SMARTERAPP INTERFACE SPECIFICATION

for

TEST DELIVERY TO TEST INTEGRATION

AND

TEST INTEGRATION TO DATA WAREHOUSE

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Revision History

Revision Description	Author/Modifier	Date
0.1: Initial Release (DRAFT)	Rami Levy	April 28, 2014
0.2: Clarified that this specification covers both the TDS-to-TIS and TIS-to-DW interfaces, as they are exactly the same.	Rami Levy	July 8, 2014
0.3: Removed Opportunity/windowStart	Rami Levy	July 18, 2014

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Purpose

The purpose of this document is to provide a format specification describing the output of the Test Delivery System (TDS), which feeds into the Test Integration System (TIS), which feeds into the Data Warehouse (DW). The interface is exactly the same for both; that is, the TDS output contains the complete specification for TDS-to-TIS and TIS-to-DW. The specification includes a table describing each XML node and attribute. In addition, the XSD and a sample XML file are included for reference.

This specification represents the combined work of Smarter Balanced and various vendors working on related contracts.

References

Ref	Reference	Author	Version
1	Common Education Data Standards (CEDS) specification (https://ceds.ed.gov/elements.aspx)	ceds.ed.gov	4.0

Test Integration Data Flow Overview

This document describes the data interface between the Test Integration component and one or more Data Warehouses (an interface labeled as arrow 8 in Figure 1).
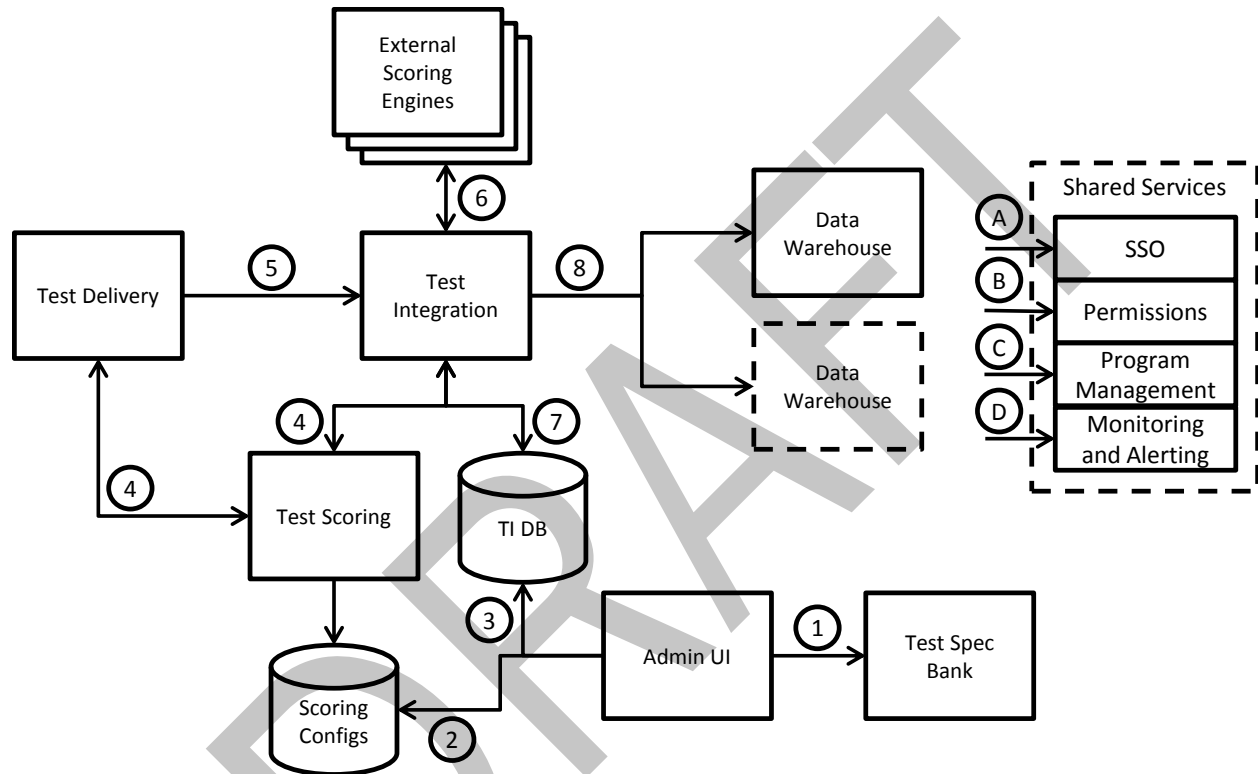

