



IMS Global CBE Record Standard Work Group Meeting
May 7, 2015
Atlanta, GA



knowledge
2work

John Milam, Ph.D.
Lord Fairfax Community College

IMS Global ET Work Group

CEDS v5 ERDs



Common Education Data Standards

ies NATIONAL CENTER FOR
EDUCATION STATISTICS
Institute of Education Sciences

<http://ceds.ed.gov>

4/24/15



CEDS v5 ERDs

CEDS Domain Entity Schema (DES)

- Early Learning
- K12
- Postsecondary
- Career and Technical
- Adult Education
- Workforce
- Assessments
- Learning Standards
- Learning Resources
- Authentication and Authorization

Domain	Entity	Domain	Entity
EL	EL Child	K12	K12 School
EL	Parent/Guardian	K12	Local Education Agency (LEA)
EL	EL Family	K12	State Education Agency (SEA)
EL	EL Organization	K12	K12 Student
EL	EL Staff	K12	Parent/Guardian
EL	Staff Credential	K12	K12 Staff
	Staff Professional Development	K12	K12 Course
EL	Activity	K12	Course Section
	Professional Development	K12	Assessments
EL	Requirement	K12	Program
EL	Professional Development Activity	K12	Incident
EL	Professional Development Session	K12	Calendar
EL	Technical Assistance	K12	Learning Resource
EL	EL Class/Group	K12	Financial Account
		K12	Organization Account Value
PS	PS Institution	K12	Session
PS	PS Student	K12	Rubric
PS	PS Section	K12	Rubric Criterion
PS	PS Staff	K12	Rubric Criterion Level
PS	PS Applicant	K12	Allergy
PS	Parent/Guardian	K12	Staff Credential
PS	Assessment		Staff Professional Development
PS	Learning Resource	K12	Activity
PS	Learning Goal		Professional Development
PS	Authentication	K12	Requirement
PS	Authorization	K12	Professional Development Activity

4/24/15

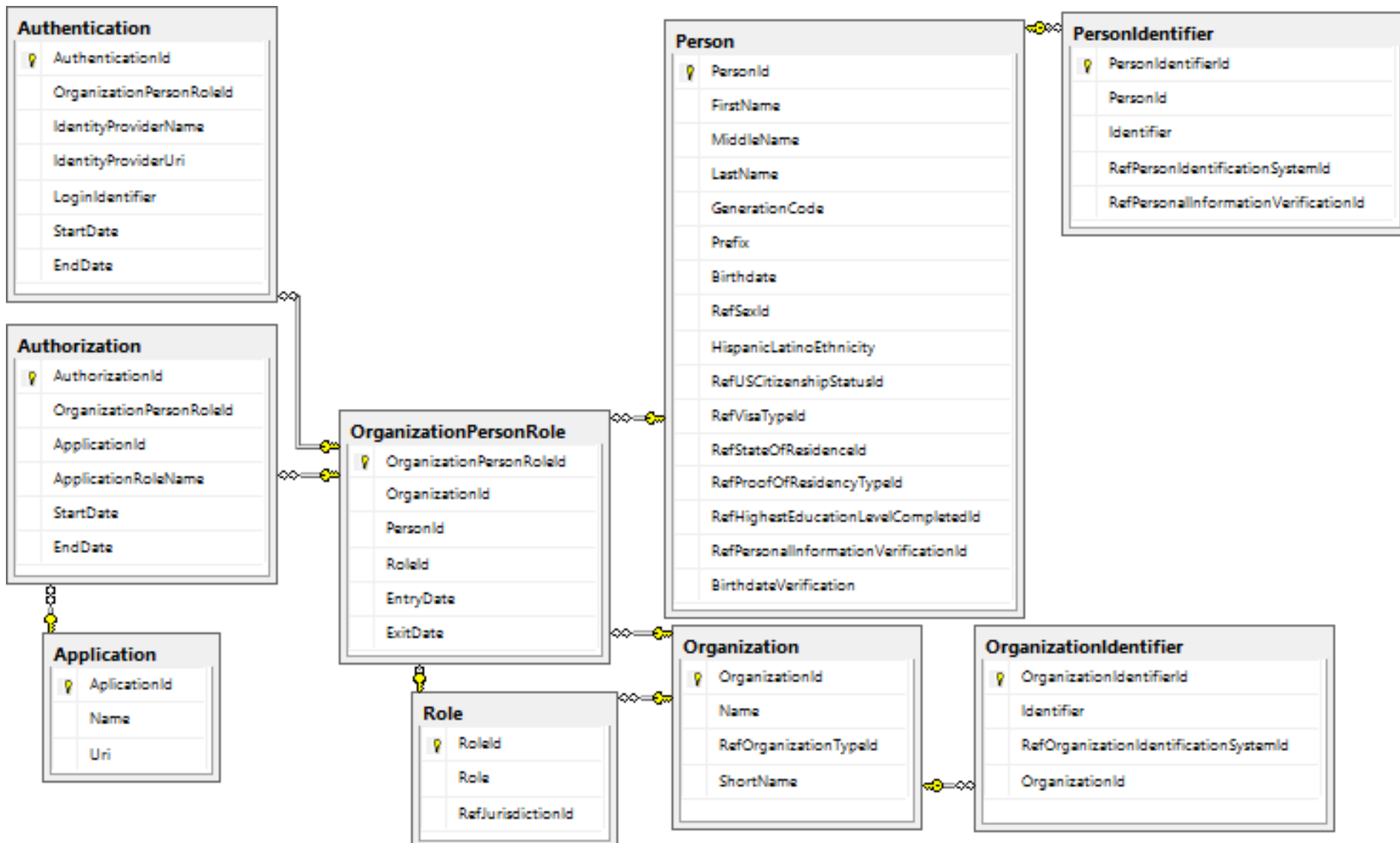
CEDS Postsecondary Student Entity Relationship Diagram

