Learning and Employment Records
Progress and the path forward

A white paper from the American Workforce Policy
Advisory Board Digital Infrastructure Working Group

September 2020

Table of contents

Contributors

Members of the American Workforce Policy Advisory Board's (AWPAB) Digital Infrastructure Working Group authored this white paper, with major contributions by subject matter experts from their organizations, as well as outside experts. Institutional affiliations listed below are for identification purposes only and do not necessarily indicate endorsement by any organization.

Digital Infrastructure Working Group

- **Eric Holcomb**, Governor, Indiana (Co-chair)
- **Scott Pulsipher**, President, Western Governors University (Co-chair)
- **Jay Box**, President, Kentucky Community and Technical College System
- **Tom Donohue**, CEO, U.S. Chamber of Commerce
- **Doug McMillon**, President & CEO, Walmart
- **Michael Piwowar**, Executive Director, Milken Institute
- **Sebastian Thrun**, Founder, President, and Executive Chairman, Udacity
- **Scott Sanders**, Executive Director, National Association of State Workforce Agencies
- **Jay Timmons**, President & CEO, National Association of Manufacturers
- **Marianne Wanamaker**, Professor, University of Tennessee

The principal contributors to this report are:

- **Marni Baker-Stein**, Provost and Chief Academic Officer, Western Governors University
- **Savi Barrowes**, Vice President, Workforce Platforms, Dignity Health Global Education
- **Ellie Bertani**, Senior Director, Learning Strategy & Innovation, Walmart
- **Adam Caplan**, Senior Vice President, Digital Skills
- **Alana Dunagan**, Director, Higher Education & Workforce Policy, Western Governors University
- **Rodolfo Ergueta**, Senior Director, Product Management
- **Matt Gee**, President, BrightHive
- **Darin Hobbs**, Director, Academic Records and Credentials, Western Governors University
- **Alex Kaplan**, Global Leader, Blockchain and AI for Industry Credentials, IBM Talent and Transformation
- **Phil Komarny**, Vice President of Innovation, Salesforce
- **David Langdon**, Senior Policy Advisor, U.S. Department of Commerce
- **Phillip D. Long**, T3 Innovation Network Community Manager, RHz Consulting LLC
- **Andrew Malley**, CEO, Dignity Health Global Education
- **Jessica R. Nicholson**, Senior Economist, Bureau of Economic Analysis (White Paper Coordinator)
- **Kacey Thorne**, Director, Skills Architecture, Western Governors University
- **Wesley Smith**, Senior Vice President, Policy and Public Affairs, Western Governors University
- **Jason A. Tyszko**, Vice President, Center for Education and Workforce, U.S. Chamber of Commerce Foundation

Background

In September 2019, the American Workforce Policy Advisory Board (AWPAB) Digital Infrastructure Working Group[1] (Working Group) published a white paper on Learning and Employment Records[2,3] (LERs). An LER is a system that contains verifiable information about a person's achievements spanning an inclusive range of contexts, whether education or training processes, formal or informal, classroom-based or workplace-based. LERs can seamlessly record, verify, transmit, and interpret information about learning achievements between learning institutions, businesses, and individuals.

Now more than ever, as the U.S. labor market faces unprecedented challenges in light of the COVID-19 pandemic, American workers deserve to own a dynamic and lifelong record of their learning and work experiences and achievements that can be instantly verified and shared directly and easily with educational institutions and employers.

The need for individuals to better signal their authenticated achievements is age-old, but addressing this issue has rising possibility, gravity, and urgency in an age of digital transformation. This capability is one of the fundamental labor market issues President Trump set out to address in the July 17, 2018 Executive Order 13845, establishing the National Council for the American Worker (NCAW). He charged this interagency council with drafting the first-ever national workforce strategy, which includes increasing data transparency to support informed decision-making among American students and workers. Through this Executive Order, President Trump also established the AWPAB. This 25-member federal advisory council developed actionable strategies for the NCAW under four focus areas, each with a corresponding working group:

1. Develop a public campaign to promote multiple pathways to career success
2. Increase data transparency to better match American workers with American jobs
3. Modernize candidate recruitment and training practices
4. Measure and encourage employer-led training investments

American workers deserve to own a dynamic and lifelong record of their learning and work experiences and achievements.

The Learning and Employment Record

LER technology surfaces the data around earner and learner experience and capabilities that are necessary to enable and accelerate each of the strategies recommended by AWPAB. LER technology also lays the groundwork for the development of a broad ecosystem of applications and service solutions designed to better guide earners and learners to their next educational opportunity or work experience, and to help employers identify ready talent when and where they need it.

Now more than ever: The LER imperative

Rapid digital transformation is changing the way we learn, work, participate in society, and lead our everyday lives. Although these changes are disruptive to traditional notions of employment readiness—and the nature and location of work itself—the future of work supported by a robust digital infrastructure can create a more equitable, prosperous society for all.

LER technology enables us to dynamically respond to the labor market challenges of our current moment by providing a foundation upon which we can build infrastructures, systems and services that support a future in which individuals are empowered to pursue lifelong learning and career advancement, to demonstrate their capabilities on a level playing field, and support employers in finding and investing in talent. The LER gives individuals ownership of a verified and detailed record of their skills and achievements, and transparently surfaces those skills to current and prospective employers and educational institutions—all while preserving an individual's right to own and control that data.

Technical capabilities to enable LERs are emerging, and this white paper will discuss a series of pilots that demonstrate the feasibility of LER technology. But investments are needed to create common standards and practices, and to drive widespread institutional and private sector adoption in order to better match American workers with American jobs at scale and across sectors.

Unlike traditional records such as resumes, certificates, transcripts, and diplomas, LERs are a secure and detailed record of verified achievements that can easily transfer from one job or learning experience to another.

LERs include data on discrete achievements from specific education institutions and employers, building a collective profile of achievement that represents the entirety of an individual's experience from cradle to career. LERs can also provide deeper insight to the specific skills that are represented by a degree or certification and how those skills align to career pathways. Developing and adopting LER technology will create critical benefits for individuals and employers and will improve the fairness of our labor markets and the competitiveness of our workforce:

LERs are a secure and detailed record of verified achievements that can easily transfer from one job or learning experience to another.

- **Individuals** will have ownership and control of their records, as well as portability of their achievements, and will be able to curate and share their skills and capabilities in pursuit of economic mobility and opportunity.

- **Employers** will benefit from clear and transparent signals of job-readiness and trusted and verified granular information about the skills profile of their workforce and of job seekers, and the ability to move into a new paradigm of human potential management by driving upskilling and reskilling investments for their employees that are responsive to the changing nature of work and careers.