Figure 1: Test Integration and Scoring Data Interfaces

Table 1 summarizes the elements in Figure 1 that are relevant to this document.

Diagram Element	Description
Test Delivery (TDS)	Test Delivery is responsible for the real time, interactive portion of a student assessment. Test Delivery holds a student's assessment result for a test opportunity until that opportunity has been completed.
Test Integration (TIS)	Test Integration holds an assessment result when the real time, interactive portion of the assessment is completed.
Test Integration Database	The Test Integration Database stores: (1) in-process assessments that have items that are awaiting are awaiting scoring by external scoring engines, and (2) storing configuration information about how to process assessment opportunities for particular assessments. The configuration information about a particular assessment is provided by a test package via the Admin UI that contains the scoring rules.
External Scoring Engines	External Scoring Engines are typically hand scoring systems, but may also be other types of item scoring engines such as automated essay scoring engines that may take more time than is reasonable to be used during a live assessment event. There is no vendor that is building these scoring engines, so AIR will design the protocol to these scoring engines and develop a stub that satisfies the other end of this protocol.

Diagram Element	Description
Data Warehouse (DW)	The Data Warehouse is being developed for Smarter Balanced under Contract 15. The Test Integration component will deliver fully scale scored XML documents to the Data Warehouse that represents a complete test opportunity for a student.
Test Scoring	The Test Scoring component is responsible for scale scoring an assessment based on preconfigured scoring rules that are provided by means of test packages authored by Test Authoring and stored in the Test Spec Bank.
Scoring Configs Database	The Scoring Configs Database stores scoring configurations that the Test Scoring component uses to know how to score a particular assessment. The configuration information about a particular assessment is provided by a test package via the Admin UI that contains the scoring rules.

Table 1: Component Definitions

Test Integration receives the completed assessment from Test Delivery (arrow 5), delivers responses to external scoring engines (arrow 6), receives and collates results from external scoring engines (arrow 4). *The interfaces associated to arrows 5 and 8 are identical and are specified in this document*. Their format has been designed with optimal flexibility, in order to capture information for any type of assessment. For this reason, many of the nodes and attributes are normalized to name/value pairs, rather than being hard-coded to accept specific data fields.

Test Integration Data Format Conventions

Table 2 provides information regarding the XML output format and its associated XSD, such as the allowable values, sizes, and descriptions, as well as any standards alignment. Also included in this document are the XSD and a sample XML output. The fields in Table 2 below follow these conventions:

- **Case sensitivity**: Field names are case sensitive and follow the guideline that the XML *Node/Element* is in UpperCamelCase, while node *attributes* are in lowerCamelCase.
- **Order sensitivity**: Fields are not order-sensitive.
- **Non-required (optional) fields:** By default, these fields do not need to be included in the XML file. A missing optional field is simply treated as not present or not applicable.
- **Cardinality**: The number of possible instances of a particular node is defined clearly in the XSD (see Test Integration Format XSD).

