

T3 INNOVATION NETWORK

# PHASE 1 REPORT

Developing an Open, Public-Private Data  
Infrastructure for the Talent Marketplace

OCTOBER 2018



U.S. CHAMBER OF COMMERCE FOUNDATION

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## ABOUT OUR ORGANIZATIONS

The U.S. Chamber of Commerce Foundation is dedicated to strengthening America's long-term competitiveness. We educate the public on the conditions necessary for business and communities to thrive, how business positively impacts communities, and emerging issues and creative solutions that will shape the future.

The U.S. Chamber of Commerce is the world's largest business federation representing the interests of more than 3 million businesses of all sizes, sectors, and regions, as well as state and local chambers and industry associations.

Lumina Foundation is an independent, private foundation in Indianapolis that is committed to making opportunities for learning beyond high school available to all. The foundation envisions a system that is easy to navigate, delivers fair results, and meets the nation's need for talent through a broad range of credentials. Lumina's goal is to prepare people for informed citizenship and for success in a global economy.



## EXECUTIVE SUMMARY

The T3 Innovation Network (T3 Network) was established through the collaboration of the U.S. Chamber of Commerce Foundation and Lumina Foundation. It is an open innovation network that is working to promote and build an open, shared, and distributed public-private data and technology infrastructure for the talent marketplace. The T3 Network is made up of a diverse group of stakeholders, including employers, education, training and credentialing providers, technical standards organizations, technology vendors, government agencies, and others.

Its goal? To explore how the convergence of Web 3.0 technologies can be used to create a more responsive, dynamic, and equitable talent marketplace. The result? An empowered American student and worker (learner) who can leverage data and technology to better access and navigate opportunity in an increasingly data-driven talent marketplace.

Phase one of the T3 Network began in March 2018 with the creation of four work groups that explored stakeholder use cases in the talent marketplace, data standardization, competency development, and uses of linked individual-level data. Over seven months the T3 Network held a series of in-person and virtual meetings with more than 150 public and private organizations and institutions.

Phase two of the T3 Network will begin in 2019. This phase will focus on supporting the T3 Network's Guiding Principles, formalizing the engagement of participants, growing the diversity and global reach of the network, and implementing the 10 pilot projects outlined in this report.

This report summarizes and brings to a close phase one of the T3 Network. The report is divided into two parts. Part I focuses on the T3 Network's vision, guiding principles, and profiles the work groups. Part II highlights the T3 Network's recommendations, organized as a list of pilot projects that together provide the foundation for an open, distributed, public-private data infrastructure that supports access and opportunity for the American student and worker. The report concludes with next steps and acknowledgements.

Finally, we would like to thank all the organizations and professionals that contributed to the development and release of this report.

### POTENTIAL PILOT PROJECTS



**Pilot Project 1:**  
Data Standards Harmonization



**Pilot Project 6:**  
Competency Analysis and Translation



**Pilot Project 2:**  
Employment and Earnings Record Standards



**Pilot Project 7:**  
Learning Outcomes Exchange



**Pilot Project 3:**  
Learner Record Standards



**Pilot Project 8:**  
Government Use of Open Competency Data



**Pilot Project 4:**  
Public-Private Standards Development and Use by Government



**Pilot Project 9:**  
Data Collaboratives for Individual-Level Data



**Pilot Project 5:**  
Competency Data Exchange



**Pilot Project 10:**  
Empowering the American Student and Worker

# INTRODUCTION

Since January 2018, the U.S. Chamber of Commerce Foundation and Lumina Foundation have been working with employers, education, training providers, and credentialing providers, technical standards organizations, technology vendors, government agencies, and other stakeholders to explore how the convergence of Web 3.0 technologies can be used to create a more responsive, dynamic, and equitable talent marketplace.

These Web 3.0 technologies include semantic web (SW) standards (e.g., Linked Data), distributed ledger technology (e.g., blockchain), artificial intelligence (AI) (e.g., machine learning), and large-scale data analytics. Web 3.0 technology convergence is defined as the leveraging of two or more of these technologies in applications that strengthen connections and transform business processes between employers, education, training and credentialing providers, learners (students and workers), and government.

In March, the Chamber Foundation and Lumina Foundation released [a background paper](#) that identified Web 3.0 convergence opportunities to improve the current data and technology landscape across the talent marketplace.

That same month, a group of stakeholders met at Workday's offices in California to discuss the background paper and opportunities to work together to build a public-private data and technology infrastructure that will allow (1) employers to signal the skills they need, (2) learners (students and workers) to signal what they can do, and (3) educators to signal what people are being trained and educated to do.

Based on this meeting, phase one of the T3 Network was launched.

Phase one of the T3 Network began with [four work groups](#) organized to address what key stakeholders need to do to improve the functioning of the talent marketplace and better utilize Web 3.0 technologies to achieve breakthrough innovations.

Over seven months, these four work groups reviewed stakeholder use cases and technical challenges, identified promising pilot projects, and explored implications for a public-private data and technology infrastructure.

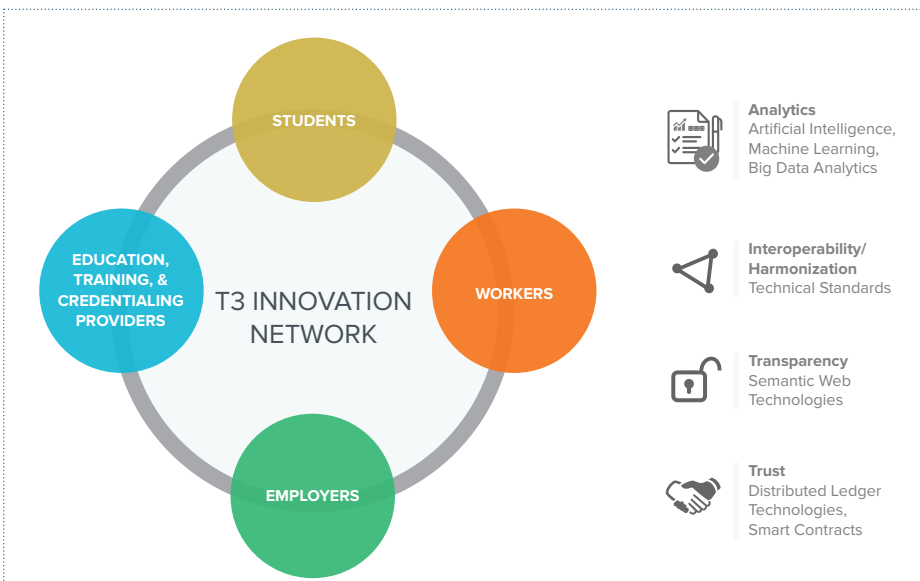
The results were shared with federal and state government agencies and related policy organizations at a meeting in July 2018 in Washington, D.C.

In August 2018, final reports were produced and shared publicly, outlining the findings and recommendations from each of the four work groups.

In September 2018, at LinkedIn's offices in New York City, the T3 Network convened to discuss potential pilot projects drafted by the four work groups that would begin to build a public-private data and technology infrastructure for the talent marketplace. After prioritizing those pilot projects, the group began to explore next steps, including participation in an online survey.