4

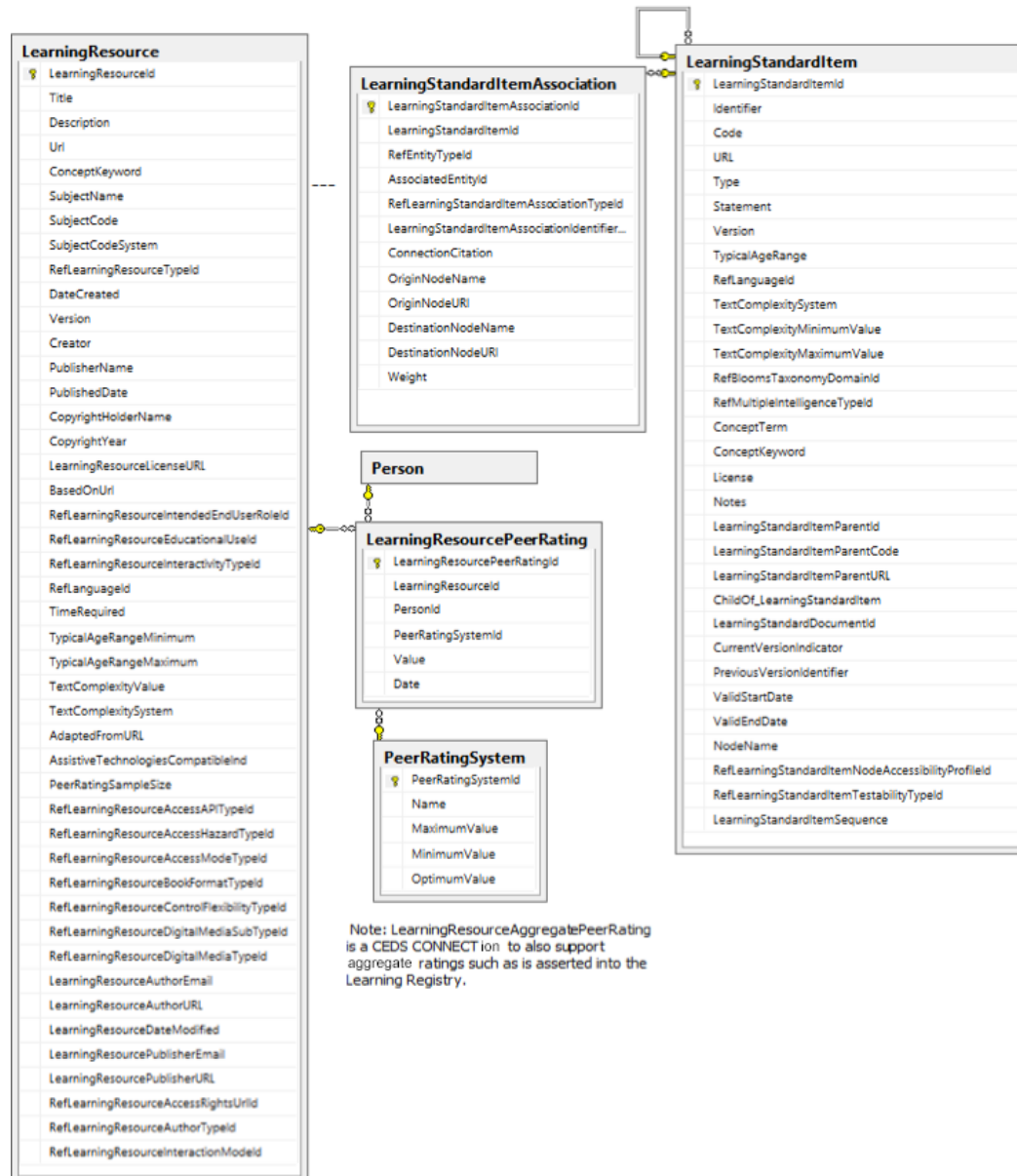


CEDS Identity, Authentication, and Authorization Entity Relationship Diagram

5



CEDS Learning Resource Metadata Entity Relationship Diagram



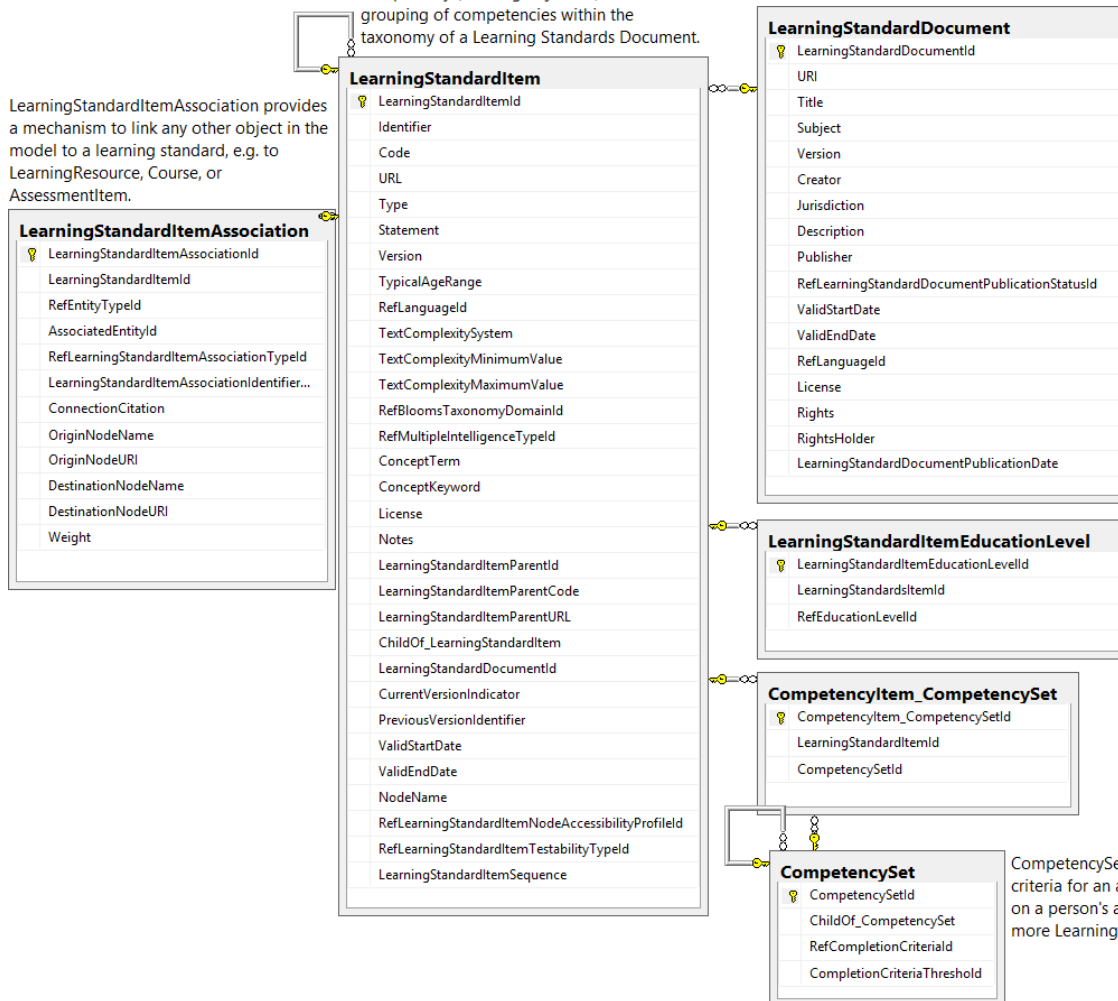
CEDS Learning Standards (Competency and Competency Framework Definitions) ERD

7

A collection of learning standard items, typically arranged in a hierarchical structure or classification scheme, reflecting expectations of learner competencies within a single subject area covering one or more levels. (examples: Head Start Child Outcomes Framework, Common Core State Standards for Mathematics, Accountability Criteria for National Health Care Cluster Foundation Standards)

Content that either describes a specific competency (learning objective) or describes a grouping of competencies within the taxonomy of a Learning Standards Document.