- **Labor markets** will, for the first time, be able to value work-based and academic learning as equivalent and interchangeable, broadening access for millions who face barriers on the traditional pathway to opportunity.

- **Our workforce** will be able to reskill and upskill with a fluidity that matches the dynamic change our economy is undergoing, driving resilience, human flourishing, and national competitiveness.

- **Our economy** will be strengthened through a better educated workforce that is better matched to opportunities, lowering unemployment rates and making companies more competitive in the global marketplace.

Key qualities for LERs

There are several key qualities that a national system of LERs must meet in order to enable open, skills-based dialogue between learners, academic institutions, and employers. Table 1 displays and explains these key qualities. In short, to be effective at improving labor market outcomes, LER data must be interoperable so that information can be easily exchanged and understood, and verifiable, so that information can be trusted. Individuals must be assured that their personal information is secure and private until they wish to share it. LERs should be accessible and shareable from anywhere and on any device.

The technology to enable these conditions exists, and stakeholders are collaborating to further enhance interoperability.[4]

Table 1. Key qualities for Learning and Employment Records

Criteria	Description
Transparent	Clearly defined, enables comparison, and is based on shared open standards, common language/descriptions, and skills ontologies/frameworks. Provides contextual information for determining relevance and skills mastered.
Relevant	Carries meaning and value applicable to useful purposes, including employment, career advancement, and ongoing learning. Enables endorsement by recognized experts and authorities for specific purposes. Remains up to date.
Equitable	Enables educational, social, and economic mobility for people with varying abilities, preparation, and skills. Supports pathways to better employment opportunities and to further education and training.
Private	Access to selected fields of the LER is limited to the parties, purposes, and duration specified by the learner. Complies with relevant privacy standards and permissions to protect the individual's identity and record.
Secure	Complies with relevant security standards to protect the data from unauthorized editing or access.
Portable	Can be used in a variety of environments, across sectors and states, connecting to multiple purposes and opportunities in employment, education, and other contexts. Allows the individual to control the location, organization, and combination of their own records for their own uses.
Interoperable	Uses open standards and common ontologies/frameworks to enable data to be machine readable, exchangeable, and actionable across technology systems and, when appropriate, on the Web. Supports combinations of data from multiple sources. Enables human interoperability and can be understood by people in different occupations and industries from diverse backgrounds.
Shareable	Enables learners to share their LERs when they apply for jobs or educational opportunities. Learners reserve the right to grant appropriate permissions to provide relevant access for the time duration specified by learners.
Verifiable	Can be digitally confirmed by one or more issuers to be authentic and intact. Supports expiration and revocation by the issuer. Provides information about the provenance of the credential and the skills attained to earn the credential.

A shared language of skills

Many stakeholders, including education institutions, private firms, trade associations, professional associations, unions, state regulators and the military each maintain their own frameworks and nomenclature for achievements. These myriad frameworks are akin to a Tower of Babel: we have many languages for describing achievements, but no shared language that allows for apples-to-apples comparison and meaningful translation. In this context, skills have emerged as a common vocabulary and an important currency that add value to learning achievements, work experience, and other credentials issued to an LER.

By moving towards a system where individuals and employers can understand the skills an individual has by the credentials they hold, we enhance the power of the LER as an accelerator for skills-based hiring and education practices. LERs illuminate how skills align to industry-specific career pathways. This enables workers, employers and education institutions to understand how a set of skills can translate into various career pathways and to provide guidance on specific steps to take to upskill or reskill. Skills included as metadata on achievements linked to an LER will allow for transformational intelligence and compassing capabilities, making skills-based pathways to opportunity clear, transparent, and accessible for every individual.

A supporting ecosystem

At the center of an LER ecosystem is the learner: continuously upskilling or reskilling through cycles of learning and achievement. Learners can collect credentials from multiple issuers (educational institutions, training providers, testing centers, and employers) and can curate them through an LER application or interface to understand their own strengths and weaknesses as they progress on career pathways. Employers and education and training/testing providers are also key stakeholders in an ecosystem; they are both issuers of credentials and consumers of the LERs that learners curate.

All stakeholders need to understand how skills map to career pathways in order to provide guidance on closing skill gaps to pursue a career, or on adjacent or analogous careers suited to previously acquired skills. Figure 1 displays a conceptual LER ecosystem and shows how issuers, consumers, and users interact with each other.

The issuers, learners, and consumers that come together in an ecosystem represent overlapping interests and have common challenges. They each also have unique requirements. All stakeholders need to understand how skills map to career pathways. This understanding facilitates job matching based on current skills profiles and allows both employers and individuals to identify opportunities to close skills gaps with learning experiences, thereby moving from a paradigm of human capital management and to a paradigm of human potential management.

Figure 1. Learning and Employment Records ecosystem

Interoperable Learning Records

Employer

Consume to hire, reskill, or upskill employees	
Issue credentials to employees	
Use to verify credentials and skills	

Learner

Upskill and learn more	Enroll and learn
Share achievements	Collect digital evidence of learning
Match achievements to job skills	Search and compare credentials to job reqs
Get a job	Achieve learning outcomes

Education & Training Providers

Consume to enroll students	
Issue credentials to learners	
Use to verify credentials and skills	

Occupation, job, and skill descriptions ⟷ Credential and skill descriptions

Industry aligned career pathways

The Digital Infrastructure Working Group

The AWPAB's Digital Infrastructure Working Group identified LERs as a novel but technically feasible technology to enable communication of an individual's record of verified credentials and experience between employers and education and training institutions, and to allow individuals to own that record.[6] In a September 2019 white paper, the Working Group recommended three actions to accelerate the development of the LER ecosystem and the process of bringing LERs to widespread use within the labor market. The three recommendations were:

1. Create an LER Inventory[7];
2. Convene an expert group of employers and education institutions who will develop a project plan for the piloting of LER prototypes;
3. Champion FastTrack Prototyping against specific milestones.

The goal was to achieve these milestones as of July 2020, and this goal has been met. The White House, through AWPAB, has facilitated progress toward this goal by enabling collaboration between employers, academic institutions, technology firms, and government partners. Collaboration is essential to achieving the vision of the LER: a future in which all elements of the labor market can communicate fluently.

Following the release of AWPAB's three recommendations to accelerate progress toward the development of the LER ecosystem in September 2019, stakeholders have been extremely active. The September 2019 white paper catalyzed major advances toward achieving the reality of a functional LER ecosystem.

The goal was to achieve these milestones as of July 2020, and this goal has been met. The White House, through AWPAB, has facilitated progress toward this goal by enabling collaboration between employers, academic institutions, technology firms, and government partners.

