

Introduction

The U.S. Department of Education (ED) is interested in the development of open technology standards for managing and delivering student assessments, including capturing and reporting assessment results. Creating and adopting open technology standards in this area will facilitate the delivery of State- or locally selected assessments across multiple systems, including those provided by different vendors and licenses.

Developing and implementing these types of technology standards will help ensure that investments in assessment instruments and related technology can be used in the education sector as broadly as possible and, at the same time, contribute to a competitive and innovative marketplace. Interoperability will spur innovation in technology in several ways, specifically by:

- Encouraging seamless integration of assessments and other educational data in schools, districts, and States, while protecting students' personally identifiable information;
- Providing opportunities for organizations to create new and varied approaches to developing and administering educational assessments without sacrificing compatibility with existing systems; and
- Making assessment items and tasks portable across organizations, platforms, and States.

In September 2010, ED provided discretionary grants to two consortia of States under the Race to the Top Assessment (RTTA) program to build next-generation assessment systems that will provide timely and accurate information about students' preparation for college and careers. ED also provided discretionary funding to two consortia of States, under the General Supervision Enhancement Grants (GSEG), to develop common assessment systems for students with the most significant cognitive disabilities and to one consortium of States under the Enhanced Assessment Grant (EAG) to develop an English language proficiency assessment. All five consortia are required to develop assessment items and produce student data consistent with industry-recognized, open-licensed standards for interoperability that are approved by ED.

In December 2010, ED released a Request for Information (RFI) regarding assessment technology standards. Twenty-two organizations responded to the RFI, identifying various assessment areas in which standardization could be helpful. In April 2011, ED released a summary of those responses. (The RFI, public comments, and ED's summary can be found at: <http://www.ed.gov/oii-news/summary-interoperable-assessment-technology-standards-public-responses>.)

Based on the RFI responses and the RTTA, GSEG, and EAG program requirements, ED has determined that, in order for member States functionally to be able to select various technology vendors during and after the project period covered by the RTTA, GSEG, and EAG grants, interoperability technology standards should include the following priority areas:

- Assessment items;
- Assessment instruments;
- Student information and data profile;
- Student assessment results; and
- Infrastructure, including data transportation, activation, and security.

Standards for interoperability are important not only within these areas but across them. Standardization in other areas, such as the administration of assessments, scoring, and learning records management, may be beneficial but is not essential at this time.

Purpose

The purposes of this document are to identify and invite feedback on the main areas to be included in interoperable technology standards. We encourage public comment as to whether ED has identified the key areas for interoperability standards in assessment items and student data that are necessary to meet the above goals and continue to spur innovation in the field. Public comments should be submitted to the Office of Innovation and Improvement blog at <http://www.ed.gov/oii-news> or to RaceToTheTop.Assessment@ed.gov by no later than November 7, 2011. ED will screen all comments, whether submitted by email or on the blog, and then post all appropriate comments publicly. After reviewing the public comment, ED will finalize and make public the next steps in the process to approve the standards developed or adopted by the RTTA, GSEG, and EAG grantees.

Organization of this Document

This document is a shorter, visual depiction of ED's summary of responses to the RFI. It details the five areas identified above and provides examples of work already under way in those areas.

Specifically, the following pages provide:

1. A description of the priority standards areas and examples of cases in which such standards could be used;
2. Examples of existing standards that are available in the priority standards areas as well as areas without current standards;
3. A visual representation of the stages of implementation for data standards; and
4. A list of acronyms/abbreviations and defined terms.

Please note that ED does not endorse or recommend any specific standard or set of standards at this time. Examples of existing standards listed on the succeeding pages are based upon responses we received to the RFI and ED's knowledge of existing technology standards; they are not meant to be exhaustive.

When would educators use assessment interoperability standards?