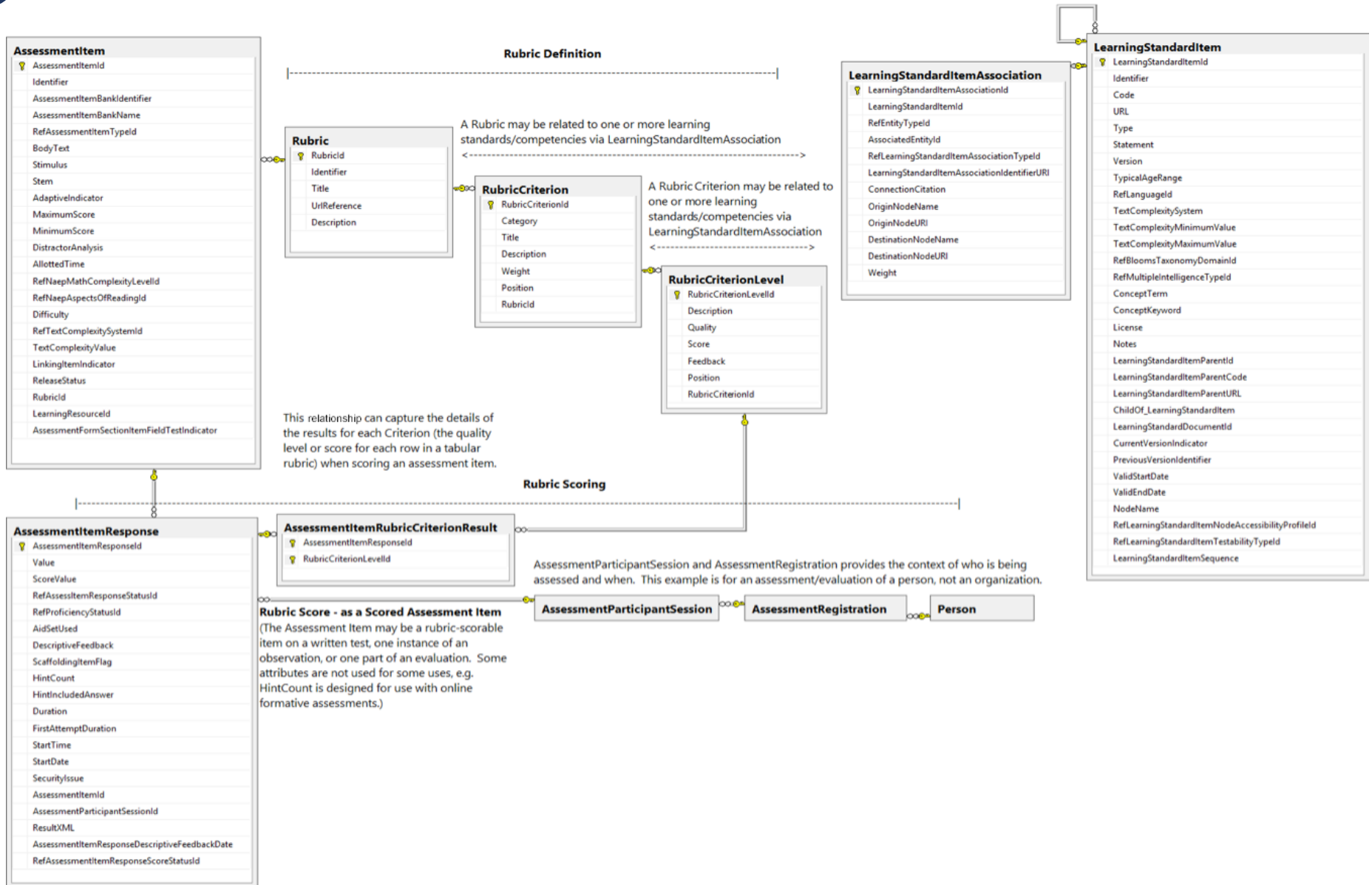
LearningStandardItemAssociation provides a mechanism to link any other object in the model to a learning standard, e.g. to LearningResource, Course, or AssessmentItem.



CompetencySet supports defining criteria for an achievement based on a person's attainment of one or more LearningStandardItem(s).

CEDS Program Rubric Entity Relationship Diagram

9



CEDS Assessment Delivery Entity Relationship Diagram

10

Assessment Delivery

Information related to a specific person registered for an Assessment Administration, assigned a specific Assessment Form for participation in one or more Assessment Sessions.

AssessmentRegistration
AssessmentRegistrationId
CreationDate
DaysOfInstructionPriorToAssessment
ScorePublishDate
TestAttemptIdentifier
RetestIndicator
CourseSectionOrganizationId
RefAssessmentParticipationIndicatorId
TestingIndicator
RefAssessmentPurposeId
RefAssessmentReasonNotTestedId
RefAssessmentReasonNotCompletingId
RefGradeLevelToBeAssessedId
RefGradeLevelWhenAssessedId
PersonId
AssessmentFormId
OrganizationId
SchoolOrganizationId
LeaOrganizationId
AssessmentAdministrationId
AssignedByPersonId
AssessmentRegistrationCompletionStatusDateTime
RefAssessmentRegistrationCompletionStatusId

Information for an assessment event or administration period.

AssessmentAdministration
AssessmentAdministrationId
AssessmentId
Name
Code
StartDate
StartTime
FinishDate
FinishTime
RefAssessmentReportingMethodId
AssessmentSecureIndicator
AssessmentAdministrationPeriodDes...

*Related tables include information about a person's results from an assessment. (See "Assessment Results"), accommodations, and personal needs profile.

Information about a specific person's participation in an Assessment Session. *

AssessmentParticipantSession
AssessmentParticipantSessionId
ActualStartDateTime
ActualEndDateTime
TimeAssessed
RefAssessmentPlatformTypeId
DeliveryDeviceDetails
SecurityIssue
RefAssessmentSessionSpecialCircumstanceTypeId
SpecialEventDescription
LocationId
RefLanguageId
AssessmentFormSectionId
AssessmentSessionId
AssessmentRegistrationId
AssessmentParticipantSessionDatabaseName
AssessmentParticipantSessionGUID

person taking the test and person(s) administrating, scoring, assigning, proctoring, etc.

Person
PersonId
FirstName
MiddleName
LastName
GenerationCode
Prefix
Birthdate
RefSexId
HispanicLatinoEthnicity
RefUSCitizenshipStatusId
RefVisaTypeId
RefStateOfResidenceId
RefProofOfResidencyTypeId
RefHighestEducationLevelCompletedId
RefPersonalInformationVerificationId
BirthdateVerification

Information related to an instance of delivering an assessment during a specific period of time.

AssessmentSession
AssessmentSessionId
AssessmentAdministrationId
ScheduledStartDateTime
ScheduledEndDateTime
ActualStartDateTime
ActualEndDateTime
AllottedTime
RefAssessmentSessionTypeId
SecurityIssue
RefAssessmentSessionSpecialCircumstanceTypeId
SpecialEventDescription
Location
OrganizationId
Lea_OrganizationId
School_OrganizationId

Roles served related to the administration of an assessment session.

AssessmentSessionStaffRole
AssessmentSessionStaffRoleId
RefAssessmentSessionStaffRoleTypeId
PersonId
AssessmentSessionId
AssessmentParticipantSessionId

AssessmentPersonalNeedsProfile

AssessmentPersonalNeedsProfileId
AssessmentNeedType
AssignedSupportFlag
ActivateByDefault

See additional tables that fully support AIF and IMS Global specifications.

CEDS Assessment Results Entity Relationship Diagram

Assessment Results

Reference to information about the performance levels that may be assigned to an Assessment Subtest Result and specifications for selecting the performance level based on a score. Four styles are supported:

- 1) Specification of performance level by lower and upper cut score
- 2) Specification of performance level by lower cut score only
- 3) Specification of performance level without any mapping to scores
- 4) Specification of performance level by mapping to other scores

AssessmentPerformanceLevel

AssessmentResult_PerformanceLevel

Reference to information for scoring an Assessment Form based on a set of Assessment Item responses with explicit rules to produce an Assessment Subtest Result, which may be for the entire Assessment Form or one aspect of evaluation based on a subset of Assessment Items.

AssessmentSubtest

An entity that includes information about a person's results from an assessment which may be for the entire assessment or one aspect of evaluation. The scoring method is defined by the related Assessment Subtest. The entity includes the score value and information about the score, such as a diagnostic statement.

AssessmentResult

AssessmentResultId
ScoreValue
RefScoreMetricTypeId
PreliminaryIndicator
RefAssessmentPretestOutcomeId
NumberOfResponses
DiagnosticStatement
DiagnosticStatementSource
DescriptiveFeedback
DescriptiveFeedbackSource
InstructionalRecommendation
IncludedInAppCalculation
DateUpdated
DateCreated
AssessmentFormSubtestId
AssessmentRegistrationId
RefELOutcomeMeasurementLevelId
RefOutcomeTimePointId
AssessmentResultDescriptiveFeedbackDa...
AssessmentResultScoreStandardError
RefAssessmentResultDataTypeId
RefAssessmentResultScoreTypeId

Reference to delivery data for evaluation of results.