Test Integration Format Specification

Category / Node (XML Element)	TDS Field Name (attribute)	XML Hierarchy	Width (chars)	Required	Data Element Description	Acceptable Values	Data Type	Reference
Test	name	TDSReport:Test	250	Y	Name of the test. This usually consists of the testID with some extra information indicating the client and the season. E.g. (Oregon)OAKS-Math-5-Fall-2012-2013	one or more printable ASCII characters	xsd:token	CEDS [1]: K12 -> Assessments -> Assessment Administration -> AssessmentAdministration Name ID #977
	subject		10	Y	Subject of the test. E.g. ELPA or MA.	one or more printable ASCII characters	xsd:token	
	testId		255	Y	The Test Authoring ID of the test, independent of client, season and year	one or more printable ASCII characters	xsd:token	CEDS [1]: K12 -> Assessments -> Assessment -> AssessmentIdentifier ID #1067
	bankKey		8	Y	ITS bank of blueprint. This value may be deprecated and eventually removed.	positive 32-bit integer	xsd:unsignedInt	Used for Field Test, but will be removed for operational system.
	handScoreProject		8	N	If this test has items that need to be scored by hand, this is the ID of the handscore project (either in own handscoring center, or an ID to identify a subcontractor's handscoring project).	positive 32-bit integer	xsd:unsignedInt	
	contract		100	N	Contract of this test (e.g. ELPA or OAKS for Oregon's tests).	one or more printable ASCII characters	xsd:token	
	mode		50	Y	Mode of the test. Either 'online', 'paper' or 'scanned'. Here 'paper' means it was a data entry test (meaning the student took the test on paper and someone else then entered the responses in the online system).	online paper scanned	xsd:token	

Category / Node (XML Element)	TDS Field Name (attribute)	XML Hierarchy	Width (chars)	Required	Data Element Description	Acceptable Values	Data Type	Reference
	grade		100	Y	Tested grade.	IT - Infant/toddler PR - Preschool PK - Prekindergarten TK - Transitional Kindergarten KG - Kindergarten 01 - First grade 02 - Second grade 03 - Third grade 04 - Fourth grade 05 - Fifth grade 06 - Sixth grade 07 - Seventh grade 08 - Eighth grade 09 - Ninth grade 10 - Tenth grade 11 - Eleventh grade 12 - Twelfth grade 13 - Grade 13 PS - Postsecondary UG - Ungraded	xsd:token	CEDS [1]: K12 -> Assessments -> Assessment -> AssessmentLevelForWhichDesigned ID #177
	assessmentType		20	Y	Type of assessment	one or more printable ASCII characters, preferably from the list in CEDS. Examples: Summative Formative Interim	xsd:token	[CEDS [1]: K12 -> Assessments -> Assessment -> AssessmentType ID #29
	academicYear		4	Y	Current academic year	1900 <= YYYY <= 9999	xsd:integer	CEDS [1]: K12 -> K12 School -> Session -> SchoolYear ID #243
	assessmentVersion		30	Y	Version of this assessment	string	xsd:token	
Examinee	key	TDSReport: Examinee	16	N	Internal examinee key	positive 64-bit integer	xsd:unsignedLong	This will change to GUID after the field test.

Category / Node (XML Element)	TDS Field Name (attribute)	XML Hierarchy	Width (chars)	Required	Data Element Description	Acceptable Values	Data Type	Reference
ExamineeAttribute	name	TDSReport: Examinee : ExamineeAttribute	50	Y	Name of the attribute.	Birthdate HispanicOrLatinoEthnicity AmericanIndianOrAlaskaNative Asian BlackOrAfricanAmerican White NativeHawaiianOrOtherPacificIsl ander DemographicRaceTwoOrMoreR aces FirstName Sex GradeLevelWhenAssessed LastName ExternalSSID	xsd:token	
	value		500	Y	attribute value	varies per attribute	xsd:token	
	context		50	Y	Context of the attribute (currently either INITIAL or FINAL).	INITIAL FINAL	xsd:token	-
	contextDate		23	Y	Date and time the attribute was fetched from TR	time+date	xsd:dateTime	-
ExamineeRelationship	entityKey	TDSReport: Examinee: ExamineeRelationship	22	Y	TR unique identifier	entity identifier + state abbreviation	xsd:token	
	name		100	Y	Name of the attribute.	DistrictID DistrictName SchoolID SchoolName StateName GroupId GroupText	xsd:token	
	value		500	Y	attribute value	one or more printable ASCII characters	xsd:token	
	context		50	Y	Context of the attribute (currently either INITIAL or FINAL).	INITIAL FINAL	xsd:token	
	contextDate		23	Y	Date and time the attribute was fetched from TR	date+time	xsd:dateTime	-
Opportunity	server	TDSReport: Opportunity	128	Y	Name of the TDS server that was used to administer this test.	one or more printable ASCII characters	xsd:token	