In March 2020, the AWPAB highlighted three immediate and enduring priorities for expediting the U.S. economic recovery:

1. Expedite American workers' return to employment and upward mobility by investing in career pathways and implementing skills-based hiring practices;
2. Remove obstacles to the modernization of American education and training to accelerate reskilling and facilitate innovation in workforce development;
3. Build the technological infrastructure necessary for the future of work.

The LER will drive progress across each of these priorities, opening the door to a labor market that is better informed by local, regional and national talent data and that is supported by an aligned, dynamic, relevant education system. This technology is how we enable the highly competitive workforce of the future, unleash and showcase the potential of every American worker, and transform the world of education and training.

The work to develop a scaled and effective LER was underway prior to the arrival of COVID-19 on our shores, but the pandemic has enhanced the urgency of the task. COVID-19 is driving further disruption in both the world of learning and the universe of work, creating a massive need for upskilling and reskilling, an unprecedented number of individuals looking for work, challenges for hiring employers, and both exposing and exacerbating existing inequities in our economy. The situation calls for a renewed commitment across education, employers and government to accelerate efforts to move toward a skills-based future that can facilitate more equitable, efficient, and effective learning, job searching, and hiring.

To that end, members of the AWPAB and their partners have developed a series of pilot projects to identify and resolve barriers to communication between academic institutions and employers. These pilots demonstrate the technological feasibility of the LER, as well as its potential to unlock value for individuals and employers.

Building and testing the LER ecosystem

In early 2020, the White House hosted a second meeting of LER stakeholders to facilitate a discussion on launching LER pilots and the progress achievable by September 2020. Walmart, Salesforce, and IBM each presented ideas for pilots at this meeting and formed pilot teams to take on the task of developing and testing LER capability.

At its most foundational level, the LER is rooted in a series of agreed upon definitions and ways to organize information. The technology that houses that information must meet certain basic conditions, including giving learners ownership and access of their records, allowing records to be verifiable, and assuring compliance with data and security regulations. But the LER ecosystem is interoperable by design and can accommodate a diverse set of technology platforms and applications that employers, institutions, and learners can use to record, view, share, and analyze data.

In addition to the three pilot teams that formed in coordination with the fall 2019 White House meetings, the T3 Innovation Network, has developed a supporting LER Pilot Directory consisting of these and 18 additional pilots. These pilots represent the robust range of technology solutions at play, illustrate the depth the LER ecosystem has currently achieved, and foreshadow its potential for rich, consumer-friendly applications. The T3 Network has further worked with all pilot participants to guide appropriate standards that assure interoperability between each of the various approaches to skills data within each pilot and to consider governance structures that will enable and encourage innovation, entrepreneurship and scale adoption.

Western Governors University (WGU) has significantly contributed to each of the White House-convened pilots and has provided inputs to several of the T3 Network-registered pilots. WGU is deeply invested in furthering the LER ecosystem. WGU relies on its own ontology of over 10,000 skills to power its competency-based programs and learner-owned achievement wallet.

Currently, the LER ecosystem is testing 21 pilot initiatives.

The T3 Innovation Network

The U.S. Chamber of Commerce is a member of the AWPAB and a partner in the LER work. The U.S. Chamber of Commerce Foundation launched The T3 Innovation Network in 2018. The T3 Network serves as an open innovation network to support the digital transformation of the talent marketplace. It is composed of a diverse set of stakeholders, including business, education and workforce training providers, government agencies, the military, and a wide variety of technology vendors that serve them. Their goal is to work together to build the enabling data and technology infrastructure to make (1) all learning count; (2) competencies and skills the currency of the labor market; and (3) to empower workers and learners with their data so that they may pursue continuing education and employment opportunities.

The T3 Network is composed of over 500 public and private partners and is growing. Their work is standards-based, use case driven, and vendor neutral. Per their goal, they divided the work up into eight work groups, each tasked with building a piece of the data infrastructure (e.g. enabling and supporting digital identity on the open web). Each of the projects that is supported under T3 is highly relevant to enabling LERs. The T3 Network is helping build and accelerate the shift toward an open, distributed, and decentralized data and technology infrastructure for LERs globally.

The LER pilots

Responding to the challenge of developing, proof-of-concept demonstrations of the LER, IBM, Walmart and Salesforce each conceived of three unique pilots. Where technological approach and software may differ, each pilot incorporates the following common themes:

- Learner ownership and control of their LER achievements consistent with appropriate privacy and security frameworks

- Utilization of common data standards for the representation and trustworthiness of achievements
- Portability and translation of achievements across education and employers
- Identification of industry aligned career pathways and associated talent gaps that may be addressed via the LER

IBM

Tracking the learner's journey from school to a job in cybersecurity

Background

Cybersecurity is a growing and critical field in which the demand for skilled workers continually outpaces supply. Efforts to boost the number of workers in the field have been ongoing since President George W. Bush established the Comprehensive National Cybersecurity Initiative in 2008. Still, it is reported that approximately 3.5 million jobs in cybersecurity will go unfilled.[8] Recognizing and understanding the capabilities of workers in cybersecurity is critical to our national security, to the security of corporate and consumer data, and to the advancement of workers in the field.

Because of the importance of cybersecurity education, the National Institute for Cybersecurity Education (NICE) was founded within the U.S. Department of Commerce in 2010. NICE initially developed a cybersecurity skills ontology in 2011, called the NICE Framework, and has updated this ontology as the field has developed.[9] The NICE Framework represents a set of agreed-upon terms—a language—to describe skills in the field of cybersecurity.

Goal

The IBM pilot's primary objective is to demonstrate how blockchain, artificial intelligence, and data analytics can employ the language of skills—using the NICE Framework—to advance outcomes and opportunities for cybersecurity workers and those who desire to enter the field. The pilot translates information between academic institutions—Western Governors University (WGU) and Central New Mexico Community College (CNM)—to the IBM managed Learning Credential Network blockchain. Learners are then able to access and share their data through the National Student Clearinghouse's (NSC) and iQ4's Myhub wallet. With this wallet learners receive compassing and job counseling services that helps them understand the labor market value of their current and potential skills for a cyber security career.

Pilot overview

The IBM pilot is focused on validating the technical and use case assumptions for LERs using a career in the cybersecurity as an LER test use case for an industry aligned career pathway. The pilot also demonstrates end-to-end functionality for managing credentials and careers in a permissioned manner for learners and job candidates, and interoperability of skills-based data between different organizations.

The pilot leverages three specific technologies to enable users to navigate the cyber security skill pathway.

The first is the Learning Credential Network (LCN) a blockchain-based platform designed to support a wide range of trusted and verified skill-based credentials. The LCN allows an individual to maintain a verified, private record of all their achievements from their cradle to career journey, allows them to easily and securely communicate that skills information to prospective employers, and provides them full "self-sovereign" control on who can see and use their skills-based information.