AssessmentParticipantSession

Reference to the assessment item design element for evaluation of the results.

AssessmentItem

An entity with information about detailed actions taken by a learner while engaging in learning activities, such as asking for a hint when taking an online formative assessment.

LearnerAction

LearnerActionId
AssessmentItemResponseId
RefLearnerActionTypeId
Value
Time
Date
LearnerActionActorIdentifier
LearnerActionObjectDescription
LearnerActionObjectIdentifier
LearnerActionObjectType

An entity with information related to a specific response to an assessment item by the person being assessed. The entity includes the response, a score or indication that the response was correct or incorrect, and other information such as response time.

AssessmentItemResponse

AssessmentItemResponseId
Value
ScoreValue
RefAssessmentItemResponseStatusId
RefProficiencyStatusId
AidSetUsed
DescriptiveFeedback
ScaffoldingItemFlag
HintCount
HintIncludedAnswer
Duration
FirstAttemptDuration
StartTime
StartDate
SecurityIssue
AssessmentItemId
AssessmentParticipantSessionId
ResultXML
AssessmentItemResponseDescriptiveFeedbackDate
RefAssessmentItemResponseScoreStatusId

AssessmentRegistration

Results are linked via Assessment Registration and by reference to other assessment delivery information.

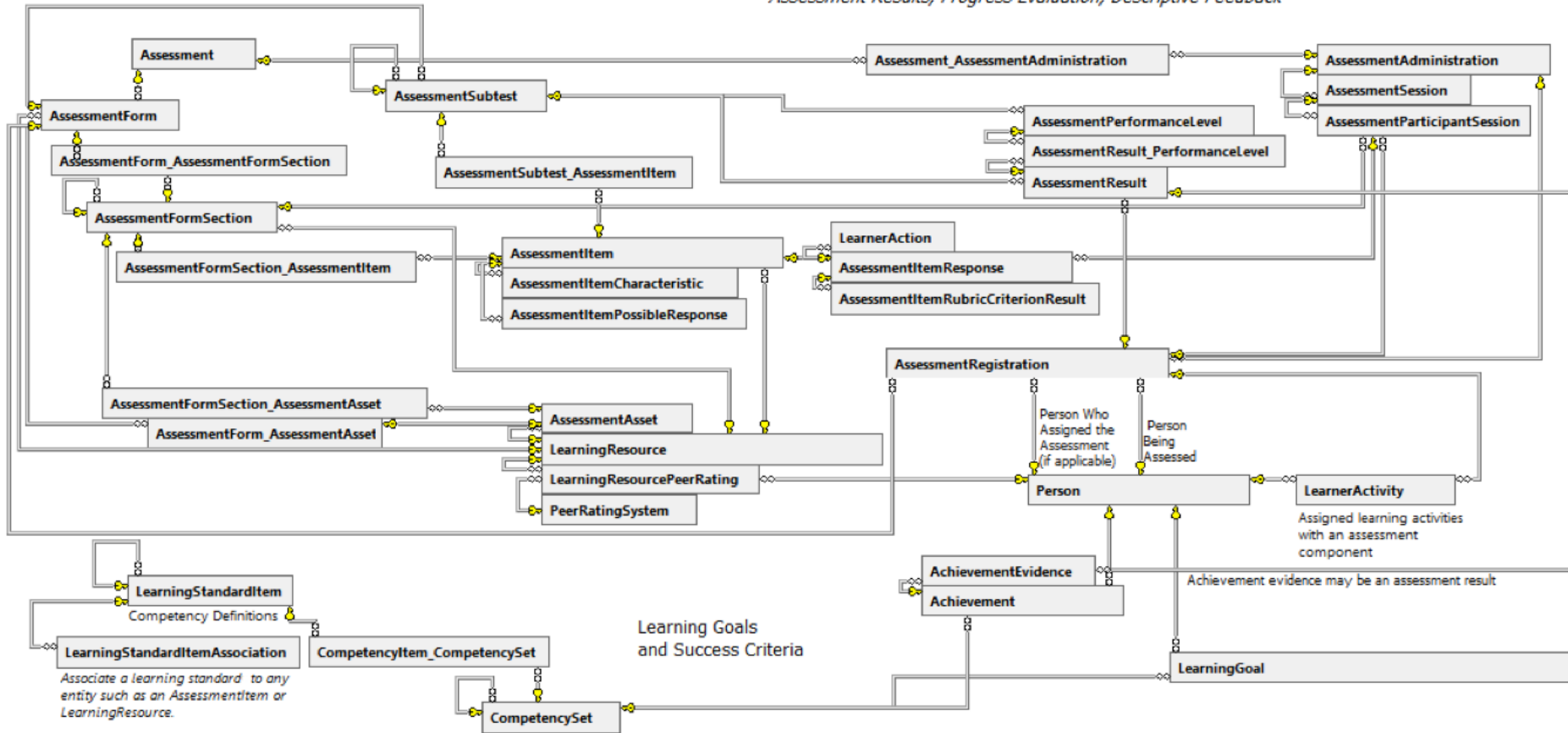
CEDS Formative Assessment Process Entity Relationship Diagram

12

ASSESSMENT DEFINITION

ASSESSMENT DELIVERY, SCORING, EVALUATION, FEEDBACK

Assessment Results, Progress Evaluation, Descriptive Feedback

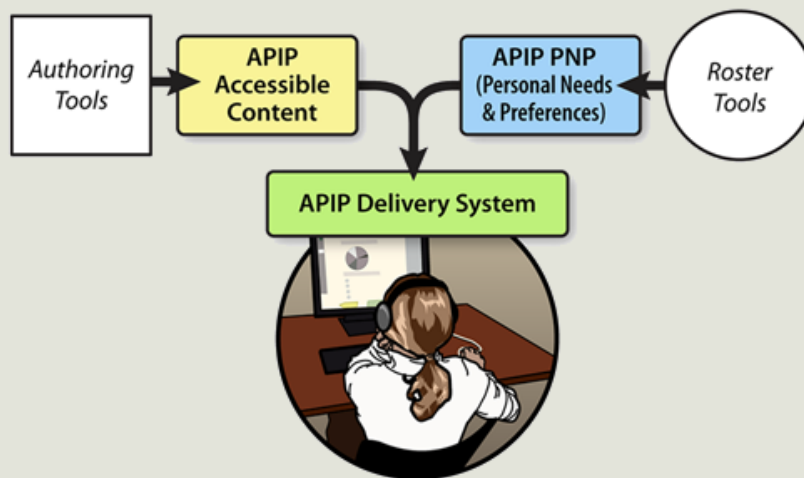


Accessible Portable Item Protocol™ (APIP™)

The Accessible Portable Item Protocol (APIP) Standard provides assessment programs and question item developers with a data model for standardizing the interchange file format for digital test items. When applied properly, the APIP standard accomplishes two important goals. First, the standard allows digital Tests and Items to be ported across APIP compliant test item banks. Second, it provides a test delivery interface with all the information and resources required to make a Test and an Item accessible for students with a variety of disabilities and special needs. [Read the APIP Frequently Asked Questions.](#)

APIP Version 1.0 focuses is on:

- Enabling the exchange of question Items and Tests;
- Adopting, wherever possible, established learning technology interoperability standards and specifications, and only extending these when required;
- Ensuring that the solution can be readily expanded, at a later date, to support the exchange of other related assessment information;
- Ensuring the solution can be combined with other IMS and non-IMS specifications to support new functionality, e.g., the reporting of assessment scores and outcomes;
- Ensuring that further profiling can be undertaken to tailor the approach to meet the needs of specific state assessment activities without compromising the baseline interoperability requirement and capability;
- Enabling vendors to adopt the solution without constraining their ability to create market-differentiated products and services.