Category / Node (XML Element)	TDS Field Name (attribute)	XML Hierarchy	Width (chars)	Required	Data Element Description	Acceptable Values	Data Type	Reference
	database		128	N	Name of the TDS DB that was used to administer this test.	zero or more printable ASCII characters	xsd:token	
	key		36	Y	A globally unique identifier for the opportunity (GUID)	one or more printable ASCII characters	xsd:token	
	oppId		16	Y	Opportunity ID, formerly known as vndr_test_event_id. A unique identifier (within client) of the test opportunity.	Positive 64-bit integer	xsd:unsignedLong	
	startDate		23	Y	Date and time the student started the opportunity.	date+time	xsd:dateTime	CEDS [1]: K12 -> Assessments -> Assessment Administration ID #962, #963
	status		50	Y	Status of the opportunity.	appeal completed expired handscoring invalidated paused reported reset scored submitted	xsd:token	
	opportunity		8	Y	A counter that counts the number of times a student has taken this test.	positive 32-bit integer	xsd:unsignedInt	
	statusDate		23	Y	The date and time the status of this opportunity last changed. Generally this is close to the opportunityDateCompleted, but it can be much later, e.g. for resets, invalidations, hand scores being added, etc.	date+time	xsd:dateTime	-
	dateCompleted		23	N	Date the student submitted the opportunity for scoring.	date+time	xsd:dateTime	CEDS [1]: K12 -> Assessments -> Assessment Administration ID #964

Category / Node (XML Element)	TDS Field Name (attribute)	XML Hierarchy	Width (chars)	Required	Data Element Description	Acceptable Values	Data Type	Reference
	pauseCount		8	Y	number of times Examinee paused the opportunity	positive 32-bit integer	xsd:unsignedInt	
	itemCount		8	Y	Number of items in the XML file. Note these are presented items plus prefetched items (there could be items the student never saw).	positive 32-bit integer	xsd:unsignedInt	
	ftCount		8	Y	number of field test items in count	positive 32-bit integer	xsd:unsignedInt	
	abnormalStarts		8	Y	The number of times the test was restarted after an abrupt end to a test (browser crash, power shutdown, network loss etc.).	positive 32-bit integer	xsd:unsignedInt	
	gracePeriodRestarts		8	Y	The number of times the student paused the test and restarted it within the grace period (20 minutes).	positive 32-bit integer	xsd:unsignedInt	
	TAID		128	N	ID of the Test Administrator that administered this test (often the TA's e-mail address)	zero or more printable ASCII characters	xsd:token	CEDS [1]: K12 -> K12 Staff -> Contact -> Email ID #88
	TAName		128	N	Name of the Test Administrator that administered this test.	zero or more printable ASCII characters	xsd:token	
	sessionId		128	N	TDS's ID for the session in which this test was taken.	zero or more printable ASCII characters	xsd:token	
	windowId		50	Y	the ID of the window in which the test was administered (E.g. EOC-Spring)	one or more printable ASCII characters	xsd:token	
	windowOpportunity		8	N	A counter that counts the number of times a student has taken this test in this window.	zero or more printable ASCII characters	xsd:token	
	dateForceCompleted		8	N	If a test is actually complete (all items responded to) at the time it expires it might (depending on per-client configuration) instead be "force completed". That is, it is submitted for the student. It will not have status 'expired', but 'scored'. This is the date the "force completion" was done.	date+time	xsd:dateTime	
	clientName		255	Y	Name of the client this test is for (e.g. Oregon).	one or more printable ASCII characters	xsd:token	