This report summarizes the work completed by the T3 Network to date, as well as the recommendations and results of that work.

Part I covers the vision and guiding principles of the T3 Network as well as the four work groups. Part II covers the pilot projects and concludes with next steps.



## VISION

A public-private, open, and distributed applications marketplace where employers, students and workers, education, training and credentialing organizations, and government agencies can exchange data and information that improve access and opportunity in the talent marketplace and empower the American student and worker (learner).

This vision can best be realized through an open innovation network of major stakeholders in the talent marketplace that embrace a common set of guiding principles.

## GUIDING PRINCIPLES

### PRINCIPLE 1: Focus on High-Impact Stakeholder Use Cases

Stakeholders should focus on high-impact stakeholder use cases that strengthen connections and transform business processes between employers, education, training and credentialing providers, government, and learners. These use cases should have clear performance metrics that clearly define expected improvements in the talent marketplace.

### PRINCIPLE 2: Promote Web 3.0 Convergence

Stakeholders should leverage the benefits of two or more advanced Web 3.0 technologies such that the value of the results is greater than either technology used alone.

### PRINCIPLE 3: Foster Open Collaboration

Systems and applications should be developed through open collaboration among stakeholders and members of the technology ecosystem. This collaboration should start small with a focus on minimum viable demonstrations that could lead to breakthrough innovations.

### PRINCIPLE 4: Develop Open Technical Standards and Protocols

Systems and applications are built on open data and technology standards that promote interoperability and the effective sharing of information throughout the talent marketplace. This includes metadata standards that enable the application of SW and AI applications.

### PRINCIPLE 5: Utilize Open Competency Frameworks, Taxonomies, and Ontologies

Systems and applications utilize open competency resources that promote transparency and enable the application of SW and AI applications in improving the development and comparison of competencies in the talent marketplace.

### PRINCIPLE 6: Empower Individuals and Enable Self-Sovereign Identity and Data Management

Systems and applications should be designed to empower individuals in the talent marketplace. Those that contain personal information enable self-sovereign management by the individuals whose data are stored in those applications. Users establish digital identities and have access and control of their identity attributes and other public and private information about them.

### PRINCIPLE 7: Facilitate Open Data Access in Public-Private Data Infrastructure

Enable users to make their information publicly available through multiple channels on the open Web, provide permissioned access to private information to conduct transactions, and provide greater access to de-identified individual-level information that can be used to improve guidance and transparency in the talent marketplace while protecting privacy and ensuring security.

### PRINCIPLE 8: Promote Ethical Practices and Equity Considerations

Stakeholders should develop and promote ethical standards and codes of conduct in managing access and use of data in the talent marketplace, including equity considerations.

# WORK GROUPS

The T3 Innovation Network established four work groups to address the most critical stakeholder use cases, technical challenges, and potential pilot projects. Following is an executive summary of each of the four work groups derived from their final reports.

## WORK GROUP 1: Stakeholder Use Cases for Achieving Breakthrough Innovations

Work Group 1 was charged with identifying the most important stakeholder use cases for achieving breakthrough innovations across all major stakeholders through the application and convergence of Web 3.0 technologies.

**WORK GROUP 1  
FINAL REPORT**

In addition, participants were asked to identify technical challenges, ethical issues, and performance metrics in addressing critical stakeholder use cases. Breakthrough innovations were held to the test of whether they could create shared value for all stakeholders and promote a more responsive, dynamic, inclusive, and equitable talent marketplace. They also needed to balance time, cost, and quality while improving market efficiency, economic opportunity, and diversity.

Work Group 1 participants emphasized that the technical challenges must be addressed with the full understanding that all major stakeholders have widely varying capacities in using data and technology, including small and midsize employers and types of postsecondary institutions, as well as students and workers from low-income and disadvantaged backgrounds.

Work Group 1 concluded by outlining the ethical issues that stakeholders should consider as it relates to promoting opportunity and diversity, digital access, self-sovereignty, privacy, and data security.

## STAKEHOLDER USE CASES

<b>Employers must be able to:</b>	<b>Learners (Students and Workers) must be able to:</b>	<b>Education, Training, and Credentialing Providers must be able to:</b>
<ul style="list-style-type: none"> <li>Signal hiring requirements</li> <li>Recruit qualified candidates</li> <li>Improve application processing through screening and verification</li> <li>Address onboarding and development concerns</li> <li>Use performance analytics to recognize top performers</li> </ul>	<ul style="list-style-type: none"> <li>Signal obtained competencies, credentials, and skills</li> <li>Search and discover career and education opportunities</li> <li>Manage application submissions, screening, and verification</li> <li>Streamline participation and transitions by managing personal information</li> <li>Use performance analytics to plan best career and learning options</li> </ul>	<ul style="list-style-type: none"> <li>Use employer signals to improve alignment with workforce and learner needs</li> <li>Search and discover changing hiring requirements and gaps</li> <li>Improve learner services to career readiness</li> <li>Align programs, credentials, and learner records</li> <li>Use performance analytics to update programs and credentials</li> </ul>

## TECHNICAL CHALLENGES

<b>Improving Search &amp; Discovery</b>	<b>Improving Application Processing &amp; Verification</b>	<b>Improving Performance Analytics</b>
<ul style="list-style-type: none"> <li>Use open linked data to access, analyze, and link to other data</li> <li>Improve verification processes for competencies, credentials, and work history</li> <li>Be able to develop and translate competencies</li> </ul>	<ul style="list-style-type: none"> <li>Align recruitment and applicant processing systems with those that manage learner records</li> <li>Improve the way competency requirements are communicated to stakeholders</li> <li>Streamline verification processes to be more cost and time efficient</li> </ul>	<ul style="list-style-type: none"> <li>Provide equal access to large-scale data and tools across national, state, and local talent markets to make more informed decisions</li> </ul>

## WORK GROUP 2: Exploring Sustainable Data Standards Convergence

Work Group 2 was charged with exploring data standards convergence opportunities with respect to the stakeholder use cases identified by Work Group 1.

WORK GROUP 2  
FINAL REPORT

Work Group 2 included members of the Credential Data Ecosystem Mapping Team (Mapping Team), a group of volunteers representing multiple North America-based data standards organizations that convene to map competency and credential data standards. The overall goal of the Mapping Team is to promote collaboration, interoperability, and harmonization among standardization initiatives related to the credential ecosystem by cataloging, sharing, and mapping data models, standards, and schema.

This collaboration will produce a common set of rules for the way data are described and recorded so that it can be more easily shared, exchanged, and understood by computers and online applications. Leveraging its expertise and building on its work to date, Work Group 2 established four next steps for the Mapping Team:

### 1. SCHEMA CROSSWALKS

Advance the current talent marketplace description language (schema) beyond credential and competency framework description languages to include: job descriptions, job openings, transcripts, resumes, profiles, portfolios, and comprehensive student records.

