Cross-Standards
LER Wrapper and Wallet

to provide guidance to implement an Interoperable Learner Records using a VC structure and learner wallet functionality, created in an open architecture for any given domain to use and extend depending on their use case.

December 9, 2020

Adapted from May 1, 2020 presentation with U.S. Chamber of Commerce Foundation. All slides are CC BY 4.0.
T3 Network Overview and Projects

Building the data and technology infrastructure of the future for the talent marketplace, where: 1) all learning counts; 2) competencies and skills are the new currency; and 3) learners are empowered with their data.
Domain Entity Schema

Domain Entity Schema (DES) provides a hierarchy of domains, entities, categories, and elements. It is intended for use primarily by people as an index to search, map, and organize elements in a logical way.
LER Wrapper/Learner Wallet Goals

Goals:
1. Draft a public domain specification for an LER wrapper and learner wallet—or minimum viable data elements to transport learner record data from system to system and/or to and from a learner wallet.
2. Post the draft specification on the LER Resource Hub as a protocol for LER pilots to test and use as they see fit and for data standards organizations to use and possibly adopt as they choose to.

Connection to T3 Network
- Map and Harmonize Data Standards Project
- Comprehensive Learner/Worker/Military Record Standards Project
- Management and Use of Individual-Level Data Records Project

Important Note: The draft domain specification embraces all standards (no preference) and does not require any changes to standards.
Interoperability Considerations: Transport

System to System

Sender
- e.g. Credential Issuer System, Employer System, etc.
- e.g. Employment Record, Transcript, Credential Assertion, Competency Assertion, etc.

Receiver
- e.g. Job Application System, College Application System, etc.
Interoperability Considerations: Transport

Sender
- e.g., Credential Issuer System, Employer System, etc.

Via
Self-Sovereign Learner Wallet
- Learner Wallet System (sender and receiver)

Receiver
- e.g., Employment Record, Transcript, Credential Assertion, Competency Assertion, etc.

- e.g., Job Application System, College Application System, etc.
Design Principles

General
- Keep it simple
- Save problems for later - do not raise controversies
- Support all standards in payload
- Use existing standards
- We are starting with a JSON-LD wrapper designed to be simple and as close to the W3C Verifiable Credential (VC) design pattern as is possible and practical

Learner Wallet
- Limit to functional specifications (the “what”)
- Do not prescribe specific technologies, architectures, protocols (the “how”)

LER Wrapper
- Informed by W3C VC
- Support all standards payloads
Interoperability Considerations

Different record types using different data and packaging standards* can share a secure container

* e.g.
  - IMS CLR (Open Badges, CASE, QTI, etc.)
  - HR Open (Applicant info, Work experience...)
  - PESC (Transcript, Certificate...)
  - A4L
  - ...other standards and data not yet in serialization standard.

Data sets at-rest in "file cabinet" or "vault" or in portable "wallet"
Minimum Functionality
The Learner Wallet must be able to:
1. **Receive** LERs
2. **Persist** Learning/Employment Records
3. **Select** Learning/Employment Records by querying the wallet data store (filter persisted Learner Records)
4. **Send** LERs
<table>
<thead>
<tr>
<th>Goal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Give entities, both human and non-human, the power to directly control their digital identifiers without the need to rely on external authorities.</td>
</tr>
<tr>
<td>Privacy</td>
<td>Enable entities to control the privacy of their information, including minimal, selective, and progressive disclosure of attributes or other data.</td>
</tr>
<tr>
<td>Security</td>
<td>Enable sufficient security for relying parties to depend on the LER verification and security model for their required level of assurance.</td>
</tr>
<tr>
<td>Proof-based</td>
<td>Enable LER subjects (learners) to provide cryptographic proof when interacting with other entities.</td>
</tr>
<tr>
<td>Discoverability</td>
<td>Make it possible for entities to discover LERs for other entities to learn more about or interact with those entities.</td>
</tr>
<tr>
<td>Interoperability</td>
<td>Use interoperable standards so LER infrastructure can make use of existing tools and software libraries designed for interoperability.</td>
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<tr>
<td>Portability</td>
<td>Be system and network-independent and enable entities to use their LER Metadata with any system that supports LERs and Learner Wallets.</td>
</tr>
<tr>
<td>Simplicity</td>
<td>Favor a reduced set of simple features to make the technology easier to understand, implement, and deploy.</td>
</tr>
<tr>
<td>Extensibility</td>
<td>Where possible, enable extensibility provided it does not greatly hinder interoperability, portability, or simplicity.</td>
</tr>
</tbody>
</table>

Adapted from: https://w3c.github.io/did-core/
Interoperability Considerations: Record Info

Different record types using different data and packaging standards can share a secure transport of portable data, if provided basic information such as:

1. **The Payload**: The content of the LER. Payloads can use different existing standards or models.