More Information

[APIP v1.0 Specification Documents](#)

[APIP Frequently Asked Questions](#)

[QTI/APIP Alliance Website Login](#)

[APIP v1.0 Validator Tool](#)

[APIP v1.0 Conformance](#)

[QTI v2.1 Conformance](#)

[Benefits of joining the QTI/APIP Alliance](#)

[Join the QTI/APIP Alliance Online](#)

[Download the APIP brochure](#)

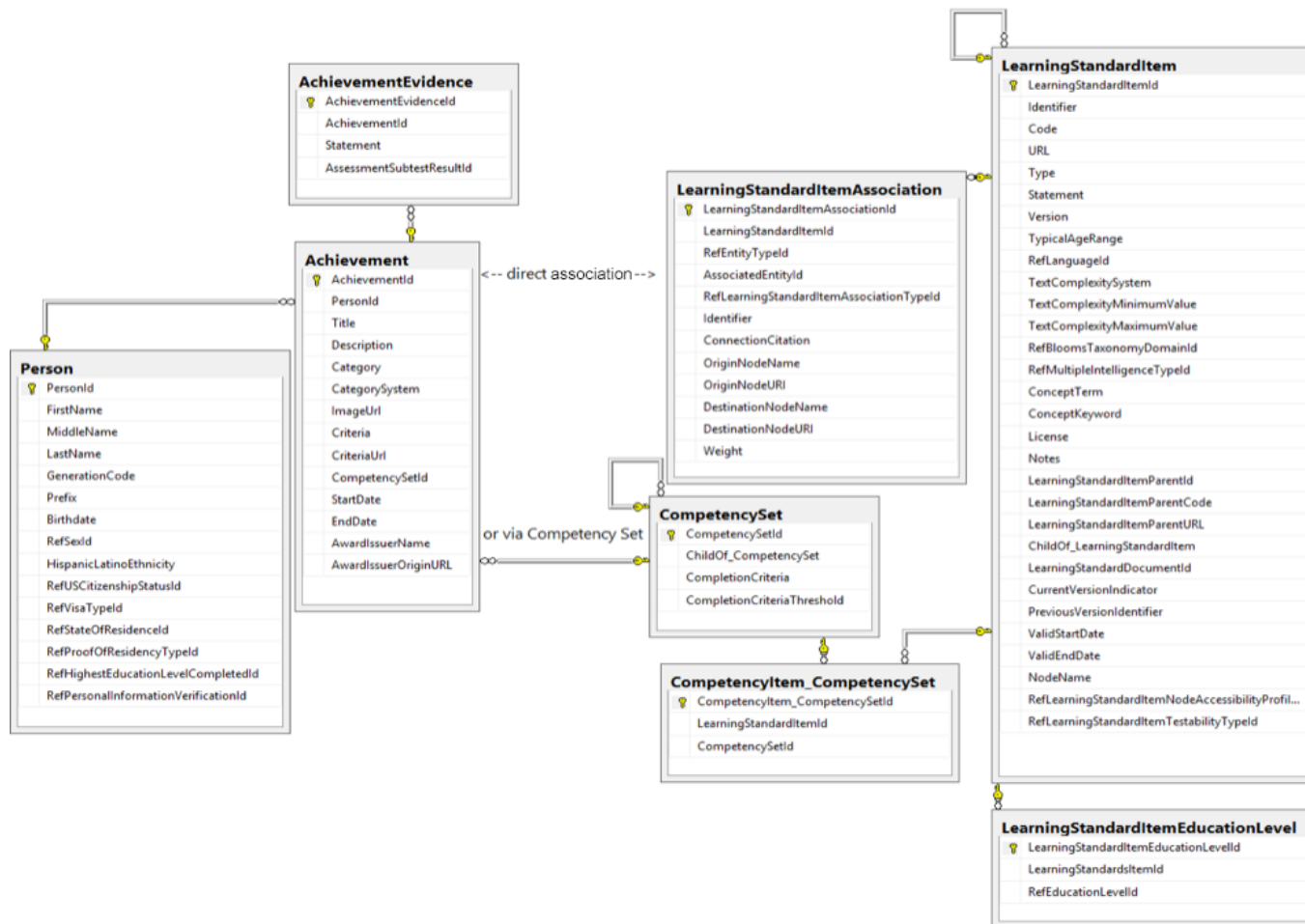
CEDS Achievement Entity Relationship Diagram

14

In CEDS an "Achievement" is a recognition earned by a learner upon fulfilling a specified criteria. It could be specific, such as the ability to add two digit numbers, or more summative, such as meeting all proficiency requirements for a professional license. CEDS data elements defined for an Achievement are compatible with the metadata used for digital badges, e.g., the Mozilla Foundation's OpenBadges.

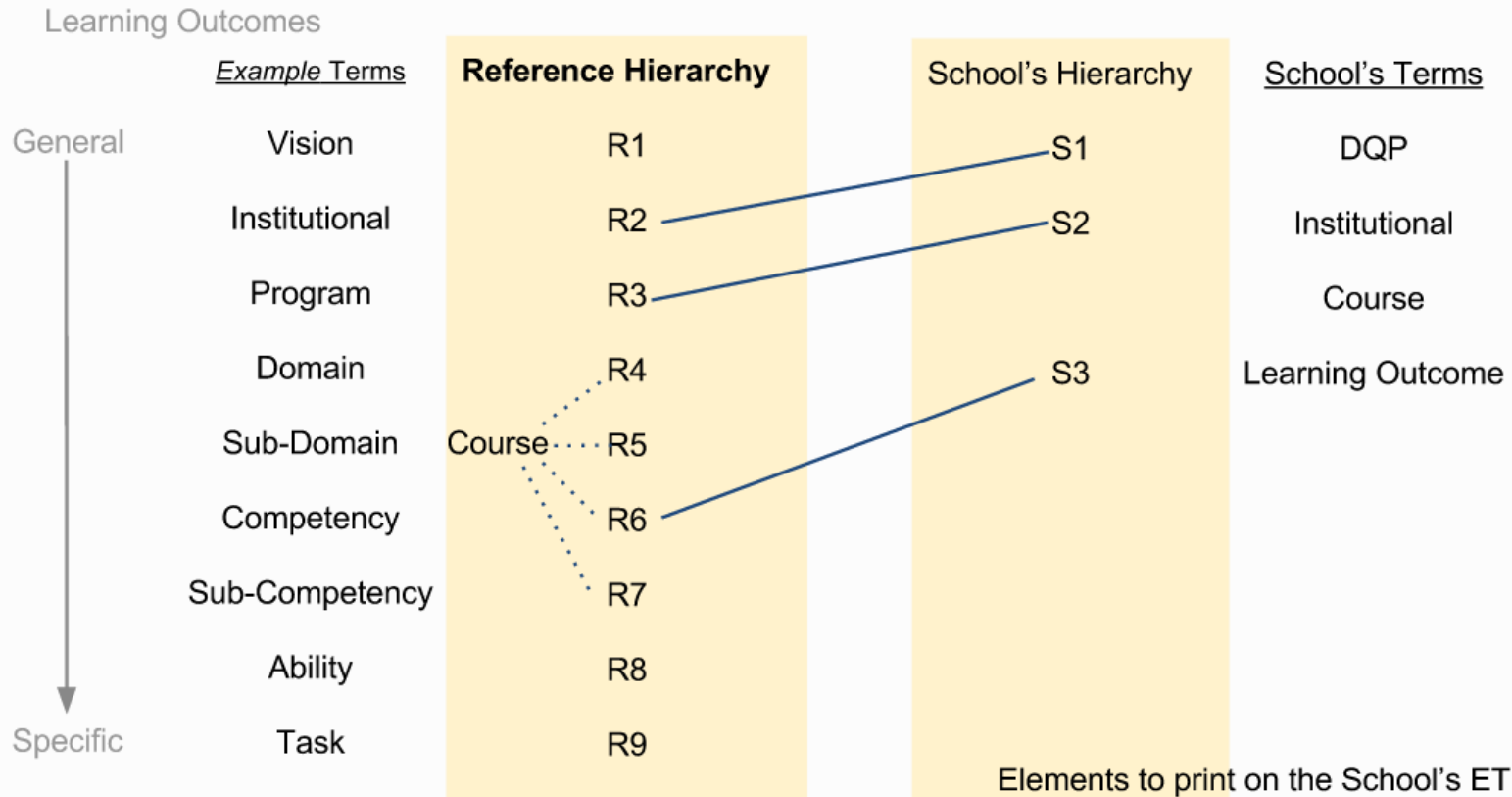
Achievements are associated with one or more Learning Standard Item(s), a.k.a. Competencies, and may include criteria logic when the achievement represents a set of competencies. The data model supports competencies as nodes in an educational framework or pathways in a learning progression.