The second are compassing tools from iQ4 that helps learners understand the value of their achievements in the marketplace for a cyber security career, and then uses those achievements to point them towards education and job opportunities that leverage their skills.

The third is the Myhub wallet from the NSC that provides a single point of integration and control for all credentials academic and co-curricular & non-academic whether they exist on the LCN or not.

The pilot shows how the educational partners, WGU and CNM, create student data for, and map that data to, course/credential offerings using the NICE Framework, and issue the student credentials that correspond to specific cybersecurity skills.

Meet Izzy

Izzy always understood how important education was to her future success and worked hard in school to make sure she was career ready. She participated in a STEM program in high school in which she learned basic programming and statistics, which helped her land an internship at the New Mexico Department of Health. After graduation The Department of Health offered her an entry level data analyst job. Initially, Izzy was thrilled to have a job right out of high school, but after two years, she feels like she has gained all she can from her current role.
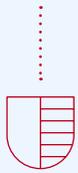
1. Using a Myhub career pathways recommendation, a cybersecurity job listing catches her eye. After researching more, she is convinced she has found job opportunities and course recommendations that will accommodate her personal goals, such as working from home and having ample job opportunities, and more importantly, will allow her to use her skills to directly impact and help others. Excited about her new choice, Izzy discovers that Western Governors University offers a full cybersecurity curriculum online.

2. She looks over WGU's website and locates a career pathways guidance tool called Myhub from the National Student Clearinghouse and iQ4. Izzy discovers that the National Student Clearinghouse is the primary organization for managing learning credentials and that it complies with all federal and state regulations around her personal data, so she feels confident she can trust it. Myhub has multiple capabilities that are valuable to Izzy. She particularly enjoys the ability to decide who gets to see her information, and to let potential employers know the experience she has and that she is looking for a job.

3. Using the Myhub Career Pathways for Cybersecurity tool, an iQ4 workforce and mobility platform, Izzy learns what skills from the NICE Framework are required for a career in cybersecurity. She is thrilled to learn the WGU classes are aligned to the NICE framework and decides to apply for enrollment. She is accepted at WGU and begins taking cybersecurity courses. As she progresses through her coursework, her achievements are synced with Myhub. Izzy decides to make her credentials anonymously available for all employers to view in the Learning Credential Network (LCN).

4. IBM searches the LCN for someone with Izzy's skills and gets a list of potential candidates, including Izzy, as an anonymous candidate. IBM requests that Izzy apply for a role in Boulder, CO. Izzy is thrilled at this life-changing opportunity and after an impressive interview is hired by IBM to fill the position. She begins her exciting new cybersecurity career at IBM, while also continuing to progress toward her bachelor's degree at WGU.

Showcasing retail workers' skills to unlock opportunities

Background

Walmart U.S. employs over 1.5 million American workers across over 5,000 locations. Understanding and investing in skills is critical for Walmart's success. Walmart U.S. promotes over 200,000 employees per year, and three quarters of its managers started as hourly associates. Walmart spends billions of dollars annually on training, including offering high-quality college degrees for $1 per day. Managing and investing in such a massive workforce demands systems that can track workers' skills and achievements.

Goal

The Walmart pilot is designed to prove interoperability between a university, an employer, and recruitment platforms. The pilot will share information between WGU and Walmart. The pilot will also demonstrate the ability of learners to showcase their skills to their employer using technology and applications from Workday, and to prospective employers, using LinkedIn.

Pilot overview

This pilot aims to show how LER technology can allow learners to seamlessly share earned credentials with a potential or current employer. Walmart, the pilot's lead organization, is the largest private employer in the world, giving this pilot the potential to unlock opportunity for a significant number of workers. Walmart is investing in LER technology because it needs a better way to identify workers with the skills needed to fill thousands of open jobs. This effort will benefit current and future Walmart associates alike. The pilot demonstrates the ability to transfer verified credentials across organizations and individuals. This capability will give Walmart associates the ability to manage and control a machine-readable learning record of the skills they have achieved, enabling them to market their skills to achieve promotions or to explore new opportunities. Walmart will gain visibility to associates who have achieved multiple skills and badges and are considered high potential.

Meet Marcus

Marcus was always a hard worker—his family needed him to be. Right out of high school, his mother was diagnosed with cancer, and he started working full time to help support his family. His first job was as a Walmart Electronics Sales Associate.

1. Immediately, he was enrolled in Pathways, the Walmart frontline associate training program. When he completed it, he got a pay raise. After a year, he was promoted to Department Manager, managing employees in a section of the store. Marcus thrived in management. He loved the opportunity for leadership, and the daily process of developing employees. He could picture a future in management. He received further training in the Walmart Academies, but the experience left him wanting even more.

2. He searched online for programs in Business that he could do at his own pace, on his own time—he wanted to go to school, but his first commitments were to his family, and his job. He found a program in Business Management at WGU, applied, and was accepted.

3. Marcus wanted his managers at Walmart to see the progress he was making, so he allowed his achievements to be shared with Walmart through the Workday WayTo mobile wallet app.

4. Separately, Walmart was searching for an associate who could fill a newly available Assistant Manager position. Walmart reviewed its local talent pool using Workday, trying to identify employees that had the skills to take on more responsibility. Marcus was identified as a candidate that had the specific skills needed for the position, and Walmart reached out to him about interviewing. The hiring manager could see not only what Marcus had achieved at Walmart and through the Walmart Academies, but also the skills he had acquired through his coursework at WGU. He was promoted again.

Creating a trusted skills network for accelerated healthcare hiring and onboarding

Dignity Health | Global Education

Robots & Pencils

MERCY COLLEGE
OF HEALTH SCIENCES

WGU

Today, there are approximately [3.8 million nurses in the United States][10] approximately 2.2 million of whom [work in hospitals].[11] The healthcare hiring process is time consuming and expensive, with secondary impacts on both the cost and quality of care. Streamlining job searching and hiring could make nursing a more attractive, high-mobility career.

For nurses, preserving records of their credentials, acquiring and showcasing relevant skills, and maintaining up-to-date certifications can be a difficult, time-consuming and stressful affair, particularly when educational institutions go out of business. The patchwork of records to verify nurses' professional credentials and skills makes the pursuit of opportunity in nursing—switching employers, advancing in responsibilities, or up-skilling for future roles—extremely difficult.

