Improving the Talent Marketplace through the Application of Web 3.0 Technologies

March 7, 2018
Agenda

- Project Background and Overview
- Convergence Opportunities for Web 3.0 Technology Applications
- Vision, Guiding Principles, and Proposed Work Groups
- Work Group Discussion
- Exploring Implications for a Public-Private Infrastructure
- Next Steps
Project Background and Overview
Project Overview

- Explore how the convergence of Web 3.0 technologies can be used to improve the talent marketplace.

- Identify where and how data interoperability and harmonization can be achieved between multiple vendor tools and systems used by employers, learners, and universities and colleges.

- Explore convergence and interoperability opportunities with a special focus on competencies and credentialing;

- Explore implications for a new public-private data and technology infrastructure; and

- Develop a vision, guiding principles, and a roadmap including next steps for pilot-testing the most promising use cases and applications.
Improving the Talent Marketplace

Interoperability/Harmonization
Technical Standards

Trust
Distributed Ledger Technologies
Smart Contracts

Analytics
Artificial Intelligence
Machine Learning
Big Data Analytics

Transparency
Semantic Web Technologies
Innovation Landscape

Supply-side Innovation
Student and Educator Applications

- Student Information Systems
- Catalog Systems
- Transcript Systems
- Badging Systems
- Assessment Systems
- Portfolio Systems
- Career Guidance Systems
- Web Content Systems

Demand-side Innovation
Worker and Employer Applications

- Career Sites
- Job Posting Systems
- Recruitment Systems
- Applicant Tracking Systems
- Human Resource Information Systems
- Resume Systems
- Web Content Systems
Supply/Demand Side & Technical Silos

Distributed Cryptographic Ledger Technology

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<tr>
<th>Colleges &amp; Universities</th>
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<th>Workers</th>
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Analytics / Artificial Intelligence

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Semantic Web Inferencing & Linked Data

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Other Web 3.0 Technologies

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Technical Standards Landscape

- W3C
- Schema.org
- Credential Engine
- DCMI
- ... (omitted)

- Workers
- Employers
- Learners
- Universities & Colleges

- HR Open Standards
- CEDS Standards
- IEEE LTSC Standards
- IMS Global Standards
- PESC Standards
- MedBiquitous Standards
- ... (omitted)
What is Web 3.0 Convergence?

- Leveraging two or more Web 3.0 technologies:
  - Semantic web standards (e.g., Linked Data)
  - Distributed ledger (e.g., blockchain)
  - Artificial intelligence, machine learning, large-scale data analytics
  - Other
- Applications that strengthen connections and transform business processes between employers, universities and colleges, learners (students, workers) and government.
Convergence Opportunities

Distributed Ledger Technology

Semantic Web Inferencing & Linked Data

Analytics / Artificial Intelligence

Other Web 3.0 Technologies
Why Web 3.0 Convergence and Interoperability Now?

• Improved interoperability is needed across the end-to-end talent sourcing process.
• Empowering students and workers to manage their own information can be enhanced by Web 3.0 technology convergence on both the demand and supply sides.
• Breakthrough innovations can best be achieved by collaborative initiatives that focus on high-impact stakeholder use cases providing Web 3.0 technology convergence opportunities.
Convergence Opportunities for Web 3.0 Technology Applications
Semantic Web Convergence Opportunities

• Current applications
  • Demand side—Job postings (e.g., Job Registry)
  • Supply side—Credentials (e.g., Credential Engine) and professional profiles
  • Government—Transparency and data access

• Possible convergence opportunities
  • Search and discovery and verifiable claims
  • Competency development, comparison, and analysis
  • Sharing student/worker data across the talent sourcing process
Distributed Ledger Convergence Opportunities

- Current applications
  - Demand side—Self-sovereign data management, talent sourcing and verification, and payroll
  - Supply side—Self-sovereign data management, credential verification, and data reporting
  - Government—Self-sovereign data management and public-private data management

- Possible convergence opportunities
  - Self-sovereign data management—open web, transactions, and public-private data infrastructure
  - Data standardization across the talent sourcing process
  - Work history verification and analytics
AI, Machine Learning, and Data Analytics Convergence Opportunities

• Current applications
  • Demand side—Performance analytics and sourcing
  • Supply side—Student outreach, enrollment, completion management, and student services
  • Government—Government agency and program services and information access

• Possible convergence opportunities
  • Improved search and matching of career/education opportunities
  • Development, comparison, and analysis of competency data
  • Managing access and use of individual-level data
Vision, Guiding Principles, and Proposed Work Groups
Proposed Principles for Exploring Convergence Opportunities and Implications for a Public-Private Infrastructure