### 2. SCHEMA DEVELOPMENT

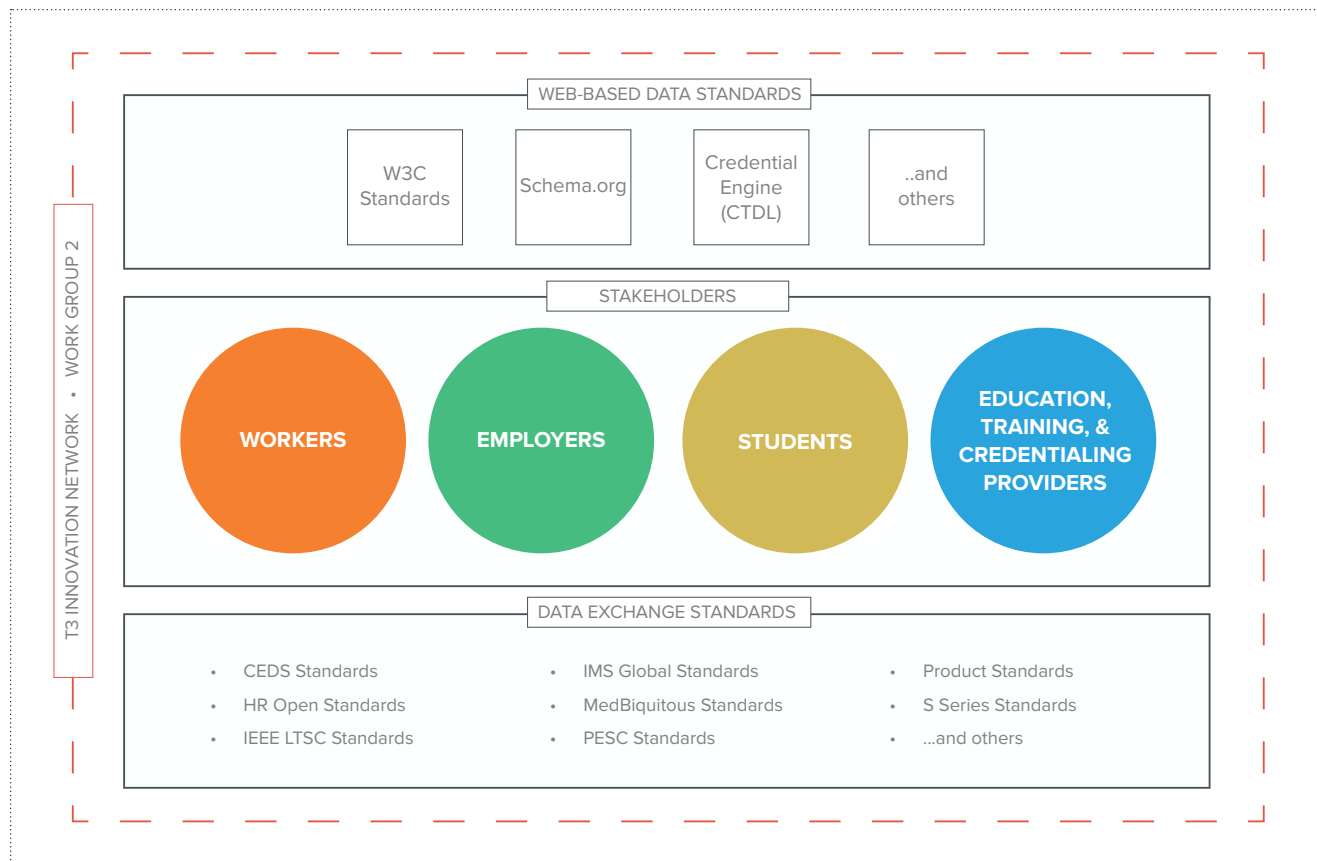
Identify description languages (schemas) that are necessary to the talent marketplace and are underdeveloped or not developed, including assessment.

### 3. PATHWAY TO HARMONIZATION

Develop a pathway for applications across the talent marketplace to exchange data with full data harmonization.

### 4. ENABLE ONGOING SUPPORT & EXPANSION

Provide support for staffing, hosting, online mapping, harmonization tools, and convenings.



### WORK GROUP 3: **Developing & Analyzing Competencies**

**WORK GROUP 3  
FINAL REPORT**

Work Group 3 participants reviewed the Work Group 1 stakeholder use cases and technical challenges and identified three categories of technical challenges and pilot project ideas to assess and improve the fit of competencies among employers, education and training providers, and learners (students and workers). This included analyzing how competencies are developed, translated, and aligned across stakeholders. It also explored how SW standards and AI can be used to improve the development and analysis of competency data.

Additionally, Work Group 3 participants recommended the development of an open, distributed competency data and technology infrastructure that could support an open application marketplace for employers, learners, and education, training, and credentialing providers. This infrastructure could support the translation of competency languages across all major stakeholders.

Work Group 3 was informed by an in-person expert meeting held in conjunction with the Postsecondary Electronic Standards Council’s (PESC’s) annual meeting in May 2018 in Washington, D.C.

Context Engineering	Socialization & Incentives	Training Data & AI Algorithms
<p>Characteristics of the competency framework environment complicate the task of creating, interpreting, translating, and comparing competencies by both humans and machines.</p>	<p>A number of challenges exist in both the public and private sectors (e.g., proprietary concerns, value proposition, lack of training) that under-incentivize talent marketplace collaboration to develop a more cohesive, contextualized, and linked competency framework ecosystem.</p>	<p>There is opportunity and potential for a globally linked ecosystem of competency frameworks. Any progress, however, will require a significant amount of time and expertise to interpret, align, and translate the unstructured or semi-structured data that exist to be machine readable for the talent marketplace.</p>





## WORK GROUP 4: New Architectures and Uses of Linked Individual-Level Data

Work Group 4 was tasked with building on the stakeholder use cases by exploring the potential for learners to be in charge of their own data records while improving verification of their personal data.

WORK GROUP 4  
FINAL REPORT

In addition, Work Group 4 identified implications for a public-private data and technology infrastructure that included the need for a public-private digital identity infrastructure, mechanisms for individuals to consent to and manage the sharing of their personal data, and standards and protocols for verifying claims about education and employment.

Work Group 4 participants also highlighted ethical considerations concerning data security, privacy, and equity along with identifying the following five categories for pilot projects.

Employer HR Technology	Education, Training, & Credentialing Providers	Learner (Student and Worker)
Explore how HR technology vendors could use distributed ledger technology to provide more complete and trusted verification of job histories provided by applicants.	Explore how multiple credential and transcript vendors could publish complete information about an individual to a network that could be accessed and verified from HR systems.	Explore how skills and competencies could be submitted by applicants and verified by educational institutions or potential employers.
Large-Scale Data Analytics	Employer and Government	
Develop a secure multi-party computation application prototype and prototypes that develop labor market indicators from multiple data sources.	Explore how HR technology vendors could provide more current and verified employment and earnings information for government programs.	