At the same time, archaic recruitment technologies cost hospital millions of dollars per year. Hospital human resources recruiters spend much of their time searching job sites, reviewing resumes, and confirming credentials to find a small number of qualified candidates. With an average of 42 days to fill a role and an [average cost of $4,129 per hire],[12] these administrative tasks slow the hiring process. Moreover, upskilling, onboarding, and unstaffed roles add strain to other nurses and ultimately can affect patient care. Addressing these issues can save not just millions of dollars, but also lives.

Goal

This pilot's main objective is to validate the technical feasibility and marketplace desirability of using LER technology to address hiring and job searching frictions in nursing. Dignity Health Global Education (DHGE) is developing the Altra talent network, a technology system that will allow medical professionals, healthcare providers, and educational institutions to seamlessly collaborate to meet the evolving needs of the healthcare talent marketplace while empowering medical professionals to advance their careers.

To validate technical feasibility, the use of [Verified Credentials][13] and [Open Badges] (OBI)[14] standards, along with [Badgr],[15] a market leading micro-credentialing platform, were leveraged to facilitate the exchange of information in a privacy-protecting manner. In addition, skills-based credentials were explored to signal progression towards a larger education objective (e.g., a Bachelor's degree). The exchange of this information was tested among DHGE, Mercy College of Health Sciences (Mercy College) and Western Governors University (WGU).

Pilot overview

The pilot showcases how a nurse can maintain an up-to-date, verifiable profile to find new opportunities, receive trusted credentials, and share them in a machine-readable and verifiable format. This pilot also explores how the LER technology can drastically reduce the time required for HR recruiters to hire qualified nurses. Finally, the pilot explores how educational institutions like Mercy and WGU facilitate the life-long educational journey by accepting verifiable credentials from multiple sources.

Meet Claire

Claire, a Registered Nurse (RN) in Iowa, is ready to advance her career. While general purpose job search sites offer help, Claire has struggled to find positions of interest and to understand the skills and training needed to qualify for them. That's why Claire downloaded the Altra app by DHGE. Altra helps identify jobs matching Claire's current skills and the steps necessary to advance into more sophisticated roles.
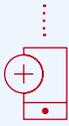
1. Claire adds personal data to her profile, like contact information, educational information, and work history. In addition, her profile allows her to receive cryptographically signed credentials from different educational institutions and industry bodies, such as state certification boards, for example, which allows potential employers to eliminate the time consuming and manual process of verification.

2. While browsing the app for nurse manager roles—a personal career objective—Claire learns that she needs a BSN to advance. She finds an online RN to Bachelor's in Nursing program from Mercy College of Health Science that allows her to participate on her own time. Once the degree is completed, Claire receives a verifiable credential in her profile along with a list of specific skills acquired during the program. Moreover, the Altra app now recommends roles like head nurse, nursing supervisor, and other more advanced positions in line with her new credential.

3. Claire also finds new learning opportunities, including a micro-credential in Healthcare Management from WGU. As part of the application, Claire provides her Mercy College credentials, and WGU offers to accept prior credit for one of three courses. This accelerates Claire's path to earning the micro-credential.

4. A human resources recruiter leverages the Altra Network to find candidates for nursing leadership roles at her hospital. The skills in Claire's public profile strongly match the role, pushing her up the candidate list. The recruiter identifies Claire as a potential candidate, but she also directly invites her to apply. Claire submits her application with verified credentials and advances to a video interview. After a great discussion, she gets the job as a head nurse thanks to Altra.

5. With the Altra App and the network it creates, nurses and jobs are matched in minutes instead of months. Recruiters save time and cost with access to a qualified candidate pipeline and spend less time on verification. Most importantly, through transparency in hiring and control over learning and employment records, Altra provides nurses with the knowledge, tools, and opportunities to advance their careers and improve their lives.

Learning and Employment Records Progress and the path forward

LER Resource Hub and Pilots Directory

In early 2020, the T3 Network held a pilot design workshop to inspire and educate organizations interested in developing LER pilot, and to help organizations find potential pilot partners. One of the outcomes of the design workshop was to identify where existing T3 work groups might shift their focus to better support LER pilots. Three priorities were identified: (1) developing a specification for constructing and proofing the authenticity of digital credentials; (2) providing guidance on managing digital identity in LERs; and (3) ensuring data standards mapping across learning and work domains are consistent with LER pilots and use cases.[16]

The LER Pilot Projects registered with the T3 Network represent a wide range of efforts, both in terms of technology approaches and target problems being addressed. All, however, share the core commitment to follow recognized standards for types of records being exchanged and methods by which they are validated and verified. The full list of projects can be found at the LER Hub Resource Pilot Directory.[17] At the time of this writing, there are a total of 18 LER Pilot Projects described in detail on the T3 Network's directory.

In July 2020, the T3 Network launched the LER Resource Hub, a living, expanding, and comprehensive inventory of LER pilots, open data resources, and enabling technologies.[18] This inventory—and others like it that may emerge—will continue to help provide updated resources and profiles of partners as the LER work becomes increasingly national and global.

LER Resource Hub

The LER Resource Hub features a wide variety of open data resources and tools to create and test an interoperable LER. It also features a directory of LER pilot projects. Currently, the LER Resource Hub features the following priority resources that were identified by members of the T3 Network and aspiring LER pilots as essential:

- Introductory material to orient the newcomer to the overall work underway within LER community

- Resources related to data standards including a directory of standards, key concepts related to data standards, and data mapping tools.

- Resources related to skill and competency repositories including information on the key concepts related to skills and competences, storage options, frameworks, and tools to manage and extract them.

- Digital Identity Resources including an overview, key concepts, organizations working in this area and descriptions of their efforts, and a set of technical papers and reports on decentralized identifiers, self-sovereign identity principles, data privacy laws, and a publicly available specification for creating an LER wrapper and wallet.

- LER Pilot Directory describing 18 LER Pilot Projects registered with the T3 Network.

The LER Resource Hub will be updated iteratively, adding resources and supports based on lessons learned from pilots and demonstrations and the onboarding of new pilots testing different use cases.

LER pilot outcomes

Successes

Each of these pilots has been part of a collective effort between LER stakeholders to demonstrate the technical feasibility of the LER. The results of the pilots are clear: LER technology is viable and can reduce labor market frictions. Each of the pilots demonstrates the use of common or open achievement frameworks; this shared language of achievements used within each of the pilots collectively lays the foundation for interoperable, scaled LER technology.

The September 2019 white paper laid out a set of concepts and ideas for how to construct a set of solutions that make it easier to connect workers with jobs and provide better opportunity for all Americans. The pilots turned those concepts and ideas into real solutions that could be tested, demonstrated and replicated. In making that leap from concept to software the teams had to address complex issues around data, privacy, standards, interoperability, governance and the roles of each participant in the LER ecosystem. As a result, the pilots have significantly advanced our collective knowledge about all facets of creating a national infrastructure to support LERs.