2. **The Wrapper Metadata**: Minimum info needed about “the Payload.”
   - a. Identifier
   - b. Issuer Identifier
   - c. Type
   - d. Date
   - e. Name
   - f. Description
   - g. Image
   - h. Proof of Control Identifier
   - i. Payload Type
   - j. Payload Format
   - k. Payload Encoding
   - l. Payload Compression
   - m. Payload Encryption
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# LER Wrapper

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## Proof (elements may vary with Proof type)

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LER Wrapper

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Proof (elements may vary with Proof type)

- **type**
- **created**
- **proofPurpose**
- **verificationMethod**
- **JWS**

Record

Proof of Control ID
LER Wrapper

Identifier | Issuer ID | Type

Name | Description | Image

Proof (elements may vary with Proof type)

- type
- created
- proofPurpose
- verificationMethod
- JWS

Record

Proof of Control ID

Payload

Payload Record

Payload Record includes all pertinent Data about the event related to the learner/employee in a format defined by a standard.
The LER Specification:

tinyurl.com/LERWrapper

https://drive.google.com/file/d/1RfdXAUNhp0kluD9htpb8c_Tg2dLm2QcJ/view

T3 Network webpage: uschamberfoundation.org/T3-Innovation
LER Resource Hub: lerhub.org

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Deputy Director
American Association of Collegiate Registrars and Admissions Officers, USA
Agenda

- Lessons Learned from the Pandemic
- New Developments
- Discussion: Expanding Access
Digital Mobility: Lessons Learned from the Pandemic

*Even well-resourced countries and institutions were not ready*

“Alternative online service developed in response to Covid-19 - July 15, 2020
A new service will be launched shortly to enable electronic transcripts to be issued securely to third parties via Portico on request by students. This service has been developed to replace the printed transcript service that was suspended when offices closed in response to the Coronavirus (Covid-19) outbreak.”

“COVID-19 Update
Due to the current Covid-19 pandemic, paper documentation cannot currently be produced. We have implemented a digital option for official transcripts, but these delays have caused significant backlog that we are working on.

Printed official transcripts will not be available until further notice.”
Digital Mobility: Lessons Learned from the Pandemic

Even well-resourced countries and institutions were not ready

Official Transcript Printing & Delivery in the early days of the pandemic:
64% were printing transcripts on campus even though the campus is closed for normal business
13% are being printed at home by a staff member
43% are experiencing a delay in outbound printed transcripts
56% say the delay is less than one business week Official Transcript Delivery and Receipt.

In direct response to COVID-19:
34% of those who receive high school transcripts for any purpose were making changes
21% making changes to how official college transcripts are received
24% are considering changes to how they delivery official college transcripts
“Half of the total number of learners — some 826 million students — kept out of the classroom by the COVID-19 pandemic, do not have access to a household computer and 43% (706 million) have no internet at home, at a time when digitally-based distance learning is used to ensure educational continuity in the vast majority of countries.”

“...in sub-Saharan Africa, 89 per cent of learners do not have access to household computers and 82% lack internet access.”

Digital Mobility: Lessons Learned from the Pandemic

Higher Education must (continue to? Accelerate?) Embrace Innovation

Inspired by the 2014 GDN meeting in DC “Introducing the Digital Student Data Ecosystem”

“Digitisation is understood as... digitisation of student data and as digitisation of parts of the credential evaluation process.”

European Qualifications Passport for Refugees
Digital Mobility: Lessons Learned from the Pandemic

We must increase the percentage of learners who have access to digital mobility tools.

We have evidence of a number of successful global projects. We need more.