Category / Node (XML Element)	TDS Field Name (attribute)	XML Hierarchy	Width (chars)	Required	Data Element Description	Acceptable Values	Data Type	Reference
	assessmentParticipantSessionPlatformUserAgent		512	Y	A list of product tokens (keywords) with optional comments that identifies the client hardware and software with which the assessment was delivered to the student during the assessment session.Implementation Note: The recommended approach is to store the User-Agent string returned as part of an HTTP header. For example, an assessment session delivery via iPad might have "Mozilla/5.0 (iPad; U; CPU OS 3_2_1 like Mac OS X; en-us) AppleWebKit/531.21.10 (KHTML, like Gecko) Mobile/7B405"	\<User-Agent string\>	xsd:string	CEDS [1]: K12 -> Assessments -> Assessment Participant Session -> AssessmentParticipantSessionPlatformUserAgent ID #1152
Segment	id	TDSReport: Opportunity: Segment	250	Y	Segment the item was administered on.	one or more printable ASCII characters	xsd:token	
	position		8	Y	Position of the segment on the test.	positive 32-bit integer, null allowed	xsd:unsignedInt	
	formKey		100	N	ITS key of the form (if algorithm = fixedform).	one or more printable ASCII characters	xsd:token	
	formId		150	N	If the algorithm is fixedform then this is the ID of the form for the segment. Otherwise null.	one or more printable ASCII characters	xsd:token	
	algorithm		50	Y	Item selection algorithm that was used for this segment.	one or more printable ASCII characters	xsd:token	
	algorithmVersion		50	Y	Item selection algorithm version	one or more printable ASCII characters	xsd:token	
Accommodation	type	TDSReport: Opportunity: Accommodation	510	Y	accommodation type (e.g. 'ColorContrast')	one or more printable ASCII characters	xsd:token	CEDS [1]: K12 -> Assessments -> Assessment Participant Session ID #385
	value		510	Y	accommodation value (e.g. 'Magenta'). Note that there is a one to one relationship between value and code.	one or more printable ASCII characters	xsd:token	

Category / Node (XML Element)	TDS Field Name (attribute)	XML Hierarchy	Width (chars)	Required	Data Element Description	Acceptable Values	Data Type	Reference
	code		510	Y	Accommodation code (e.g. 'TDS_CCMagenta')	one or more printable ASCII characters	xsd:token	
	segment		8	Y	Segment number the accomodation applies to. A 0 means the accomodation applies to the entire test (all segments).	positive 32-bit integer, Null allowed	xsd:unsignedInt	
	context		50	Y	Context of the attribute (currently either INITIAL or FINAL).	INITIAL FINAL	xsd:token	
	contextDate		23	Y	Date and time the attribute was fetched from TR	date+time	xsd:dateTime	
Score	measureOf	TDSReport: Opportunity: Score	150	Y	The set of items this value measures. Usually a strand or an AffinityGroup. E.g. Overall or Mathematics-10.2 or Listening.	one or more printable ASCII characters	xsd:token	
	measureLabel		150	Y	Label of this measure. E.g. ScaleScore, PerformanceLevel, Attempted.	one or more printable ASCII characters	xsd:token	
	value		64	Y	Value of the measure. E.g. 1034 (for ScaleScore) or Y (for Attempted).	one or more printable ASCII characters	xsd:token	CEDS [1]: K12 -> Assessments -> Assessment Item -> Assessment Item Response ID #724
	standardError		8	N	Standard error of the measure.	float, null allowed	xsd:token	
GenericVariable	context	TDSReport: Opportunity: GenericVariable	50	Y	This node is optional but if used all of these attributes are required	one or more printable ASCII characters	xsd:token	
	name		50	Y	general use	one or more printable ASCII characters	xsd:token	
	value		255	Y	general use	one or more printable ASCII characters	xsd:string	
Item	position	TDSReport: Opportunity: Item	8	Y	ordinal position of item on test	positive 32-bit integer, null allowed	xsd:unsignedInt	
	segmentId		250	Y	Segment the item was administered on.	one or more printable ASCII characters	xsd:token	