IBM, Walmart, Workday, Salesforce, WGU, and the T3 Network have collaborated on the core challenges required to foster the use of LERs. This work has focused collaboration in two areas: technical standards and skills. The collaboration on technical standards is about creating a seamless experience for the user so they can easily and securely share credentials between the various systems each organization uses to help its employees manage their own careers and identify reskilling and upskilling opportunities. The collaboration on skills uses common frames of reference that are industry-aligned to uncover career pathways allowing people to understand the value of the skills they currently have, match those skills to the careers they want, and find education opportunities available to build those skills.

Lastly, the pilots demonstrated the viability of technology platforms to address labor market challenges that create friction for both employers and learners and workers. Each pilot was successfully organized around the needs of learner-workers and designed to address the pain points they face in identifying pathways to opportunity, job searching, demonstrating qualifications to current and potential employers, and identifying additional opportunities for learning. Simultaneously, each addressed the costs, time, and complexity that employers face in searching for and identifying talent. LER technology can catalyze economic growth by creating opportunity for individuals and by improving efficiency and reducing costs for employers.

In short, the pilots proved the technical viability of LER technology, employed best practices to build scalable, interoperable systems, and deployed the technology against the critical challenges facing the workforce today.

Challenges

Throughout this process, all organizations involved in the LER pilots had to re-balance resources to respond to the COVID-19 pandemic. For example, the COVID-19 pandemic introduced a huge challenge for the Salesforce/DHGE pilot as it created mass disruption in the healthcare space, significantly complicating the recruitment of hospital partners and nurses to participate in the pilot and provide feedback.

While there is great progress in developing and testing the LER infrastructure and ecosystem through the development of pilots and other initiatives, there are challenges as well. These innovations are occurring in a rapidly evolving business and technical environment. This presents challenges in making consequential decisions about systems, processes, partnerships, and technology investments. As LERs are still emerging, significant business risks remain for early innovators and adopters. Additionally, the role of the federal and state governments as both employers and regulators in a skills-based talent marketplace are still evolving, contributing to uncertainty for early innovators.

The pilots proved the technical viability of LER technology, employed best practices to build scalable, interoperable systems, and deployed the technology against the critical challenges facing the workforce today.

The path forward

The Working Group has followed the pilot projects with great interest as it has considered what course of action is necessary to move from limited LER pilots to fuller LER ecosystems. The significant coordination required across each pilot project points to the broader need for governance structures. While other countries may equate LER governance with government—such as the European Commission's Europass Digital Credentials Infrastructure—the Working Group advocates for a federated structure that accepts the government as a partner along with many other stakeholders. However, the Working Group outlines a robust role for federal and state governments to support LER investments, awareness, and adoption.

LER governance

As the use and adoption of LERs increase, two different, but related, governance challenges will emerge. The first challenge is governance within a network of LER users and producers. Each network needs to configure its set of technologies and business models to meet network members' initial needs. At the same time, each member of the network will decide upon norms, standards, and process for making decisions regarding the development and use of LERs and the eventual expansion of the network, which can help ensure long-term viability.

The second challenge is managing the emergence of multiple, possibly competing, LER networks. Interoperability among the various LER networks is needed to provide users a seamless experience. Communication and cooperation among the pilot partners are required for the hope of interoperability to become reality. Open standards and open application program interfaces, or APIs, can ensure that the data from one network seamlessly crosses networks, making their technology differences invisible to the services that users of LER networks depend on. Establishing these practices will also facilitate adoption of innovation at a more rapid pace. Additionally, LER networks will need

to connect to other networks that are not specific to LERs, but on which LERs are dependent. For example, an LER will need information about an individual that could include degrees, certifications, employment, schools attended, internships, etc. All this information is under the control of different government agencies, public and private educational institutions, nongovernmental organizations, and private sector organizations.

In order to handle this complexity, the AWPAB recommends the creation of entities that can operate the LER infrastructure "as a service." This technical and governance expertise will facilitate interaction between the broad ecosystem of LER stakeholder. The LER pilots and T3 should come together with funders to organize entities that can take on this charter and mission.

Recommendation 1: Create a loosely federated governance structure for LERs

The idea of the networks all interacting to create a "network of networks" is consistent with the future direction and aspirations of the LER community, because it is a pre-condition for success. Therefore, the AWPAB recommends a loosely federated governance structure to address interoperability across networks.

This approach is also optimal for the required innovation and entrepreneurship to assure broad adoption and innovative uses of LERs.

The T3 Network has launched a work group to explore the design and business model for supporting technical interoperability across new and emerging LER networks and to ensure there are bridges to other data and technology networks on which they rely (e.g., data standards organizations, skills data, etc.). By the end of 2020, the T3 Network will publish recommendations on the design of the network of networks outlined in this white paper and how it will support cross-network LER governance. From there, T3 plans to implement a global network of networks community of interest in 2021 to support and accelerate the digital transformation of the talent marketplace, including scaling adoption and use of LERs.

Role of government in LERs

The AWPAB recognizes that the private sector is primarily responsible for the technological, governance and management innovations that leverage the potential of LERs, and innovation and entrepreneurship to construct LER solutions that drive value for LER users. Businesses and their employees have a critical role to play in the development of LERs, and should explore, adopt, and internalize LERs and skills-based hiring. But federal and state governments have a critical role to play in advancing the development of a scaled LER ecosystem. At the federal level, the National Council for the American Worker should prioritize LER development and adoption by explicitly tracking and coordinating these initiatives across agencies in collaboration with the private sector. Federal and state governments can and should actively encourage and support innovation and entrepreneurship to support a future in which LERs seamlessly connect individuals with their next opportunity. Governments should fund creation of a national LER infrastructure and assure a regulatory environment that encourages, incentivizes, and mandates the use of LERs.

> Federal and state governments can and should actively encourage and support innovation and entrepreneurship to support a future in which LERs seamlessly connect individuals with their next opportunity.

Recommendation 2: Educate businesses and the public about LERs

Organizations must take the time to develop a sound understanding of LERs and the positive organizational impact they can drive. For organizations new to LERs, this can be accomplished by undertaking feasibility studies, needs analyses, and pilot projects. Federal and state governments should establish collaboratives with key stakeholders and provide available resources to advance skills-related work within their jurisdictions. Comprehensive feasibility studies and needs analyses by regions or sectors can provide roadmaps for developing skills-based learning and hiring practices. Key stakeholders include state and local governments (for the federal government), workforce boards, economic development organizations, institutions of higher education, secondary schools, employers, and unions.