- Principle 1: Focus on High-Impact Stakeholder Use Cases
- Principle 2: Promote Web 3.0 Convergence
- Principle 3: Foster Open Collaboration
- Principle 4: Develop Open Technical Standards and Protocols
- Principle 5: Utilize Open Competency Frameworks, Taxonomies, and Ontologies.
- Principle 6: Empower Individuals and Enable Self-Sovereign Identity and Data Management.
- Principle 7: Facilitate Open Data Access in Public-Private Data Management
- Principle 8: Promote Ethical Practices
Proposed Work Groups Focused on Convergence of Web 3.0 Technologies

**Work Group 1:** Stakeholder Use Cases for Achieving Breakthrough Innovations

**Work Group 2:** Exploring Sustainable Data Standards Convergence

**Work Group 3:** Developing and Analyzing Competencies

**Work Group 4:** New Architectures and Uses of Linked Individual-Level Data
Work Group Discussion
Work Group 1: Stakeholder Use Cases for Achieving Breakthrough Innovations

Objectives

● Identify the highest-impact stakeholder use cases where Web 3.0 technology convergence could improve interoperability and achieve breakthrough innovations in:
  ○ Employer signaling of hiring requirements including competencies and credentials
  ○ Talent sourcing including recruitment, screening, verification, and hiring
  ○ Learners pursuing careers, education, and credentialing opportunities
  ○ Universities/colleges improving the delivery of services to employers and learners
● Identify challenges and issues that should be addressed in the technical work groups.
● Identify performance metrics for evaluating the potential impacts.

Possible Participants

● Employer HR professionals and universities and colleges
● Other interested stakeholders, including technology vendors
Work Group 1
Background and Possible Topics

Background
● Many promising stakeholder initiatives to explore how one or more Web 3.0 technologies can be used to address critical use cases on demand and supply sides.
● Need to identify high-impact use cases that could improve interoperability and achieve breakthrough innovations.

Possible Topics
● How to improve employer signaling of hiring requirements with a special focus on competencies and credentials
● How to improve employer, university and college, and student/worker communication and connections in talent networks
● How to improve data access and use for performance analytics
● How to improve the sharing and use of job candidate data in the talent sourcing process including outreach, screening, verification, and hiring
Work Group 2: Exploring Sustainable Data Standards Convergence

**Objectives**
- Identify stakeholder use cases that require additional data standardization and/or improved data standards harmonization.
- Develop plans and identify pilot projects for improving data standardization.

**Possible Participants**
- Technical standards organizations and technology vendors
- Other interested stakeholders
Work Group 2: Background and Possible Topics

Background

● One major challenge in improving interoperability and promoting the convergence of Web 3.0 technologies is the harmonization of data standards. Some data standards organizations are working together to crosswalk data standards that are relevant to convergence opportunities.

● There may be potential for the Credential Data Ecosystem Mapping Team to expand their scope in support of convergence opportunities.

Possible Topics

● How to improve data standardization in competencies and competency frameworks and related information needed by AI and data analytics applications

● How to improve harmonization of data standards bridging supply- and demand-side needs of learners, universities and colleges, workers and employers
Technical Standards Landscape

- W3C
- Schema.org
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- DCMI
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- Employers
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- PESC Standards
- MedBiquitous Standards
- …
Work Group 3: Developing and Analyzing Competencies

Objectives
● Identify stakeholder use cases that require improvements in how competencies are developed and analyzed.
● Develop plans and propose pilots of how SW and AI technologies can be used to improve the development and analysis of competency data.
● Create a set of marquee examples
● Explore grass roots vs top-down competency generation and implementation in curriculum

Possible Participants
● Competency, SW, AI, machine learning and natural language processing experts
● Disciplinary associations
● State departments
● Technical standards organizations and technology vendors
● Employers, HR professionals, military stakeholders and other interested stakeholders
Work Group 3: Background and Possible Topics

**Background**
- Major stakeholder use cases have the potential to drive innovation that require improved development and analysis of competency data.
- Competency data is found in a wide variety of formats (e.g., text), documents, and datasets across application domains (e.g., HR, SIS, ATS).
- The development and comparison of competency lists and frameworks remains largely an expensive, time-intensive endeavor done by experts for very specific applications.