	HIGH SCHOOL	FIRST JOB: Retail	UNIVERSITY	SECOND JOB: Sales Manager	UNEMPLOYED: Workforce Counseling	TECHNICAL TRAINING: Coding Bootcamp	THIRD JOB: Product Manager
WHAT DATA ARE COLLECTED?	Student Educational Record (grades, attendance, etc.)	Employment and Wage Record Resume	Student Transcript Comprehensive Learner Record	Employment and Wage Record Skills and Competencies	State Department for UI Claims and Case Management System	Student Record	Employment and Wage Record Skills and Competencies
WHERE ARE THE DATA STORED/ MANAGED?	Student Information System (SIS)	Human Resources Information System (HRIS) Online	Student Information System (SIS)	HRIS System Payroll System Online Profile	State UI Database and Case Management System	SIS System Online Profile	HRIS System Payroll System Online Profile
WHO CONTROLS THE DATA?	School District	Employer	Institution of Higher Education	Employer	State Department for UI Local Workforce Agency	Training Program	Employer

# EXPLORING PUBLIC-PRIVATE COLLABORATION OPPORTUNITIES

The T3 Network organized a meeting in July 2018 at the U.S. Chamber of Commerce headquarters in Washington, D.C., to explore how federal and state governments can leverage the T3 Network to support the use of advanced Web 3.0 technologies that have the potential to improve the talent marketplace. The meeting convened government, private sector, and data experts to review the work group reports, discuss implications for public-private collaboration opportunities, and explore next steps for building a public-private data and technology infrastructure.

Meeting participants reviewed 15 federal government data and technology initiatives and related state government, private sector, and nonprofit initiatives. Participants then explored three key categories for public-private collaboration opportunities.

Public-Private Data Standards Collaboration	Competency Data Access, Analysis, and Translation	Accessing and Using Linked Individual-Level Data
<p>Attendees discussed building on Work Group 2 recommendations to expand federal and state government participation in public-private data standards collaboration and promote the use of public-private data standards in government data collection and sharing systems.</p>	<p>Attendees discussed promoting more public and private access and sharing of open structured competency data and contextual data to update government standard occupational classification systems (e.g., SOC) and occupational information data systems (e.g., O*NET).</p>	<p>Attendees explored collaboration opportunities to expand access and use of individual-level education, credentialing, employment, and earnings data. Additionally, there was discussion on how to align existing data standards for resumes and learner records to create more comprehensive learner records as well as explore how to provide more open access to aggregated outcome data for the full range of learning and credentialing opportunities at the program and credential level.</p>

# INTRODUCTION OF PILOT PROJECTS

The T3 Network organized a meeting in September 2018 at the LinkedIn offices in New York City to provide work group updates, explore potential T3 Network pilot projects, and discuss the future of the network.

The meeting brought together a diverse group of more than 125 stakeholders consisting of businesses, colleges and universities, technical standards organizations, technology vendors, and human resource (HR) professionals.

All participants were briefed on 12 potential pilot projects that would lay the foundation for an open, distributed data and technology infrastructure for the talent marketplace. Meeting participants voted to prioritize the pilot projects and later responded to a survey to further refine the T3 Network's priorities and next steps.

Based on work group reports, public-private collaboration meetings, and additional project ideas, ten pilot projects were selected for further exploration. These pilot projects were identified based on four major criteria:

1. **High Impact**—The project has the potential to directly address the most critical stakeholder use cases or provide the necessary foundation for other projects to be successful in addressing these use cases (see Principle 1).
2. **Feasible**—The project could be implemented today given existing Web 3.0 and related technologies.
3. **Stakeholder Commitment**—The project has sufficient support by one or more T3 network participants.
4. **Guiding Principles**—The project is consistent with the T3 Network guiding principles.

## PILOT PROJECTS



**Pilot Project 1:**  
Data Standards Harmonization



**Pilot Project 6:**  
Competency Analysis and Translation



**Pilot Project 2:**  
Employment and Earnings Record Standards



**Pilot Project 7:**  
Learning Outcomes Exchange



**Pilot Project 3:**  
Learner Record Standards



**Pilot Project 8:**  
Government Use of Open Competency Data



**Pilot Project 4:**  
Public-Private Standards Development and Use by Government



**Pilot Project 9:**  
Data Collaboratives for Individual-Level Data



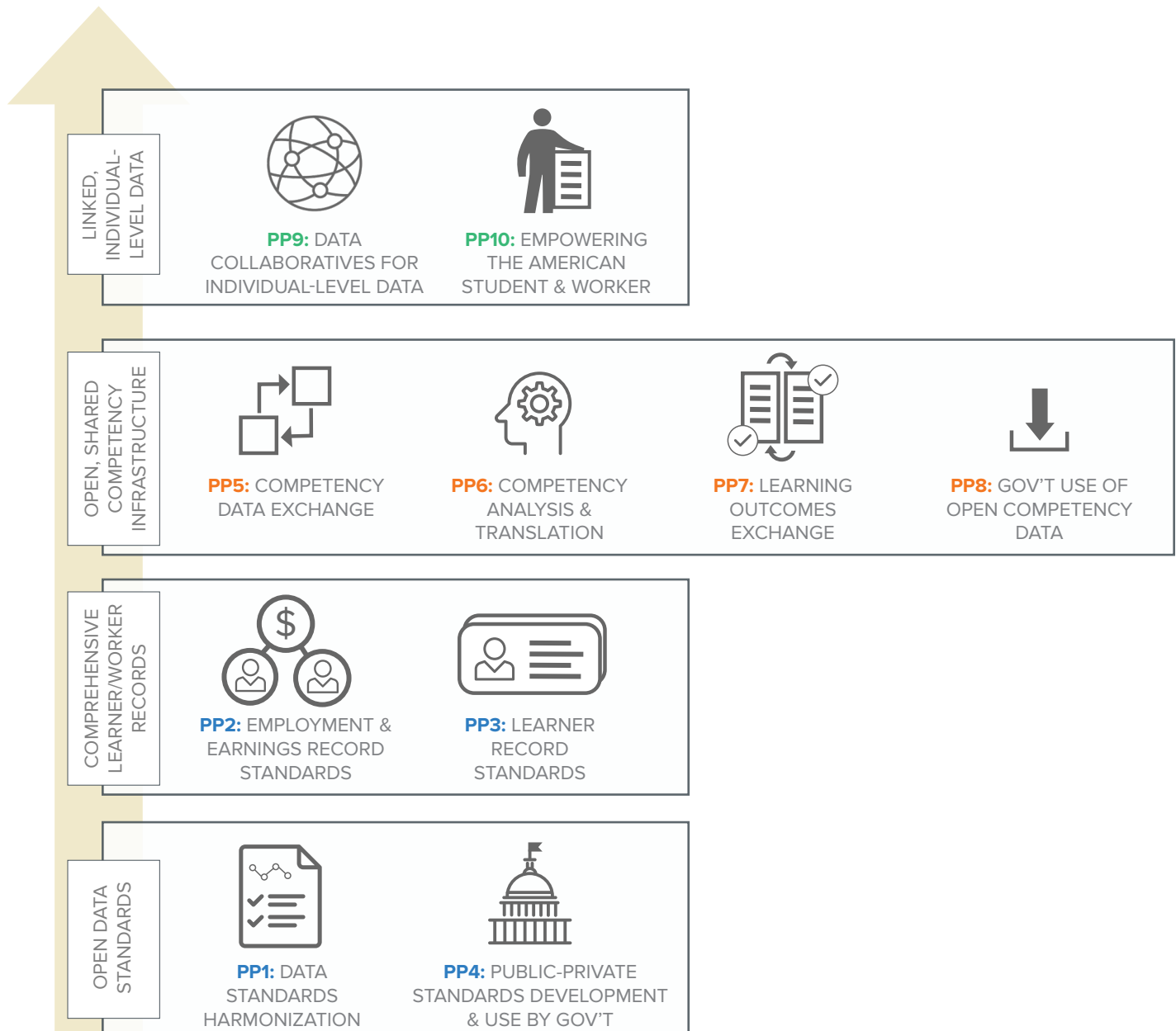
**Pilot Project 5:**  
Competency Data Exchange



**Pilot Project 10:**  
Empowering the American Student and Worker

# RELATIONSHIP BETWEEN PILOT PROJECTS

The image below shows how all of the T3 Innovation Network pilot projects are related and build off each other to create the open, public-private data and technology infrastructure of the future.