Category / Node (XML Element)	TDS Field Name (attribute)	XML Hierarchy	Width (chars)	Required	Data Element Description	Acceptable Values	Data Type	Reference
	bankKey		40	Y	Permits items from multiple Item Authoring banks	one or more printable ASCII characters	xsd:token	CEDS [1]: K12 -> Assessments -> Assessment Item ID #1181 This will be removed after the field test.
	key		40	Y	internal ID from Item Authoring. This is the item identifier.	positive 64-bit integer	xsd:unsignedLong	For the field test, this will be an ITS identifier. For operational, it will be GUID.
	clientId		80	N	how client identifies the item	one or more printable ASCII characters	xsd:token	
	operational		8	Y	1 if operational, 0 if field test	0,1	xsd:unsignedInt	
	isSelected		8	Y	Whether the student submitted his response for scoring or not. Possible values 0 (not submitted) or 1 (submitted).	0,1	xsd:unsignedInt	

Category / Node (XML Element)	TDS Field Name (attribute)	XML Hierarchy	Width (chars)	Required	Data Element Description	Acceptable Values	Data Type	Reference
	format		50	Y	Item type (e.g. MC (multiple choice) or GI (grid item)).	associateInteraction choiceInteraction customInteraction drawingInteraction endAttemptInteraction extendedTextInteraction gapMatchInteraction graphicAssociateInteraction graphicGapMatchInteraction graphicOrderInteraction hotspotInteraction hottextInteraction inlineChoiceInteraction matchInteraction mediaInteraction orderInteraction positionObjectInteraction selectPointInteraction sliderInteraction textEntryInteraction uploadInteraction EBSR EQ ER GI HT HTQ MC MI MS NL SA TI TUT WER WORDLIST Stimulus	xsd:token	CEDS [1]: K12 -> Assessments -> Assessment Item -> Assessment Item APIP Interaction ID #1158
	score		8	Y	number of scorepoints earned by Examinee. -1 means not scored	unsigned float, -1 allowed	xsd:float	

Category / Node (XML Element)	TDS Field Name (attribute)	XML Hierarchy	Width (chars)	Required	Data Element Description	Acceptable Values	Data Type	Reference
	scoreStatus		50	N	Provided by independent item scoring engine	NOTSCORED SCORED SCORINGERROR WAITINGFORMACHINESCORE		
	adminDate		23	Y	Date and time item was administered to Examinee	date+time	xsd:dateTime	
	numberVisits		8	Y	Number of times the student modifies his response to the item.	positive 32-bit integer	xsd:unsignedInt	
	mimeType		255	Y	MIME type of item response.	one or more printable ASCII characters		
	strand		150	Y	Top level strand in the strand hierarchy the item is on.	one or more printable ASCII characters		
	contentLevel		150	Y	Lowest level strand in the strand hierarchy the item is part of.	one or more printable ASCII characters		
	pageNumber		8	Y	Number of the (online) page the item appears on.	positive 32-bit integer	xsd:unsignedInt	
	pageVisits		8	Y	Number of times the student visited the (online) page this item is on.	positive 32-bit integer	xsd:unsignedInt	
	pageTime		8	Y	Time (in milliseconds) the student spent on the (online) page this item is on.	signed 32-bit integer	xsd:int	
	dropped		8	Y	Whether the item is dropped. If an item was administered but later inactivated the DW might receive a new record with this flag turned on.	0 or 1	xsd:unsignedInt	
Response	type	TDSReport: Opportunity: Item: Response	10	N	Type of responseValue. Possible values 'value' or 'reference'. 'reference' is used for scanned paper tests where the scanned response is not included, but only a reference to the file containing the scanned response.	value reference \<blank allowed\>	xsd:token	