Priority Standards Area	Description/Use Cases
Assessment Items	<p><u>Description:</u> An assessment item is the content and material necessary to provide a stimulus that elicits a student response, taking into account student diversity.</p> <p><u>Use Case:</u> An assessment bank or repository moves some or all items to another similar assessment bank or repository.</p> <p><u>Purpose:</u> To permit the other system to undertake some or all the functions the original system was providing via the use or application of the items</p>
Assessment Instruments	<p><u>Description:</u> An assessment instrument is a group of items collectively intended to provide information about student knowledge and skills, taking into account student diversity.</p> <p><u>Use Case:</u> Assessment bank or repository moves some or all instruments to another similar assessment bank or repository.</p> <p><u>Purpose:</u> To permit the other system to undertake some or all of the functions the original system was providing via the use or application of the instruments</p>
Student Profile*	<p><u>Description:</u> A student profile provides sufficient information about a student to facilitate appropriate assessment administration (such as item, section, or instrument-wide accessibility needs as well as demographic data needed to administer, score, and report on an assessment activity).</p> <p><u>Use Case:</u> An authorized educational system rosters and/or initiates an assessment for a specific student or group of students.</p> <p><u>Purpose:</u> To permit an authorized system to start an assessment process for students where the assessment activity/process is located on a remote machine</p>
Assessment Results*	<p><u>Description:</u> Assessment results are the raw scores, scale scores, and information about the relationship between raw and scale scores as well as the link between an individual student's score and the relevant content and achievement standards.</p> <p><u>Use Case:</u> An assessment administration system transfers student work artifacts and/or raw scores to another system.</p> <p><u>Purpose:</u> To score an assessment administered by one system, where scoring processes are located elsewhere or where scoring involves long-running and/or human intervention</p> <p><u>Use Case:</u> Send scored assessment results to systems of record</p> <p><u>Purpose:</u> To finalize the administration process by recording the score of a student or group of students with a system of record</p> <p><u>Use Case:</u> Provide a series of reports/data about student assessment results to any systems that are authorized to display them</p> <p><u>Purpose:</u> To provide flexibility in distributing results of the assessment to various systems, from publicly visible and searchable systems, to student systems that need access to individual student information (PII) consistent with privacy requirements</p>
Infrastructure (Data Transportation, Activation and Security)*	<p><u>Description:</u> Data activation is the ability to invoke an action to or from one or more systems, and may involve reliable, multi-step actions. Data transportation is the ability to move data from one system to another. Security is the ability to undertake any action privately and with appropriate authentication (identity) and authorization (permission).</p> <p><u>Use Case:</u> Enable independently managed systems to communicate with each other.</p> <p><u>Purpose:</u> By permitting independence and communication among systems, systems can be designed to replace one another more easily, and building any given system can be simplified by defining a more narrow set of features that must be "exposed" to remote systems. Security can also be enhanced by narrowing the scope of transactions accepted across systems.</p>

*Consistent with all applicable privacy statute and regulation for the security of personally identifiable information

What are examples of standards that might contribute to interoperability for assessment systems?

Priority Standards Area	Assessment Items	Assessment Instruments	Student Profile*	Assessment Results*	Infrastructure (Data Transportation, Activation and Security)*
Examples of existing standards	<ul style="list-style-type: none"> Format: APIP, QTI, SIF assessment 	<ul style="list-style-type: none"> Format: APIP, QTI, SCORM, SIF assessment 	<ul style="list-style-type: none"> Formats: SIF, Ed-Fi, CEDS, APIP student profile 	<ul style="list-style-type: none"> Formats: SIF, Ed-Fi, CEDS assessment results 	<ul style="list-style-type: none"> <u>Formats</u>: XML, JSON <u>Activation</u>: LTI/BLTI, REST and/or SOAP <u>Transport</u>: HTTP, ESB, SIF <u>Security</u>: SSL, SAML, OpenID, OAUTH2
Areas without current standards	<ul style="list-style-type: none"> Coding related to quality, difficulty provenance, copyrights “Clusters” of related or co-delivered items (aka “testlets”) Unification of formats 	<ul style="list-style-type: none"> Instrument level packaging Adaptive logic, if applicable Unification of formats 	<ul style="list-style-type: none"> Unification of formats Enough information about students to permit administration of appropriate assessments 	<ul style="list-style-type: none"> Unification of formats Formats for: <ul style="list-style-type: none"> Artifacts/Input Raw Scores Scaled scores Aggregate data Description of instrument characteristics 	<ul style="list-style-type: none"> Ability to handle variety of RTTA data formats/standards (i.e. “glue” between standards) Integration to enterprise identity

Format – Data element definitions (e.g., student name, grade level) bound by coding to a well-defined model (order and relationship between elements) using a specific format structure (e.g., XML, JSON)

Transport – Protocols to move data between systems, which could involve complex multi-stage activities (e.g., ESB) or simple one-way transfers (e.g., HTTP)