## PILOT PROJECT 1 (PP1)

### Data Standards Harmonization

#### PUBLIC-PRIVATE DATA STANDARDS CONVERGENCE AND HARMONIZATION



Support Public and Private Standards Organizations in Providing Data Format Options for Data Exchange and the Web

### PROBLEM STATEMENT

There are information gaps in the commonly used data standards needed by stakeholders, and the practices within communities do not consistently produce machine actionable data. The data standards gaps and lack of ability to move data seamlessly across systems suppress access to data that are critical to improving the talent marketplace.

### PROJECT SUMMARY

Work with data standards organizations and communities of practice to address the most critical stakeholder needs to support search and discovery of open jobs, hiring requirements for those jobs, and the skills and competencies that students and workers possess through linking data over the Web as well as moving data between closed systems. This pilot project will address gaps and differences with data standards, expand data exchange standards to include data descriptions enabled for the Web, and work to harmonize data across existing standards for data.

### PROJECT TASKS

- Develop a sustainable data standards work group of willing organizations responsible for developing and maintaining international standards that support the talent marketplace (e.g. education and training, human resources and workforce development, credentials and competencies, and government reporting)
- Determine and provide the support and tools needed to enable ongoing data standards mapping that results in openly licensed, public information
- Convene work groups to focus on specific use cases with representation from a diverse group of stakeholders that use the data standards
- Provide micro services through an open public-private infrastructure to host data mapping and work group outputs for harmonizing data standards
- Promote the data standards work group and expand its membership

### GUIDING PRINCIPLES

Promote Web 3.0 convergence (Principle 2), foster open collaboration (Principle 3), develop open technical standards and protocols (Principle 4), and utilize open competency frameworks (Principle 5)

### COMMITTED STAKEHOLDERS

- Leaders of data standards organizations and their members
- Credential Data Ecosystem Standards Mapping Team

### FEASIBILITY

The T3 Network membership includes representatives from multiple data standards organizations that have indicated the need to work across projects and standards to improve and harmonize data standards in the talent marketplace ecosystem.

### IMPACT & OUTCOMES

- This project establishes the foundation for all other T3 Network pilot projects
- Harmonize data critical to stakeholder use cases that bridge gaps in data standardization
- Improve access to machine actionable data across systems that expand opportunities in the talent marketplace
- Provide opportunities to derive data from authoritative sources for competencies that can be linked from products to training to employment
- Expand the data exchange formats to the SW

## PILOT PROJECT 2 (PP2)

### Employment and Earnings Record Standards

PUBLIC-PRIVATE DATA  
STANDARDS CONVERGENCE  
AND HARMONIZATION



Develop and Pilot Test Public-Private Data Standards for Comprehensive Employment and Earnings Records

#### PROBLEM STATEMENT

Federal and state governments are increasingly using employment and earnings records collected from Unemployment Insurance (UI) and tax reporting to evaluate the employment and earnings outcomes of participants in public-financed and regulated programs. However, these records do not contain critical information needed for these applications (e.g., job title and location of employment). They also do not provide critical information (e.g., previous jobs held) for employers in confirming an applicant's previous work history. A more enhanced employment and earnings record system that can be accessed easier with worker consent could provide major benefits to all key stakeholders.

#### PROJECT SUMMARY

Develop data standards for employment and earnings records (e.g., UI wage records) that can be used to link with other individual records to support employment verification, consumer information systems, and government programs. Gain public and private consensus on core elements of a comprehensive employment and earnings record to be adopted by state and federal agencies. Conduct pilot tests in using standards-based employment and earnings records.

#### PROJECT TASKS

- Develop public-private employment and earnings records data standards through PP1 data standards work group
- Pilot test use of standards-based comprehensive records in two to three states to ensure the standards-based records can be implemented to meet major uses and benefits for stakeholders and determine the costs for scaling to evaluate the costs of implementation and the benefits achieved for stakeholders
- Promote adoption of a comprehensive employment and earnings record by states and federal agencies to reduce reporting costs of employers and HR technology vendors, and create a stable investment environment to bring the system changes to scale

#### GUIDING PRINCIPLES

Focus on high-impact stakeholder use cases (Principle 1), foster open collaboration (Principle 3), develop open technical standards and protocols (Principle 4), and facilitate open data access in public-private infrastructure (Principle 7)

#### COMMITTED STAKEHOLDERS

- Employers, employer associations, HR standards organizations, HR technology vendors, HR associations
- Federal and state workforce UI and revenue agencies, federal and state data systems and statistical agencies

#### FEASIBILITY

Previous national and state efforts have identified key issues in developing a more comprehensive standards-based employment and earnings record and have identified the key stakeholders needed to support its development and adoption.

#### IMPACT & OUTCOMES

- This project establishes the foundation for related pilot projects PP3, PP9, and PP10
- Reduce time and costs in verifying work history of job applicants
- Reduce time and costs in meeting multiple and inconsistent federal and state government reporting requirements
- Access to better data for use in consumer information systems, government statistics, and employer talent pipeline management

## PILOT PROJECT 3 (PP3) Learner Record Standards

PUBLIC-PRIVATE DATA  
STANDARDS CONVERGENCE  
AND HARMONIZATION



Develop and Harmonize Comprehensive Learner Record Standards Addressing Work History and Full Range of Learning and Credentialing Aligned with HR System Standards

### PROBLEM STATEMENT

Learner records consist of data from many sources; however, current systems do not allow for data to be shared seamlessly between sources. Common standards for learner records data are different for each source of information, which directly impacts how the technology vendors design their products. In addition, HR systems face challenges using learner records in sourcing talent. Identifying gaps of information, along with improving data standards across systems, is needed to ensure that learners and workers' records are complete with their full range of competencies and credentials.

### PROJECT SUMMARY

Align and harmonize data standards for comprehensive learner records to include unique individual identifiers and elements of a person's resume (employment history, learning, and credentialing). This project will also align comprehensive learner record standards with HR standards for recruiting and applicant tracking systems. Additionally, the project will better align and harmonize data standards to be used by employers, credentialing organizations, and federal and state government agencies to provide individual-level data in a standardized way to multiple data systems.