Category / Node (XML Element)	TDS Field Name (attribute)	XML Hierarchy	Width (chars)	Required	Data Element Description	Acceptable Values	Data Type	Reference
	\<node text\>		unlimited	N	If responseType is 'value', then the actual response. Note that both MC responses and CR responses are captured here. If responseType is 'reference' then the filename where the scanned response is saved.		xsd:string	CEDS [1]: K12 -> Assessments -> Assessment Item -> Assessment Item Response ID #724
	date		23	N	Date and time the student responded to the item	date+time	xsd:dateTime	CEDS [1]: K12 -> Assessments -> Assessment Item -> Assessment Item Response ID #959, #958
ScoreInfo	scorePoint	TDSReport: Opportunity: Item: ScoreInfo	8	N	Output of the machine scorer giving reasons for the assigned score. Now also contains dimension scores for certain items.	float, -1 allowed	xsd:float	
	scoreDimension		255	N	Dimension the score is for.	one or more printable ASCII characters	xsd:token	
	scoreStatus		22	N	Provided by independent item scoring engine	NotScored Scored ScoringError WaitingForMachineScore	xsd:token	
	conditionCode		1	N	For hand-scored items and machine-scored NL items	A-Z	xsd:token	
ScoreRationale	\<node text\>	TDSReport: Opportunity: Item: ScoreInfo: ScoreRationale	unlimited	N			xsd:string	
SubScoreList		TDSReport: Opportunity: Item: ScoreInfo: ScoreRationale: SubScoreList		N	SubsccoreList has no attrs, but can have nested ScoreInfo nodes for multi-dimensional items.			
Comment	context	TDSReport: comment	200	Y	Context of the comment (e.g. TESTITEM or GlobalNotes).	one or more printable ASCII characters	xsd:token	

Category / Node (XML Element)	TDS Field Name (attribute)	XML Hierarchy	Width (chars)	Required	Data Element Description	Acceptable Values	Data Type	Reference
	itemPosition		8	Y	If this was an item level comment (context = TESTITEM), the position of the item the comment was for.	positive 32-bit integer, Null allowed	xsd:unsignedInt	
	date		23	Y	Date and time comment was entered.	date+time	xsd:dateTime	
	<node text>		unlimited	N			xsd:string	
Score	value	TDSReport: Opportunity: score	10	Y	Score (or ConditionCode if type isn't Final).	one or more printable ASCII characters	xsd:token	
	compName		50	Y	Component name. Dimension: if the score is a dimension score. ScorePoints: if there are no dimensions and this is just a score for the whole item. ConditionCodes: if the score value is actually a condition code (these usually apply to all dimensions).	one or more printable ASCII characters	xsd:token	
	dimension		50	Y	Dimension the score is for.	one or more printable ASCII characters	xsd:token	
	sequence		8	Y	Used to count backreads. 1 for all other types.	positive 32-bit integer	xsd:unsignedInt	
	conditionCode		10	N	Blank if this record is for a regular score, otherwise the condition code. Only used for final scores.	one or more printable ASCII characters	xsd:token	
	type		50	Y	Type of the score.	Initial Reliability Resolution Backread Final	xsd:token	
	userId		50	Y	ID of the scorer.	one or more printable ASCII characters	xsd:token	
	userLastName		50	N	Last name of the scorer.	one or more printable ASCII characters	xsd:token	
	userFirstName		50	N	First name of the scorer.	one or more printable ASCII characters	xsd:token	
ToolUsage	toolType	TDSReport: ToolUsage	100	Y	Tools used on certain items or item groups (passages). For instance TTS (TextToSpeech). Type of the tool.	one or more printable ASCII characters	xsd:token	

Category / Node (XML Element)	TDS Field Name (attribute)	XML Hierarchy	Width (chars)	Requir ed	Data Element Description	Acceptable Values	Data Type	Reference
	toolCode		100	Y	Code for the tool.	one or more printable ASCII characters	xsd:token	
ToolPage	page	TDSReport: ToolUsage: ToolPage	8	Y	(Online) page the tool was used on.	positive 32-bit integer	xsd:unsignedInt	
	groupId		59	Y	Item or Passage ID	one or more printable ASCII characters	xsd:token	
	count		8	Y	Number of times the tool was used.	positive 32-bit integer	xsd:unsignedInt	

Table 2: Test Integration XML Output Format Description