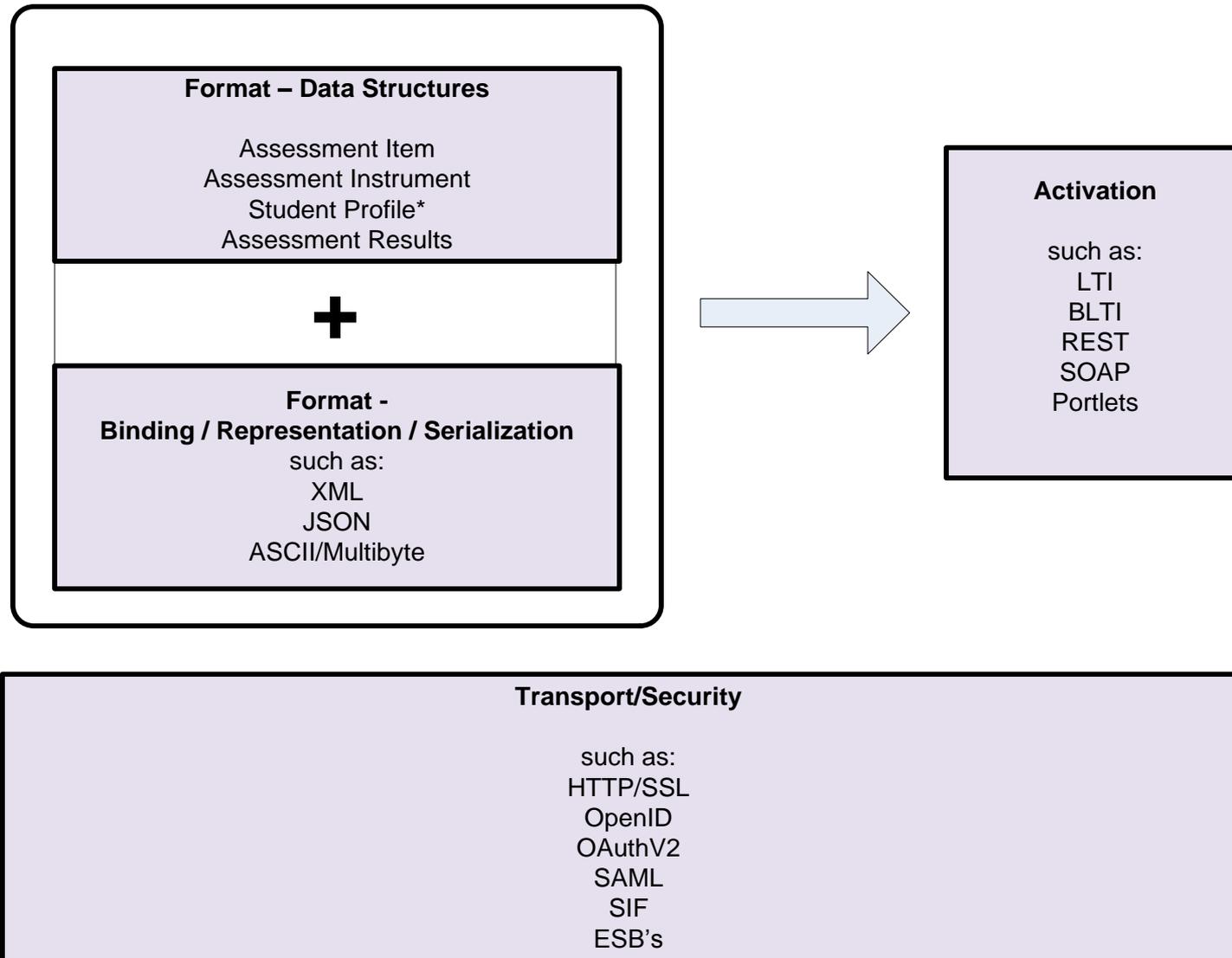
Security – Technologies and standards to maintain privacy and ensure only authorized, authenticated users access information

Activation – Protocols to cause remote systems to take actions (e.g., REST or SOAP) or to act as if they are running locally (e.g., HTML, Portlets)

Standardization/Unification of formats – Defining elements such that a single machine-readable binding or serialization can be used to express all relevant technical information (i.e., defining data elements and binding them to a specific format such as XML or JSON)

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How do standards come together to implement interoperable work?



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Acronyms/Abbreviations

APIP – Accessible Portable Item Profile
BLTI – Basic Learning Tools Interoperability
CEDS – Common Education Data Standards
Ed-Fi – profile and assessment results data standard
ESB – Enterprise Service Bus
HTTP – HyperText Transfer Protocol
JSON – JavaScript Object Notation
JSR 168/268 – portlet data standards that allow for varied customization of the same web page
LTI – Learning Tools Interoperability
OAuth v2 – Open Authorization data standard
OpenID – a user authentication data standard that does not require central control
QTI – Question and Test Interoperability specification
REST – Representational State Transfer
SAML – Security Assertion Markup Language
SCORM – Sharable Content Object Reference Model
SIF – Schools Interoperability Framework
SOAP – Simple Object Access Protocol
SSL – Secure Sockets Layer
XML – eXtensible Markup Language
ZIS – Zone Integration Server, transport part of SIF specification

Terms

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