In addition, federal and state governments can develop collaboratives with advanced stakeholders to facilitate pilot projects directed at implementing LERs and skills-based initiatives. They should resource collaborative efforts with key stakeholders to pursue a purposeful skills-based future. Pilot projects should aim to drive broad adoption and should be easy to implement from a regulatory perspective. Governments can help capture and disseminate the lessons learned from pilot projects so that others can replicate successes and avoid past pitfalls. This work should inform regulatory or legislative changes required for broadscale adoption of LERs.

Recommendation 3: Support core infrastructure investments for LERs

Federal and state agencies should take a fresh look at grant requirements to consider how they can help stakeholders build the digital and data infrastructures needed for LERs. Federal and state education, training, workforce, and economic development grants can directly or indirectly support the skills acquisition of millions of Americans.

This year, the U.S. Department of Education has led by example. Funded by the Coronavirus Aid, Relief, and Economic Security Act,[19] or the CARES Act, the Department created the Education Stabilization Fund—Rethink K-12 Education Models (ESF-REM)[20] grant program to support new, innovative ways to access education with an emphasis on meeting students' needs during the coronavirus national emergency. The ESF-REM program permits grant funding to be used for developing and implementing LER systems that record and communicate verifiable information about an individual's credentials, skills, and achievements. The program also encourages applicants to design programs using common schema and linked data standards compatible with LERs, as defined in the AWPAB's September 2019 white paper. The inclusion of LERs as an allowable use for grant funds encourages organizations to begin thinking about LERs as a resource and to start marking LER investments to foster economic recovery.

The Department of Education has also supported meaningful LER ecosystem pilots using block-chains to provide decentralized secure storage networks for digital credentials. Through the Education Blockchain Initiative led by the American Council on Education, the program seeks technology-enabled solutions that reorient the education and employment ecosystem around the individuals that they aim to serve, driving interoperability, social mobility, and learner control.[21]

There are many similar opportunities for government agencies at the federal and state level to examine how they can deploy funding to stimulate public-private partnerships to catalyze the LER ecosystem.

Recommendation 4: Establish LER coordinating structures within government

Governments can also establish internal LER coordinating structures. A vast internal network across the federal government, for example, is needed to create and reap value from LERs. No single federal agency can serve as the leader in policy development, adoption, or funding for LERs.

Already, multiple federal agencies are actively building LER networks. For example, the Department of Defense (DoD) is working on an Enterprise Learner Record Repository,[22] which consolidates DoD education and training resources that currently exist on different systems in different formats. This consolidation will allow for DoD agencies to better share information and resources. The Cybersecurity and Infrastructure Security Agency and the Department of Homeland Security are planning to create a standardized, universally accessible means of tracking and validating the credentials of cybersecurity professionals. Likewise, the General Services Administration has created a Curated Data Skills Catalog[23] to help agencies develop competencies for managing data as a strategic asset and making data-driven decisions.

Coordinating across these valuable individual initiatives would bolster the federal governments' ability to establish its own LER ecosystem, participate more fully in LER governance structures, and demonstrate by example how to harness the power of LERs and skills-based hiring. The National Council for the American Worker is especially well-suited to act as the coordinating organization within the federal government given the wide range of departments and White House offices involved and its mandate to equip American workers to win in the global economy.

Recommendation 5: Adopt skills-based hiring practices

LERs will only reveal their true value in a skills-based labor market in which learning and achievement are measured through the skills that learners attain. Federal and state governments should adopt skills-based hiring practices and explore action to incentivize other employers to embrace these practices as well.

Organizations undertaking this journey begin by defining the skills required for their jobs, inventorying the skills their employees have, developing educational opportunities that allow them to prepare their workforces for the future, and creating clear career pathways. In addition, they embed these concepts in all their enterprise systems and approaches for talent management and talent acquisition. Finally, they join with others in their industry to create skills-based ontologies and career pathways for their specific industry.

By moving toward a system in which individuals and employers can understand the skills someone has by the credentials they hold, we enhance the power of the LER as an accelerator for skills-based hiring and education practices. Skills included as metadata on achievements contained in an LER allows for transformational intelligence and capabilities, making skills-based pathways to opportunity clear, transparent, and accessible for every individual.

As the nation's largest employer, the Federal government has an opportunity to make a substantial impact in the movement toward skills-based hiring. On June 26, 2020, President Trump signed the [Executive Order on Modernizing and Reforming the Assessment and Hiring of Federal Job Candidates](#).[24] The order calls for the Office of Personnel Management to shift from vetting candidates for federal government jobs largely on educational credentials and written questionnaires to using assessment methods that more directly determine whether job seekers possess the knowledge, skills and abilities to do the job they're applying for.

Likewise, the state of Indiana is making skill-based hiring both a statewide priority and a key component of the Indiana Disability Hiring Initiative. The state's Office of Information Technology and the State Personnel Department are updating job postings to consider and embed skills-based approaches, while State Personnel Department hiring managers are receiving basic training in skills-based hiring practices. In the Indiana Disability Hiring Initiative, the State Personnel Department is implementing a plan that spans multiple state agencies and community partners to identify job descriptions that would be ready for a rewrite to focus on skills and increase the hiring of disabled individuals.

In addition to working toward being a model employer regarding skills-based hiring efforts, Indiana is also working to increase the number of employers that utilize skills-based hiring practices. Local workforce boards and the employer engagement team at the Indiana Department of Workforce Development have participated in the Skillful Talent Series training regarding skills-based hiring practices. Those trained are then working with employers across the state to help them transition to skills-based hiring practices and utilize skills-based approaches to access training funds available through the state's Employer Training Grant program.

LERs can increase equity in the labor market

The use of LERs that verify skills attainment can decrease inequities by reducing the focus on degrees that individuals have earned and increasing the focus on what individuals can do. Many capable individuals are eliminated from a job opportunity simply because they do not have a degree. LERs can help individuals show their qualifications for jobs by articulating their skills and competencies to an employer. The adoption of LERs will increase economic mobility for individuals who have been disproportionately impacted by degree-based hiring. Hiring and promotion practices that focus on skills will enhance the power of LERs and the efficiency of the labor market.

Federal and state governments should revise regulatory processes and data-sharing agreements related to education and employment by fully embracing LER structures that support evidence-based policymaking. Education providers, workforce boards, and private employers spend considerable time, money, and resources on data collection and reporting without using the data to directly improve learner and worker outcomes. LERs that are interoperable across public and private networks will allow for easy, standardized, and automated data exchange that replaces burdensome manual reporting, saving resources while also improving the quality and depth of administrative data.
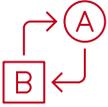
For instance, LER data can be used to understand which programs and skills offered by local training providers increase economic mobility. Similarly, workforce boards could satisfy reporting requirements through participants' LER records rather than through the costly tracking and reporting system used today. With higher quality data, workforce policy program evaluation would likely be far more accurate and successful. LER adoption by state unemployment insurance (UI) offices could dramatically reduce the reporting burden for employers while simultaneously enhancing UI wage records at a time when better real-time information on unemployment is critical.