The time to commit resources is now, before the inevitable next crisis.
Impact of the Pandemic

- Cancellation of the in-person annual meeting
  - Passing of the By-laws
  - Webinar series
- Building for the future
• Updated look and feel
• Signatory benefits
  ✓ Login
  ✓ Directory
• Digital Signatory application process
Harnessing Resources: New Opportunities to Engage

Patronage
- Minimum 3-year commitment
- Substantive financial commitment
- Support the sustainability of the GDN’s access mission

Advisory Board
- Recognition of thought leadership in the digital mobility space
- Gain a stronger advisory voice in strategic direction of GDN initiatives
Looking forward to 2021

GDN Annual Meeting moved to 13-15 October 2021
Questions / Discussion
Introduction to PESC: IEEE LTSC & W3C

Jim Goodell
Kim Hamilton Duffy
Simone Ravaioli (moderator)
DATA STANDARDS UNITED FOR LIFELONG LEARNING AND EMPLOYMENT

**Vision**
Collaborate and align standards to support the global education and workforce digital ecosystem.

**Charter**
Establish a "common ground" mechanism to coordinate and align disparate global data standards while respecting each organization's independence across systems, platforms, networks, sectors, and industries, produced, or supported by the respective standards bodies.

**Mission**
Establish a sustainable collaborative of Data Standards Development Organizations (SDO) and their stakeholders across education, employment, and training sectors.

**CORE VALUES**
Organizations within Data Standards United, will abide by the following core values:

1) **Free access to data standards.**

2) **Transparent, voluntary, consensus-based standards development, approval, and maintenance processes.**

3) **Public support of the Data Standards United collaborative and lifelong learning and employment standards.**
Learning Technology Standards Committee (LTSC)

The LTSC follows an open and transparent formal standards development process and fully supports the IEEE's sponsorship of the OpenStand Initiative. We coordinate with other organizations, both formally and informally, that produce specifications and standards for learning technologies. We welcome new members who can volunteer their time and expertise to help understand and solve product interoperability issues caused by the rapid advance of new learning technologies. Please contact the LTSC Secretary or a relevant Work Group Chair if you are interested in participating.

LTSC Officers

- Chair - Richard Tong
- Vice Chair - Jim Goodell
- Secretary - Brandt Redd
- Treasurer - Shelly Blake-Plock

To contact the officers, please email ltsc@ieee-ltsc.org

LTSC Work Group Chairs

- Child and Student Data Governance Working Group (P7004) - Marsali Hancock - marsalih@gmail.com
- Learning Analytics Working Group (P7403) - Lisa McPherson - lmcp0003@george.mary.com
ILR vs LER vs WTF
Logical Component Framework

Universal Architecture. Any ecosystem requires common components to fulfill the universal scenario.

1. Collaboration Tools - Services such as WeliLibrary and Brighthive that support collaboration between stakeholders, generate governance frameworks, and data trust governance.
2. Shared Registries:
   a. Trust Registry Service
   b. Trusted Accreditation Organization
   c. Skill Crosswalk Service
   d. Resource Services
   e. Credential Services
   f. Revocation Services
3. Achievement Assertion Tool - Services that enable learners or instructor/evaluators to initiate claims of achievement (skill, credential, etc) with evidence that result in assertions.
4. Credential Publisher - Services that enable achievement assertions to be wrapped in credentials that are cryptographically signed onto distributed ledgers for verification from requestors
5. Universal Wallet - Services that enable learners and their adult guardians to subscribe, curate, and control access to achievement assertions and other credentials.
6. Universal Validator/Requestor - Services that enable credential requestors to view and validate credentials.
7. Skills Lab - Credential currency exchange deployment services not covered above to complete the ecosystem
The ILR Recommended Practices [1484.2] provides best practice guidance for learner records related to:

- Identity and Trust
- Open Ontology References
- Verifiable Assertions
- Integrated learner record payloads supporting the spectrum of formal or informal education and workplace learning, and military learning records.
DNA of the work

• Informed by the W3C VC specification as suggested in the ILR Wrapper spec - *The Envelope*

• Drilling down inside the wrapper by investigating and modeling different types of Educational Verifiable Credentials’ payloads - *The Letter*

• Liaising with other standardization bodies like PESC, HR Open, A4L, CEDS, ADL, Medbiquitous, W3C, ISO, IMS Global, CEN...

