Balanced components.** A vendor with an existing assessment delivery system may choose to incorporate key source components from the Smarter Balanced system. These might include the formatting code, the browser-side JavaScript rendering system, the scoring engines, and/or the adaptive engine.
3. **Tune an existing assessment delivery system to meet Smarter Balanced requirements.** A vendor with an existing assessment delivery system may choose to adapt its existing system to meet Smarter Balanced requirements, without use of Smarter Balanced code.

Test Registration, Test Delivery and Scoring are the three components that comprise an Assessment Delivery System. The following figure shows how state-procured systems are intended to interact with Smarter Balanced–hosted systems.

The Test Registration component accepts data from district or state student information systems and schedules students for testing. It includes a user interface for validating and updating student registration information and for adding accommodation requests. Notably, Test Registration must supply test registration data to the Data Warehouse for quality assurance purposes.

The Test Delivery component must render assessment items to the student's browser with authenticity, collect student responses, and store them in the right format. Student responses are then sent to the Item Scoring component. As Smarter Balanced uses computer adaptive testing, the adaptive engine selects test items from the Test Package in real time, based on students' performance with previous items.

Certification

To ensure that tests are delivered and scored consistently, Smarter Balanced is developing a certification program. There will be certifications for secure browsers, for assessment delivery systems, and for operational policies and procedures. The following information describes the certification of Assessment Delivery Systems; information regarding other certifications will be released separately.

Smarter Balanced is engaging a partner to assemble the **Assessment Delivery Certification Package** to assist states in successfully deploying the Smarter Balanced system. The certification package will contain all of the specifications, sample data, test harnesses, and other services that a state or vendor needs to develop and prepare a deployment for certification. It should not be a barrier to deployment; rather, it is intended to contribute to the QA process so that states and vendors know when they are prepared for test implementation.

The Certification Package is designed to support and enhance, but not replace, states' and vendors' quality control processes. The package will provide detailed requirements that will allow vendors to affirm the quality of their technology deployment and implementation. Smarter Balanced will make available, upon a state's request, a verification of the certification elements.

To be certified, an Assessment Delivery System deployment must do the following:

- Register students based on imported data from state or district systems.
- Validate student registration against the Smarter Balanced Data Warehouse.
- Deliver Smarter Balanced assessments with authenticity.
- Score assessment items accurately and consistently.
- Apply the adaptive algorithm, consistently selecting the next item based on the student's previous performance.
- Manage the items appropriately for non-real-time item scoring (such as AI and hand-scoring) so that they are available to be included in the test scoring process and potentially available for informing subsequent item selections for the student via the adaptive algorithm.
- Integrate item scores into test scores.
- Deliver student responses and scores to the Data Warehouse in the proper format.

The Certification Package will be posted on the SmarterApp.org website. Preview editions of some of the specifications and sample data have already been posted. Other preview editions and final versions will be posted as they become available, with the full package being complete in September 2014. Following is a working outline of the components expected to be in the complete package:

Specifications
- Assessment item format specification
- Test package format specification

- Adaptive algorithm (specifies how item results are used to select the next item to be displayed to the student)
- Data Warehouse API specifications (for test registration validation and for results reporting)

Sample Content and Data
- Sample test package that represents all prompt and interaction types
- Sample test package that exercises the adaptive engine
- Simulated student registration data
- Simulated student response data that exercises the scoring engines
- Simulated scored response data

Test Specifications and Harnesses
- Specifications for the certification tests, including exercises to be performed and expected results
- Test harness that manifests the Data Warehouse APIs against which vendors can test their systems
- Test harness that manifests the Security Assertion Markup Language (SAML) Single Sign-On APIs against which vendors can test their systems

Source Code
- Source code to the entire Smarter Balanced Assessment System

Summary

States are responsible for deploying the Assessment Delivery System for their state. This system must accept test packages from Smarter Balanced, deliver tests and items to students with authenticity, collect responses, score responses, and deliver scores to the Smarter Balanced Data Warehouse. States can rely on Smarter Balanced for all other services. However, they may choose to deploy their own Data Warehouse.

The Certification Package, and the certification program which will follow, are in support of states' efforts to deliver high-quality assessments. Verification that states and vendors have met requirements will be available on request from Smarter Balanced. Detailed technical specifications and all other information needed for the systems to achieve certification is being posted to SmarterApp.org, with the full certification package to be complete in September 2014.