### PROJECT TASKS

- Work with PP1 participants to facilitate cross-collaborative work between HR data standards, individual student record data standards, and government reporting standards to identify gaps in the data, harmonize data standards, and initiate updates
- Identify ethical practices and equity considerations for sharing data and protecting individual-level data
- Enable data to be shared between closed systems and the Web
- Harmonize and map resume and comprehensive learner record standards with HR standards for recruiting and applicant tracking systems
- Promote the use of harmonized standards by federal and state data reporting systems and national data collaboratives to reduce the burden of inconsistent data requirements.

### GUIDING PRINCIPLES

Focus on high-impact stakeholder use cases (Principle 1), promote Web 3.0 convergence (Principle 2), foster open collaboration (Principle 3), develop open technical standards and protocols (Principle 4), and promote ethical practices and equity considerations (Principle 8)

### COMMITTED STAKEHOLDERS

- Leaders of data standards organizations and their members
- Technology vendors that develop and provide products using the related data standards
- Federal and state data systems and statistical agencies

### FEASIBILITY

The T3 Network includes representatives from data standards organizations that develop standards commonly used for employment, learning, and credentialing data as well as the technical vendors and communities that use the data (e.g., employers and postsecondary education, training, and credentialing). These organizations have indicated the need to work across projects and standards to improve and harmonize data standards in the talent marketplace ecosystem.

### IMPACT & OUTCOMES

- Enable the seamless sharing of data across both closed systems and the Web
- Harmonize data standards across the talent marketplace ecosystem
- Create opportunities to improve information provided by technology vendors
- Expand the data exchange formats to the SW



## PILOT PROJECT 4 (PP4)

### Public-Private Standards Development and Use by Government

PUBLIC-PRIVATE DATA  
STANDARDS CONVERGENCE  
AND HARMONIZATION



Promote Development and Use of Open Public-Private Data Standards in Federal and State Governments

#### PROBLEM STATEMENT

Open public-private data standards are a foundational part of an open public-private data and technology infrastructure. Currently, federal and state agencies create both formal and informal data standards for agency and program-level data reporting and statistical systems that are not always aligned with voluntary consensus standards used by the private sector (employers, universities and colleges, certification organizations). Now is the time for broader federal and state participation in developing and using public-private data standards.

#### PROJECT SUMMARY

Conduct meetings with federal and state agencies to produce an action plan for developing and using open public-private data standards consistent with the Federal Data Strategy, Office of Management and Budget (OMB) guidelines, leading state open-government and digital-government policies, and the T3 Network Guiding Principles.

The action plan will include guidelines for how federal and state agencies can participate in the development of voluntary, consensus data standards for use in government policies and data collection. It also will include guidelines for how federal and state agencies can make aggregate data available as Linked Open Data (LOD) consistent with the World Wide Web Consortium (W3C) SW guidelines.

#### PROJECT TASKS

- Identify federal and state agencies that develop and use relevant data standards including education, workforce, and human service agencies
- Develop an inventory of relevant data standards being used by federal and state agencies and connect the public sector with similar work being done through private data standards organizations to better align data standards across the talent marketplace
- Explore how federal and state governments are using W3C SW guidelines for LOD and opportunities to develop and use public-private data standards consistent with federal and state policies

- Develop an action plan for federal and state government agencies to engage with private sector standards organizations to develop and use open public-private data standards and promote the use of W3C SW guidelines across the public and private sectors

#### GUIDING PRINCIPLES

Foster open collaboration (Principle 3), and develop open technical standards and protocols (Principle 4)

#### COMMITTED STAKEHOLDERS

- Federal and state agencies
- Technical standards organizations

#### FEASIBILITY

This approach has been successful in other policy areas (e.g., healthcare and environmental protection) and is consistent with federal and state initiatives. Additionally, federal policies, including OMB guidelines promote the use of private voluntary consensus standards whenever possible.

#### IMPACT & OUTCOMES

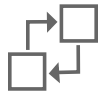
- This project is fundamental for building a public-private data and technology infrastructure and will enable PP1, PP2, PP9 and PP10 to be successful



## PILOT PROJECT 5 (PP5)

### Competency Data Exchange

## DEVELOPING & ANALYZING COMPETENCIES



Promote Distributed Network of Open Competency Frameworks and Related Resources from Authoritative Sources

### PROBLEM STATEMENT

Competency information is difficult to access due to a lack of machine-actionable competency frameworks. Competencies need to come from reliable sources and link to credentials, curriculum, people, and their work in order to get the full understanding of what a learner knows and can do.

New business models need to be developed to incentivize the open sharing and distribution of competency frameworks from reliable sources and to develop protocols and processes for sharing competencies across networks. Data standards tools are needed to process reliable source competency data using AI to write open, machine-actionable competencies that can be used by employers, learners, and education and training providers.

### PROJECT SUMMARY

Work with data standards organizations to develop business models and tools for publishing and maintaining linked, open-license competency frameworks in non-proprietary, machine-actionable data formats. Additionally, address the challenges with access to machine-actionable competency frameworks beginning with reliable sources of competencies through the publishing and sharing of them via closed systems and the Web.

### PROJECT TASKS

- Identify and collaborate with data standards organizations to develop, publish, and maintain open license and machine-actionable competency frameworks
- Develop business models and tools for publishing and maintaining open license competency frameworks that support systematic discovery and translation between alternate data formats
- Pilot test and promote the business models and publishing tools as well as the machine translation tools needed for transformation of data between machine-actionable formats (e.g., O\*NET and ESCO)
- Process structured product maintenance, operation, and troubleshooting task analysis into open, machine-actionable competencies through algorithms and AI

### GUIDING PRINCIPLES

Focus on high-impact stakeholder use cases (Principle 1), promote Web 3.0 convergence (Principle 2), foster open collaboration (Principle 3), develop open standards and protocols (Principle 4), utilize open competency frameworks (Principle 5), and facilitate open data access in public-private data infrastructure (Principle 7)

### COMMITTED STAKEHOLDERS

- Leaders of data standards organizations and their members
- Stakeholders that are the main source of competency data

### FEASIBILITY

This project was identified as a top priority pilot project and received the most interest from T3 Network participants. Having an open and shared solution and infrastructure for competency authoring and translation is critical to ensure that all major stakeholders can communicate competencies and skills with one another via technology.

### IMPACT & OUTCOMES

- Enable seamless sharing of competency data across closed systems and the Web
- Harmonize data standards across the talent marketplace ecosystem
- Create opportunities for improved information provided by technology vendors
- Expand data exchange formats to the SW
- Utilize AI to generate open, machine-actionable competency frameworks

## PILOT PROJECT 6 (PP6)

### Competency Analysis Translation

#### DEVELOPING & ANALYZING COMPETENCIES



Establish an AI Collaborative for Developing and Sharing Open Source AI Tools and Data Resources for Translating, Comparing, and Analyzing Competencies

### PROBLEM STATEMENT

Competency-based education and hiring rely on structured competency statements translated between education curriculum, online profiles, and job postings. Unfortunately, we lack a universal way for translating skills and competencies across these contexts. There's a high cost for manually aligning competencies between educational materials and job descriptions making it prohibitive for most organizations. AI offers a promising alternative that could reduce the costs and enable translatable competency statements. However, almost all of the work using AI to create and link competency data has been in silos and proprietary, which has slowed the progress and created a high barrier to access and use.