• Seeking out inclusive international contribution from outside North America, namely Europe and Asia.
A primer: The ILR wrapper spec

Putting lifelong learning records in a digital wallet
W3C Credentials Community Group

• Standards Incubation
• Broader charter, draft standards, but not SDO
  • We create draft standards and work with SDOs that can help bring the specs to maturity
  • We solidify with reference implementations, use cases
• VC-EDU Task Force
• Closely aligned with IEEE LTSC
• Modeling Educational Verifiable Credentials
What do we mean by “credential”? 
Verifiable Credentials Ecosystem

- **Issuer**
  - Issues
  - Issue Credentials
  - Verify Identifiers and Use Schemas

- **Holder**
  - Acquires, Stores, Presents
  - Send Presentation
  - Register Identifiers and Use Schemas

- **Verifier**
  - Requests, Verifies
  - Verify Identifiers and Schemas

- **Verifiable Data Registry**
  - Maintain Identifiers and Schemas
LER Wrapper

- How to verify the credential
- Whether the issuer is authentic
- How to verify the learner
- Credential status information
- Vocabulary/taxonomies used in the credential
Question:
EdExchange but with SSI?
The following workgroups are presently active within the LTSC:

- Adaptive Instructional Systems (AIS) (P2247)
- Augmented Reality Learning Experience Model (AR-LEM) (P1589)
- Child and Student Data Governance (CSDG) (P7004)
- Collaborative Edge Computing (CED)
- Conceptual Model for Learning Technology Systems (CM4LTS) (P1484.1)
- Computer-Managed Instruction (CMI) (P1484.11.2 P1484.11.2)
- Digital Literacy, Skills and Readiness (DLSR) (P3527.1)
- Experience API Base Standard (xAPI) (P9274)
- Explainable Artificial Intelligence (XAI) (P2894)
- Federated Machine Learning (FML) (P3652.1)
- Interoperable Learner Records (ILR) (P1484.2)
- Learning Object Metadata (LOM) (P1484.12)
- Mobile Learning Platforms (Mobile) (P7919.1)
- Recommended Practices for Defining Competencies (P1484.20)
- Resource Aggregation Models for Learning, Education, and Training (RMLTWG) (P1484.13)
- Renewing SCORM Standards (SCORM) (P1484.11.1 P1484.11.2 P1484.12.1, P1484.12.3)
- Standard for Learning Metadata (LMeta) (P2881)
Introduction to PESC: IEEE LTSC & W3C

Jim Goodell
Kim Hamilton Duffy
Simone Ravaioli (moderator)

Thank You!
Who Are These People and Why Are They Talking to Me?

**Kim Bartkus** - Executive Director, HR Open Standards Consortium
   
   Interesting Kim Fact: Learned how to kayak last year

**Larry Fruth, Ph.D.** - Executive Director, Access 4 Learning (A4L)
Community/Student Data Privacy Consortium (SDPC)
   
   Interesting Larry Fact: Been in Vomit Comet AND Alvin Submersible

**Johmarx Patton** - Director, Educational Technology and
Standards/MedBiquituous, Association of American Medical Colleges (AAMC)
   
   Interesting Johmarx Fact: Recently restarted practicing Japanese calligraphy
Agenda – Or Questions to Answer:

What is the Current State Of Technical Standards in the Marketplace?

What is Data Standards United?

What Does It or Could It Do?

What is the Value-Add for MY Organization?

How Do I Get Involved If It Might Be a Fit for Us?
What is the Current State Of Technical Standards in the Marketplace?

It’s Messy!

And this is JUST K12.....
What is Data Standards United (DSU)?

**Mission:** Establish a sustainable collaborative of Data Standards Development Organizations (SDO) and their stakeholders across education, employment, and training sectors.

**Core Values:** Organizations within DSU, will abide by the following core values:

- Free access to data standards.
- Transparent, voluntary, consensus-based standards development, approval, and maintenance processes.
- Public support of the Data Standards United collaborative and lifelong learning and employment standards.

*Data Standards Organizations will adopt the charter organizationally*
What is Data Standards United (DSU)?