**Possible Topics**
- Enumerate potential barriers to implementation
- Employer search and discovery of credentials, education and training programs to address changing competency requirements
- Matching job competency requirements to competencies in credentials, applicant resumes and learner records
- Generating real-time labor market information on changing employer competency requirements
- How to ensure we are building on prior work and current processes
Interoperability and Usability

5 Star: Open competency data is linked to other organization’s data to provide talent marketplace context

4 Star: Open competency data only uses semantic standards from W3C and identifies things with URIs

3 Star: Open competency data uses open formats instead of proprietary formats

2 Star: Competency data is structured and machine-actionable using any format

1 Star: Competency data openly available on the Web in any form with an open license

Benefits of W3C 5-Star Linked Open Data

Cost and Analysis Overhead

Interoperability and Usability

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Machine-Actionable Competency Frameworks: Generation, Enhancement, Analysis, Comparison, & Linking

Artificial Intelligence
Machine Learning

Documents & Document Stores

Distributed Cryptographic Ledgers

Databases, Graph and Triple Stores

Semantic Web Linked Data

Generate
Enhance
Compare
Analyze

5 Star Linked Competency Data
Work Group 4: New Architectures and Uses of Linked Individual-Level Data

Objectives
- Identify stakeholder use cases that have major implications for new data verification architectures and protocols.
- Review existing and emerging trust architectures in relation to the use cases and identify key limitations and challenges.
- Identify pilot projects and key stakeholders capable of demonstrating new trust architectures that enable new uses of individual-level data.
- Identify capabilities that enable changes to the use of individual-level data.
- Focus on incremental use case.
- Identify what is out of bounds.
- Focus on starting from a technology agnostic point of view.
- Delineate issues of student privacy, security, and record fidelity.

Possible Participants
- Technology experts in distributed ledgers, secure multi-party computation, and cryptographic systems and protocols
- Technology experts in Semantic Web and AI
- Government data system experts
- Technical standards organizations and education/employer technology vendors
- Other interested stakeholders
Work Group 4: Background

**Background**

- Currently, the collection, management and use of individual-level information is fractured across multiple systems with a few trusted intermediaries playing data aggregator roles.
- Emerging technologies—DLT, smart contracts, secure multi-party computation policies and legal structures—are changing what is possible with individual-level data.
- There is a need to focus on convergence opportunities.
Learner/Worker-centered Approach: Distributed Lifetime Verifiable Claims

- Student record
- Employment & Wage Record, Resume
- Student Transcript
- Employment & Wage Record
- Skills and Competencies
- UI Claims
- Workforce Case Management Record
- Third Job
- LOD, PII
- First Job
- PII, LOD
- College
- LOD, PII
- Second Job
- PII, LOD
- Government Agencies
- LOD, PII
- Technical Training
- LOD, PII
- Unemployed
- LOD, PII

Linked Open Data
Personally Identifiable Information

Distributed Lifetime Education & Work Record

Student record
Employment & Wage Record, Resume
Student Transcript
Employment & Wage Record Skills and Competencies
UI Claims Workforce Case Management Record
Student Record
Employment & Wage Record Skills and Competencies
Work Group 4: Possible Topics

Possible Topics

● What are the new architectures and protocols that require cross-sector convergence to demonstrate and bring to market?
● What are leading practices in linking individual-level data across blockchains and other related data systems?
● What are leading practices in multi-party computation?
● What research areas and developments intersect SW, DLT and AI technologies?
● When can these new architectures and applications be pilot-tested?
● Identify capabilities that enable changes to the way we use individual-level data
● Focus on incremental use cases
● Identify what is out of bounds
● Focus on starting from a technology agnostic point of view
● Delineate issues of student privacy, security, and record fidelity
● Explore implications for disruption of current systems and business models
● Look at international models for self-sovereign identity
Exploring Implications for a Public-Private Data and Technology Infrastructure
Implications for a Public-Private Data and Technology Infrastructure

- Public and private sector data and technology experts building on working group reports
- Public sector:
  - Federal education, workforce, and statistical agencies
  - State education, workforce, and statistical agencies
  - Education and workforce policy organizations
- Recommendations for review in next stakeholder forum
Next Steps
Next Steps Before Reconvening

• Revise vision, guiding principles, and work group plans.
• Establish work groups—two webinars each—and develop work group reports.
• Conduct meeting on a new public-private infrastructure.
• Conduct briefings with stakeholders, funders, and other partners.
• Develop draft project report.
Work Group Schedule

• Work Group 1: Webinars April 9th and April 24th @ 1:00 - 2:30 pm ET
• Work Group 2: Webinars May 16th and June 13th @ 11:00 - 12:30 pm ET
• Work Group 3: Expert Group May 4th, Webinars May 11th and June 6th @ 1:00 - 2:30 pm ET
• Work Group 4: May 17th and May 30th @ 1:00 - 2:30 pm ET
• Meeting On New Public/Private Infrastructure: July
• Final Stakeholder Meeting: September
Contacts

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