An Achievement is associated with evidence, e.g., one or more assessment results.




Extended Transcript Reference Hierarchy and Course Relationships

DRAFT for Brainstorming



(1) A course or offering can be linked to the *school's desired level* on the reference hierarchy

Common Education Data Standards

User Name

Create an Account

Password

Forgot [User Name](#) or [Password](#)

Log In ...

[Home](#) | [About](#) | [Elements](#) | [Data Model](#) | [Tools](#) | [Resources](#) | [Contact Us](#)

☐

 EarlyLearning

☐

 K12

☐

 Postsecondary

☐

 Career and Technical Education

☐

 Adult Education

☐

 Workforce

☐

 Assessments

☐

 Learning Standards

☐

 Learning Resources

☐

 Authentication and Authorization **TAACCCT**
TRADE ADJUSTMENT ASSISTANCE COMMUNITY COLLEGE AND CAREER TRAINING GRANT PROGRAM**COMPETENCY-BASED
EDUCATION NETWORK** **LFCC**
Linn-Benton Community College

- 4,797 data elements, including reference data variables for lookup tables which do not have CEDS Global IDs
- 3,596 data elements with Global IDs, redundant across the domains
- 1,497 distinct data elements
- 232 distinct data elements of higher CBE interest for review

	A	B	C	D	E	F	G	H
	Domain	Entity	Category	New Association	Element Name	Definition	Option Set	Use Case / Connection
1	Postsecondary	PS Section	Course	No	Postsecondary Course Title	The name or title of the course taken by a student at an academic	None	Postsecondary Education -> Transition
2444	Postsecondary	PS Section	Course	No	Course Credit Units	The type of credit (unit, semester, or quarter) associated with the credit hours earned for the course.	NoCredit - No Credit Quarter - Quarter Semester - Semester Units - Units CarnegieUnits - Carnegie Units ContinuingEducationUnits - Continuing Education Units ClockHours - Clock Hours Other - Other Unreported - Unreported	Postsecondary Education -> Transition
2445	Postsecondary	PS Section	Course	No	Course Credit Value	Measured in Carnegie units, the amount of credit available to a student who successfully meets the objectives of the course.	None	Postsecondary Education -> Transition
2446	Postsecondary	PS Section	Course	No	Course Begin Date	The year, month and day an instance of a course officially began.	None	K-12 -> High School Feedback Report Postsecondary Education ->
2447	Postsecondary	PS Section	Course	No	Course End Date	The year, month and day an instance of a course ends.	None	K-12 -> High School Feedback Report Postsecondary Education ->
2448	Postsecondary	PS Section	Course	No	Agency Course Identifier	The course identifier as it may be recorded at the regional or state level to conform to a standardized course classification system.	None	
2449	Postsecondary	PS Section	Course	Yes	Classification of Instructional Program Code	A six-digit code in the form xxxxxx that identifies instructional program specialties within educational institutions.	CIP codes are available at: http://nces.ed.gov/ipeds/cipcode/browser.aspx?y=55	K-12 -> High School Feedback Report Postsecondary Education -> Complete College America Postsecondary Education -> IPEDS Postsecondary Education ->
2452	Postsecondary	PS Section	Course	Yes	Classification of Instructional Program Version	The version of CIP being reported.	CIP1980 - CIP 1980 CIP1985 - CIP 1985 CIP1990 - CIP 1990 CIP2000 - CIP 2000 CIP2010 - CIP 2010	Postsecondary Education -> Complete College America Postsecondary Education -> IPEDS
2453								