DSU is **NOT** a new organization but a **collaborative** to:

✓ **Promote transparency, harmonization, data linkages and communications on the usage of openly developed and freely accessible interoperability standards.**

✓ **Determine levels of compatibility between data standards; identify opportunities for further alignment, convergence and partnerships; and develop better understanding of each stakeholder’s role across education, employment and training sectors.**

✓ **Inventory, share, and map/crosswalk data standards, models, taxonomies, vocabularies & schemas.**

✓ **Support various projects brought to the community and produce agreed upon communications, documentation, outputs, tools and artifacts for use and adoption.**
What Does It or Could It Do? Real World Examples

Collaboration with HR Open and T3 Network

• *The Employment and Earnings Records Standard*
  — Addresses reporting of employee’s employment and earnings records to the government
  — Explains how records can be better used by employers, government, and public-private data collaboratives in support of workforce analytics

• *The Job Data Exchange (JDX)*
  — Refine job posting standard in coordination with HR Open Standards, USCCF, Schema.org, and Credential Engine
  — Converted to JSON-Schema and XML and hosted by HR Open Standards to promote adoption and allow continued maintenance
Background: HR Open Scope

* Talent Management includes Succession Planning, Competency, Learning and Performance Management

Property of HR Open Standards Consortium
What Does It or Could It Do? Real World Examples

PESC and SIF High School Transcript
• Collaboration with co-habitation of each group to align deliverables
• PESC – “we are HE and here is what we want”
• A4L/SIF – “we are K12 and here is what we have to give”
• 95% congruence between the two work products!

JSON Task Force
• A4L Community and PESC partnered to further the development of JSON usage in their approved open standards and specifications.
• This collaborative identified rules for creating a programmer friendly JSON from XML defined data.
Background: A4L Community

The A4L and SDPC Communities help schools and marketplace providers establish “connected, secure and effective learning ecosystems”™

Student Data Privacy Consortium (SDPC) goals

- Establish a Community of Stakeholders
- Tools and Resources
- Leverage Partnerships
- Identify projects that have on-the-ground and real-world impact
- Develop a clearinghouse of student data privacy operational issues

SIF INFRASTRUCTURE (global)

SIF DATA MODEL (Australia)

SIF DATA MODEL (New Zealand)

SIF DATA MODEL (North America)

SIF DATA MODEL (United Kingdom)
What Does It or Could It Do? **Real World Examples**

Creating a new standard alone or in collaboration

- No data exchange standard currently exists for sharing immunizations and CPR training, key pieces of a digital credential for healthcare professionals and learners
- Is there something that already exists?
- Can we collaborate on a new standard?

- Two simple questions but a powerful set of responses
  -- Community of Practice
Background: MedBiquitous

Health Professions Education is undergoing a dramatic shift:

- Digital transformation of teaching and learning
- Digital transformation of education administration
- Digital transformation of licensure, credentialing and certification
- Digital transformation of healthcare

**AT THE SAME TIME!**

Three key aspects to the MedBiquitous Program:

- A community of health professions educators and technology innovators.
- A process to develop, approve, and disseminate health professions education data standards.
- A collection of open, health professions education and credentialing data standards and technology guidelines.
**Value Proposition**

- Add your organization’s expertise and public support for a seamless, lifelong learning infrastructure via sustainable standards.
- Be a part of an open forum for emerging and innovative technologies and business applications wishing to work within a standards environment.
- Promote existing standards-based solutions while not disrupting current investments in technology and systems.
- Foster an understanding in each stakeholder’s role across education, employment and training sectors and to leverage each other’s work.
Next?

Organizational:
• Establish additional “rules of the road” for the gatherings

Projects:
PESC JSON Transcript Workgroup
• Launch Wednesday January 27, 2021 Noon EST
• Free & Open (Voting Restricted to PESC Members)

Standards Registry & Repository
• Upgrade on the Horizon
• Partnerships & Collaboration
How Do I Get Involved If It Might Be a “Fit” for Us?

STANDARDS BODIES
• Review and sign charter acknowledging your organization agrees with the collaboration’s mission and values
• Participate in meetings to work with colleagues on projects and share ideas

OTHER SUPPORTERS
• Participate in meetings to work with colleagues on projects and share ideas
• Engage others about questions/strategies on your data needs
Questions and To Find Out More

Top of Mind Opportunities?

Start of a Web Presence for Collaboration
https://datastandardsunited.org/contact-us

Come Help Form the Community and Get the Latest!

Next Call: Wednesday, January 13 at 12ET
Send contact info to Ifruth@a4l.org