### PROJECT SUMMARY

Develop an AI collaborative for accelerating the development of AI algorithms that aid in competency identification, structuring, and translation. The collaborative will provide access to pooled and open license competency data, contextual data from coursework, and job postings. The pooled data will allow for the sharing of open source algorithms while allowing for the benchmarking of proprietary algorithms.

### PROJECT TASKS

- Organize an AI collaborative to contribute and pool open data to begin analyzing, translating, and comparing competencies
- Develop systematic approaches to dynamic competency framework creation with updates and maintenance that leverage existing data standards and sources, as well as emerging data flows from both employers and education and training providers
- Create applications leveraging AI to enhance the “meaning” of competencies through analysis of context embodied in associated resources (e.g., performance levels, assessments, evidence)
- Determine AI algorithms best suited for interpreting, aligning, writing, and generating competencies and for defining necessary metrics for training given defined tasks and use cases
- Develop clear objective functions and access to an established dataset that provides competencies, labels, and context that are validated

- Investigate implicit and explicit bias in the development and use of algorithms for competency translation

### GUIDING PRINCIPLES

Focus on high-impact stakeholder use cases (Principle 1), promote Web 3.0 convergence (Principle 2), foster open collaboration (Principle 3), develop open standards and protocols (Principle 4), utilize open competency frameworks (Principle 5), and facilitate open data access in public-privates data infrastructure (Principle 7)

### COMMITTED STAKEHOLDERS

- Coalition of data contributors, applied researchers, and technologists

### FEASIBILITY

This project builds on several existing public-private applied research collaboratives for competency translation and other AI tasks at institutions participating in the T3 Network. Additionally, several T3 Network companies have expressed strong interest in coordinating certain components of the applied AI work to advance skills and competencies.

### IMPACT & OUTCOMES

- Accelerate innovation in the use of AI to identify, suggest, and translate competency statements within and between education and work
- Allow employers, education providers, and governments to do competency-based education and hiring using machine learning and AI to transform their current materials into competency-rich material
- Support the creation and ongoing maintenance of linked, dynamic, and open license competency frameworks (PP5)
- Allow government classifications used in statistics to be updated and improved in real time (PP9)

## PILOT PROJECT 7 (PP7)

### Learning Outcomes Exchange

#### DEVELOPING & ANALYZING COMPETENCIES



Develop and Pilot Test Standards-based Tools for Developing Machine-Actionable Learning Outcomes Using Open Educational Resources

### PROBLEM STATEMENT

Historically, competency-based education projects have been challenging because of issues around copyright for course content, postsecondary institution engagement, and lack of integration with existing workflows for teachers and students. This project seeks to establish testbeds for competency-related pilot projects through a partnership with Open Education Resource (OER) providers and an initial network of postsecondary institutions using OER materials in their coursework. These testbeds will help develop standards for context and will improve the usability and reliability of AI algorithms.

### PROJECT SUMMARY

Develop and test educational applications demonstrating the use of open competency data standards, open license competency models, and OERs. Assist program, course, and lesson plan developers in creating machine-actionable learning outcomes that can be connected to competencies in job postings, online profiles, and other education courses. The applications will simplify the creation, curation, and publication of well-defined competencies and their frameworks by education and training providers, and other credentialing organizations. These tools would also enable postsecondary institutions to work with employers and employer collaboratives that are using HR tools to develop validated job competency profiles and use the profiles to analyze and close gaps between employer competency-based hiring requirements and learning outcomes.

### PROJECT TASKS

- Organize a work group and identify additional stakeholders willing to participate in developing standards-based tools for machine actionable learning outcomes using OERs
- Collect, clean, format, and publish open license competency models to a public repository while identifying candidate competency translation algorithms and convene key stakeholder groups
- Create a preliminary prototype by extracting competencies from coursework using OER materials and a set of open license competency models using the Credential Transparency Description Language and applying the Achievement Standards Network Description Language (CTDL-ASN) and other relevant data standards

- Publicly share and disseminate all code, findings, and competency-tagged OER materials from the pilot project and develop plans for replication and scale

### GUIDING PRINCIPLES

Focus on high-impact stakeholder use cases (Principle 1), promote Web 3.0 convergence (Principle 2), foster open collaboration (Principle 3), develop open technical standards and protocols (Principle 4), utilize open competency frameworks (Principle 5), and facilitate open data access in public-privates data infrastructure (Principle 7)

### COMMITTED STAKEHOLDERS

- OER providers, OER-using postsecondary educational institutions, domain experts in competency-based education and competency data, and technology and data science partners

### FEASIBILITY

This project is highly feasible, given current levels of commitment among a core set of T3 Network stakeholders. This project is partially contingent on PP5 and PP6.

### IMPACT & OUTCOMES

- A new set of OER resources with tagged competencies that can be used by everyone
- Allow schools and application developers to demonstrate how course content linked to open competencies can create new approaches to learning pathways, course recommendations, and learning outcome measurements
- The new competency-based learning models will measurably improve student choice, achievement, and value

## PILOT PROJECT 8 (PP8)

### Government Use of Open Competency Data

DEVELOPING  
& ANALYZING  
COMPETENCIES



Using Employer-Provided Open Competency Data to Update Government Occupational Data Systems

#### PROBLEM STATEMENT

Government statistical agencies do not have the resources to regularly update their occupational data systems using employer-provided job competency data in a rapidly changing talent marketplace. Efforts to use real-time labor market information from online job postings and other sources are promising but often do not provide fully validated and granular competency data needed to update government data systems including the Occupational Information Network (O\*NET) and the Standard Occupational Classification (SOC) system. New public-private partnerships are needed to leverage leading technologies to provide better real-time data for updating these government occupational data systems.

#### PROJECT SUMMARY

Develop and pilot test processes for government agencies to access and use open or pooled competency data sourced from and validated by employers through their human resource Information (HRIS) systems. The data will inform the updating of government occupational data systems to complement survey-based methods and make government occupational data systems more granular and dynamic.

#### PROJECT TASKS

- Analyze current practices in using real-time labor market information (LMI) and other sources to update government data
- Explore new approaches that leverage public-private standards, SW, and AI technologies
- Gather more granular job competency data from employers
- Develop a process with one or more data partners to gain access and use this data to update government systems
- Pilot test this system with one or more partners
- Revise the process and develop partnership agreements to move to scale

#### GUIDING PRINCIPLES

Foster open collaboration (Principle 3), develop open technical standards and protocols (Principle 4), and utilize open competency frameworks (Principle 5)

#### COMMITTED STAKEHOLDERS

- Employer organizations
- Federal statistical agencies

#### FEASIBILITY

This process has been done with existing real-time LMI data sources and can be improved with expanded use of public-private data standards and leading Web 3.0 technologies.