CEDS 5 CBE-Related Elements

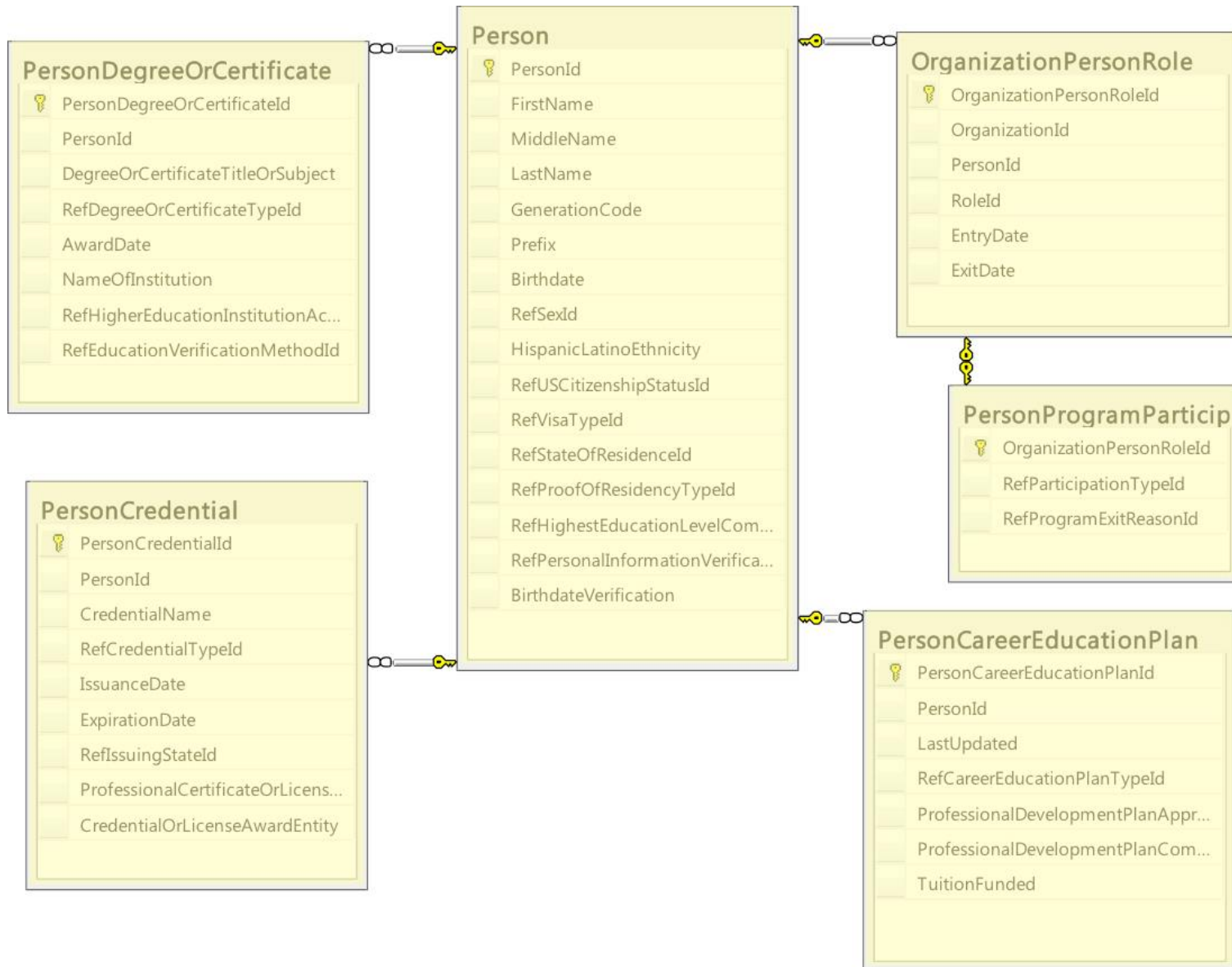
20

CEDS CBE Data Elements by Bucket

Row Labels	Definition
1. Learning experience	
Academic Term Designator	The academic term for which the data apply.
Additional Credit Type	The type of credits or units of value available for the completion of a course in addition to Carnegie Units.
Advanced Placement Credits Awarded	The number of credits awarded a student by the postsecondary institution based on successful completion of advanced placement courses and/or advanced placement tests.
Available Carnegie Unit Credit	Measured in Carnegie units, the amount of credit available to a student who successfully meets the objectives of the course. A course meeting every day for one period of the school day over the span of a school year offers one Carnegie unit. A Carnegie unit is thus a measure of "seat time" rather than a measure of attainment of the course objectives.
Career and Technical Education Concentrator	An indication of a student who has met the state-defined threshold of career and technical education concentrators, as defined in the State's approved Perkins IV State Plan.
Career and Technical Education Participant	An indication a student has met the state-defined threshold of Career and Technical Education participation as defined in the State's approved Perkins IV State Plan.
Career Pathways Program Participation Exit Date	The year, month and day on which the person ceased to participate in a program.
Classification of Instructional Program Use	An indicator of whether the CIP Code is referencing an enrollment program or an award program.
Competency Set Completion Criteria Threshold	The minimum number of competencies in the set that must be achieved for completion or partial completion of a unit, course, program, degree, certification, or other achievement/award.
Course Academic Grade Scale Code	The grading scale used by an academic educational institution for an academic course.
Course Begin Date	The year, month and day an instance of a course officially began.
Course Code System	A system that is used to identify the organization of subject matter and related learning experiences provided for the instruction of students.
Course Credit Level Type	The level of credit associated with the credit hours earned for the course.
Course Credit Units	The type of credit (unit, semester, or quarter) associated with the credit hours earned for the course.
Course Credit Value	Measured in Carnegie units, the amount of credit available to a student who successfully meets the objectives of the course.
Course Description	A description of the course content and/or goals. Reference may be made to state or national content standards.
Course End Date	The year, month and day an instance of a course ends.
Course Honors Type	An indication that the course is or can be counted as an honors course.
Course Identifier	The actual code that identifies the organization of subject matter and related learning experiences provided for the instruction of students.
Course Instruction Method	The primary method of instruction used for the course.
Course Instruction Site Name	The name of the location at which the course is taught.
Course Instruction Site Type	An indication of the type of location at which the course is taught.
Course Level Characteristic	An indication of the general nature and difficulty of instruction provided throughout a course.
Course Section Instructional Delivery Mode	The primary setting or medium of delivery for the course.
Course Section Number	The number assigned to differentiate among distinct occurrences of courses that have the same course abbreviation and number but are considered to be different courses.
Course Subject Abbreviation	The alphabetic abbreviation of the academic department or discipline offering the course. It is one part of the total course identifier number.
Course Title	The descriptive name given to a course of study offered in a school or other institution or organization. In departmentalized classes at the elementary, secondary, and postsecondary levels (and for staff development activities), this refers to the name by which a course is identified (e.g., American History, English III). For elementary and other non-departmentalized classes, it refers to any portion of the instruction for which a grade or report is assigned (e.g., reading, composition, spelling, and language arts).
Credit Hours Applied Other Program	Codes identifying the set of credit hours taken in other programs or degrees that were applied to the individual's degree.
Credit Type Earned	The type of credits or units of value awarded for the completion of a course.
Curriculum Framework Type	An indication of the standard curriculum used for this course.
Diploma or Credential Award Date	The month and year on which the diploma/credential is awarded to a student in recognition of his/her completion of the curricular requirements.
Distance Education Course Enrollment	An individual's enrollment in a course or courses in which the instructional content is delivered exclusively via distance education. Distance education is education that uses one or more technologies to deliver instruction to students who are separated from the instructor and to support regular and substantive interaction between the students and the instructor synchronously or asynchronously. Technologies used for instruction may include: Internet; one-way and two-way transmissions through open broadcasts, closed circuit, cable, microwave, broadband lines, fiber optics, satellite or wireless communication devices; audio conferencing; and video cassette, DVDs, and CD-ROMs, if the cassette, DVDs, and CD-ROMs are used in a course in conjunction with the technologies listed above.

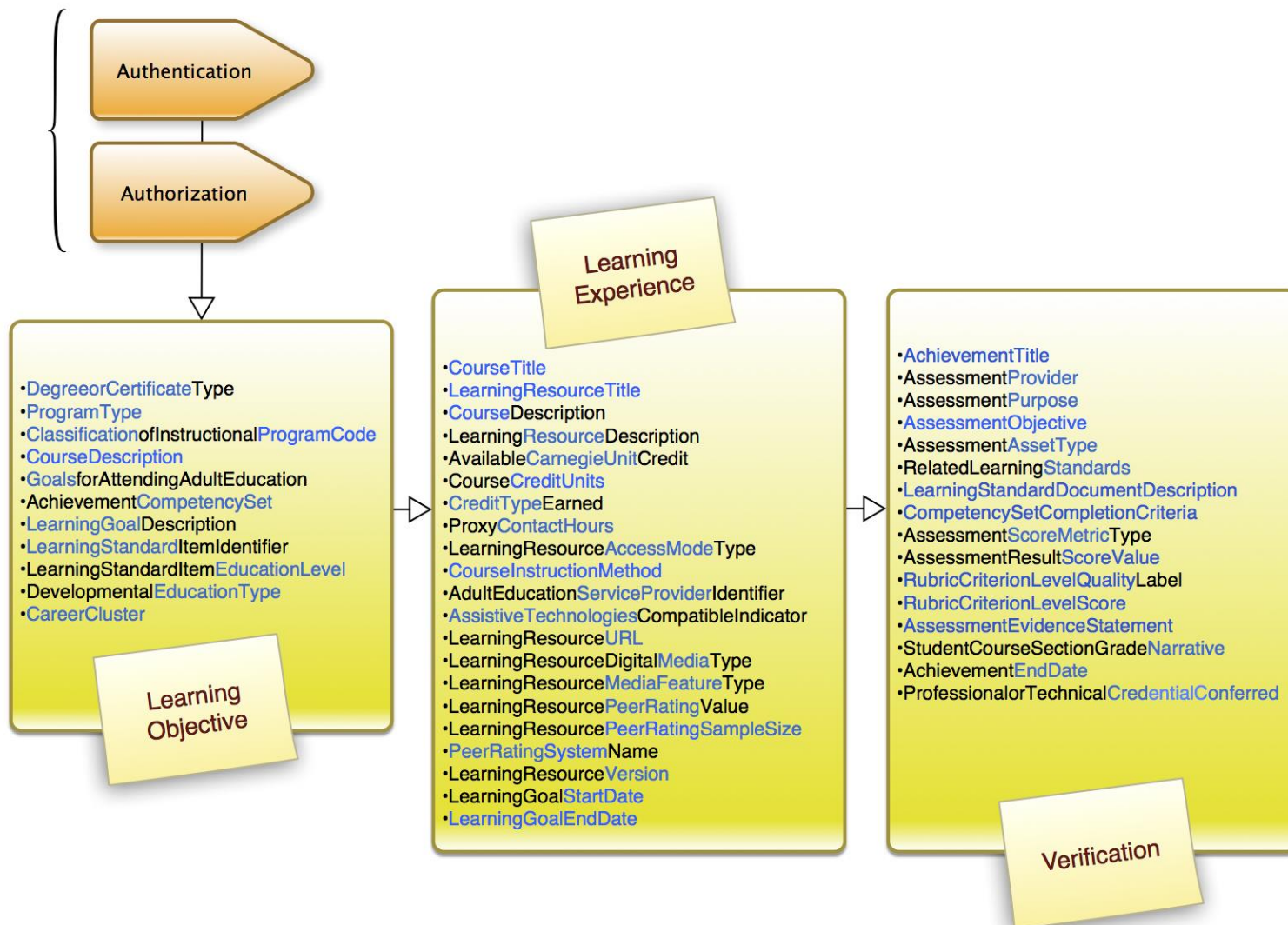
CEDS ERD for CBE Data Elements Related to Persons, Programs, and Awards