Another potential use case for LERs would be to facilitate the student loan process. LER data controlled by students could be used to apply for financial aid. This would reduce barriers to post-secondary enrollment while streamlining reporting mandated by the Perkins Act, which requires postsecondary institutions to collect, clean, and share several hundred performance metrics based on individual-level student records. LERs have the potential to make this process much simpler, quicker and more accurate.

By transforming one-directional regulatory reporting structures to more dynamic public-private data collaboratives powered by LERs, government agencies can continue to meet Federal reporting requirements, while providing significantly more public value with the data for employers, education providers, learners and workers. LERs would also increase the privacy and security of regulatory data sharing and make data governance more transparent and accountable. Regulators should clearly signal an intended transition from current burdensome data collection practices to LER transmitted data.

Indiana is already beginning this process, exploring how to combine diverse state administrative datasets on employment and education to improve the ability to provide services to constituents, including guiding UI recipients to training programs. Overtime, these integrated datasets can serve as a foundation for state governments to better engage with LER ecosystems.

Conclusion

LER's are an essential element of a digital infrastructure to enable the future of learning and work. LER technology reduces hiring friction and helps workers identify and travel along pathways to opportunity. The pilots facilitated by the White House and the T3 Network illustrate the feasibility and efficacy of LER technology and demonstrate the many ways that LERs can improve the talent marketplace for learners, employers, and educators.

As the country continues its shift toward a scaled, interoperable LER ecosystem, it will be essential for government to collaborate with the private sector to encourage innovation and entrepreneurship around tools, technologies, methodologies and approaches that can scale the adoption of LERs and define where they can have the greatest impact.

This white paper recommends actions for federal and state governments to support LER development and adoption. At the federal level, the National Council for the American Worker should immediately implement the white paper's recommendations.

LERs that are interoperable across public and private networks will allow for easy, standardized, and automated data exchange that replaces burdensome manual reporting, saving resources while also improving the quality and depth of administrative data.

1 This working group was formerly named Data Transparency Working Group.

2 American Workforce Policy Advisory Board. White Paper on Interoperable Learning Records. September 2019. Available at: www.commerce.gov/sites/default/files/2019-09/ILR_White_Paper_FINAL_EBOOK.pdf

3 In the September 2019 white paper, this concept was referred to as an interoperable learning record (ILR), which has the predominant technical nomenclature in the community working on this issue. Subsequently, to the white paper release, as the concept garnered a wider audience, the community of institutions, companies, individuals, and other stakeholders involved in this effort came to see the need for a more accessible term. The new term, Learning and Employment Record (LER) reflects the collective desire to provide intuitive nomenclature to describe this technology as these concepts become increasingly mainstream. Ultimately, this technology will improve the lives of all American workers and learners, and it is critical that the language used to describe it is increasingly accessible and discussable.

4 As a note, the technology underpinning LERs is covered at length in the September 2019 AWPAB white paper and the 2020 white paper "Understanding Interoperability for Educational Blockchains."

5 http://shorturl.at/kqyD7

6 See slide 5 of https://www.commerce.gov/sites/default/files/2020-08/AWPABJune18Slides_FINAL.pdf

7 In the fall of 2019, White House staff compiled and published an inventory to inform the field of LER work already underway. The inventory was published in November 2019 and represents a snapshot of the LER landscape at that time. The inventory provides detailed descriptions of LER secure issuing and verification protocols; data standards; ontologies and frameworks; implementations, pilots, and implementation support networks; and products and services. The inventory is available on the AWPAB webpage at www.commerce.gov/sites/default/files/2019-12/AWPAB_ILR_Inventory_Nov2019.pdf.

8 www.nytimes.com/2018/11/07/business/the-mad-dash-to-find-a-cybersecurity-force.html

9 The NICE Framework is a fundamental reference for describing and sharing information about cybersecurity work in the form of Task Statements and Work Roles that perform those tasks. The NICE Framework establishes a taxonomy and common lexicon that describes cybersecurity work and workers irrespective of where or for whom the work is performed. The NICE Framework maps 1,007 cybersecurity tasks, 630 knowledge sets, 374 skills, and 176 abilities against over 50 jobs roles in the field. The NICE Framework is intended to be applied in the public, private, and academic sectors. For more information see: nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-181.pdf and https://www.nist.gov/itl/applied-cybersecurity/nice/nice-framework-resource-center.

10 www.aacnnursing.org/news-Information/fact-sheets/nursing-fact-sheet#:~:text=Nursing%20is%20the%20nation's%2largest,registered%20nurses%20(RNs)%20nationwide.

11 www.bls.gov/spotlight/2015/employment-and-wages-in-healthcare-occupations/pdf/employment-and-wages-in-healthcare-occupations.pdf

12 Society of Human Resource Management's 2016 Human Capital Benchmarking Survey results available at www.shrm.org/about-shrm/press-room/press-releases/Pages/Human-Capital-Benchmarking-Report.aspx

13 A verified credential is a trusted claim between an issuer, a holder, and a verifier. In November 2019, the World Wide Web Consortium (W3C) published the Verified Credential Data Model. The model is available at: www.w3.org/TR/vc-data-model/.

14 openbadges.org

15 info.badgr.com

16 T3 Innovation Network's LER use cases are available at lerhub.org/s/curators/ilr-utilities/DSTHPH7XGQseS3FcY.

17 The T3 Innovation Network LER Pilot Directory is available at: lerhub.org/s/curators/specs-0/ZT3McEDpgKayCXyqc-0.

18 www.uschamberfoundation.org/t3-innovation-network/ilr-pilot-program. See the July 14, 2020 blog "Introducing the LER Hub—The Next Phase in the Development of Learning and Employment Records." Available at: www.uschamberfoundation.org/blog/post/introducing-ler-hub-next-phase-development-learning-and-employment-records

19 www.congress.gov/bill/116th-congress/senate-bill/3548

20 oese.ed.gov/offices/education-stabilization-fund/states-highest-coronavirus-burden

21 www.acenet.edu/Research-Insights/Pages/Blockchain-Innovation-Challenge.aspx

22 federalnewsnetwork.com/defense-main/2020/08/dod-overhauling-training-systems-creating-central-repository

23 strategy-staging.data.gov/feedback/action-13

24 www.whitehouse.gov/presidential-actions/executive-order-modernizing-reforming-assessment-hiring-federal-job-candidates