#### IMPACT & OUTCOMES

- This project is fundamental to a public-private data and technology infrastructure
- This project will ensure improved alignment between government and private LMI data that are used to provide guidance to employers, education and training providers, and learners in the talent marketplace

## PILOT PROJECT 9 (PP9)

### Data Collaboratives for Individual-Level Data

## NEW ARCHITECTURES AND USES OF LINKED INDIVIDUAL-LEVEL DATA



Develop Data Standards, Protocols, and Anonymization Rules for Sharing, Matching, Aggregating, Accessing, and Using Individual-Level Data Across Data Collaboratives

### PROBLEM STATEMENT

From program performance analytics that improve consumer information to evidence-based policy making, many of the T3 Network high-impact use cases require sharing, linking, and analyzing individual-level data records from multiple organizations. These use cases include federal, state, and public-private efforts that face the same set of legal and technical hurdles in trying to responsibly and legally share, validate, and clean data that is messy and inconsistent, link records to each other without common universal IDs, and ensure that any analysis performed preserves the privacy of individuals.

### PROJECT SUMMARY

Work with federal government, state government, and national nonprofit data collaboratives to develop protocols for accessing, matching, and using individual-level education and employment records for policy research and evaluation, consumer information systems, and large-scale data analytics. This project will inform and build on data standards for linking employment and earnings and learner records (see PP2 and PP3). It also will establish protocols for improving efficiency in accessing and matching records across data collaboratives. In addition, it will establish protocols for using new technologies (e.g., multiparty computing) to increase access to sensitive or restricted data on an individual level while protecting privacy, security, and confidentiality.

### PROJECT TASKS

- Convene a linked data work group composed of stakeholders working on one or more projects linking individual student and worker records
- Define the set of shared data sources and technical and legal challenges for individual-linked data and review the landscape of existing resources and solutions
- Develop additional protocols and guidance and make tailored recommendations for any remaining barriers and challenges to the applied research community, data standards bodies, and state and federal policymakers

### GUIDING PRINCIPLES

Focus on high-impact stakeholder use cases (Principle 1), promote Web 3.0 convergence (Principle 2), foster open collaboration (Principle 3), develop open technical standards and protocols (Principle 4), utilize open competency frameworks (Principle 5), and facilitate open data access in public-private data infrastructure (Principle 7)

### COMMITTED STAKEHOLDERS

- Federal government, state government, and national nonprofit data collaboratives that work with individual-level linked data
- Data standards organizations
- Technical assistance organizations with deep expertise in individual-level linked data, privacy preserving analysis, and domain expertise to aid in the development of guidelines

### FEASIBILITY

The project addresses a well identified shared need to reduce the costs and risks of individual-level linked data across organizations doing anonymous aggregate analysis. Many of the key government stakeholders in the T3 Network are interested and willing to participate.

### IMPACT & OUTCOMES

- Reduce time and cost for participating in both mandated and volunteer data reporting processes for performance measures and outcomes
- More informed decision making on a case-by-case basis for learners, employers, education, training and credentialing providers, and policymakers



## PILOT PROJECT 10 (PP10)

### Empowering the American Student and Worker

NEW ARCHITECTURES  
AND USES OF LINKED  
INDIVIDUAL-LEVEL DATA



Promote the Development of Standards and Tools for Improving Self-Sovereign Management and Use of Learning, Credentialing, and Employment Records

#### PROBLEM STATEMENT

The data economy is not empowering individual students and workers. The limited use of individual-level data disempowers the individual, decreases choice and accountability, limits access, and reduces equity. Education institutions and employers are restricted by critical issues of privacy, security, and consent in trying to enable applications to connect individual-level data across multiple platforms. With progress being made around data standardization and new technologies and protocols for distributed data and identity management, there is an opportunity to rapidly empower individuals with access to and control over their own records across systems and institutions.

#### PROJECT SUMMARY

Demonstrate fully portable, self-sovereign student and worker records through a collaborative, standards-based development process. This project will combine existing data standards for the exchange of records with emerging standards and tools for individuals to manage their own records stored across multiple data systems and organizations. This includes managing records held in existing student information systems, learning management systems, and human resource information systems, as well as records on emerging distributed ledger networks that are increasingly being tested. The project will be informed by related initiatives in other sectors (e.g., healthcare) aimed at individual record management and promoting the adoption and use of existing data exchange standards with a new consumer-driven use case. This project will enable the development of new tools that improve learner self-sovereignty to choose among competing tools and move data with no transfer cost or loss of information.

#### PROJECT TASKS

- Form a work group of stakeholders familiar with relevant data standards and individual-level data protocols
- Identify and engage key stakeholders and pilot participants for user interviews, data discovery, and design sessions
- Conduct initial development of open self-sovereign protocol with sandboxed data infrastructure and pilot application partners using an initial set of student records prioritized based on user research
- Publish supporting tools to GitHub and disseminate to T3 Network participants for use in other pilot projects

#### GUIDING PRINCIPLES

Promote Web 3.0 convergence (Principle 2), utilize open competency frameworks (Principle 5), and empower self-sovereign identity and data management (Principle 6)

#### COMMITTED STAKEHOLDERS

- Stakeholders familiar with cross-cutting open standards and the newer protocols for distributed identity and record management
- Regional networks of education providers and employers that hold verifiable data on their students and workers and have populations that apply for and transfer between institutions within the region
- Application developers willing to build student-facing applications on top of the open protocols that demonstrate the value of self-sovereignty to the individual

#### FEASIBILITY

The project will build on multi-year efforts around comprehensive learner records and will follow best practices from other industries (e.g., healthcare) in enabling personal management of records. Similarly, this effort will leverage existing and emerging technology standards (e.g., open badges/pathways, comprehensive learner record, e-diploma, etc.) that together form the necessary building blocks of open standards for self-sovereign records.

#### IMPACT & OUTCOMES

- Student-governed records will fuel lifelong learning and career pathways leading to higher levels of education attainment and career advancement
- Increased student engagement for institutions supporting these standards
- Reduced program attrition/dropout rates for institutions and applications using new standards and protocols
- Improved employment outcomes such as reduced time to employment and higher median wages

## NEXT STEPS

The first phase of the T3 Network has concluded, with the release and distribution of this report. The Chamber Foundation is currently working to raise resources and support to engage in a set of Phase II activities and T3 Network collaboration opportunities.

Work is expected to begin in early 2019.

### PHASE II INCLUDES:

- Promote and gain widespread acceptance of the T3 Network Guiding Principles.
- Fund and implement some or all of the ten pilot projects outlined in this report to begin exploring and developing an open, public-private data and technology infrastructure for the talent marketplace.
- Formalize the engagement of T3 Network participants through the development of regular participation and feedback cycles, such as [surveys](#).
- Increase the diversity of expertise and stakeholders that make up the T3 Network and expand the network to grow the initiative globally.
- Continue to convene T3 Network meetings both in-person and via webinar to review the progress of pilot projects, share information, and develop new initiatives.

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If you are interested in learning more about the T3 Innovation Network, this report, or would like to join the Phase II work, please reach out to us at [workforce@uschamber.com](mailto:workforce@uschamber.com).

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