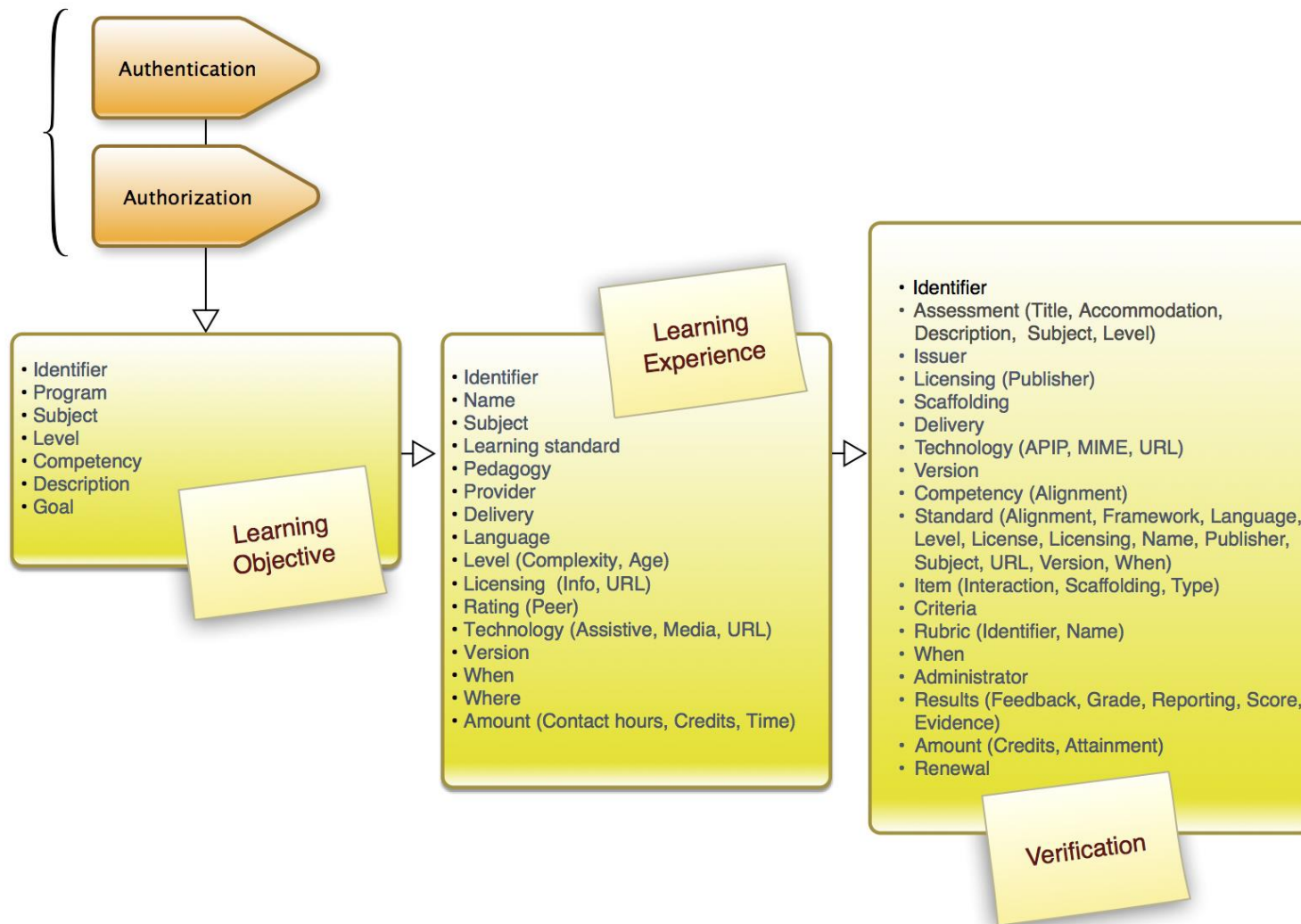
21



23







- CEDS informs this discussion of a CBE record standard & ET
- Lot of work already done on CEDS by IMS Global, PESC, SHEEO, IES, vendors, *you*, & others, especially on learning resource metadata, assessment, competency frameworks, & K12 domain
- There are standards to adhere to w/ continuous & categorical variable formats, domain entity data structures, complex table relationships
- Remember CEDS purpose, but use it to compare data structures, make sure you haven't missed anything, & rough out designs
- Assessment ERDs more complicated w/ design, rubrics, delivery, & results tied to learning standards and to learner goals, activities, & achievements; aligned w/ IMS Global APIP™
- Achievement ERDs more complicated now than just degrees & certificates, w/ clusters of competencies for badges & new types of credentials & issuers; align w/ related IMS Global work

- Instead of talking about ETL from a transaction system to do reporting, this discussion leverages a longitudinal reporting model to jumpstart transaction system designs
- Usually the transaction systems drive reporting possibilities, where here reporting needs are driving the creation of a CBE record standard that is needed for emerging CBE systems
- CEDS has use cases, mostly for P-20 SLDS for policy analysis
- The ET work group's three bucket metaphor works as an approach to understanding basic CBE data requirements
- The ET is just another report structure
- The ET Reference Hierarchy is addressed in CEDS & the buckets
- CEDS illustrates how a course-based approach is outdated
- CEDS & CBE Record Standard helpful in designing a CBE system
- Taxonomies are still needed for CEDS & CBE systems beyond CIP, SOC, & NAICS related to competency frameworks

John Milam, Ph.D.
Executive Director
Knowledge to Work
Lord Fairfax Community College
173 Skirmisher Lane
Middletown, VA 22645
(540) 868-7249
jmilam@lfcc.edu
<http://lfcc.edu/k2w>



Knowledge to Work (K2W):

A Portal for Competencies and Individualized Learning

Lord Fairfax Community College (LFCC)

173 Skirmisher Lane

Middletown, VA 22645-1745

KnowledgeToWork.com

HigherEd.org

LFCC.edu



This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

This work was funded in part by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. This work was created by Lord Fairfax Community College (LFCC) and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.